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México



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Goat Association

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International
Conference
on Goats

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XXIII Reunión Nacional
sobre Caprinocultura

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2008



9th International Conference on Goats

Sustainable Goat Production: Challenges and Opportunities of Small and Large Enterprises



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Dr. Christopher D. Lu and the IGA Board of Directors
for their support and guidance for the organization of this international conference.



XXIII Reunión Nacional sobre Caprinocultura





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9th International Conference on Goats Sustainable Goat Production: Challenges and Opportunities of Small and Large Enterprises

Preface

In recent decades, goats have become a force of social and economic transformation in rural communities all over the world. Milk, meat, mohair, cashmere, and hide from goats have contributed significantly to rural prosperity and changed people's lives. Just a few decades ago, no one would have thought that goat research, development, and technology could become such a formidable force of transformation. Goat production played an important role in the early civilization in human history, and is contributing to the well being of humankind today.

Since 1964, International Conferences on Goats have been held in United Kingdom, France, United States of America, Brazil, India, China, France again, and South Africa. Mexico was chosen to continue this almost half a century tradition. A country with a long history and economical importance in goat production, processing and marketing, Mexico is the perfect venue for the 9th International Conference on Goats. With record number of papers submitted and record number of participants from all over the World, the 9th International Conference on Goats is an historical event of the International Goat Association. The Conference is to address important issues such as:

- Sustainable Goat Production
- Food Safety, Production and Product Quality Assurance
- Future of Organic Goat Products
- Recent Advancement in Biotechnology in goats
- Branding and Marketing of Goat Products
- Goat Production and Environment Conservation
- Social Development and Contribution of Women to Goat Production

This is the first time that the program for the International Conference on Goats was determined according to its impact on people's lives; followed by the search for experts to address these issues. Mexico, represented by the Organizing Committee and Scientific Committee, has done an excellent job to assure the success of this very important conference. We are very proud of our partnership with government agencies of Mexico, and twelve Mexican universities including UNAM, University of Nuevo Leon, University of Yucatan and University of Querétaro and others. This is the first time in the history of International Goat Association that an international conference is supported and organized by so many universities. We also welcome the XXIII National Meeting of the Mexican Association of the Goat Production (AMPCA) to take place during this conference. This is an example of IGA partnership with national and regional organizations.

The International Goat Association, with members from 93 countries, is an organization that aspires to promote goat research and development for the benefit of humankind, to alleviate poverty, to promote prosperity and to improve the quality of life. I would like to express my appreciation, on behalf of the International Goat Association, to Dr. Jorge R. Kawas, Chairman of the Organizing

Committee, and Dr. Felipe Torres-Acosta, Chairman of the Scientific Committee, members of Executive Committee and many others for their tireless effort to bring the conference to fruition.

Goat production has been historically and economically important in Mexico. In the course of bringing 9th International Conference on Goats to Mexico and during the preparation of the conference for the last four years, I have witnessed many activities and events related to goats in Mexico. Most important of all, goat





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Sustainable Goat Production: Challenges and Opportunities of Small and Large Enterprises

production has been officially recognized by the Government of Mexico as an important economic sector, and will receive government support and assistance. This is most rewarding for the International Goat Association, as it can bring prosperity to many Mexican goat producers and change their lives. We are so glad that the International Goat Association has the opportunity to contribute to this important milestone.

The Proceeding consists of more than 450 papers representing the progress made by researchers, extensionists, practitioners and producers worldwide during the past four years. This is an exciting and triumphant moment for people associated with goats around the world.

Christopher D. Lu
President of International Goat Association



Prefacio

En las últimas décadas, las cabras se han convertido en una fuerza de transformación social y económica en comunidades rurales alrededor del mundo. Leche, carne, mohair, casimir, y lana de cabra han contribuido a la prosperidad rural y han cambiado la vida de mucha gente. Solo hace unas décadas, nadie hubiera imaginado que la investigación, el desarrollo y la tecnología en cabras se convertirían en una fuerza tan formidable de transformación. La producción caprina jugo un papel muy importante en los inicios de la historia del hombre, y hoy, esta contribuyendo al bienestar de la humanidad.

La Conferencia Internacional de Cabras, desde 1964, se ha llevado a cabo en: Reino Unido, Francia (dos ocasiones), Estados Unidos de América, Brasil, India, China y Sudáfrica. Ahora México fue seleccionado para continuar con casi medio siglo de tradición. Un país con larga historia e importancia económica en producción, procesamiento y mercadeo de cabras. México es el anfitrión perfecto para la 9ª Conferencia Internacional de Cabras. Con un número record de investigaciones registradas y participantes de alrededor del mundo, la 9ª Conferencia Internacional de Cabras es un evento histórico para la Asociación Internacional de Cabras. La Conferencia abordará temas importantes, tales como:

- Producción Sostenible de Caprinos
- Seguridad Alimentaria, Producción y Aseguramiento de Calidad
- Futuro de los Productos Orgánicos de Origen Caprino
- Avances de la Biotecnología en Caprinos
- Franquicias y Comercialización de los Productos Caprinos
- Producción Caprina y Conservación del Medio Ambiente
- Desarrollo Social y Contribución de la Mujer a la Producción Caprina

Esta es la primera ocasión en el que el programa de la Conferencia Internacional de Cabras haya sido determinado de acuerdo al impacto que tiene sobre la vida de las personas; complementado con la búsqueda de expertos para abordar estos temas. México, representado por el Comité Organizador y el Comité Científico, ha hecho una excelente labor para asegurar el éxito de esta importante conferencia. Estamos sumamente orgullosos de nuestra asociación con agencias gubernamentales de México, y 12 universidades de nuestro país, incluyendo; UNAM, Universidad Autónoma de Nuevo León, Universidad Autónoma de Yucatán y la Universidad Autónoma de Querétaro, entre otras. Nunca, en la historia de la Asociación Internacional de Cabras, se había contado con el apoyo y organización de tantas universidades para una conferencia internacional. También le damos la bienvenida a la XXIII Reunión Nacional de la Asociación Mexicana de Producción Caprina (AMPCA) que se llevará a cabo durante esta conferencia. Este es un ejemplo de las asociaciones que forma IGA con organizaciones nacionales y regionales.

La Asociación Internacional de Cabras, con miembros en 93 países, es una organización que aspira a promover la investigación y el desarrollo caprino para el beneficio de la humanidad, así aliviando la pobreza, promoviendo prosperidad y mejorando el nivel de vida. Me gustaría expresar

mi agradecimiento, a nombre de la Asociación Internacional de Cabras, al Dr. Jorge R. Kawas, Presidente del Comité Organizador, al Dr. Felipe Torres-Acosta, Presidente del Comité Científico, a los miembros del Comité Ejecutivo, y tantos otros, por su esfuerzo incansable para hacer de esta conferencia una realidad.

La producción de cabras es histórica y económicamente importante en México. En el transcurso de los arreglos para traer la 9ª Conferencia Internacional de Cabras a México y durante los preparativos de la conferencia los pasados cuatro años, he sido testigo de muchas actividades y eventos referentes a cabras en





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México. Más importante aun, la producción caprina ha sido oficialmente reconocida por el Gobierno de México como un sector económico importante, y recibirá asistencia y soporte gubernamental. Esto es sumamente gratificante para la Asociación Internacional de Cabras, pues traerá prosperidad a muchos productores mexicanos de cabras, cambiando sus vidas. Estamos orgullosos que la Asociación Internacional de Cabras pueda contribuir a tan importante logro.

El programa consiste de más de 450 reportes de investigación, representando el progreso logrado por investigadores, extensionistas, practicantes y productores de todo el mundo, durante los últimos cuatro años. Es un momento muy emocionante y triunfal para las personas involucradas en el área caprina de todo el mundo.

Christopher D. Lu

Presidente de la Asociación Internacional de Cabras

Keynote Speakers

Sustainable goat production: some global perspectives

Christie Peacock

Applications of biotechnology and genomics in goats

Hugo Barrera-Saldaña

The problem of grazing planning in a non-equilibrated environment: from the analytical procedure toward the systems approach

Dr. Javier Mata

Future of organic goat production

Christopher D. Lu

Recent advances in exploiting goat's milk: quality, safety and production aspects

Nissim Silanikove

Concluding synthesis and future strategies for sustainable goat production

Dr. C. Devendra





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Invited Speakers

Nutrition and Feeding

A nutrition mathematical model to account for dietary supply and requirements of energy and nutrients for domesticated small ruminants: the development and evaluation of the Small Ruminant Nutrition System

L. O. Tedeschi, A. Cannas, and D. G. Fox

Using native tropical tanniniferous tree fodders: experiences and perspectives in small ruminants

M. A. Alonso-Díaz, J. F. J. Torres-Acosta, C. A. Sandoval-Castro, H. Hoste

Biotechnology and Genetics

Goat breeding research in Mexico

H.H. Montaldo, G. Torres-Hernández and M. Valencia-Posadas

Brazilian goat breeding programs

Raimundo Nonato Braga Lôbo

Physiology and Behavior

Behavior-based management: from cells to landscapes

Dr. Fred Provenza

Applied lactation biology in dairy goats: management and milking consequences

Dr. Gerardo Caja

Social Development and Contribution of Women to Goat Production

New markets: new options for women?

Christine Okali

Genetic goat enhancement and women producers

Teresa Planas-Pérez

Animal Health

The importance of selenium and the effects of the deficiency in animal health

Adb El-Ghany-Hefnawy and J. Tórtora Pérez

Advances in diagnosis and control of Johne's disease: the Indian experience

Shoor vir Singh





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Goat Products: Marketing, Economics and Food Safety

Specialty products made from goat milk

Ana María Candido-Riveiro

Managing goat production for meat quality

Norman Casey

Management and Production Systems

Present situation and future perspectives for goat production systems in Spain

José María Castel Genís

Goat management and systems of production: global framework and case studies in the Caribbean

Marie-Clotilde Alexandre Gisèle

Reproduction

In vivo and in vitro embryo production in goats

Teresa Paramio

Principles and perspectives for the conservation of goat buck spermatozoa

Alfredo Medrano Hernández

Technology Transfer and Producer Organization

Technology transfer to producers in Brazil

Silvio Doria-de Almeida

Emerging strategic supplementation options for goats in the tropics

Jorge R. Kawas, Héctor Andrade-Montemayor and Christopher Lu

Environment and Sustainability

Use of Goats in Vegetation Management

Ann Peishel

Goat grazing impacts on rangelands of semiarid highlands of Mexico and the reconversion by grazing systems

Francisco Echavarría Chaires





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Sustainable Goat Production: Challenges and Opportunities of Small and Large Enterprises

Abstracts

Plenary Sessions and Invited Speakers





1. Sustainable goat production: some global perspectives

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The multi-dimensional nature of 'sustainability' including survival, resilience and efficiency is described as are the environmental, economic and social factors that underpin sustainability. Some of the current global trends and forces of change that impinge on goat production in the 21st century are also considered. The characteristics of some of the main goat systems and the people who keep them are described and the impact of some global trends – climate change, rising prices of food and fuel, environmental degradation, genetic erosion, dietary and lifestyle changes, social inequality and global insecurity – on the sustainability of goat production are considered. A 'sustainability scorecard' is developed as a tool to assess the ability of goat production systems to survive current trends and future shocks. Some case studies are presented from Africa, Afghanistan and the UK, including the pastoral systems of East Africa, emerging smallholder dairy systems in Africa, cashmere goat production in Afghanistan and a highly intensive niche dairy enterprise in the UK. The sustainability scorecard is applied to assess each system. Finally, conclusions are drawn about how to make goat systems more sustainable and resilient to the challenges they currently face and how goat keepers need to constantly adapt to changing circumstances in order to survive.





2. Applications of biotechnology and genomics in goats

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Convinced of the great potential of goats for the economy of semiarid Mexico, we have been promoting their virtues and educating farmers on best practices for their sustainable exploitation, considering the value of the animal's meat, milk and skin. We have also designed strategies to apply advances in biotechnology and genomics from the beef to the goat industry. Biotechnology: Recombinant bovine growth hormone (rBGH), a 191-aa polypeptide that affects animal growth and lactation, has been used for several years to increase milk production in dairy cattle. It has also been used in goats (*Capra hircus*) instead of their own hormone (CHGH), which is still not available on the market. Since both hormones differ in only one amino acidic residue, a strategy based on site-directed mutagens was used to convert the BGH-expressing cassette of an integration plasmid for *Pichia pastoris* into a CHGH one. Transformation of *P. pastoris* GS115 strain with the linearized new plasmid resulted in transformants that upon induction with methanol secreted an abundant band with the expected size and immunoreactivity for GH. Its biological activity was confirmed by adipose conversion of 3T3 preadipocytes in culture. Genomics: We have started to apply the experience from our laboratories to goats, developing DNA tests for genealogy, prediction of genetic potential for meat quality (tendering and marbling) and meat traceability. Optimization of these DNA tests is underway to make them useful for the goat cattle industry.





3. The problem of grazing planning in a non-equilibrated environment: from the analytical procedure toward the systems approach

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The idea of grazing in general and goat grazing in particular, as the cause of the deterioration of ecosystems in all conditions, is deeply-seated in society and in the scientific community, mainly ecologists and environmentalists. Many authors considered goats as destructive animals by nature and grazing with these animals one of the main reasons for desertification, habitat degradation or loss, extinctions and deterioration of native vegetation, sometimes leading into legislative proceedings for control and eradication of goat grazing. These aspects are of special interest in arid, semiarid or climatic non-equilibrated areas, where ecosystems are more sensitive to biotic and abiotic disturbances, and where stability and sustainability of vegetal resources is a complex equation. In this paper different methodologies and impact indicators are analysed to improve the management of goat grazed areas, discussing different points of view that go from analytical procedures to new indicators and methodologies integrated in a monitoring dynamic, more in accordance with the complexity of ecosystems, which can be able to incorporate measurements of trend and condition in the ecosystems and also able to detect grazing effects, as well as longer-term trends. The importance of local knowledge is also taken into much consideration as a key element to achieve the sustainability of goat grazing systems.





4. Future of organic goat production

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Organic goat production can be a rewarding livelihood and is slowly gaining popularity. Global organic production has increased 20% annually over the past 10 years. Industry analysts forecast that demand in many markets will continue to grow at 10 to 30 percent per year, with the international organic market expected to grow to a volume of US\$100 billion in the next 10 years. Organic dairy has shown stronger growth rates than organic meat production. Markets for dairy have been the strongest in the United States, the EU and to lesser extent Argentina and Brazil. In certain regions, the rise in organic milk production has increased the range of processed value-added organic milk and dairy products, and demand is out-stripping supply, and retailers are often out of stock. The basic principles of organic goat production include care, ecology, fairness, and health. Organic goat production can improve animal welfare, protect the environment, and sustain rewarding rural live styles. There are challenges when dealing with organic goat production especially when one hopes to control intestinal worms and parasites. Production efficiency of organic goat production may be lower than non-organic in certain instances. However, exploring nutritional technology and disease prevention and treatment may improve the production efficiency. There are many regulations across the world and in different countries that apply to certify organic foods. In the United States the United States Department of Agriculture has a set of standards and regulations that farmers have to follow to become USDA organically certified through the National Organic Program. Across the United States many states also have an organic certification label such as the Oregon Tilth Certified Organic Program or California Certified Organic Farmers. In parts of Europe, the European Union Regulation is followed, and in Japan, Ministry of Agriculture, Forestry and Fisheries is followed. One of the leading federations in international organic farming is International Federation of Organic Agriculture Movement. The standards can be certified under IFOAM then can be recognized in many counties around the world. These regulations serve as branding effort, not only to protect the “organic” brand but also to promote it. Future of organic goat production is to continue search for alternatives that are environmentally friendly, human health conscientious and animal considerate. Understanding organic goat farming from economic, ecological, and animal welfare perspectives will increase the likelihood of success.



5. Recent advances in exploiting goat's milk: quality, safety and production aspects

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Goat's milk production is a dynamic and growing industry that is fundamental to the wellbeing of hundred of millions of people worldwide and is an important part of the economy in many countries. The aim of the present review is to provide an integrated and critical analysis of the major aspects in this field to highlight unexploited nutritional potential of goat's milk and the need for improvements, particularly in food-safety. First, it should be kept in mind that goat's like cow's milk delivers many nutrients with relatively low energy content, and is relevant to the health of consumers throughout the life cycle. In addition, our review presents data suggesting that goat's milk possesses many advantages over cow's milk, for use as a nutritional source for infants and children and as a medicinal food. Furthermore, we suggest that goats, by consuming large amounts of natural browsing plants all year around, is a potentially overlooked "treasure trove", with respect to health promoting components. Our survey suggests that total bacterial count that is currently used as the major quality measure to prevent pathogen-related food toxicosis in Europe and the USA is not sufficiently effective. We propose the inclusion of somatic cells count as a routine criterion to qualify the hygienic status of goat's milk, and discuss the physiological and biochemical basis for this. Finally, we present a novel mechanism controlling milk secretion, and demonstrate the use of this knowledge in making decisions for two major management tasks that farmers face: i. Milking frequency that dictates to large extend the milk yield and workload in the farm, and ii. Helping to deal with sub clinical mastitis, which is the single major cause for economical losses in dairy farms worldwide.

6. A nutrition mathematical model to account for dietary supply and requirements of energy and nutrients for domesticated small ruminants: The development and evaluation of the Small Ruminant Nutrition System

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A mechanistic model that predicts nutrient requirements and biological values of feeds for sheep (Cornell Net Carbohydrate and Protein System; CNCPS-S) was expanded to include goats and the name was changed to the Small Ruminant Nutrition System (SRNS). The SRNS uses animal and environmental factors to predict metabolizable energy (ME) and protein, and Ca and P requirements. Requirements for goats in the SRNS are predicted based on the equations developed for CNCPS-S, modified to account for specific requirements of goats, including maintenance, lactation, and pregnancy requirements, and body reserves. Feed biological values are predicted based on carbohydrate and protein fractions and their ruminal fermentation rates, forage, concentrate and liquid passage rates, and microbial growth. For sheep, the SRNS accurately predicted gains and losses of shrunk body weight (SBW) of adult sheep ($n = 15$; mean bias (MB) = 5.8 g/d and root mean square error of prediction (RMSPE) = 30 g/d; and $r^2 = 0.73$) when diets were not deficient in ruminal nitrogen. Several evaluations indicated the SRNS had MB varying from 2.4 to 18 g/d, RMSPE varying from 21.4 to 41 g/d, and r^2 varying from 0.70 to 0.84 when predicting average daily gain (ADG) of growing lambs. For goats, the evaluation for lactating does indicated that ME intake ($n = 21$; MB = 0.04 Mcal/d; RMSEP = 0.24 Mcal/d g/d; and $r^2 = 0.99$) and energy balance ($n = 21$; MB = 0.075 Mcal/d; RMSEP = 0.20 Mcal/d; and $r^2 = 0.87$) were adequate. Similarly, the SRNS accurately predicted ADG of kids ($n = 31$; MB = -6.4 g/d; RMSEP = 32.5 g/d; and $r^2 = 0.85$). In conclusion, the SRNS can accurately predict dietary organic matter digestibility, ADG of growing lambs, and changes in SBW of mature sheep and ME intake and the energy balance of lactating and non-lactating adult goats and the ADG of kids of dairy, meat, and indigenous breeds. The SRNS model is available at <http://nutritionmodels.tamu.edu>.



7. Using native tropical tanniferous tree fodders: experiences and perspectives in small ruminants

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Livestock production systems world-wide rely largely on conventional feedstuffs. The present world food crisis highlighted the need to use local resources for animal nutrition, such as fodder trees and shrubs. In spite of the potential role of tropical tannin-rich plants (TRP) as nutraceuticals, they have frequently being pointed out as detrimental to ruminant production. This paper analyzes the role of tropical TRP as sources of feed and their potential positive effects in small ruminants. The first step towards a rational use of this resource is the characterization of polyphenolic compounds. Thus, the role of different analytical techniques is addressed. A second step is to define the preference and consumption using animals with browsing experience. Results with goats and hair sheep with and without the inclusion of PEG are discussed. Preference of goats and hair-sheep is not regulated by the presence of tannins. Both species preferred a mixture of plants even when a tannin free plant is available. Evidence of a physiological adaptation mechanism is presented and discussed. Both, experienced hair-sheep and goats had saliva with tannin binding capacity. If tannins are available post-ruminally, then a nutraceutical effect such as the anthelmintic (AH) effect, among others might be present. Evidence of an *in vitro* and *in vivo* AH effects are summarized together with other possible positive effects. The results summarized in this paper support a change in the current view of tannins in TRP as anti-nutritional compounds. Thus, if adequately managed, TRP can be incorporated into sustainable small ruminant production systems.

8. Goat breeding research in Mexico

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Goat breeding research in Mexico began with studies about breed and cross comparisons involving local goats and goats from breeds imported from the US such as Alpine, Nubian, Saanen and Toggenburg using data from a large goat breeding center in Tlahualilo, Durango in Northern Mexico. Genetic groups were purebred and crossbreed goats involving recurrent backcrosses to bucks from these imported breeds and local Granadina breed with undefined local goats. Traits analyzed were milk production, kidding intervals, kidding distributions, kid weights and survival traits. The last published paper with data from that center was in 2004, about breed's stayabilities. Results showed the higher milk production potential of Alpine breeds (Alpine, Saanen and Toggenburg), compared to local populations, but there were smaller advantages from the use of Nubian or Granadina. Granadina and Nubian had higher kid survival rates and longer breeding seasons. Evidence for higher stayability for adult Alpine and Saanen goats was found. Many descriptive studies done on local "Criollo" goats lack adequate population definition and description of local animals and comparative designs, therefore, the value of these studies for predicting about the genetic merit of these populations is limited, particularly when crossbreed local animals are included. More recently, research on meat goat breeding involving local goat and other genetic groups such as Boer, Nubian and breed crosses have been done. Most information is related to early weights buy research is underway to generate carcass and weights at market age. Research showed a greater efficiency for total litter weight production in Granadina and Nubian breeds on a metabolic weight basis. Research on genetic parameter estimation begun circa 1980 with estimates of heritability for birth weight in kids and repeatability for several milk production and reproduction traits and has continued till present, and is currently related to milk production and composition traits recorded in a dairy breeding population of Alpine, Saanen and Toggenburg Goats in the State of Guanajuato. These parameters are being used together with mixed-model methodology for genetic evaluation of that population for milk, fat and protein production. Collaborative studies are underway using historical US goat data to estimate breed differences and genetic parameters for milk production, reproduction, type and stayability traits. Recent (2006) studies regarding the distribution of the polymorphism for the alpha-s1 locus in several goat populations in Mexico and its effects on milk traits in Mexican dairy goats were made.

9. Brazilian goat breeding programs

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Historically in Brazil, little has been done by the government and breeder's associations regarding the development of goat breeding programs. However, the interest demonstrated by breeders has increased recently. In this country, goats are exploited for meat, pelt and milk production. However, studies about breeding objectives and economic values have not been conducted in Brazil. The only breeding program fully dedicated to meat goats in Brazil is the "Programa de Melhoramento Genético de Caprinos e Ovinos de Corte" (GENECOC – Breeding Program for Meat Goats and Sheep). The GENECOC has as main objective to give support to the breeders on the utilization of the available genetic resources to optimize their production systems. At present, 1,516 goats are involved in GENECOC, of the breeds Anglo-Nubian (meat line), Boer, Savanah, Moxotó, Canindé, Undefined Breed ("Criola") and some crossbred animals. The Brazilian Dairy Goat Breeding Program aimed to structure the national dairy goat databank and to conduct progeny testing for the main dairy breeds raised in the country. This organization would also allow carrying out studies on genetic structure of Brazilian goat population, QTL/gene identification and the development of statistical methods for genetic evaluation such as test-day models. This program is already in progress, but there are difficulties to carry it out, mainly for progeny testing. Today, 4,374 goats are involved in this program, of the breeds Anglo-Nubian (dairy line), Saanen, Toggenburg, French-Alpine, American-Alpine, undefined Breed ("Criola") and some crossbred animals. The main difficulties for the developing of these breeding programs in Brazil are the large territorial extension of the country with its large diversity of genetic groups, reduced interest from the private sector, lack of organization of breeders/producers, no breeder sector developed and lack of funding from the government and loans for technological development.



10. Behavior-based management: from cells to landscapes

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Once understood, behavioral principles and processes can be translated into practices that provide an array of solutions to the challenges and opportunities people face in managing landscapes to blend ecological, economic and social values. Unlike the infrastructure of a ranch such as corrals, fences, and water development, behavioral solutions cost very little to implement, they are not fossil-fuel intensive, and they are easily transferred from one situation to the next. Unfortunately, scientists and managers often ignore the power of behavior to transform systems, despite compelling evidence. We know the environment, continually interacting with the genome during the growth and development of organisms creates behavioral responses that are then transferred among generations and form the basis for what it means to be locally adapted to a landscape. Though experiences during development in utero and early in life are especially critical, genome-environment interactions continue throughout life. Thus, the issue isn't if systems – soils, plants, herbivores, and people -- are adapting to ongoing changes in biophysical and social environments. They all do so every day of their lives. The only question is whether or not people want to be a part of that process. For those willing to understand how environments interact with the genome to influence behavior, the potential is virtually unlimited. In the case of grazing, for instance, behavioral solutions are increasingly attractive given growing social, economic and ecological concerns with fire, herbicides, and mechanical means of rejuvenating landscapes. Behavior-based management also has implications for 1) improving the economic viability and ecological integrity of range-based enterprises on privately and federally managed landscapes; 2) using natural plant communities as models to develop bio-diverse pastures that provide the full range of benefits -- nutrition and health for plants, herbivores, and people -- without the unsustainable costs of monocultures associated with fertilizers, herbicides, insecticides, antibiotics and anthelmintics; 3) enhancing and maintaining the biodiversity of landscapes dominated by weeds; 4) optimizing wildlife benefits to land owners, managers, and users; and 5) generally improving the ability of people to adapt within and manage complex adaptive social, ecological, and economic systems.



11. Applied lactation biology in dairy goats: management and milking consequences.

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Recent developments in lactation biology which can be applied to management and milking of dairy goats are reviewed. Milk secretion is a continuous process under endocrine and autocrine regulation and mainly depending on number and activity of mammary epithelial cells. There is no evidence of neural control on milk secretion, although a local serotonin mediated mechanism has recently been demonstrated. Role of blood flow and nutrient uptake on milk yield remains unclear in dairy goats. On the other hand, milk ejection is a discontinuous process under neural and endocrine control, which allows milk removal by milking and which is essential for maintaining lactation. Nevertheless, the goat udder is characterized by a large cisternal compartment (70 to 85% milk), greater than in other dairy species, which reduces the effect of all regulatory factors acting at an alveolar level. Milk yield and milk composition vary according to lactation stage, udder morphology, milking frequency, reproductive state, length of dry-off period, hormonal treatments, photoperiod, and nutrition, which are the main effects reviewed. Induced lactation with normal milk composition is possible in nulliparous goats, but udder development and milk yield markedly increase when prolactin is used, indicating the importance of long days for maximizing mammaryogenesis and galactopoiesis in dairy goats. Simplified milking routines (e.g., omitting teat cleaning and stripping) and reduced milking frequency (e.g., once daily milking) have low impact in dairy goats, allowing user-friendly milking routines. Once-daily milking during the entire lactation reduces milk yield by 5 to 20%, but no negative effects on udder health, milk composition and milk cheese-making properties have been reported. Pregnancy has a negative effect on milk yield from week 10 onwards, and when pregnancy is omitted, dairy goats are able to extend lactation for 2 yr with low milk yield losses compared to annual kidding. Finally, despite the claim that a dry-off period is not necessary in dairy goats, recent results indicate that dry-off omission impairs kid birth weight, colostrum quality and milk yield in the ensuing lactation. A dry-off period of at least 4 wk is recommended for an optimal mammary cell turnover before kidding, and hence maximizing milk yield in the ensuing lactation in dairy goats.





12. New markets: new options for women?

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Small livestock, including goats, have been considered as appropriate foci of development initiatives designed to improve the well-being of women and their families in many countries in Latin America, sub-Saharan Africa and Asia. Since the 1980s, gender analyses from many countries have highlighted the fact that women have independent rights to small stock which are rarely challenged by more powerful others and hence any improvements in the returns to these animals are viewed as likely to result in direct benefits to the women involved. In addition, and perhaps more importantly for meeting the objectives of development agencies themselves, since women are viewed as being more altruistic than other household members, any investment that results in benefits for them is expected to result in wider societal benefits and women are even frequently viewed as being almost uniquely responsible for household food security. While all this is undoubtedly common knowledge, and needs to be viewed as the successful outcome of the massive effort that has been made over the last few decades to raise the profile of women and their contributions to the economy, this article assesses the implications of these views for programs designed to engage women in more commercial production systems. It argues that in order to move beyond simply enabling the majority of women to operate as marginal economic agents producing for subsistence and meeting household food security needs, we will need to re-assess these widely accepted paradigms on women's roles and gender relations more broadly. Livelihoods approaches have been popularized as one means by which a shift to thinking about growth rather than survival strategies can be made. While livelihoods approaches are not automatically gendered, this article suggests that they offer more scope than many and certainly take us beyond the participatory paradigms of recent decades that have been promoted as the avenues for improving the status and position of women in society. The article brings livelihoods and gender relations approaches together in an effort to address these issues of paradigm shifts and uses some recent work in the small-scale fisheries sector to demonstrate some of the challenges faced by many women in entering into new markets. It emphasizes the need to maintain a focus on how the contributions of women and men are valued in societies and argues that a major challenge for development agencies is to avoid justifying programs targeting women by focusing on their knowledge about the species, their local veterinary knowledge or their labour contributions. All these may be relevant economic arguments for supporting more socially inclusive programs in order to achieve increased production or increased productivity, but do not necessarily lie at the core of a gender-responsive programs and may not result in addressing some of the very real challenges faced by women once they themselves seek to move beyond established views of their role in rural, including livestock, development.





13. Genetic goat enhancement and women producers

Teresa Planas Pérez

Asociación Cubana de Producción Animal (ACPA)

Genetic reserve sources constitute a novel type of investigation for the conservation of biodiversity. AMCA (Cuban Association for Animal Production) has been at work on this project since the beginning of the XXI century and has been organizing these systems as a support for biodiversity in the conservation, enhancement and utilization of zoogenetic resources, where Creole goats are of great relevance, without forgetting, for example, the Nubian breed, which has an excellent behavior in Cuban tropical conditions. It is important to note that in the last 15 years, 300 of the 6000 species identified by the FAO have become extinct; there are 1350 species in danger of extinction and we lose 2 species each week. The movement to incorporate women to the productive processes, recognizing her role, has been priority work during the last years and it has been our job to elevate the participation of women to decision making positions. One example of the contribution of women is "Genetics in the hands of the breeder", a manual written by six women that has been of great importance, and is a testimony to the capacity of women working with livestock and in genetics. Doctors of Science, our women investigators are directly incorporated in the productive environment, which constitutes an example of integration. The role of producer women in genetic reserve sources and for the movement, "Amigos y Amigas de la Genética", has been decisive, with especial mention to goats, because it is a species with which women can work with in genetic enhancement, management, milking, and in elaboration of its subproducts. There is no doubt this work has set a benchmark for livestock development and the incorporation of women to the productive area.



14. The importance of selenium and the effects of the deficiency in animal health

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Selenium (Se) is an essential trace element in animal nutrition, and exerts multiple actions related to animal production, fertility and diseases prevention. Glutathione peroxidase enzyme (GSH-PX) was the first proven selenoenzyme that can prevent oxidative damage of the cellular membranes. White muscle disease (WMD) resulted from Se deficiency and was the first recognized condition associated with Se deficiency. WMD determine new born mortality, especially in ruminants, as well as growing and adult animals. Se it is critical to thyroid hormone synthesis as it is very important for converting T4 (thyroxin inactive form) to T3 (active form). A good immune response required Se too. Se status in the soil, plants and animal blood and tissue can be used in the diagnosis of Se deficiency. Diverse forms of Se supplements were prescribed but many factors affecting its chemical form, treated animals health and production condition and previous animal Se level. Acute and chronic intoxication (Selenosis) also occurred. Chronic forms are associated with regional seleniferous soils, with permanent or repeated consumption of seleniferous plants. Acute forms are associated with high ingestion of Se mixed with bad diets or salts, or by injection of high doses of parenteral Se products during treatment of the deficiency cases. The connection of Se metabolism in the fetus and pregnant dam need further investigation.

15. Advances in diagnosis and control of Johne's disease: the Indian experience

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Johne's disease (JD) has been reported first time in 1913 by Sheather from Military dairy farm in Lahore of undivided India. In subsequent years, disease lacked priority and sustained efforts for control, therefore has become endemic in the domestic ruminant population of the country. *Mycobacterium avium* subspecies *paratuberculosis* (MAP), the causative organism has recently been reported from wild ruminants and patients of Crohn's disease in human beings. Johne's disease is responsible for huge losses (direct and indirect) in animal productivity world over. However unlike developed countries, these losses have neither been estimated nor realized in India, despite low per animal productivity and huge population of domestic ruminants (>475 millions). Inattention to disease has been responsible for lack of indigenous diagnostic kits and information on National Prevalence. In the absence of data on prevalence there is no policy for control at national level (test and slaughter or vaccination). Though history of paratuberculosis research and diagnosis in India is as old as in the developed countries. However, in subsequent years country lost initiative as compared to developed countries, where disease was given highest priority. From 1917 to 1984, Johne's disease has been diagnosed in cattle, sheep and goats on the basis of necropsy findings, rectal pinch (in cattle), microscopic examination of fecal and impression tissues smears, histopathology and using single and double intra-dermal johnin tests. In latter part (1984), the studies were focussed on Imuno-fluorescent test (FAT) and ultrasturcutral pathology of JD in goats. CFT test has also been used for the diagnosis of JD in cattle. During 1985 to 1994, renewed research efforts were made on the understanding of disease (pathological changes correlated with production pitfalls), on improvement in traditional diagnostic tests and on standarization of new sensistive diagnsotic test (culture from feces, tissues and milk). Immuno-cytochemical methods have been found to be more sensitive than acid fast staining. From 1994 to 2004, there was quantum jump in the understanding of the disease process (JD was experimentally produced and studied) and diagnostic approaches (ELISA and AGID test). Due to increasing burden of positive animals, in small ruminants (goats and sheep), the policy of test and sacrifice has been adopted for government farms since 1978, however earlier policy of test and segregation is continued in large ruminants. But even after continuing with policy of test and sacrifice or removal of positive animals from herds in case of goats and sheep has not yielded desirable results and JD continue to increase in prevalence and severity in intensively managed herds and flocks. In 2005, an 'indigenous inactivated vaccine' using partially characterized 'Indian Bison type' MAP 'S 5' of goat origin have been developed and shown to be both prophylactic and therapeutic in infected goatherds and sheep flocks. The vaccine has shown to improve the antibody titers and productivity and reduce the mortality, morbidity and shedding of MAP in feces. Indigenous vaccine has also been compared with 'Gudair' vaccine and was found to be superior. After the success of the vaccine in small ruminants the efforts are under way to test the efficacy in large ruminants (cattle and buffaloes). On the lines of *Mycobacterium tuberculosis*, the use of fusion proteins (MAP 74P) in protecting mice against MAP challenge has also been considered. The above Indian experience of developing cost effective and sensitive 'indigenous diagnostic kits' and a highly efficacious 'therapeutic vaccine' using well characterized novel native MAP isolates can work as very good



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module for replication in huge low and un-productive infected population of animals in India and other developing, un-developed and poor countries, which cannot afford the costly commercial kits and vaccines produced in the developed countries.



16. Specialty products made from goat milk

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The use of goat milk as a good food is undeniable. It has participation on health maintenance, beneficial effects in physiological functions, it can be beneficial in the nutrition of children and elderly people, and according to some authors, can be fed to people allergic to cow's milk. This highlights the potential of goat milk in the market. The chemical peculiarities of goat milk can be used to manufacture pasteurized beverage, UHT, powder milk, ice cream, yogurt, candy, cheeses, among other products. Nevertheless, everything begins with good quality goat milk. Quality of goat milk can be defined as its potential to tolerate technological treatment and to turn into a product that satisfies the expectations of consumers, in health terms (nutritional value), security (hygiene) and pleasure (sensory attributes). Taste should be the principal criteria used by consumers to make decisions to purchase and consume goat milk cheeses, but most of time this does not happen. Typical goat taste is a quality component of particular importance for goat milk cheese production. Several factors contribute to these variations and must be further studied. Nowadays, hair and skin care products made from goat milk receive more attention. Besides the important benefits of goat milk products to consumers, there is an undeniable benefit to goat milk producers, who can add value to his product.



17. Managing goat production for meat quality

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Managing goat production for meat quality is a deliberate, active process that reaches from conception to consumption. The concept of quality in meat is universal, being wholesome, nutritious and palatable. Goat meat is a product of many different production systems from widely varying environments, nutritional regimes and genotypes. The physical, chemical, sensory and nutritional properties of goat meat at the point of consumption are the result of sequential influencing factors that each to a greater or lesser extent can be directed by producers, marketers and processors. This paper traces the line from conception to consumption and highlights those critical control points in producing the expected wholesome, nutritious and palatable product.



18. Present situation and future perspectives for goat production systems in Spain

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This article presents the evolution, actual situation and perspectives of goat production systems in Spain, taking into account the present day changes of socioeconomic, technological and agrarian policies of the European Union (EU). Spain is ranked second in goat population and third in goat milk yield within the EU. Nevertheless, similar to what it is happening in the EU, the goat production systems in Spain are in a critical situation, basically because of the increasing production costs and the lack of a strong central structure in this sector. To improve viability of goat farms in Spain, which, for the most part play an important social and environmental role in the less-developed rural areas, it is necessary to put forth a series of strategies. These strategies include: (i) strengthening of the central structure in the sector; (ii) improvement in the training and management capacity of goat farmers and cheese makers; (iii) enhancement of promotion and recognition of goat related products; (iv) to take advantage of the opportunities offered by the new European Union Common Agricultural Policy; (v) improvement of farmers' quality of life, so that farmers can keep their goat operation for future generations; and (vi) increase the development and research activities in this sub-sector of livestock farming.





19. Goat management and systems of production: global framework and case studies in the Caribbean

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Animal output must be considered as a complex set of activities that it are dependent upon numerous abiotic, biotic and socio-economic factors that, in most cases, are interrelated. Increasing reproductive performances, reducing mortality rate, accelerating growth rate and improving carcass merit or milk quality are multiple and interdependent objectives. Thus, the characterisation of the animals and the systems (together with their different combined factors of variation) must be done for the different interrelated animal traits contributing to production. That means that a multidisciplinary approach is necessary. Setting priorities and implementing research within development projects are better accomplished through the farming system concept and a holistic approach of interrelated factors of variation. Keeping this in mind, this paper outlines the interest of the farming system approach, and then it outlines a general framework of the numerous factors of variation involved in goat performances. From these, guidelines are proposed for i) piloting the whole system by the way of reproductive management, ii) matching the system to available feed resources, iii) implementing an integrated health control protocol and iv) adapting the breeding improvement approach to the local sector's characteristics. The second part of this paper presents case studies gathered from different experiences in many countries of the Caribbean basin (*sensus largo*). The intention is not to give ready-made solutions but to highlight the preceding guidelines by factual data obtained in different countries, in order to share these experiences and allow the reader to form their own opinion to be adapted to their situation. The climatic effects (the direct effects of this abiotic factor) upon dairy breeds are assessed, the use of male effect (one very efficient and natural reproduction management practice) is explained, the interest of forage-trees is determined (keeping in mind the need of exploiting the local available feed resources) and the integrated health control (as a sophisticated mean of reducing the infection risk) is described. Although meat is the main goat output under the harsh conditions of the region, one aspect of this work, is devoted to the case of goat milk production in Caribbean basin within their respective assets and constraints



20. *In vivo* and *in vitro* embryo production in goats

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Assisted reproductive technologies (ART) such as artificial insemination (AI) and multiple ovulation and embryo transfer (MOET), have been used to increase reproductive efficiency and accelerate genetic gain. The current limitations of MOET are due to: 1) variability response to hormonal treatment, 2) fertilization failures and 3) premature regression of *corpus luteum*. The *in vitro* production (IVP) of embryos offers the possibility to overcome MOET limitations. The method of IVP of embryos involves three main steps: *in vitro* maturation of oocytes (IVM), *in vitro* fertilization of oocytes (IVF) with capacitated sperm and *in vitro* culture (IVC) of embryos until blastocyst stage that can be transferred to recipient females or cryopreserved for future use. Recovering oocytes from live selected females by laparoscopic ovum pick-up (LOPU) and breeding prepubertal females by juvenile *in vitro* embryo technology (JIVET) will allow a high diffusion of valuable goats. Also, IVP of goat embryos will provide an excellent source of low cost embryos for basic research on development biology and for commercial applications of transgenic and cloning technologies. The most commonly used protocols for IVM of goats oocytes is a TCM199 media supplemented with FSH, LH, estradiol and fetal serum during 24 to 27 hours at 39 °C in a humidified incubator with 5% CO₂ in air. Following maturation, oocytes are placed in fertilization drops of TALP or SOF media supplemented with fetal serum. Motile spermatozoa are selected by centrifugation in a Percoll gradient (frozen-thawed semen) or by swim-up (fresh semen) and capacitated with heparin. Semen is added to the fertilization drops at a final concentration of 1 to 3 × 10⁶ sperm/ml. After co-culture of gametes for 24 h, the resulting zygotes are transferred to IVC medium for 8 days until they reach the blastocyst stage. Several media have been used successfully for the IVC. In our laboratory we use SOF medium plus serum in an anaerobic atmosphere of 5% O₂, 5% CO₂ and 90% N₂. The yield of blastocyst (blastocysts/ immature oocytes) ranges from 12% to 36% with oocytes from prepubertal and adult goats, respectively. No differences have been observed in IVM and IVF results according to female age.

21. Principles and perspectives for the conservation of goat buck spermatozoa

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This paper is focused on the use of alternative protocols for goat buck sperm cryopreservation and other current approaches to study sperm cryosurvival, considering theoretical principles for the preservation of cells at freezing temperatures. Simple modifications to traditional freeze-thawing protocols may improve sperm cryosurvival; thus, cooling to -5°C instead of $+5^{\circ}\text{C}$, before freezing, improves buck, ram and boar sperm cryosurvival. Assessment of premature capacitation induced by cryopreservation may be used as an additional tool to: 1) assess new cryopreservation protocols, i.e. the least aggressive would induce the lowest proportion of premature capacitated spermatozoa; 2) to estimate the subpopulation of frozen-thawed spermatozoa that remain fertile (live cells showing either Pattern F or B, CTC assay). Freezing and storage of spermatozoa using ultra-low freezers (-150°C) represents a feasible alternative to the use of liquid nitrogen, at least in both short and medium term. Simple tests based on simulation of osmotic stress that occurs during freeze-thawing are promising approaches to predict sperm cryosurvival; assessment of spermatozoa during hyperosmotic and isosmotic conditions at -5 and 37°C , respectively, has revealed that proportions of plasma membrane-intact and acrosome-intact cells are similar to those observed after cryopreservation. Inter-male differences in sperm freezability are an ever present variable influencing sperm cryosurvival.



22. Technology transfer to producers in Brazil

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Brazil has a representative heterogeneous herd distribution along its territory. Economical importance of goats varies according to each region, as well as the technological level implemented. There are situations of high, middle and low technological application level in all geographical Brazilian regions, from those of higher density of goats to those with a lower goat population. The aim of the present paper is to report and analyze techniques used to transfer technology to Brazilian goat producers. For economical viability of goat production to be sustainable, considering the social function, it is basic to use modern economically viable technology adjusted to specific characteristics of each production system and region, when the peculiarities and investment capacity of different producers vary. Brazil does not have a defined national program for technology transfer to producers. Finally, there are many ways of transferring technology to goat producers, but under producer's particular needs, which may limit goat productivity in Brazil.





23. Emerging strategic supplementation options for goats in the tropics

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Supplementation strategies for small ruminants that consume low quality forages in range and confinement conditions should be designed to synchronize degradability of proteins and carbohydrates in the rumen and increase the supply of nutrients to the small intestine. Mineral supplementation should be specific, considering the mineral profiles of forages in each region. Protein supplementation of goats consuming low quality forages, which are low in protein, generally improve forage intake and animal performance. However, strategies for supplementation of energy are still being evaluated due to the existing interactions with dietary factors such as level of protein needed to satisfy the N requirements of microbes in the rumen, quantity of undegradable intake (bypass) protein, effects of supplementation on ruminal pH, quantity and frequency of supplementation, physical form of the supplement, and type of carbohydrates that comprise the supplement (sugars, starch, or rapidly fermented fiber). Since international costs of feed ingredients have been dramatically increasing, emphasis should be focused in low level (0.2 to 0.4% of body weight), high protein and mineral supplements. Leguminous fodders can also serve as protein and energy supplements for meat and milk production. In milk production systems, energy supplementation based on carbohydrates, both, starch and rapidly fermented fiber, improve body condition and milk production. With the excess energy consumed, does can recover body tissue that can be mobilized to maintain milk production during the dry season in which quality of pasture and other fodders are reduced due to maturity. Supplementation of hand crafted multinutrient blocks based on molasses and urea, that can stimulate rumen fermentation and supply nutrients needed to complement deficiencies of goats consuming low quality forages, can simplify transport and management, restricting intake of the supplement, reducing the need of salt as intake regulator, and reducing the risk of intoxication with urea. Hand crafted blocks would require certain degree of compaction and calcium oxide, which would react with molasses to aid in providing hardness. More hand labour and the use of binders or reaction agents increase manufacturing costs. However, the most important aspect of supplementation is not the physical form of the supplement, but its nutritional profile.



24. Goat grazing impacts on rangelands of semiarid highlands of Mexico and the reconversion by grazing systems

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The Mexican North-Central semiarid land has been exposed to systematic grazing since colony times. The grazing impact on rangelands has degraded soils and reduced diversity and productivity. The most common and detrimental of soil degradation is soil erosion which destroys chemical, physical and biological properties. To determine the effect of grazing systems on rangelands, several studies were performed. Such studies included a description of soil profiles to categorize former degradation and the evaluation of the soil and vegetation changes due to further degradation processes as grazing systems (rotational, RG and continuous, CG) and water erosion. The study was carried out in rangelands of the ejido Pánuco, Zacatecas, from 2002 to 2005. Former soil degradation was identified by identifying six groups with similar soil profiles (GSSP) which were identified and described as: 1) low degradation soil; 2) medium soil degradation with A horizon lost; 3) high degradation soil without A and B horizons; 4) high degradation soil with in situ development; 5) high degradation soil with calcareous material; and 6) high degradation soil without development, which is a very shallow soil above the parental material. Further degradation was determined by soil measurements performed in the study area and the surroundings. Reduction of trampling on the RG area has positively affected soil characteristics and there were changes in variables of soil with respect to CG such as bulk density, which remained unchanged (1.41 vs. 1.53 gr. cm⁻³) and less soil resistance (15.3 vs 17.06 Jcm⁻¹). Vegetation cover under RG was 59 % against 35 % found in CG. Crude protein values did not show differences between both grazing systems. However, protein values showed differences between seasons and animal species ($P<0.01$). Goats collected more protein than sheep, with higher values in summer (12.0 %) and lower in winter and spring (5.3 and 4.3 %, respectively). With respect to soil losses their values were systematically less for the RG system under the native vegetation conditions studied ($P<0.01$). Changes in the production systems may imply a reconversion of the system. Some changes include a modification in the rangelands use intensity, starting with a new grazing system, as well as changes in technology which may be simulated by GIS.

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Abstracts Oral and poster presentations

Social Development & Contribution of Women to Goat Production



1. Promoting goat markets and technology development in semi-arid Zimbabwe for food security and income growth

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Goats are an important source of cash income for small-scale farmers in semi-arid Zimbabwe. However, with little investments in management, goat productivity remains low and farmers are unable to realize the full potential of their herds. An increasing demand for livestock products offers small-scale farmers opportunities for increased market participation. The existing goat markets are largely informal, with poorly developed inputs and services. Consequently, transaction costs are high, resulting in low prices. In addition, access to market information is limited and negates informed decision-making. We hypothesize that improved market access will provide farmers with the incentive to invest in improved management technologies which will enhance offtake and increase quality of their goats. This paper presents the process of promoting goat markets and technology selection in Zimbabwe. A reconnaissance survey demonstrated the comparative advantages of goats and investment opportunities for small-scale farmers. A follow up baseline diagnosis revealed that farmers use the cash from goats to finance their own food, education and human health. Yet, farmers are losing 26% of the goats, attributed to dry season feed shortages, animal health and inappropriate housing, particularly affecting farmers with small herds. Farmers attempt to improve production, and react on market development, but this is not consistent enough to realize the returns from their investment. Much more need to be done to improve production, reduce transaction costs and increase market access to ensure growth within the sector. Based on this information we established Innovation Platforms, forums that facilitate communication between farmers, market players, input and service suppliers around local production and marketing systems. The stakeholders meet to identify bottlenecks and opportunities with regards to both production and marketing. They collectively identify and evaluate improvements in markets and management technologies, and redefine their roles accordingly. This new approach places technology and market development into the local context, based on a common interests and strong partnerships between private and public sectors. It builds local capacity, aligns production with market demands and improves the overall efficiency of the system - thereby increasing food security and income growth and supporting the development of sustainable impact pathways.

2. Role of women in goat rearing in semi-arid parts of India: implications for their self empowerment and family's livelihood security

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Goat rearing has been playing an important role in the food and nutritional security of rural landless, marginal and small farmers especially in the rain-fed areas of the country having low agricultural productivity. Goats have distinct economic and managerial advantages over other livestock species. Hence millions of resource poor rural families rear goats as a means of supplementary income and source of family nutrition. The sizes of majority of goat flocks are very small having 1-5 goats and are managed by the women in the family. This paper examines the level of women's involvement in the rearing of goats and role of goats in women's' economic empowerment. The study was conducted in semiarid zones of two major goat-keeping states of Uttar Pradesh (U.P.) and Rajasthan in India during the year 2001-2002. The actual location of the study was in southwestern semiarid zone of U.P. and Eastern semiarid zone of Rajasthan. These two zones also represent the home tract of two of the most important and widely adapted and adopted goat breeds of Northern India. Total of 280 goat farmers were covered in the study. The selected farmers were post stratified based on flock size into four categories viz., category I having 1-5 breeding goats, category II (6-15 goats), category III (16-30 goats) and category IV (>30 goats). Majority of the goat keeping households had small flock size. In U.P., 54 % of the total flocks had fall in category I and 27 % in category II and similarly in Rajasthan the share of category I and II was 26% and 34 %. The goats in these small flock size categories were mainly looked after and managed by the women of the household. They contributed 54 % to 74 % of the total labour use in goat rearing in category I and 31% in category II. The women were mainly involved in cleaning the shed, milking, feeding and handling and grazing. In all, the goat rearing generated employment of 123 to 179 man-days per annum in Uttar Pradesh and 98 to 239 man-days per annum in Rajasthan in different flock size categories. The role of women in goat rearing in large categories was relatively less. In fact a number of women had started with only one goat either purchased or received in gift from relatives and through increment in numbers their current flock size was up to 10 – 15 goats even after regular sale of surplus animals. The main objective of rearing goats by women was to generate some income independently and ensure children's access to milk. They used the returns from goats mainly for clothing, food and medical care of the family. Thus goat rearing as an income generating activity helped in empowerment of rural women and improving their family's livelihood security. The landless goat keepers in U.P. spent up to 57 percent of their income from goats for acquiring food for the family. Women in category- I had control over returns from goat rearing in 73 and 44 percent households in U. P. and Rajasthan, respectively. The women in these households were taking decisions with regard to production and marketing of goats. The family's net annual income per goat ranged from Rs. 1216 to Rs. 1819 in different categories. Thus the resource poor rural women found goat rearing as a useful pathway for enhancing their income and family's livelihood security. Hence any development program focusing on goats must have women as its important component. The programs for technology generation and extension on goats should also consider the resource and knowledge situation and technological needs of the women goat keepers.

3. Characterization of family farmer's properties in the Brazilian semi-Arid

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The Brazilian northeast, occupied mostly by the semi-arid climate and the Caatinga ecosystem, has suffering an environmental and social degradation caused mainly by the non-sustainable use of the natural resources. This degradation has been gradually compromising the condition of this ecosystem, decreasing the economical and technical support of the family property. To improve the progress in this region, it's important to develop economical and social structures to enhance living conditions for its population and for that, the sustainable agricultural practices has an important role. To propose some alternatives of management systems; the Brazilian Agricultural Research Corporation (Embrapa-Goats) and partners did a characterization of communities who lives in the Brazilian semi-arid. Those communities were called "Fundo de Pasto", which explore collective areas without environmental knowledge. Questionnaires on 45 properties were applied (rural families) in the period of December 2005 to January 2006. The land that has been occupied for 37.9 years on average has the size ranging from 4 to 1,844 hectare. Electricity was found in 26.7% of the properties and the presence of woman was significant in all families. The income was obtained mainly from farming activities. More than half of the farmers used fire to prepare the land to crop. Chemical fertilizers were not used but, organic fertilizers and pesticides were used by less than a third of the producers. Corn and bean were harvest together as the main crop. Livestock was found in 75.5% of the properties including goats, sheep, cattle, hogs and poultry. Only 4.4% of farmers produce forage to feed their animals and 88.9% had no technical knowledge to storage feed. In all properties the livestock was vaccinated and received anti-helminthics as the main sanitary control. The indigenous Caatinga was found in only 25 properties, showing destruction of the native environment.

4. The use of linear programming to evaluate the impact of credit for investments in small goat farms

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The PRONAF is a government program that subsidizes the credit for investment to small farmers and improve the social development in Brazil. This research was carried out to evaluate the effect of increasing the values of credit for investment used for the PRONAF farmers in semi-arid areas, and their impact in the income and labor in the production system. Was used the economic data of dairy and meat goat systems of PRONAF farmers in "Rio Grande do Norte", Brazil. The limit of the model was the credit for investment, maximum number of animals in the system and the labor time. The current values of credit for investment (R\$ 6,000.00) were increased by of 25%, 50% e 100% and analyzed its impact in the farm income when considering milk and meat production. The maximum number of animals in the system was estimated by multiplying the carry capacity (1.5 heads/ha/year) plus the average pasture areas of PRONAF farms (35 ha). The maximum labor time, available for farm work, was 12 hours/day. This mathematical model was solved using linear programming with LINDO® software. If the credit for investment was expanded in 25 and 50%, the income of the system increased, respectively, to 22 and 41%. It happened because the values of credit allowed also an augment in the number of dairy goats in the system. However, this income could not permit a use and pay for more than 5 hours/day in goat system activities. By raising the credit for investment up to 100% it would increase the income of the system around 81%. It happened because the number of dairy goats went up to 83% and the dairy production was having better results than meat production. The system with more dairy goats produces enough income to pay the farmer labor (7 hours/day) and the other five hours could develop another activity. Therefore, the results of the model indicated that an increase in the credit for investment in small goat farms in semi-arid areas in Brazil would biased towards the dairy goat production enhancing the income of families and employment opportunities.

5. Women's participation in goat farming in Mexico: a reserve labor pool in times of neoliberalism.

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Feminization of agriculture has been described as a mayor trend in Mexican countryside since the implementation of neoliberal agrarian politics, although this does not imply that woman have gained more autonomy and recognition as farmers, nor that they have been given the chance to develop farming strategies that differ from masculine models. In the north eastern region of Michoacán the goat herd constitutes the center of social and economic activity for many peasant families. To understand women's participation and involvement in goat farming, a field study was carried out with the purpose to contribute to the design of future goat husbandry projects in the region. A small rural community located in the Bajío region of Michoacán was selected for this study. From March 2006 to April 2007 field work, consisting in participant observation, transect walks with goat families through the grazing areas, open ended structured interviews to 6 key informants and members of 20 *production units*. The life stories of 10 women engaged in goat husbandry could be obtained. Transcribed interviews were subjected to *content analysis*, defined as an analytic strategy for the systematic examination of forms of communication, to document patterns objectively. In using content analysis as a method, the objective was to get at aspects of what the contact and work with the goats signifies for these women, performing a close examination of the transcripts content. It could be stated that goat husbandry in this community is much more *feminine* than it seems at a first sight, but although women's participation is positively valued and socially recognized as an aid to the household economics, it is unambiguously conceived *only* as a support to male activities. The fact that many women have developed strong ties to the animals and genuine interest in goat farming has never been accounted, neither by governmental programs nor in the social organization of the community. The increasing economic constraints many rural households confront in this marginalized district, have led to cases of severe overexploitation of *goat women* (*chiveras*), while decisions concerning the flock and the income it generates continue to be men's domain.

6. The role of women in smallholder dairy goat production in the Central Kenyan highlands

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Women have often failed to benefit from farm enterprises despite their input in the production process. Women provide 60% of family labour with most of the agricultural activities centered around the family farm. Most of these activities are undervalued and these women have little or no access to benefits generated from cash crops and dairy cattle. Goats, like other farm enterprises that do not generate income have often been viewed as belonging to women. There has been an increasing trend in dairy goat adoption among smallholder resource-poor farmers in the Central Kenyan Highlands for provision of milk and income. However, whether these dairy goats and resources generated belong to women is an empirical question. An analysis of the implication of a technology on the workload and benefits to different gender categories is important in explaining adoption thus guiding targeting and prioritization of a technology for enhanced adoption. This paper discusses preliminary results based on a household survey conducted in Meru Central and Meru South districts where 260 randomly selected farmers were interviewed. The contribution of women in dairy goat production was analyzed as well as their access to and control of resources from the enterprise. Preliminary results indicate sharing of workload by men and women in the production of dairy goats as well as participation of both gender categories in decision-making.

7. Can goat be a vehicle in a pathway out of poverty?

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Belsi, a small village of 79 households in Chitwan district of Nepal with lush green fields, vegetable gardens and concrete houses one can hardly imagine the plight it suffered just a decade ago. Engrossed in their works, the faces of the villagers exude content and confidence. However, the people of Belsi have not always been happy. The road towards Belsi's self reliance began when the local women organized themselves into groups with assistance from Heifer Nepal in 1999. Prior to receiving goats from Heifer they organized themselves in a self-help group, built shelter for goats and planted grass, fodders and trainings on goat management. Income from the goats helped them to initiate monthly saving and credit scheme. Group saving and mobilization fund opened the door for other income generating activities. During the two years of Heifer's involvement in Belsi, the women learned ways to improve their economic and social condition. During seven years, these 50 women, spread their knowledge, skills and enthusiasm to another 760 women in the community as well as in neighboring communities. Today the income of each family ranges from 250 USD to 4500 USD per annum with the sale of goats. Each family is keeping 4 to 6 goats and there are 30 breeding bucks in the community. Building on its valuable experience of working with farm communities, Heifer Nepal uses livestock especially goats, and trainings as tools for poverty alleviation rather than solutions to poverty with a belief that development is not only about distributing inputs but about empowering individuals, developing successful models, building communities, producing deeper level impact and transformation of lives from receiver to giver, crossing the border of selfishness to sharing, not only thinking for self-livelihood but for the community livelihood and community development. By addressing the inter-related causes of poverty like social discrimination, illiteracy, superstition, poor health, and family and communal conflicts through Heifer's model of holistic development, Heifer Nepal brought lasting social and economic empowerment in the lives of more than 17,000 Nepal families.

8. Goat dual purpose women producers GGAVATT in the Guanajuato state, México “Entrepreneurs of Pantaleón”

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In México, 50.4% of the population is women, of whom 13 million live in rural areas and due to increase of the male migration rate. The role of women in the Mexican countryside has intensified, allowing it to increase its involvement in economic processes and decision-making. As from 2002, in the municipality of Acámbaro, Guanajuato, with the support of the National Institute of Forest, Agricultural and Livestock Research (INIFAP) and the technique attendance supported for the government program development of Integral Projects Agricultural and Livestock (DPAI), working under the model GGAVATT (Livestock Group of Technology Transference and Validation) the goat dual purpose group: "Entrepreneurs of Pantaleón", which is characterized as being composed of women who have an average age of 51 years; 80% did not complete primary education and 20% are illiterate; their husbands and their sons have emigrated to the United States, so that 90% of these women depend on this activity as their main source of income. Currently the producers have on average 81 animals and technical advice they have received has enabled them to improve the productivity of their herds and hence its economy. Before starting work on a Change Agent a static diagnosis (DE) was conducted of the initial technical situation of women producers that formed the basis for proposing technical activities. It showed the main technologies adopted by the producers during the January 2005 to August 2007 period, compared to its advances. It then presents the technical and economic impact during the August 2006 to July 2007 period. Technical records 12.9 vs. 90%; health management milking 30 vs. 72%; California test 0 vs. 50%; corn silage 0 vs. 90%. Birth weight of 3.47 kg (n = 867); weaning weight at 60 days 14 kg (n = 139); production of 273 kg per lactation (n = 274), with a duration of 215 days. Producing an average of five of the group had revenues of \$ 53,724.00, expenditures of \$ 110,176.00 and a gain of \$ 43,547.00. It is concluded that the goat production systems can be a source of employment and income in Guanajuato.

9. The National Association for Sheep and Goat Breeders ANOC: a professional organization serving the development of sheep and goat livestock in Morocco

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The National Association for Sheep and Goat Breeders (ANOC) is a non profit association, created in 1980. The objective of ANOC is to improve the breeder's income by the growth of the small ruminants' meat and milk production in an economically sustainable system, developing the breeders' profession, especially in hostile environments. The technical activities from the outset, limited to selection and breeding, have progressively been diversified to encompass all domains of sheep and goats breeding and include animal health, training of extension agents, supply of products and inputs to the breeders, and organization of professional workshops. Technical interventions are supported by pedagogic actions. The members are currently 5000, organized in 56 groupings, distributed among five areas (Middle Atlas, South center, Oriental, South, Atlantic Coast and North). The association supervises currently more than one million sheep and goats and also participates actively in the development of livestock by extending these actions to non member breeders "indirect recipients" (about 3.000 people). The managed animals are from five rustic sheep breeds, four sheep breeds of imported origin, local goat populations (dark goat of Middle Atlas and goat of northern Morocco), and the Alpine goat (imported). ANOC also manages a Technical Center for goat selection and breeders' training, a goat-milk dairy and a company "ANOC Agriservices" (which is authorized to import animals, food and material for livestock). ANOC employs currently 84 people in both administrative and technical personal. More than 90% of the staff is in the field to serve and help the member breeders. ANOC receives public financing through the Ministry of Agriculture in the framework of the contract-program mechanism. The parts of ANOC's own resources completed a sizeable increase which enables the organization to cover about 60% of the total budget. ANOC collaborates with many local institutions: Ministry of Agriculture, teaching and research institutes, non governmental organizations, etc. There are also many partnerships at the international scale (NGOs, European Union, and cooperation with several countries).

10. Gendered roles and relations between women and men influence access in goat production in Mediterranean region of Turkey

N. Koluman Darcan, M.Kantar Davran

This article attempts to indicate women's roles and relationship of both genders in natural resource management by highlighting their roles in management of goat flocks. The article is based on the findings of case studies in rural areas of Turkey. In this study, a questionnaire was administered to sampled male and female heads of household as well as women under male heads. The heads were asked to indicate the roles they play and key decisions they make in resource use as heads of households. The women under male heads were also asked to indicate their roles and key decision responsibilities. The results showed that gender differences within households and across resources. Men were overwhelmingly involved in productive roles, giving low priority to reproductive roles. In contrast, priority of women's roles were reproductive in nature.

11. Heifer International Promotes appropriate livestock management for small scale farmers

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Heifer International is well reputed in the community development using livestock of many species, goat being the major species. Heifer promotes integrated low external input agriculture where there are mutual benefits of the relationship between farm animals and people. In exchange for labor, financial security, social status, milk, eggs, meat, manure or wool, farm animals receive protection from predators, clean water and food, space for exercise and comfortable housing. In majority of the cases, the ownership of the animals is with the women in the family and the economic benefits are shared among the family members. Encouragement of genetic diversity and use of indigenous breeds is as critical for livestock as it is for crops. Heifer first promotes the use of local breeds of animals that are adapted to the local area. Upgrading the genetics of local breeds is one of the primary reasons that poor farmers request the assistance from Heifer. Most Heifer animals are cared for by family members, such as goats and sheep by the children and larger animals by the parents or by both. Most of the training Heifer gives to the farmers involves supplementing their existing knowledge of animal housing and nutrition. Farmers examine the basics of livestock nutritional needs. They plant grasses and leguminous plants to supplement the natural pastures, and in many cases farmers learn about feed by-products available in their areas. Goats and sheep on small farms are seldom fed much grain and are kept in zero grazing units. Heifer staff, local veterinarians and Community Animal Health Workers (CAHWs) address animal health issues. Training of local project participants has been successful in managing routine health problems in the field. Locally trained practitioners combine both traditional and modern drugs to cure illnesses. The main focus of CAHWs is on indigenous remedies, preventive care and links to local veterinary systems. Due to the holistic nature of program development and implementation, Heifer has been successful in bringing about changes in the lives of people using livestock as a tool and significantly contributing to the end of hunger and poverty while caring for the earth.

12. Utilizing contributions to Passion and Craft

Bryant, R. Donald¹, Josie Moores Connally¹, George K. Floro², Sergio Gallegos Ochoa³, and Larry J. Sheffield¹¹

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This poster shows how social theory and practice are applied to bring grassroots (producing) goat raisers together with elites associated with goats in livestock agriculture. The group of goat raisers in which the applied study is done has a background in the participatory research movement which began in Brazil in the early 1970s, spread to Mexico and elsewhere and eventually was adopted in Canada and the U.S.A. with a major publication in 1993. It provides forms of collaboration between professionals and livestock producers. In a Mexican rural development center in an Indian village (San Miguel Zinacapan) the most active grassroots participants were called “village scholars. The elite participants in the group under review are more accepting of organizational life. This poster is about five participants who in contrast are turned off by organizational life. A “practice” task portrayed is how a leadership committed to wider participation can draw upon resources provided by creative participants. Researchers in the study of goats throughout the world may miss many of the most valuable social resources if they limit their interest in the collective life of goat raisers to organizational life or miss the possibilities that can come from imaginatively bringing the grassroots and the elites together when they need each other. The craft for doing this is known throughout the academic discipline of sociology as sociological imagination and is applied to crafted dichotomies to be implemented or resolved. The participatory approach has been adopted for both affirmative and critical styles of social analysis. The poster will feature a major social contribution “being at home on the planet” which in sociology or sometimes combined with philosophy or art or other discipline is referred to as overcoming alienation. Editors and writers for newsletters and bulletins, to do what the participatory commitment calls for, need to be respectful of participants. Even a concept like alienation is to be presented for all participants to understand. The central theme in the 2007 Goat Bulletin is alienation, which demonstrates a leadership role in the implementing for lasting impact of social contributions to the collective life of producers.

13. Under what circumstances participatory research has a chance to succeed?

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The research task for this project is to take a series of cases, including those which succeed in their practice mission as well as those that fail in this respect, and to search for answers to the question raised by the title. Since participatory research builds upon forms of collaboration between elites and the grassroots a full range of applicability in theory and practice are included in the inquiry. Information gathered in the study occurred before, during, and after a community research and development project in goat agriculture. The author of this paper prepared the participatory research plan in the grant application and served as the research director for the first phase of the project. The project was located in a U.S.A. and Mexico border area where the grassroots participants were mainly Hispanic producers. Two of the “success” cases for participatory research and development were where Hispanics predominated, one in New Mexico and the other in the state of Puebla, in Mexico. Much of the paper is on theoretical review and background leading through stages: (1) consensus formation [if it does not exist at the outset] to (2) group solidarity, sometimes out of “suffering together,” and to (3) a revitalized and passionate stage with highly competitive production skills. The expectations of sponsors and/or founders are also considered in the search for requisites for success. Alternative financing is also found. During the project in 1991, Leo N. Uher, who was on the staff representing both practical experience in goat raising and business on a large scale, made contributions to the search for similar development projects from which much could be learned for the local project. Participatory research is associated with both affirmative and critical styles of social analysis, but this is not an issue in the paper. Specific projects are not being critiqued.

9th International Conference on Goats

Sustainable Goat Production: Challenges and Opportunities of Small and Large Enterprises

Abstracts Oral and poster presentations

Goat Products: Marketing, Economics & Food Safety



14. Relationship between goat milk freezing point, milk composition and properties

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Rearing of small ruminants enjoys a revival during the last decade in the Czech Republic (CR). Goat milk as important factor of human nutrition was investigated. The comparison with cow milk, especially in relations to the milk freezing point (MFP) as an important physical milk indicator (MI), was made. The bulk milk samples ((BMS) - one sample from 4 to 8 animals) were investigated on 39 Mls. Goats (White short-haired (W), n = 60 BMS) and cows (Bohemian Spotted cattle (B), n = 93) were sampled for 3 years in winter and summer season. The animal nutrition was performed in way typical for CR. There is explicit that goat milk takes the lower value of MFP (-0.5544 °C; W) than cow (-0.5221 °C; B; P<0.001). It is caused by specific physiological differences between species. They influence the contents of some parameters: fat (4.58 W vs. 3.40% B; P<0.001), urea (50.6 W vs. 26.7 mg 100ml⁻¹ B; P<0.001), calcium (1224 W vs. 1300 mg l⁻¹ B; P<0.01). The content of lactose (monohydrate) was 4.43 W vs. 5.06% B (P<0.001). We observed some significant relations (correlation coefficients or indexes from linear or non linear regressions) between goat MFP and fat (r=-0.48, P<0.001, W vs. r=-0.06 P>0.05, B), dry matter content (r=-0.57, P<0.001, W vs. r=-0.07, P>0.05, B), urea (r=-0.57, P<0.001, W vs. r=0.01, P>0.05, B), pH (r=0.75, P<0.001, W vs. r=-0.455, P<0.001, B), Ca (r=-0.48, P<0.01 W vs. r=0.12, P>0.05, B), casein (r=-0.42, P<0.01, W vs. r=-0.10, P>0.05, B) etc. The compared interspecific relationships were often different or sometimes opposite in terms of trends, which could be caused by interspecific differences but also by different levels of somatic cell counts of compared species. *Supported by projects MSM 2678846201 and LA 331 (INGO), both MSMT.*

15. The differences of some indicators of raw milk properties and especially mineral composition between small ruminants as compared to cows in the Czech Republic

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Sheep and goat farming is returning back into the Czech Republic (CR) because of positive effects of alternative milk consumption on human health. Especially the elements Ca and Mg are important for nutrition. Paper presents the comparison of mineral milk composition of goats (White short-haired-W, n=60), sheep (Tsigai-C, n=60) and cows (Holstein-H, n=36; Bohemian Spotted cattle-B, n=93). Cow milk results were considered as reference. The herds were kept at altitude 260 m (H), 360 m (B), and 572 m above sea level (W, C) with total precipitation 449, 700 and 1200 mm per year, mean air temperature 9.6, 7.0 and 3.7 °C. Bulk milk samples (4 – 8 animals in sample) from the first two thirds of the lactation and the winter and summer season were investigated. Goat milk freezing point differed from other species ($P < 0.001$). Cow milk Ca values were comparable to former results although milk yield (MY) was higher. Along lower MY the Ca was higher ($1299.6 > 1172.0 \text{ mg kg}^{-1}$; $P < 0.001$) in B than H, similar trend was in Mg ($122.0 > 107.4 \text{ mg kg}^{-1}$; $P < 0.001$). Differences ($P > 0.05$) between species were in Ni and also mostly in Cu. Iodine results differed between species but not between cow breeds ($P < 0.001$; $462.8 \text{ H and } 434.9 \text{ B} > 126.0 \text{ W and } 164.2 \text{ } \mu\text{g l}^{-1} \text{ C}$). It could be explainable by use of I disinfection at teat treatment in cows and absence of treatment in small ruminants. Macroelements were mostly highest (Ca, P, Na, Mg) in sheep milk, with exception of K. Phosphorus values ($950.1 \text{ H, } 1016.9 \text{ B, } 1042.6 \text{ W and } 1596.7 \text{ mg kg}^{-1} \text{ C}$) in species were linked with crude or true protein and casein values. Small ruminant milk could be good source of minerals for human nutrition, especially in the case of Ca and Mg of sheep and goats milk. Supported by projects MSM 2678846201 and LA 331 (INGO), both MSMT.

16. Combined effect of the lactoperoxidase system and container smoking on the keeping quality of goats' milk during ambient temperature storage

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The effect of the lactoperoxidase (LP) system in combination with container smoking on the microbial quality of goats' milk was assessed during storage at an ambient temperature. The milk samples were subjected to three treatments (LPS, activation of the LP system; CS, container smoking and LPS-CS, container smoking plus activation of the LP system) and untreated control (NT). The titratable acidity, coliform count (CC) and total bacterial count (TBC) in LP activated milk samples (LPS) decreased by 0.13%, 1.6 log units and 1.33 log units, respectively as compared to their respective values in the control at 7 h of storage. The percent of lactic acid remained the same as that of the initial level in LP activated milk sample up to 7 h of storage. Coliform count and TBC in LPS decreased by 0.33 log and 0.20 log units, respectively at 7 h of storage as compared to the initial count. On the other hand, CC and TBC increased by 1.27 log and 1.13 log units, respectively in the control at 7 h of storage as compared to the initial count. An increase in acid production was observed in milk samples kept in smoked containers (CS) at 7 h of storage; however, when container smoking was combined with the LP system (LPS-CS), no acid development was observed in the milk samples and the level of acidity remained the same as that of the initial level up to 7 h of storage. It can be concluded that the LP system combined with container smoking could effectively control microbial growth and extend the shelf life of goats' milk stored at an ambient temperature by at least 7 h.

17. Experimental evaluation of inhibiting properties of raw goat milks against *S. aureus*

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Tools and methods available at the moment do not ensure a complete safety of products made with raw milk concerning contamination by *Staphylococcus aureus*. This microorganism is responsible for non conformity of cheeses and has a great economic and sanitary impact on the entire caprine field. Therefore, this study focused on searching for microbiological ecosystems from milks naturally inhibiting *S. aureus* growth. A first step consisting in studying the history of contamination of goat herd milks collected by dairies permitted to choose herds according to the following criteria: less than 3 values above 200 UFC/ml and none above 500 UFC/ml on a previous year period. 55 French goat herd milks from the 3 main goat milk cheeses producing regions were selected to be submitted to a laboratory test. It consisted in following the growth of native and inoculated *S. aureus* strains (10² CFU/ml) from caprine mastitis in raw goat herd milks incubated at 27°C. This test evidenced about 10 goat milks inhibiting growth of native, inoculated or both types of *S. aureus* strains (less than 2 log growth and even absence of development of *S. aureus*). The inhibiting properties of the most interesting milks were confirmed in cheese making, either soft lactic technology (buchette type cheese) or soft cheese technology (Banon or Camembert type cheeses). The laboratory tests and cheese making conducted on three consecutive years showed that the test enabled to classify the inhibitory potential of milks for application in cheese making, providing that they are realized in a same lapse of time. Acidification was not the only parameters explaining the inhibiting potential of raw goat milks. The study of the microbial ecosystems of these milks needs to be deepened.

18. Microbiological, fatty acid and conjugated linoleic acid (cla) change of Mexican goat milk cheeses during storage: freezing and refrigeration

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The quality of dairy by-products could be evaluated using different criteria such as health, sanitary, dietetic, nutritional and medical issues. The cheeses are influenced by animal, agro-climatic, feeding conditions and storage management. In Mexico as a consequence of seasonal goat milk cheese production, the frozen storage of cheeses has been used. However the effect on cheese quality has not been evaluated. The changes in microbiological, fatty acids included CLA in two Mexican soft goat cheeses, made with raw (RF) and pasteurized (PF) milk were evaluated to explore the effect of milk cheese freezing (-20°C) storage. Six different lots of raw and pasteurized goat milk cheese were purchased and subdivided into six equal portions per lot. Each portion was stored at -20°C for 6 months, and then all samples were thawed at 4°C and store for 0, 14, 28, 42, 56 and 70 days and immediately analyzed. Microbial population changes were enumerated for lactic acid bacteria (LAB), yeast and mould, coliform and *E. coli*, using petrifilm techniques. The fatty acid methyl esters (FAME) profile and CLA concentration were evaluated by gas chromatography. Both frozen-thawed cheeses had significantly increased ($P<0.05$) in LAB at 14 days in relation to 28, 42, 56 and 70 days of storage. An inverse relation was detected in yeast and mould counts. Coliforms and *E. coli* were not detected. No significant differences were detected in fatty acid profile in both cheeses; however the concentration in all fatty acids in the pasteurized cheese at 70 days was higher than raw cheese ($P<0.05$). The freezing had effect significantly ($P<0.05$) on CLA in the initial evaluation in relation to the rest of days of evaluation. Lipolysis of the cheeses increased with the extended (70 days) refrigeration store at 4°C ($P<0.05$); increased yeast and molds, with a gradual deterioration on cheese ($P<0.05$). However 6 months of frozen-store (-20°C) and 30 days before thawed store (4°C) could be a good options.

19. Fatty acids and CLA of commercial goat's milk cheese manufactured in Mexico

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Several sources of information suggest that a healthy ratio of $\omega 6$ to $\omega 3$ fatty acids is near ~ 1 whereas today this ratio is $\sim 10:1$ to $\sim 20-25:1$. On the other hand, the information available about nutritional content of Mexican goat's products is scarce. Thus, the content of lipids, fatty acids and CLA in twenty three commercial goat's milk cheeses manufactured in Mexico was evaluated. Ten samples of each commercial cheese were purchased from several retailers located at Mexico City; three kinds of cheese were collected (Sainte-Maure, Panela and Feta). Total cheese lipids were determined using organic solvents and a gravimetric calculation, while the fatty acids quantification was analyzed using gas chromatographic technique. CLA was identified using a conjugated linoleic acid methyl ester standard with mixture of cis-9-trans-11-CLA and trans-10-cis-12-CLA. The total lipids content of cis-9-trans-11-CLA isomer in commercial cheese (Sainte-Maure, Panela and Feta) were 36.01, 27.62 and 18.08, while trans-10-cis-12-CLA Achieved 10.25, 11.09 and 0.02 mg/100g, wet basis respectively. Total polyunsaturated fatty acids content in Sainte-Maure, Panela and Feta cheese were 401.20, 296.27 and 229.20 g/100 g, wet basic. In conclusion, the ratio of $\omega 6:\omega 3$ fatty acids was 3.35, 3.71 and 3.48 for Sainte-Maure, Panela and Feta cheese. The results may suggest that different brands and lots of commercial goat milk and manufactured products marketed in Mexico City can have variations in fatty acids and CLA contents depending upon the sources of milk, breeds of goat, individual animals, diet, stages of lactation, and environmental factors.

20. Influence of semiarid summer browsing on chemical composition in goat's milk cheese

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The effect of feeding systems and milk pasteurization were evaluated on fatty acid and chemical composition in an artisan Mexican soft goat's cheese. A group of 20 female French Alpine goats (50 ± 5 Kg BW) were fed on a semiarid rangeland during the summer of 2006 in Querétaro, México. Other group (B) with similar characteristic was fed in full confinement with Lucerne hay and concentrate of cereals. An artisan soft cheese was prepared for 5 days from 30 kg of goat milk per group, 15 kg were proceed in raw and 15 kg were pasteurized, making 4 kind of chesses: BR = cheese made from browsing goat raw milk, BP = cheese made from browsing goat pasteurized milk, IR = cheese made from indoor goat raw milk, IP = cheese made from indoor goat pasteurized milk. Moisture, energy, crude protein, ash, lipids, cholesterol and fatty acids profile were determined. The data were analyzed with a completely random variance analysis in a 2x2 factorial arrangement. The mayor composition (energy, fat and ash) was not affected by feeding system and heat treatment. Protein content (34.0 g/100 g DM) was higher in IP compared from BR and BP cheese ($P<0.005$). Cholesterol content was lower (155.5 mg/100g DM) in BR cheese. Alpha-linolenic acid (C18:3) showed the highest concentrations in BR and the lowest value was achieved by IP cheese ($P<0.005$). Soft goat cheese nutritional quality was modified by the animal feeding system. Browsing represents an option to produce a healthy profile of fatty acids, rising Eicosapentaenoic (EPA) and Docosahexaenoic (DHA) concentration ($P<0.005$). Browsing increased the $\Omega 6:\Omega 3$ ratio in the same proportion. Pasteurization did have a significant effect on cheese quality.

21. Relationship between milk CIE (L*a*b*) colour and somatic cell count in goats

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Two hundred goat milk samples were used in the present study to determinate the relationship between milk CIE colour (L*a*b*) and somatic cell count (SCC). 100 ml of samples were obtained from two hundred Majorera goats by machine milking. After that samples were measured for colour (Minolta CR-200) and for SCC (DCC, Delaval) and a stepwise regression was performed. When SCC was expressed as total cells per ml, the r square was 0.395 including in regression only the Croma parameter, r square increased to 0.508 using in the regression L*, a*, b*, and Croma parameters. If SCC was expressed as Log SCC, r square values were lower. Samples with high SCC (more than 4 million) presented higher r square than samples with low SCC (less than 0.5 million).

22. Effects of storage temperature on DCC (DeLaval direct cell counter) somatic cell count in goat milk.

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The objective of present study was to evaluate the effect of cold storage on SCC of goat milk measured with DCC. Twenty milk samples from Majorera goats were taken and somatic cell count (SCC) was measured immediately using a DCC device. Each milk sample was divided in four aliquots and allowed to storage at four different temperatures (4, 21, 36 and 45°C). During 12 hours, samples of milk were taken every hour and SCC was recorded using a DCC device. SCC was statistically lower after 1 hour of storage. In conclusion, goat milk samples can not be stored (with independence to storage temperature) for more than 1 hour for SCC with DCC device.

Keywords: DCC, Goat Milk, SCC, Cold Storage

23. Isolation, molecular and biochemical characterization of goat milk casein and its fraction

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The SDS-PAGE electrophoretic pattern of goats' milk has a unique pattern compared to those of cow and human milk. β -casein is the major fraction and comprises 70.2% of total goat-milk caseins, while α - is a minor fraction (29.85 %). This pattern is similar to that of human casein but different to that of cow casein. Purified casein fractions of goat milk showed different electrophoretic migration compared to those of bovine milk. The corresponding Mr(s) of goat α - and β -casein were estimated at 30.2 for α s and 26.6 & 23.9 for β 1 and β 2 versus 32.6 and 26.6 for bovine α - and β -casein, respectively. The amino acid composition of goat-milk whole casein appeared to be similar to those of cow, sheep and camel caseins. Meanwhile, goat casein has the satisfactory balance of essential amino acids equal to or exceeding the FAO/ WHO/ UNU requirements for each amino acid. Goat α s-casein was characterized by the presence of higher contents of both acidic and basic amino acids than β -casein. Peptide mapping profiles of goat, cow and human caseins were completely different. This means that each protein has its own unique peptide mapping.

24. Biological value of goat-milk casein

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The effect of feeding of goat and cow milk caseins on the body weight gain, body organs, erythrocytic & leukocytic counts and their parameters, plasma lipid profile, liver enzyme activities, renal function and plasma proteins of rats over a period of 45 days was studied. Feeding of goat or cow milk caseins had no significant effect on the parameters studied ($P \leq 0.05$) between rats fed either milk. However, rats fed on goat milk casein showed a significant increase in high density lipoproteins, which are considered more useful, and a decrease in low density lipoprotein in blood of rats fed on goat milk casein.

25. Effects of *trans*-10, *cis*-12 conjugated linoleic acid dietary supplementation on quality and texture profile of semi-hard goat milk cheese

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Dietary supplementation of *trans*-10, *cis*-12 conjugated linoleic acid (CLA) has been reported to affect milk composition by milk fat depression in dairy cows, sheep, and goats. In this study, effects of *trans*-10, *cis*-12 CLA dietary supplementation on quality and texture profile of semi-hard goat milk cheese were investigated. Thirty Alpine does were randomly assigned into three groups and fed diets supplemented with lipid-encapsulated *trans*-10, *cis*-12 CLA at dosages of 0 (control), 3 (CLA-1), and 6 g/d per doe (CLA-2). A three-period (each period was 2-wk, followed by 2-wk between periods) experiment was conducted using a 3×3 Latin square design. Bulk milk was collected from evening and morning milkings for cheese manufacture after 3 and 13 d of treatment in each period. A total of 18 batches of semi-hard cheese were made and cheese samples were collected on Day 1 (fresh) and Day 60 (aged) for the analyses of yield, composition, sensory score, and texture profile. Longer treatment (13 d) and the highest dosage of CLA (6 g/d per doe) resulted in 10.0% lower cheese moisture and 10.2% lower cheese yield as compared with the control. However, the lower dosage (3 g/d per doe) and shorter treatment (3 d) of CLA supplementation did not significantly affect cheese yield, composition, or fresh cheese texture profile. CLA supplementation also had significant effects on cheese fat and fatty acids recovery but not on cheese sensory scores. Hardness, springiness, and chewiness of cheeses increased while cohesiveness and adhesiveness decreased when milk fat was reduced by *trans*-10, *cis*-12 CLA supplementation. It is concluded that dietary supplementation of *trans*-10, *cis*-12 CLA with an adaptation period between 3 and 13 d and a minimum level of between 3 and 6 g/d per doe were needed to affect quality and texture profile of semi-hard goat milk cheese.

26. Effect of fat reduction on food quality of three months ripened reduced-fat goat milk cheese compared with full-fat cheese

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Reduced or low fat dairy products have been increasingly popular among consumers since high fat diets are implicated with coronary heart diseases and other health problems. Many studies have been conducted on evaluation of food quality of reduced-fat and low-fat cow milk products, especially in cheeses. However, research on reduced or low fat dairy goat products has been almost non-existent. Two lots reduced-fat (RF) and two lots of full-fat (FF) Cheddar-type caprine milk cheeses were manufactured to study the effects of fat reduction and aging on food quality of the cheeses. The experimental cheeses were made at the University dairy plant using bulk tank milk collected from Saanen, Alpine, and Nubian goat herd. Cream was separated from the whole goat milk by a cream separator (Model PG-57, Hoegger Suppl. Co., Fayetteville, GA, USA), and RF cheeses were processed using cream separated milk. One FF cheese was made using 2 week old pasteurized milk for a reference observation. All cheeses were subjected to aging at 4°C for three months, and lipolytic and proteolytic indices were examined. Moisture contents of all RF and FF cheeses were more than 42% and exceeded the legal limit (39%) of Cheddar cheese, probably due to the soft curd formation. Average fat contents of RF and FF cheeses were 22.95 and 27.0%, and the range of fat reduction was 15.4-21.4%. Acid degree value (ADV) as lipolytic index of free fatty acid contents for RF and FF cheeses were 0.820 and 0.775, respectively. No difference in ADV was found between 1 and 3 months aged RF cheeses (0.721 vs. 0.820). However, the FF cheese made of 2 weeks old milk revealed substantial elevation in ADV (0.775 vs. 2.87). Mean water soluble nitrogen (WSN) as proteolytic index for the RF and FF cheeses were not different (16.69 vs. 17.54%), while the reference cheese had significantly increased WSN (20.58%). No difference in pH between RF and FF cheeses was found after the ripening (5.31 vs. 5.28). Fat reduction up to 21.4% made no difference in lipolytic and proteolytic indices as well as in flavour characteristics of the RF goat cheeses.

27. The effects of modified atmosphere packaging rich in oxygen on goat kid meat quality

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40 goat kid ribcages were held for 7 days in storage conditions (4°C) and used to determine the effects of three different packaging methods (atmospheric air, vacuum and modified atmosphere package -MAP- 10:70:20 mixture of N₂:O₂:CO₂) on meat quality. Instrumental colour (L*a*b*), final pH, water holding capacity (WHC), and water loss were recorded at 1, 3, 5 and 7 days. L* was affected by the packaging method, as the chops packaged by the MAP were lighter than those stored by the other methods of vacuum and atmospheric air packaging at day 7 of storage. The coordinate a* statistically increased during storage time, being higher on day 7 than on day 1 for vacuum and MAP. For MAP packed chops and those kept in atmospheric air, b* increased markedly during storage time whereas it remained unaffected throughout storage when in vacuum packages. Final pH values ranged from 5.6 to 5.8 and no effects were found for either storage time or packaging method. WHC means were lowest for the three packaging methods on day 7 of storage and highest on day 1. Storage time increased water loss in vacuum treatments, being highest on day 7 and lowest on day 3.

28. Evaluation of chemical and color index characteristics of goat milk, its yoghurt and salted yoghurt

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Salted yoghurt (SY) is one of the most popular dairy products in Hatay region of Turkey. It is made of goat milk, and known as “yoghurt cheese” or “winter yoghurt” due to its high solids content and long shelf life. Two different salting methods are traditionally used in manufacturing the SY: First by direct salting to the yogurt, and second by salting to whey removed yogurt before boiling. The SYs were manufactured using the direct salting method to compare the differences between the two salting methods in chemical parameters and changes in color values during salted yoghurt processing with reference to the original milk. Chemical composition and parameters such as total solids, fat, ash, salt and pH of the products were evaluated. The color characteristics of the samples were measured by the Minolta Chroma Meter CR-400 (Minolta Co., Ltd, Japan). Results showed that the mean chemical composition and indices of the original goat milk, regular yoghurt and SY were: total solids (%) 12.2, 12.0 and 31.9; total fat (%) 4.40, 4.20 and 10.20; ash (%) 0.58, 0.60 and 2.26; pH 6.53, 3.67 and 3.77, respectively. The slight decreases in total solids and fat contents of the regular yogurt may be due to the water from the yoghurt culture, where one-day old yogurt was used as starter culture. SY has substantially ($P<0.001$) higher fat and total solids contents compared to the original milk and regular yogurt, while pHs of both yogurts significantly ($P<0.01$) lower than that of original milk. Color values of the goat milk, regular yoghurt and SY were: L 85.2, 90.19, 92.07; a -3.38, -3.37, -7.33 and b 7.76, 7.33, 14.72, respectively. The mean L -value, lightness, was the lowest in milk. The a -value, an indicator of green color, was higher for milk and regular yoghurt. Yellowness (b -value) index was the highest in SY. The characteristics of color analysis revealed that yellowness increased two-fold during cooking of the yoghurt, and greenness decreased two-fold during cooking in comparison with those of regular yoghurt and milk samples. These color changes may be attributable to the caramelization of carbohydrates in the milk.

29. Effect of feed deprivation time on bacterial contamination of skin and carcass in meat goats

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Previous research has shown that diet and feed deprivation time prior to slaughter can influence the fecal shedding of bacteria in goats. This experiment was conducted to determine the effects of feed deprivation time (FDT) on skin and carcass bacterial counts. Thirty-two Boer × Spanish goats (BW = 18.8 ± 0.82 kg) were randomly assigned to one of 4 FDT (0, 9, 18, or 27 h) before slaughter. Immediately after slaughter and evisceration, the pH values of rumen liquor and cecal digesta were determined. Rumen and rectal content samples were collected and transported to the laboratory for culture and determination of microbial load. Initial pH of *Longissimus* muscle (LM) was determined at 15 min postmortem on each carcass. Swab samples were collected from skin (hind leg; 25 cm² area) and carcass (flank, brisk and leg; 75 cm² area) of each animal to assess the bacterial load. The 27-h FDT group had higher ($P < 0.05$) rumen pH (6.95) than 0 h (6.23) or 9 h (6.46) FDT groups. Cecal pH was not affected ($P > 0.05$) by FDT. The microbial counts of rumen and fecal contents were not influenced by FDT. The *E. coli*, total coliform (TCC), and total plate counts of rumen content were 2.93, 3.14, and 6.08 log₁₀CFU/g, respectively, and those of fecal contents were 3.56, 7.25 and 6.81 log₁₀CFU/g, respectively. The FDT had no effect on the initial (pH = 6.87) of LM. The *E. coli*, TCC, and aerobic plate counts on skin were 1.13, 1.49, and 3.78 log₁₀ CFU/cm², respectively, and those on carcasses were 1.51, 1.65, and 3.11 log₁₀ CFU/cm², respectively. Both skin and carcass microbial counts were not affected ($P > 0.05$) by FDT. The results indicate that feed deprivation time alone up to 27 h may not significantly influence gut, skin, or carcass microbial loads.

30. Evaluation of quality parameters of goat unripened cheese added of Cumarú (*Amburana cearensis* A.C. Smith)

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The goat milk production and byproducts has been impelled in the Brazilian northeast rising as an emerging economic and nutritional option for small farmers. On this side, the production of goat unripened cheese added of Cumarú (*Amburana cearensis* A.C. Smith) has appeared as an interesting alternative for improving the income of small farmers from Cariri Region, Paraíba State, Brazil. Cumarú is a Brazilian northeast native plant known as having some medicinal properties as anti-inflammatory, analgesic and bronchi wider. This study aimed to evaluate some quality parameters of the goat unripened cheese added of Cumarú manufactured in Paraíba State, Brazil. 20 samples of the assayed cheese were submitted to physico-chemical (moisture, axes, acidity in lactic acid, proteins and fat), microbiological (fecal coliforms, mesophilic, moulds, *Staphylococcus* spp. and *Salmonella* spp.) and sensorial (aspect, flavor, texture, taste, global evaluation using score range of 1 – 9; and purchase intention using score range of 1 – 5) analysis. Average values found to moisture, axes, protein, fat, ashes and acidity were 46.12 %, 3.66 %, 24.01 %, 25.54 %, respectively. Counts of mesophilic and moulds were in a range of 3.7×10^4 – 5.6×10^8 and 4.6×10^2 – 5.2×10^8 cfu/g, respectively. For fecal coliforms it was in a range of $< 0.3 \times 10^1$ – 2.0×10^3 MPN/g. *Salmonella* spp. and positive coagulase *Staphylococcus* were not found. Results of the sensorial quality analysis revealed average scores of 7.03, 6.93, 7.13, 7.02 and 7.23 for aspect, texture, taste and consistence, respectively, suggesting a general good acceptance of the tested product. Purchase intention evaluation showed an interesting average score of 3.98. In respect to the high count of mesophilic and moulds and the general good acceptance found to the analyzed cheese rise the necessity of improving the sanitary control in their manufacture which could result in better insertion of them in the food market.

31 Effect of ripening on mineral composition of Palmero PDO cheese

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Palmero PDO cheese, from Canary Islands, is an uncooked, pressed cheese, ripened at different periods. It presents two varieties, *artisan* cheese and *herd* cheese with goats grazing autochthonous forages. The objective of this paper was to determine the effect of ripening time, day of elaboration and cheese maker on the mineral composition of Palmero PDO cheese. The technicians of the Regular Council selected 4 cheese artisan factories representatives of the island production. Cheeses were made three consecutive days and ripened for 0, 15, 30, 60 and 90 days. The minerals and the trace element concentrations were determined by spectrophotometry in the case of P and by atomic absorption spectrometry with air/acetylene flame (Na, K, Ca, Mg, Fe, Cu and Zn) or with hydride generation (Se) previous nitric digestion in samples. Within the macroelements, Ca was the element with a higher content, followed by P and Mg which had a lower concentration. The Na introduced a high variability in the cheeses tested, which is due to differences in added salt. Within the trace elements, Zn was the largest element, and Se was the lowest concentration in cheese. No significant differences were observed in any of the items discussed between the three days of cheese elaboration. Significant differences were found between the three different cheeses for each ripening time made by farmers for all the minerals and trace elements analysed, except Mg and Zn. The changes in the ripening process of cheeses involve variations in the content of minerals and trace elements that, in general, tend to increase. The different elaboration process between cheese makers involves changes in the contents of minerals and trace elements. However, we found no significant changes in this content on sire by the same cheese maker, it is clear that the producers had uniformity in cheese elaboration. Acknowledgements: This work was supported by DOQUECAN Project (Canarian Government) with FEDER funds.

32. Sensorial changes in Palmero PDO cheese during ripening (90 days)

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Palmero PDO (Protected Denomination of Origin) cheese is a traditional Canarian cheese made with raw milk from the Spanish local breed of Palmero dairy goats. This study was a part of the regional project (DOQUECAN) which was focused on the valorisation of Canarian P.D.O. cheeses. The objective of this study was to evaluate the changes in physical parameters (colour and texture) of Palmero PDO cheeses during 90 days of aging. Forty-eight hand-made cheeses from 4 different producers were compared by determining sensorial characteristics, mechanical parameters from the texture profile analysis (TPA) and colour parameters in terms of CIELAB and CIELCH colour space. The rheological and colour changes in the experimental cheeses were examined throughout 15 to 90 days of ripening. During the 90 days of ripening an increase ($p < 0.001$) in hardness, fracturability and chewiness occurred and elasticity decreased simultaneously. The L* internal value decreased significantly ($p < 0.001$), while yellowness increased during cheese ripening. Chroma and Hue angle changes were not clear. Sensorial texture also was affected: roughness increased along ripening and friability only until 60 days aged, moisture decreased and elasticity decreased while firmness, solubility and granularity did not change. Odour and flavour intensity increased and lactic descriptor change to herbal, dry fruits and butter sensations. Older cheeses were more salted and sharp and with less acidity; cheeses were a little bitter until 30 ripening days. All these sensorial and instrumental profiles are useful tools for PDO panel testers and for a better definition of this traditional cheese. Acknowledgements: This work was supported by DOQUECAN Project (Canarian Government) with FEDER funds.

33. Influence of feed and rennet type on mineral composition of goat's milk cheeses

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The minerals and the trace element concentrations were determined in samples of Majorera goats' raw milk and whey and several types of cheeses (fresh; semi-hard; and hard cheeses) produced under experimental conditions following the traditional method authorized by the PDO Majorero Cheese Regulatory Board. The variations factors were: diet of females (traditional diet with local forages vs. a diet poor in long fiber) and rennet (natural rennet from kid's abomasums vs. commercial animal rennet). The determinations were carried out by atomic absorption spectrometry with air/acetylene flame (Na, K, Ca, Mg, Fe, Cu and Zn) or with hydride generation (Se) previous nitric digestion while phosphorus was determined by spectrophotometry. The type of diet used in feed for animals such as the type of rennet used to make cheese had little influence on the concentration of the macroelements and trace elements studied. In general, semihard and hard cheese samples obtained from goats fed with local forage had a higher mean of Ca, K, Na and P concentrations than those samples obtained from goats fed with the diet poor in fiber. While in milk and fresh cheese the mineral concentrations are favourable to concentrate diet. They type of rennet used in the cheese making process had some influence on the content of mineral and trace elements. The cheese obtained with commercial rennet showed higher concentrations of all minerals and trace elements, being significant for Na and Zn. A complete differentiation of the samples according to the type of dairy product was observed applying a stepwise lineal discriminate analysis (LDA). When the stepwise LDA was applied on whey and on the three types of cheeses differentiating the rennet used, an almost complete percentage of correct classifications of the cheeses were obtained according to the goat's diet consumed by the animals. Acknowledgements: This work was supported by DOQUECAN Project and RTA 01-092 Project, both with FEDER funds.

34. Effect of forage type and goat breed on health promoting index and fatty acid profile of caciotta cheese

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Changing the milk fatty acid composition can improve the physical and nutritional properties of milk and dairy products, as well as, their acceptability to consumers. A more healthful milk fatty acid profile can be achieved by changing goat's diet or selecting animals or breeds with more unsaturated milk fatty acid content. We examined the effect of type of forage and that of goat breed on fatty acid composition and health promoting index. The health promoting index (HPI) is the sum of unsaturated fatty acid divided by the sum of lauric acid, palmitic acid and 4 x miristic acid; increasing values of HPI dairy product mean increased health promoting. The aim of *experiment 1* was to evaluate the effect of two single silages (*Triticale* and *Corn silage*) and two single hays (*Oat* and *Alfalfa*) on HPI and fatty acid profile of *caciotta* cheese. The forage type affected HPI and fatty acid profile of *caciotta* cheese. The HPI differences resulted mostly from increased proportion of oleic acid in milk fat of *Triticale silage* group. As regard Conjugated Linoleic Acids, the higher content was detected in *Triticale* and *Corn silage* groups rather than in other groups. It appears that *Triticale silage* favourably modifies the nutritional quality of *caciotta* cheese fatty acids by raising its HPI sharply. The aim of *experiment 2* was to study the effect on the fatty acid composition and HPI of *caciotta* of four Mediterranean goat breeds (*Maltese*, Red Syrian, *Ionica* and *Girgentana*). In spring, all goat breeds were reared at pasture and received concentrate supplement indoor. The breed affected HPI and all fatty acid except saturated and monounsaturated fatty acids. *Caciotta* cheese from *Girgentana* breed displayed a fatty acid profile, CLA content and HPI index compatible with good health and nutrition of consumers.

35. The electronic nose (ES) techniques to discriminate cheese from different animal species and goat breeds

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Electronic nose is a widespread emerging method that recently has been applied to the experimental analysis of milk and dairy products but also to the rapid appreciation of silage quality and meat aroma. The electronic nose PEN3 was used. An electronic nose does not provide any information about the chemical composition (compounds category and compounds content) of sample. With a training set (pattern) it is capable to distinguish the quality of different products (discrimination), or may be used for discovering deviations between standards and different samples. The basic principle of operation of Sensor-Array always consists of a combination of chemical sensitive sensors. The signals obtained from these sensors (MOS - Metal Oxide Semiconductors) are related to the gas composition currently measured and can be compared with previously stored pattern. The aim of this study was to examine the possibility of use of EN in a synthetic predicting evaluation of the differences between cheese of different animal species, sheep and goat, and different goats breed (Ionica vs Saanen). The study was conducted to compare cheeses from sheep and goat mixed herds (146 samples), cheeses from sheep (50 samples) and goat cheeses (24 samples). In these last farms of goats cheeses from Ionica breed (9 samples) and Saanen breed (13 samples) were compared. Principal Component Analysis (PCA) and discriminate analysis (LDA) have been used for examination of the pattern data. For different animal species: the cumulative variance explained by the first two principal components was 96.4%, with the first component providing 88.7% of the total. For different goat breeds: the cumulative variance explained by the first two principal components was 73.2%, with the first component providing 53.5% of the total. The PCA and LDA graphs showed that the discrimination between different cheese species and different goat breeds is achieved easily. The results obtained by electronic nose analysis are promising and could be used to discriminate the different cheese from different animal species and goat breeds.

36. Physico-chemical, microbiological and toxicological characteristics of local goat's milk in the north of Morocco

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The present work aimed to study the physico-chemical, bacteriological, and toxicological characteristics of milk of North Moroccan goats. The studied parameters were pH, lactic acid, proteins, ash, fat, fatty acid profile, lactose, and oligo-elements. The bacterial study was focused on the hygienic and the technologic floras. Milk was also analyzed for pesticides and polychlorobiphenyles. The hygienic quality of goat milk depends essentially on the practices and rules applied during milking. In deed, in controlled breeding more than 95% of samples are in good quality, but in the extensive ones, less than 36 % of samples are in good quality. Concerning bacteriological quality, the technological floras is relatively important and it is dominated by halotolerant, mesophilic lactic, lactocoques and thermophilic lactic bacteria in the controlled breeding. The composition of goat milk is as follows: dried matter 13, 9%, fat: 3.6 %, proteins 3.9%, lactose 3.6%, ash 0.7%, pH 6.60, lactic acid 2,7g/l. The percentages of dried matter, fat, lactose and proteins increase significantly with the lactation period. The results obtained from this study indicated that the rank of lactation and parity of goat did not affect physico-chemical and bacteriological parameters. The composition of fatty acids of goat's milk is characterized by the dominance of middle chains fatty acids (C 14 – C 16), 43 % followed by short ones (C4-C12) and long ones (> C18). The general tendency observed during the advancement of lactation is a significantly increased for the C4, C12 and C16 fatty acids and a significantly reduced for the long chains fatty acids. The goat milk issued from different northern areas is rich in oligo-elements and contains few toxic elements, but lead percentage is high (between 48 and 120 ppb) in most studied areas. For pesticides and polychlorobiphenyles, the obtained values are less than the authorized limits.

37. Estimation of carcass composition tissue based on evaluated traits on live animals and after slaughter

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This work is aimed to analyze the interrelations among weight and carcass measures of *Longissimus dorsi* muscle thickness and area, and of sternum tissue thickness, measured directly on carcass and by ultrasound scan in live animals. It also aims to develop models of multiple linear regressions, to estimate the composition of shoulder blades, from selected variables, in kid goat of both genders, and five racial groups, raised on feedlot system. In this study 89 animals were used, of both genders and five racial groups. In the day before the slaughter, the animals were measured by ultrasound, with the images collected in the back region of the *L. dorsi* and in the sternum region between the 3rd and 4th sternum bone, biometric measures and scores of animal were also taken. The animals were sleighed about 110 days after solid deprivation, and presented shrunk weight (LW) that varied from 6.90 to 24.80 Kg. Other measurements were accomplished making a total of 32 variables. The variables considered relevant and not redundant on the information they carry, for the first common factor analysis, were submitted to a second common factor analysis in order to obtain a group of new variables, used in the carcass composition estimative development models. The presuppositions of linear regression models relative to residues were evaluated with the procedures: Lilliefors's test, graphic analysis of studentized residues versus estimated values and Durbin Watson's test. The group of 32 initial variables could be reduced to four variables that contained most of the relevant information for the initial group, being this information supplied by their inter-correlations. The selected variables were: 1 – hot carcass weight (HCW), 2 – rump perimeter, 3 – leg length, 4 – tissue height in the 4th sternum bone. The analysis of common factors was shown as an effective technique to study the interrelations among the independent variables. The measures of carcass dimension, solely, did not add any information to HCW. The carcass muscle weight can be estimated with high precision from simple models, without the necessity of information related to gender and breed, and it could be built based on carcass weight, what makes it easy to be applied.

38. Traditional cheese types in the Mediterranean region of turkey: some properties and made of Künefe and Sünme cheese.

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Künefe and Sünme cheeses, traditional dairy products from Southeastern part of Turkey, are produced local artisan cheese-making procedures. Künefe and Sünme cheeses are mostly made from goats', sometimes cows' milk or a mixture of both. While Künefe cheese is sold fresh as soft cheese for a special dessert (Künefe), Sünme cheese is usually consumed in the breakfast. The objectives of the present paper was to characterize the processing stages of Künefe and Sünme cheeses produced from goats' milk and to describe their compositional characteristics. A better knowledge of their characteristics would support the improvement of the production technology and help to obtain a constant quality product capable of being successfully introduced into national and international markets.

39. Preliminary studies on fatty acids composition in Milk of Xinong Saanen dairy goats

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The objective of the study was to analyze the fatty acids composition of goat milk from Xinong Saanen dairy goats of different number of births. Eight primiparous and 30 multiparous goats from the herd of the Saanen Goat Farm of Northwest A&F University were randomly selected to determine the fatty acids (FA) composition of colostrums and normal milk. 40 colostrums and 140 normal milk samples from Xinong Saanen dairy goats were collected to assay the FA composition using gas chromatography. The colostrums and normal milk samples of postpartum were collected twice a day in the morning and in the afternoon for five and two consecutive days, respectively, however, the normal milk were sampled in the end of wk 5, 9, 13 of the lactation, composite daily colostrums and normal milk samples were used for analysis. All data were statistically analyzed by analysis of variance using the general linear models (GLM) procedure of SPSS (12.0). The results indicated the significant differences in content of Butyric (C_{4:0}), Caproic (C_{6:0}), Caprylic (C_{8:0}), Capric (C_{10:0}), Lauric (C_{12:0}), Myristic (C_{14:0}), Palmitic (C_{16:0}), Oleic (C_{18:1}) and Linoleic (C_{18:2}) acids among the first five days after parturition ($P<0.05$), the means of Caproic (C_{6:0}), Caprylic (C_{8:0}), Capric (C_{10:0}) content which assumed to be the source of goaty flavor in the colostrums were 6.13%, 5.62% and 13.63%, respectively; there were significant differences in content of Caprylic (C_{8:0}), Lauric (C_{12:0}), Stearic (C_{18:0}), Linoleic (C_{18:2}) acids ($P<0.05$) and significant difference in content of Capric (C_{10:0}), Lauric (C_{12:0}), Oleic (C_{18:1}) acids between colostrums and normal milk ($P<0.01$), the significant differences in content of Oleic (C_{18:1}) and Linoleic (C_{18:2}) was also noticed between the primiparous and the multiparous goats ($P<0.01$). In conclusion, the differences in fatty acid composition for individual goats provided information to further research on the milk fatty acid synthesis and the milk-composition-based goat breeding.

Key words: Goat milk; Fatty acids composition; Lactation stage

40. Effect of sex and carcass weight (4, 6, 8 kg) on carcass and meat quality of “Cabrito Transmontano” (PDO)

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The objective of the study was to contribute to the characterization of the Serrana breed on the meat production aspects.

The study was carried out in 60 (Cabrito Transmontano) milk-fed kid carcasses (31 males and 29 females) to evaluate the effects of sex and carcass weight (4, 6 and 8 kg) on some carcass conformation measurements; on longissimus dorsi muscle thickness and fat thickness measurements; on regional joint carcass composition and finally on meat pH and color. Furthermore a study on the relative growth of the carcass joints and its tissue composition, by means of logarithmic transformation of the Huxley equation ($\text{Log } y = \text{Log } a + b \text{ Log } x$) was undertaken. Finally, prediction equations of the carcass composition were estimated by using both conformation and the longissimus dorsi measurements. An analysis of linear association was carried out and those measurements which were significant were included in the linear regression model applying a stepwise regression method. Results showed that sex did not affect the carcass conformation measurements, as well as on the meat pH and color, but there were some differences on the carcass regional and tissue composition, being the proportion of chump and breast joints, which contains more fat, higher in females than in males (0.3% and 0.9% respectively). A significant effect of carcass weight was observed on the carcass yield, the conformation, longissimus muscle thickness, fat thickness measurements, and regional and tissue compositions. In general, it can be indicated that values of all measurements increased with the increment of carcass weight. Furthermore, it was seen that pH was higher in the lighter carcasses than in the 6 kg and 8 kg carcasses. The red index and the saturation were higher in 8 kg carcasses than in the lighter carcasses. The allometry study indicated that limbs were precocious in growth in relation with the rest of the carcass and that the tissue that presented a more precocious growth was the bone ($b=0.79$), whereas the muscle showed an isometric growth ($b=1.05$) and the fat a later growth ($b=1.32$).

41 Carcass characteristics of indigenous goats of Zimbabwe

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Data from 537 indigenous goats (females and males) collected over a period of four years were analyzed to determine carcass characteristics of different age groups: 0-19, 20-33, and 34+ months. Live weights ranged from 20.4 to 38.4 kg for females and for males from 22.1 to 41.2kg, hot carcass weights from 7.9 to 15.6kg, and 9.6 to 17.6kg, and cold carcass weights from 7.6 to 14.9 and 9.2 to 17kg, for females and males respectively. Carcass length increased with age, ranging from 43.6 to 52 cm and 44.9 to 53.8cm for females and males respectively. Dressing out percentages of goats varied between 41% and 49%. Regression equation indicated live weight as a predictor ($r^2=0.88$) of cold carcass weight. Age at slaughter and sex significantly affected ($P<0.05$) live weights, carcass components, and dressing percentages both on live weight as well as on empty live weight basis. The edible and non-edible carcass components were significantly affected by age and sex. Results indicate the potential of indigenous goats in their contribution to red meat production. Indigenous goats are unselected, and a large percentage of the goat population is raised under subsistence management. The meat quality from young and old goats needs investigation so as to influence the marketing of goat products.

42. Carcass conformation and description of Creole goat of Guadeloupe: initial results

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A data base composed of carcass data on 164 Creole bucks was used. Kids were fed either at pasture or indoors with or without pellets and animals were slaughtered at 7, 11 or 15 months. Standardized procedures of slaughtering, carcass measuring and carcass cutting were followed. Weights of carcass, cuts and tissues, quality scores and linear measurements were analyzed. Feeding system, age at slaughter and weight were taking into account for statistical analysis and differences related to conformation score were discussed: 5 levels in the European official grid of light lamb implemented for meat goat in our country. There were significant differences among carcass conformation classes (CC) for many traits except for fat scores, leg length and compactness ratios: 2.2, 34.5 cm and 0.30 (carcass width on length) on average, respectively. As for joint weights, significant differences appeared between two groups: classes 1 and 2 vs. classes 3, 4 and 5. Regardless of carcass weight, the distribution of primal cuts remained similar with approximately 63% and the leg proportion represented 30%. Otherwise, values of chilled carcass weight and yield and carcass linear measurements, regularly increase until conformation class 4 or 5: 6.7 to 11.2 kg (1.17 by one point CC) , 49 to 55% (1.6 by one point CC) and 52.4 to 58.0 cm carcass length (1.9 by one point CC). Compactness indices calculated on a weight basis (g/cm), either for the carcass or the leg, increased significantly ($P < 0.01$): with 54 and 63% difference between the two extreme classes, respectively. Muscle, bone and fat proportions in the shoulder, did not vary within class of conformation with 0.72, 0.22 and 0.06, respectively. Same traits in leg were 0.74, 0.23 and 0.03, the two latter being different ($P < 0.05$) from class 1 to class 5. The ratios muscle/bone calculated either in shoulder or in leg ranged from 3.1 to 3.6 ($P > 0.05$). These initial results, using sheep grading system for goats, suggested that there is a lack of evidence for determining specific carcass attributes to describe Creole goat conformation. Further studies will allow to expand the data base and to use a multivariate analysis.

43. Effect of green tea and grape seed extracts / combination and TBHQ on physicochemical properties of Baladi goat meats on storage at 5 °C for 9 days

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This study evaluated the effectiveness of synthetic and natural antioxidants; green tea, commercial grape seed extracts/combinations and TBHQ, with varying concentrations on lipid oxidation and the redness of goat meats stored at 5 °C for 9 days. Fresh boneless baldi (black) goat meats were ground and mixed with varying concentrations of antioxidants: Green tea, grape seed extracts alone/ in combination and TBHQ. The color values of raw, and Thiobarbituric acid-reactive substance (TBARS) values of raw and cooked goat meat were determined for 0-9 days of storage at 5 °C. TBARS values ranged from 0.21 – 1.21 and 0.31 – 4.57 mg malondialdehyde / kg (goat meat) for raw and cooked goat meats, respectively. TBHQ and plant extracts significantly decreased lipid oxidation. Higher level of plant extracts addition was more effective in minimizing lipid oxidation. Grape seed extract addition significantly increased the redness while green tea decreased and no effect of TBHQ was observed. The antioxidants and selected plant extracts addition to baldi goat meat is an effective method to minimize lipid oxidation caused by storage.

44. Effects of different modified atmosphere packages on oxidation and myofibril fragment index on goat kid meat

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80 goat kid ribcages were used to determine the effects of four different packaging methods (atmospheric air, vacuum, modified atmosphere –MAP1- 30:30:40 mixture of N₂:O₂:CO₂ and –MAP2- 10:70:20 mixture of N₂:O₂:CO₂) on meat quality which were held for 7 d in storage conditions (4°C). Oxidation (TBA) and myofibril fragment index (MFI) were recorded at 1, 3, 5 and 7 days. Two experiments were performed. In the first experiment three packaging methods were used (atmospheric air, vacuum and modified atmosphere –MAP1- 30:30:40 mixture of N₂:O₂:CO₂). No effects of packaging method were observed on TBA and MFI. TBA at day 3 was statistically lower than at day 1, 5 and 7. Storage time did not affect MFI values. In the second experiment three packaging methods were used (atmospheric air, vacuum and modified atmosphere MAP2- 10:70:20 mixture of N₂:O₂:CO₂). No effects of packaging method were observed on TBA and MFI. TBA at day 3 was statistically lower than at day 1, 5 and 7. Storage time did not affect MFI values.

45. Serrana Andaluza kid carcass produced in extensive and intensive systems

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In the present study we have recorded 109 characteristics of the Blanca Serrana kid carcass, with a view of its use to define productive and commercially the main product of the breed, the meat. In this purpose we have sampled initially 40 kids, 20 males and 20 females. Half of them were located in an intensive farm until slaughtering with around 18 kg. Another set of kids was maintained in the original farm under extensive conditions. The carcass components were separated and weighted under standard methods, always by the same technician. These data were located in a data base and analyzed with the Statistic for Window soft ware. We applied a descriptive statistic analysis and ANOVA of fixed effects (GLM), enclosing the factors sex and management system as source of variation, together with their interaction. Our results have shown as in most of the studied variables there is not appreciable significant effect of the proposed factors and interaction; only those variables linked to the secondary sexual characters, such us the head weight, shown a clear effect of the sex; while those where the fattening is involved, shown a significant effect of the management system, but also some adaptative character as the digestive organs weight was affected by this source of variation. We have defined a specific profile for the commercial characteristics of the Blanca Serrana kid carcass, useful to differentiate it in the market. Also we have detected a small effect of the management system over the most interesting carcass variables. Also the sexual dimorphism was very few evident in the carcass characteristics.

46. An investigation of water-soluble flavour precursors and aroma volatiles from Saanen goat meat

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The Saanen breed is widely reared for milk production, and contributes significantly to the goat flock in UK. Producers have been concerned about the destiny of male Saanen kids, since there is relatively little demand for meat from these animals. The objective of this study was to investigate the water-soluble precursors and flavor profile of male Saanen goat meat, with the aim of understanding its flavor quality. Rumps from three castrated Saanen male goats (six months old) were analysed for their non-volatile components and volatile profiles. The major water-soluble flavour precursors were glucose (186 mg/kg wet weight), 5'-inosine monophosphate (152 mg/kg wet weight), inosine (105 mg/kg wet weight), glycine (57 mg/kg wet weight) and alanine (39 mg/kg wet weight); however cysteine was present at the lowest concentration (0.04 mg⁻¹ wet weight) among the free amino acids. Glucose, IMP, and cysteine appeared to be important in goat meat flavor formation. One hundred and forty volatile compounds were identified in the flavor profile of Saanen goat meat; a profile which was similar to that found the other red meat, such as lamb and beef.

47. Chemical composition and flavor of chevon as influenced by a diet high in condensed tannins

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Diets high in condensed tannins (CT) have been reported to decrease nematode infections in meat goats. However, the effect of feeding high levels CT on the quality of goat meat (chevon) has not been studied. This experiment was conducted to determine the effects of a high CT-containing diet (sericea lespedeza hay) on the chemical composition and flavor of chevon. Twenty Boer × Spanish kids (6 mo of age; BW = 19.2 ± 0.74 kg; n = 10 goats/treatment) were fed 75% ground sericea (2 pens, SER) or bermudagrass hay (2 pens; BER), and 25% corn-based supplement for 14 wk (n = 10 goats/treatment). At the end of the feeding trial, goats were slaughtered using standard procedures. After 24 h of cooler storage (2 °C), the carcasses were fabricated to obtain 2.5-cm thick loin chops (Longissimus dorsi, LD) and used for chemical and flavor analysis. No significant differences were found in moisture, protein, fat, and ash percentages between the LD muscle samples from SER and BER groups. Four fatty acids, palmitic (16:0), stearic (18:0), oleic (18:1n9), and linoleic (18:2n6) acids, made up 87% of the total lipids in the LD muscles of goats, but no differences ($P > 0.05$) were found between treatments in the percentages of these fatty acids. However, goats from the BER group had higher ($P < 0.05$) levels of margaric (17:0) and *trans*-7-hexadecenoic (16:1t) acids in LD muscles, compared with those from the SER group. Analysis of broiled meat volatile compounds revealed 7 aldehydes, 5 ketones, and 7 alkanes in the chevon loin chops; however, no significant differences were found in the SER and BER groups. The results indicated that a diet containing high levels of CT did not influence the basic nutrient and fatty acid profile of chevon, as well as cooked flavor volatiles.

48. Fatty composition of the Serrana Andaluza kid carcass

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It is known that the value consumers place on different types of meat including goat meat depend of the chemical composition of the carcass. This paper reports on the effect of management system and sex on fat characteristics. Samples of mesenteric and pelvic-kidney fat and fat extracted from muscle (*Longissimus dorsi*) obtained from 30 kids of both sexes and two management systems (intensive and extensive) were evaluated for the levels of Saturated fatty acids (AGS), Unsaturated Fatty Acids (AGI), Monounsaturated fatty acid (MUFA), Polyunsaturated Fatty Acids (PUFA), Appreciated Fatty Acid (AGDES) and not Appreciated Fatty Acids AGIND). The results obtained from the descriptive statistic analysis and the ANOVA with sex and management system as fixed effects and their interactions have shown a high variability among individuals, but they were randomly distributed in the experiment in most of the cases. Only MUFA and PUFA have shown a significant effect on the muscular fat, while MUFA was also significantly affected by sex in the mesenteric fat. It was concluded that the variation in fatty acid composition was very high within the sample population, but was not clearly identifiable the source of variation, at least sex and management system did not show spectacular signification.

49. Tissue composition of the Murciano-Granadina kid carcass

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Tissue composition of the carcass is something valued in the commerce. Carcass prize depends of the proportion of noble pieces. By now, knowledge on this subject in the Murciano-Granadina breed were null, even we are in a process to put in value the meet from this dairy breed. Here we are showing the result obtained in the piecing of 61 Murciano-Granadina kid carcasses. We have separated bone, muscle, and fat in surface and internal fat components in five body areas (neck, leg, t-bone, arm and abdominal area). These data were studied statistically by mean of a descriptive statistic analysis and ANOVA of fixed effect enclosing the factors sex, management systems (Intensive and Organic) and their interaction. Our results have shown mean values in the ratio of the specie, but a high variability. The analysis of variance has shown a slight sexual dimorphism affecting the tissue components of the carcass justifying the traditional preference for male carcass. Some muscular and fatty components have been affected by the management system, because the differences in feeding and exercise. Anyway, we can conclude that in early ages carcasses have shown a good commercial quality with clear specificities to get the differentiation of the product in the market.

50. Effect of transportation on muscle fiber properties and meat quality characteristics of Omani goats

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This experiment aimed to study the effects of road transportation in an open truck under solar radiation during hot season on muscle fiber properties and meat quality characteristics of Dofari Omani goats. Thirty-one year old male goats were divided into two groups (Transported or Control). The Control Group remained in holding pens of slaughterhouse lairage with feed and water provided ad libitum prior to slaughter. The Transported Group was transported on the day of slaughter for 300 km in an open truck under solar radiation (average ambient was 36°C). Animals were blood-sampled before loading and immediately prior to slaughter. Muscle samples were removed within 20 minutes post-mortem from the left longissimus dorsi (LD) muscle at the last rib location. Samples were immediately cut into one cm² pieces (parallel to the muscle fibers) and frozen in iso-pentane that was cooled using liquid nitrogen. Muscle samples were cut (8-µm-thick) on a cryostat at -20°C, and placed on silane-treated microscope slides. Sections were treated with an acid preincubation at pH 4.35 followed by an alkaline treated at pH 7.8. Sections were treated with a combination histochemical staining procedure of reduced nicotinamideadenine dinucleotide-terrazolium reductase for metabolic capacity and acid myofibrillar ATPase to identify Type I, IIA and IIB muscle fiber types. Samples were viewed using a Leitz (Wetzlar, Germany) diavert inverted phase contrast-fluorescence microscope with a magnification of 160X. Images were taken using a Spot 2 Slider camera. At least 500 myofibers on four viewing frames per sample were counted for the determination of fiber types (I, IIA and IIB). Three sections were analyzed for each muscle sample. From each section, at least 10 muscle fiber types (I, IIA and IIB) were measured and then averaged for the determination of CSA. The rest of LD muscle was left with the carcass and kept in the chiller (3-4°C) for 24 hrs then dissected. Muscle shear force, sarcomere length, pH, expressed juice, colour and cooking loss were measured. The transported goats had higher plasma cortisol (P<0.01), adrenaline, nor-adrenaline and dopamine concentrations (<P0.05) than not-transported goats. Transportation stress had a significant (P<0.05) effect on meat quality characteristics of the LD, muscle. Meat from transported goats had significantly higher ultimate pH, expressed juice, cooking loss percentage, shear force, but significantly shorter sarcomere length, L*, a* and b* values. Muscles from the transportation goats had a significant higher diameter for the three muscle types than non-transported animals. These results indicated that subjecting goats to the two-hour road transportation under high ambient temperatures can generate major physiological and muscle metabolism responses that may lead to deteriorate meat quality characteristics.

51. Some physical characteristics and using areas of coarse and down (cashmere) fibers obtained from hair goats in Turkey

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In this research, some physical characteristics and using areas of coarse and down (cashmere) fibers obtained from hair goats (ordinary goat) raising in the province of Antalya, Artvin, Diyarbakir, Izmir, Kars and Konya were determined. In the general provinces, the diameters of coarse and down fibers are 92.1 ± 0.56 and 16.5 ± 0.07 micron, respectively. The number of crimp of the down fiber was 9.3 ± 0.108 , nature length of coarse fiber was 11.6 ± 1.37 cm and nature and true length of down fibers were 2.4 ± 0.35 cm and 4.4 ± 0.47 cm, respectively. According to the handicrafts research made in the above mentioned areas, tent, stiffening cloth, card weaving, floor weaving (çul and cicim), saddle-bag, bag, sack, feeding bag, stocking obtained from coarse fibers; hat, scarf, glave, stocking obtained from down fibers of Hair goats were determined.

52. Performance and carcass yield of goat kids under tropical grazing conditions in Guerrero, Mexico

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The aim of this work was to study variations in the bodyweight gain and carcass yield over the period June to October in a caducifolious forest located in the region of “tierra caliente” Guerrero, Mexico. 10 male goat kids were allocated, to two groups (A and B) at 18° 29' 59 N latitude and 100° 02' y 101° 29' W longitude and set to grazing without supplementation. The region is described as a warm sub-wet dry tropical climatic condition (AW0). The vegetation included *Cynodon dactylum*, *Panicum fasciculatum*, *Asistida ternipes*, *Pithecellobium acatiense*, *Prosopis leavigata*, *Cordia elaeagnoides*, *Cassia tora*, *Pithecellobium dulce*, *Acacia farneasiana*, *Malva parviflora*, *Ipomoea purpure*, *Cuphea aequipetala*, *Cassia didymobotrya* and *Ipomoea cairica*. Animals were weighed bi-weekly throughout the study, slaughtered at 120 days of age. The results were analyzed by ANDEVA, comparison of means with a significant difference were established by Tukey's ($P < 0.05$). The daily bodyweight gain at the first period was 0.042 y 0.040 Kg for group A and B respectively. During the second, third, fourth and fifth periods registered values of 0.093, 0.079, 0.118, 0.039 and 0.066, 0.092, 0.126, 0.104 Kg/day, for group A and B respectively, without difference ($P > 0.05$). At the 90 days there were no changes in the bodyweight gain, compared with the previous steps in both treatments, but in the next period (seventh) goat kids lost weight (0.132 y 0.026 Kg/day). Final body average weight in both groups was 19 kg. Group A and B hot carcass weights (40.94% and 34.4% respectively) were different ($P < 0.05$). The delay of the goat kids growing was probably due to the scarce of feed at the beginning of the trial as well as the presence of *Monezia spp* detected in the course of the sixth, seventh and eight periods. Additional investigation is necessary in order to clarify the complete potential of goat kid production under tropical condition.

53. Development of strategies to increase commercial production of mohair and cashmere in Australia

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Australia has mohair and cashmere industries which need to expand to obtain economies of scale and retain commercial services. Supply chains exist for larger industries but investors have not been attracted in sufficient numbers to counteract the exit rate of farmers. To identify perceived impediments to diversifying into mohair and cashmere production and develop programs and strategies, targeted interviews of people internal and external to these industries were conducted. Questions focused on attributes of investment decision making (financial, compatibility, marketing, information, perception). Analysis differentiated the views of small and large-scale farmers and farmers external to these industries. The results showed: 1. Profitability was the primary financial motive for running cashmere or mohair enterprises followed by financial security. Job satisfaction and job variety were the major non-financial motivators. 2. People unrelated to the industry rated feasibility and comparative advantage as highly important. They perceived finding financial and marketing information more difficult than people in the industry and they had less trust in the people's opinions. People thought there was a lack of experienced and qualified people to give them reliable advice. 3. Assessing the suitability of a farm for mohair and cashmere is not easy and comprehensive enough to ensure people make a fast and considered decision. 4. Large-scale farmers have a higher demand for credible and detailed information that has been proven correct over time. They respect credible consultants, local Department of Agriculture, Associations and commercial farmers but not breed societies and small breeders. We found that information is available but not accessible or is inappropriate to make fast and effective decisions. 5. People will invest if they can be convinced they will be better off. Benefit statements alone are not enough. Proof (net gain) is needed. Suggested strategies included: use of commercial producers as information generators; improve the quality of information provided; articulate features, advantages and benefits; manage objections of enterprises to change perceptions; gather credible information; establish financial feasibility model with benchmarking and financial data; control more steps of the investment decision-making process to reduce 'search, thinking and time obsolescence costs'. Large-scale farmers will judge these enterprises on profitability, appealing to other motives will fail.

54. Milk-fed kid (cabrito) preferences

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The main purpose of this work is the characterization of consumers' preferences for *Transmontana* Milk-fed kid meat, which is a Protected Origin Designation (POD) product. The effects of sex and carcass weight were studied. Parameters of taste, texture, juiciness and overall acceptability were evaluated on sixty males and females allocated to 3 carcass weight groups: 4, 6 and 8 kg. Animals were grouped by sex and carcass weight in 6 different groups: 4 kg females, 4 kg males, 6 kg females, 6 kg males, 8 kg females and 8 kg males. Sensory quality of meat was evaluated by a consumer's panel in a total of 1360 answers, in ten sessions. Meat was previously cooked in a conventional oven. Then it was cut in sample pieces and given to the panel members to be evaluated following a standard methodology. *Cabrito Transmontano* POD includes animals from 4 to 9 kg carcass weight. Even so, differences among them can be important, since both taste panel and consumer's panel found differences between animals from different weights. Meat from lighter carcasses was considered by the taste panel as more tender, with less flavour and odour intensity than heavier animals. Consumers from the panel preferred lighter carcasses, in all sensory parameters studied. The results indicate to Breed Association to sell young animals to produce light carcasses according to consumer preferences in a better way to reduce costs with a higher market price and not competing with the milk production fundamental to produce a cheese also with protected origin designation. In fact, this may conduct to higher profitability since lighter animals have higher market price.

55. Meat goat demographics and niche marketing

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Six focus groups were conducted with each having ten people who attend different Islamic Centers in Ohio. The objective of the focus groups was to understand Halal meat purchase patterns and consumption patterns of the Moslem population with special attention to goat. The Ohio State University Extension personnel are utilizing these results to work with meat goat producers to understand and meet the requirements of the Halal meat market. Participants discussed the Zabiha approach to slaughtering animals as the most merciful by causing the least pain. Many participants noted they had no way of knowing where the animal came from and this held tremendous concerns relative to the feeding of animal by-products, use of hormones, and adulteration with pork. These trust concerns led to decisions about where to purchase their meat with 72% purchasing from a Moslem owned retail store. Only 13% purchased from a large grocery and 8% direct from a farmer. Participants indicated their consumption patterns according to weekly, seasonal, and holiday use in addition to variations according to their personal geographic origin. The average meat purchase was 23 pounds with an average occurrence of 12.5 times per annum. Purchasing trends indicated that 78% prefer lean over marbled cuts. Nearly 86% prefer fresh over frozen goat meat and nearly a third responded that they would pay more for fresh. Intact males were preferred by 42% of the respondents. Preferences for meat goat cuts were: Leg (71%), Chops (42%), Shoulder (24%) and Breast (7%). Nearly a third indicated they also want the kidneys, heart, or head. Demographic shifts in the United States indicate that there are almost 53 million people who have a preference for goat meat. There are 2.4 million goats in the US according to the 2007 Agricultural Statistics. Based on consumption trends of this study, goat demand exceeds inventory by 160%. Meat goat consumer trends are changing regarding religious concerns, convenience, food safety, and food quality issues. Opportunities exist to develop niche marketing opportunities for fresh goat with local ethnic or faith based populations.

56. Local consumer's knowledge and willingness to pay for the handmade andalusian goat milk cheeses

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Andalusia is the Spanish Autonomous Community leading the production of goat milk. Its autochthonous milking breeds (Payoya, Murciano-Granadina, Malagueña and Florida), besides the exploitation of natural resources, result in an ample variety of high quality handmade goat milk cheeses all of them made from traditional recipes. The increasing supply of andalusian quality products, linked to the growing interest of consumers in healthy food products, result in the development of supporting policies in the regional, national, and EC framework, and show a necessity to study the market of quality food products in defense of this singularity. In this paper, local consumer's knowledge, and willingness to pay for handmade goat cheeses are studied. These variables are explained both by the socio-economic characteristics and the typology of local consumers. The methodology followed to perform this consumer typology is based in a Cluster Analysis, using the information coming from a survey on consumption and purchasing behaviour of cheeses, made to a sample of 400 consumers, stratified according to the population of the andalusian production areas. Chi-squared tests were used to study the relationship between the criterion and the explanatory variables. Some significant results show that local consumers are used to eating handmade cheeses very frequently, preferring semi-cured or cured cheeses; they are very demanding in regard to quality, and most of them would pay more than for an industrial cheese. Based on these results some conclusions are drawn, and some recommendations have been made to improve the level of knowledge and willingness to pay for handmade goat cheeses among local consumers.

57. Traditional dairy goat products produced in the Mediterranean region of Turkey

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Goats' milk has been used as a raw material for various products in dairy production sector since ancient times. The unique properties of goat milk and the increasing interest for healthy and natural products have heightened the demand for dairy goat products throughout the world. Turkey is one of the leading goat raising country in the world with 7 million head of goats and ranks fourth with 280.000 tonnes of milk production among the Mediterranean countries. However, lack of the national milk policy and support policies affect the small scale producer as well. Although there is a increasing industry of dairy goat product sector in big scales, goat milk in the rural areas is mainly processed into some traditional dairy products such as; Salted (cooked) yogurt, Surk cheese(a kind of moulded herb cheese), Tulum cheese (cheese encased in a skin), Carra cheese and the production is in small scales and consumed locally. Traditional products are not widely known and consumed in then whole country for many reasons. In comparison with its popularity in the world, dairy goat products don't have its deserved market share in Turkey yet. Lack of the interdisciplinary collaboration between farmer, producer and the consumer triangle, hygienic and sanitary conditions in the production and storage conditions constitute the main problems. This paper introduces the traditional dairy goat products of the Mediterranean region in Turkey, discusses the main problems in that sector and suggests new approaches to improve the present situation in dairy goat product sector.

58. Cheesemaking systems: Canarian goat P.D.O. cheeses

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The objective of this paper was the analysis of Majorero P.D.O. and Palmero P.D.O. systems making a special point on cheese making and commercialization. The study included in DOQUECAN project was performed on all farms and cheese factories of Majorero P.D.O. (16) and Palmero P.D.O. (19). The information was obtained from surveys and the technicians of the Regulator Councils recorded data. A questionnaire was compiled with the aim of examining some of the structural and management aspects of the farms as well as cheese-making process and commercialization. Majorero and Palmero goat cheeses are typical products of Fuerteventura and La Palma (Canary Islands, Spain), and are manufactured from Majorera and Palmera goats' milk according to the specifications of their Regulatory Boards (1996 and 2002). Majorero cheese is a cylindrical fat cheese that can be consumed fresh (8-20 days) or semihard (20-80 days), weighing from 1 to 6 kilograms. The goat's census included in Majorero P.D.O. farms was nearly twenty-five thousands (24.937). All the farms used mechanical milking machines. Most of them (85%) transformed crude milk into Majorero cheese while the 15% remaining pasteurized their milk. Every producer used commercial rennet and starters in the cheese making process. The most usually commercialization method was direct sale (75%) although intermediaries had also a great importance (65%). Palmero systems are characterized by an average flock size of 166 heads of Palmero goats. The production system could be considerate as semiextensive (80% of the flocks grazed). Animal feeding is mostly based on the utilization of autochthonous and endemic pastoral resources. Cheeses were ripening till 15-20 days old and then were commercialized by intermediaries (63%). Nearly 80% of the producers smoked their cheeses by traditional methods. This singular process gives special sensorial characteristics. Acknowledgements: This work was supported by DOQUECAN Project (Canarian Government) with FEDER funds.

59. Sensorial characteristics of Majorero PDO cheese since 90 ripening days

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The sensorial attributes of cheese play a major role in product acceptability and influence the success of the product in the market. Majorero PDO cheese is a goat milk cheese with limited production from the Canary Islands. It is very important to maintain the authenticity of the traditional cheese that makes it different from other goat cheeses. This study is included in a regional Project (DOQUECAN) for Canarian PDO cheeses valorisation. The objective is to make an exhaustive description of sensory characteristics of Majorero PDO cheeses during ripening process. Cheeses from six representative producers were analyzed by a panel specifically trained for Majorero cheese for texture, odour, flavour and taste. Colour was estimated with a colorimeter Minolta CR 600 and texture with a texturometer TX2i. Determinations were carried out from 15, 30, 60 and 90 days ripening. Ripening time affected most sensory parameters analysed. As the cheeses matured and became drier they became rougher ($p<0.001$) with more granularity ($p<0.001$) and less elastic ($p<0.001$), none effect was observed in firmness, friability, adhesivity and solubility. The odour and aroma intensity increased ($p<0.001$) during ripening. This increase is associated with a progressive reduction of lactic descriptors as well as butter and dried fruit descriptors raised. All texture instrumental parameters were affected by ripening ($p<0.001$); along the period analyzed fracturability, hardness, adhesiveness and gumminess increased, while elasticity decreased. Older cheeses were darker ($p<0.001$) and with higher chroma ($p<0.001$). All this results are very useful for PDO Tester Panel and for the differentiation and characterization of this local product. Acknowledgements: This work was supported by DOQUECAN Project (Canarian Government) with FEDER funds

60. Colour characteristics of smoked Gomero's goat cheeses: comparison between colorimeter and judges

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The aim of this paper was: a) the characterization of external colour characteristics of Gomero cheeses, b) analyze if non trained judges (consumers) can detect the differences evidenced by the colorimeter and c) determine if judges has a preference for any colour. Experimental cheeses were smoked with the two traditional and common materials used in La Gomera Island: rose rock (*Cistus spp*) and heather (*Erica arborea*) wood, they were smoked at two times (smoked 4 days after elaboration and smoked 10 days after elaboration). Cheeses smoked with heather were darker. Differences obtained by colorimeter could be detected by consumers, 91.11 % ($p<0.001$) detected the darkest cheese and 88.89 % ($p<0.001$) the lightness. Sensorial evaluation was nearly 4 points (good in a scale between 1 and 5), and the best scores were for cheeses smoked with heather wood for cheeses smoked in fresh 52.63% and 59.14 % for cheeses smoked at 10 days. Acknowledgements: This work was supported by CAL 02-075-C3 Project.

61. Home-based Chevon processing: a value-adding strategy to encourage goat production in the uplands

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The overall objective of this research was to develop a multi-purpose dried chevon product that can be produced and stored by the upland goat farmers even without cooling facilities, can be rehydrated and cooked into desired recipes any time, has a longer shelf life, can be transported to proper market centers at a minimal cost, and is acceptable in terms of sensory attributes. Ten uncastrated male goats of mixed breeds with slaughter weights from 18–28 Kg were slaughtered following standard procedures, deboned and the meat pieces divided into three lots corresponding to the three curing treatments: 14% salt solution, 14% salt solution with nitrite and no curing at all (control). These meat pieces were either sun dried or smoked/oven-dried to reduce moisture to 15–20%. The dried products were evaluated for chemical, shelf- life, rehydration and sensory characteristics. Data were analyzed using Analysis of Variance (ANOVA) under 2x2 factorial in Randomized Complete Block Design (RCBD) with the animals as blocks, curing solution as factor A and drying method as factor B. Comparison of means was done using Duncan's Multiple Range Test (DMRT). Results showed that curing and drying methods did not affect most of the chemical composition of the samples ($P>0.05$). There were no differences in the residual salt content among treatments ($P>0.05$) and residual nitrite content was lowest in sundried and rehydrated sun ndried samples ($P<0.05$). No differences in percent rehydration among treatments ($P>0.05$) while shear value (SV) indicated all treated samples were tougher than the control ($P<0.05$). Water activity, total plate count and coliform tests indicated that dried chevon is shelf stable for 60 days at room temperature. Prepared into caldereta, a local dish, nitrite-cured/sun dried chevon were the closest to the control ($P<0.05$), and the most acceptable to the experienced panel in terms of general sensory attributes while the sun dried samples, regardless of the curing brine used were the most desirable to the local consumers. Benefit-cost ratio (BCR) ranged from 1.52 to 2.73. Chevon drying technology can be used in the upland rural areas to produce a multi-purpose dried animal product which could be sold or consumed by the household.

62. Strategies for industrialization and marketing of goat products of small producers in Guanajuato

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The meat and milk goat production in the state of Guanajuato has been increased in more of 100% in the last 26 years; nevertheless, the transformation of the production is made in an artisan form and minimum organization, mainly by small producers that represent 90% of the goat producers of the state. In order to design strategies of commercialization and value added for products generated, it was made a survey to 120 producers and 25 agro industries to characterize the production systems and the transforming companies; later the products were identified and evaluating for each one, once identified a study from market to 220 families was made to detect the consumption of these products; also the successful options of commercialization and added value were identified that are being made. With base to this information and in consensus with the producers, strategies were designed to improve the process of marketing and industrialization. The results show that all the producers generate meat and only 75% produce milk, the derivatives of this product are: cosmetics; mainly soap, shampoo and body creams; candies, “chiclosos”, “glorias”, “natillas”, condensed milk, flan, gelatin, cheeses and yogurt. With respect to the meat, the main product that sold is the cabrito. Of the 220 families interviewed: 17,0% consume goat milk, 24,3% has consumed meat, 34,5% has consumed cabrito, 33,5% consumes goat cheese, 42,7% small box and 3,4 % it consumes yogurt of goat milk. The identified strategies were: 1) to consolidate the organization of producers and 2) elaboration and beginning of five regional projects: in Salamanca and Irapuato, the cheese elaboration mess orderly; in Villagrán, Cortázar and Jaral, the candy paste elaboration; in Abasolo and Pénjamo, the elaboration of small box and cheese French type; in Leon and Guanajuato the gelatin elaboration, flanes and candies; and for the municipalities where the goat systems predominate that only produce meat, the elaboration of a project for the sale of cabrito carcasses is required.

63. Goat cheese commercialization in Zacatecas, Mexico

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The objectives of this work were to analyze goat cheese seasonal availability, distribution conditions, price levels, and requirements of self service chain stores to be a provider. The study was divided in two types of markets: formal and informal. Formal markets are those that sell brand cheese. Informal markets are mainly public, city markets where cheese is sold without consumer information. Data was collected using a questionnaire applied to all formal and informal markets of the city of Zacatecas. Results indicate that in informal markets goat cheese is available only during the milky season of herds fed in non-intensive, arid, systems, close to Zacatecas, city, while in formal markets cheese is available all round year. Regarding distribution conditions to consumers it was found that in informal markets mexican standards of quality (NOM-121-SSA1-1994) regarding tags, nutritional information, ingredients, product management, etcetera are not satisfied. This situation implies health risks to consumers. Formal markets met those requirements. There were identified 6 different brands, 4 of them are national (coming from the states of Guanajuato, Jalisco and Mexico) and two are imported (one from Germany and other from France). Prices vary from 15-20 U.S dollars/kg for national brands; from 40-50 U.S dollars/kg for imported brands and only 5 U.S dollars/kg for non branded cheese sold en informal markets. To be a self service chain stores provider requirements are: formal firm (registered and approved by ministries of finance and health), tag including weight of product, nutritional information and temperature requirements. Based on the previous information we can conclude that it is necessary to promote educational programs regarding standards of quality in informal markets to reduce consumer health risks. Price levels of imported and national brands are high enough to incentive local farmers to produce high quality goat cheese. Self service chain stores are willing to buy cheese of local providers but stores requirements (similar to developed countries) need to be met. This can be a good opportunity for local producers to increase income and employment.

64. Intramammary antibiotics in dairy goats

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Withdrawal periods of three intramammary antibiotics (Curaclox LC, Spectrazol Milking Cow and Rilexine 200 LC) in dairy goats were compared to withdrawal periods recommended for use in cattle. The Parallax Beta Lactam Assay test proved to be more sensitive than the Thermo-Resistant Inhibitory Substances (TRIS) test or the dye tests (Curaclox LC). Withdrawal period for Spectrazol Milking Cow was significantly longer ($P < 0.05$), and that for Rilexine 200 LC was shorter, than the withdrawal periods for cows. All withdrawal periods were significantly different ($P < 0.001$) from the recommended withdrawal periods for cattle less the 24h safety margin. Relatively high producing goats ($> 1.5\text{L/d}$) had shorter withdrawal periods than low producers. Withdrawal periods in goats with clinical mastitis differed from those of healthy goats. Somatic Cell Counts (SCC) (Fossomatic) and California Milk Cell Tests (CMCT) were shown to be unreliable for identifying subclinical mastitis in dairy goats and should be accompanied by microbiological tests. The CMCT was more useful in confirming the absence of infection, rather than in diagnosing mastitis. However, CMCT and SCC were indicators of irritation of the udder parenchyma, caused by some antibiotic formulations. Somatic cell counts (SCC) of udder halves with clinical mastitis ranged from 7053×10^3 to 7948×10^3 cells/ml for milk samples without bacteria, and from 6476×10^3 to 8479×10^3 cells/ml for those with bacteria. Withdrawal periods were also affected by milk yield, stage of lactation and parity. Differences in percentage milk fat, protein and lactose before, during and after treatment were not statistically significant.

65. The milk yield aptitudes of the “Carpatina” goat breed Reared in Romania

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The researches we've done on the milk yielding potential of the goats shown that the individuals within the studied species could produce, within usual conditions, during normal milking periods, more than 15 times milk quantity than their own body weight. According to the researches set up on “Carpatina” breed goats, reared in Romania, the milk yield of those females is not quite similar to that obtained by the females belonging to some high milk specialized breeds, although the Romanian goats gave average yields of 200 l per lactation, during the 3rd, 4th and 5th lactation. Within a milking period, the milk secretion process follows the same evolutions like in ovine species, increasing during the first three months and reaching monthly productions over 30 l, continuing with a plateau period, during two months and following a gradual decreasing until the end of the milking period. Milk quality was evaluated through monthly assessments on its chemical composition. According to the analyzed data, it could be stated that the values of the three main component of the milk increased toward the final period of the lactation, maximal values being recorded during its two last months. The high values given by the variability coefficient leded us to state that the chemical composition of the milk depends on the analyzed individual as good as on the milking month. To complete the effectuated study, we have determined the level of the somatic milk celli and the different correlations that are between characters and features specific to the goat population from the Romanian areas. The main conclusions show that the “Carpatina” breed is characterized through a high heterogeneity, concerning the quantitative and qualitative milk yield. Par consequence, it imposes to elaborate competent breeding programs for the goat populations in Romania, in order to improve their milking potential.

9th International Conference on Goats

Sustainable Goat Production: Challenges and Opportunities of Small and Large Enterprises

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66. Using Benchmarking to improve the financial and social sustainability of commercial goat meat, cashmere and hohair farms in Australia

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Benchmarking is a method of business improvement that provides evidence of how practices affect production and financial returns. Farmers use benchmarking to change management practices and enterprises. Benchmarking projects were conducted with mohair, cashmere and goat meat farmers to improve their production and financial performance. Mohair and cashmere farmers weighed goats, sampled and tested fleeces. Cashmere was processed. Mohair farmers provided detailed financial information about costs and revenue. Goat meat farmers completed a questionnaire during an interview. For mohair, mean farm attributes were: live weight of 2½-year-old does 23–39 kg; 3rd shearing fleece weight and fiber diameter 1.7–2.8 kg and 26.0–30.2 µm. Parameters for different farms (range) were: kids born per 100 does joined 94 (49–126); greasy mohair production 4.25 kg/goat (2.9–5.5) and 2.7 kg/ha/100 mm of rainfall received (1.1–5.2). The gross margin of enterprise income above costs per stock unit was \$23.13 (9.64–34.13), compared with similar sized wool enterprises of \$13.08. Cashmere production at the second shearing averaged 141 g/head (69–225) and fleece value (\$6.24–21.59). The top farms averaged \$20.79 per fleece compared with \$15.11 for all farms. There were significant differences between farms for cashmere production, mean fiber diameter and other attributes. Processing showed that farm of origin did not affect processed cashmere attributes once other significant factors associated with processing efficiency or product length were taken into account. For goat meat farms: weaning rates averaged 99% (51–165); husbandry costs (\$0–3.07); and supplementary feeding costs (\$6.75–9.60). The issues of concern were: internal parasitism, doe fertility, kid predation, kid growth rate, Johne's disease, and fencing security. Benchmarking demonstrated substantial scope to increase productivity and profitability. The reported stocking rates were lower than expected indicating that farmers are not grazing at economic levels. Improved pasture management skills and increased fertilizer use would result in substantial improvements in productivity. The average and large range in weaning rate indicate significant losses prior to weaning, possibly from sub-optimal mating management, sub-optimal nutrition of breeding and lactating does or high levels of kid mortality. Farmers and industry groups reported that the benchmarking process and results were helpful and resulted in them changing management practices.

67. Selecting Angora goats to consume more juniper

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This research project was initiated in 2003 to develop a more effective tool for biological management of invading juniper species on rangelands through herbivory by Angora goats. After we had established that juniper consumption in free-ranging goats has a genetic component (heritability = 13%), male and female goats were bred selectively for above- (high) and below-average (low) juniper consumption that was estimated by fecal near-infrared reflectance spectroscopy. Divergent lines are being produced to facilitate the identification of physiological mechanisms that permit some goats to consume considerably more juniper than others as a regular component of their diet. Because diet is known to affect growth and fiber production, another objective of the project is to establish the effects of the selection protocol on body weights, fleece weights, and fiber characteristics. Mature females (age > 1.5 yr) and kids were maintained on rangeland and shorn twice a year. Extreme high- and low-consuming yearling males (10 of each per year) were evaluated annually in a central performance test. The selection protocol resulted in average EBV for percentage juniper consumption of 3.9 and -0.4 ($P < 0.0001$) respectively for the 2006-born high- and low-consuming yearlings. A physiological difference in bioavailability of monoterpenes between high and low consumers was recently detected. Fiber data for 2006-born 12-mo-old kid goats indicated no significant differences ($P > 0.1$) in body weight, mohair production and properties between high and low consumers. However, the adult data for the extreme males indicated that high consuming males have lower body weights than low consumers (53.8 vs. 57.9 kg, $P = 0.01$). Differences in body weight and several mohair production and quality traits have also been detected in the mature females but at this early stage of the selection program, no substantial differences have been observed and certainly none that would have an economic impact for producers. Ultimately, we expect to demonstrate that the high-consuming line controls juniper more effectively than either the low-consuming line or unselected Angora goats. Subsequently, we plan to release high juniper-consuming genetics to commercial breeders for use in range management.

68. Social indicators for evaluating sustainability of goat livestock farms: methodological approach

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Currently, sustainability is an objective of priority for any economic activity or development process. Many studies with theoretical reflections relating to the concept of sustainability exist, but few methodological contributions adequately quantify and evaluate the level of sustainability of agrarian systems, specifically with respect to small ruminant. The level of sustainability of these systems should be estimated taking into account not only economic and environmental aspects, but also social aspects. Despite its importance to the functioning of agrarian systems, the social dimension has been little addressed, and is frequently ignored in studies of this nature. The objective of this study is to carry out methodological reflections based on identification and quantification of social indicators applied to goat livestock farms. Furthermore, this study forms part of a broader comparative study on sustainable development of animal systems in Andalusia (Spain) and Chiapas (Mexico), in which economic, environmental, and social indicators are used in an integrated manner. The methodology used to obtain indicators is based on the authors’ knowledge of the functioning of goat livestock systems, focus groups and opinions of experts in the field, and revision of the available bibliography. As a result of the study, we propose a group of indicators made up of several variables based on the logical-mathematical principals of different scales of measurement as well as on multicriteria analysis. The social indicators proposed refer to several themes: i) multi-functionality (multi-activity of the producer, maintenance of the craft tradition of transformation of the products and search for new marketing channels, among others); ii) membership in professional associations; iii) implication for local life (participation of the farmer in various civic activities); iv) social well-being (quality of life, especially that related to work); and v) continuity of the goats livestock activity (possibilities for continuation of the farm, farmer’s age, adaptation to innovations, and level of education and agricultural training).

69. Condensed tannins extracts from tropical forages and their effects on ruminal gas production

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Condensed tannins (CT) can be a natural and effective method for control of gastrointestinal nematodes in small ruminants. They also play an important role in rumen protein and fiber degradability, and can reduce methane production in ruminants. However, limited comparative data are available on CT concentrations of tropical legumes and their effects on ruminal gas production. An *in vitro* study was conducted to compare forage tannins extracts from three tropical leguminous plants [*Arachis glabrata*, (AR), *Calliandra calothyrsus*, (CA) and *Cratylia argentea* (CR)], and a non-leguminous plant, Morera (MR; *Morus sp.*) combined in different proportions [0, 50 and 100% with alfalfa (*Medicago sativa*; 0.3% CT, as negative control)] on *in vitro* gas and methane gas production. The former was measured in duplicates with a plunger displacement (ml) at 0, 1, 2, 3, 4, 5, 6, and 8 h incubation periods with different level of CT-containing forage mixtures and compared with the non-CT-containing alfalfa. Methane gas was determined from 6 h *in vitro* incubation gas samples in an open-circuit respiration calorimetric system (Sable Systems; Henderson, NV). Analyzers were calibrated with gases of known concentrations. Response variables analyzed with Proc. Mixed of SAS were CT concentrations, *in vitro* ruminal gas and methane gas production. The model included plant sources and different combinations of these. *In vitro* gas production rate was measured repeatedly and calculated using the exponential equation of Ørskov and McDonald (1979): $Y = a + b(1 - e^{-ct})$. Forage plants differed in CT %, with CA being highest (12%). CT concentrations from AR, CR and MR averaged 1.9, 0.8 and 2.9%, respectively. A linear direct response in total gas production (rate 'c' and potential, a + b) was observed ($P < 0.05$) when CC was incubated with increasing alfalfa ratios, but this effect was not observed with the other three forages as a result of their lower CT concentration. Methane gas production at the 0:100 ratio was lower for the high CT containing-CA (0.58 cc/h) when compared to AR, CR and MR, which averaged 41.3, 43.9, and 27.1 cc/h, respectively. In conclusion, the high CT- containing-CA resulted in lower total gas and methane production compared to the low-CT forages.

70. Goat production systems in mountainous areas: approach to the organic model

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At the moment, an increasing interest exists to encourage the sustainable animal production systems linked to natural pastures. This is the case of the organic systems which promotes a high level of biodiversity, preserves natural resources, respects the well-being animal and guarantees the health of the consumer. The goat production in Andalusia (Spain) has been linked traditionally to marginal areas, that otherwise are unproductive. The objective of this work is to evaluate the approach degree of mountain range goat production in relation to the model of organic production and to analyze the aspects that must be improved. A questionnaire for farmers was designed using the specifications standard (*Council Regulation EEC N° 2092/91 of 24 June 1991 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs*) and the opinion of experts. The questionnaire included about 40 variables integrated in 10 indicators (1. *Nutritional management*; 2. *Sustainable pasture management*; 3. *Soil fertility and contamination*; 4. *Weed management*; 5. *Pest management*; 6. *Veterinary care and prevention of diseases*; 7. *Breeds and reproduction management*; 8. *Animal well-being*; 9. *Salubrity* and 10. *Organic management*). The optimal value for each indicator was considered the 100%. Surveys were carried out in 23 farms (5 meat orientated and 18 milk orientated). Six of these 23 farms were certified by the organic standards (2 of meat and 4 of milk) which represent 10% of the total of certified organic goat farms of Andalusia. The results show that non-certified farms have 5 out of the 10 indicators that do not qualify as good as those of certified farms (indicators number 1, 2, 3, 6, and 10). Whereas indicators 4, 5, 7 and 8, both systems are close to the optimal values of the organic production model. Globally, the organic farms present around 80% and conventional 50 % of proximity to the model of sustainable organic production.

71. Digestibility prediction model of natural herbaceous pastures of the Canary Islands

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Goats represent more than 80% of the grazing livestock of the Canary Islands, where harmonizing the animal production objectives with the environmental conservation must be a goal. Looking forward the sustainable use of natural resources easy systems to estimate carrying capacity must be developed. Taking into account the high cost of analyses for determining the digestibility of herbaceous production, as an estimate of the energy content of pastures, this study proposes a model for predicting digestibility values on the basis of the most significant factors. For that purpose a univariate multifactorial variance analysis (UNIANOVA) was carried looking for of the factors which, being easy to gather, could explain the highest percentage possible of the variance. The result has been a model with a high predictive power ($R^2 = 0.76$), which allows the estimation of the digestibility of dry matter in a simple way. The most important variability factors were the month, the botanic group and the ecosystem. After that the costs of determining livestock carrying capacity in the new areas of work will be considerably reduced, facilitating the development of management projects.

72. Similarity indices of a sarcocaullescent scrubland and browsing goat diets in northwest Mexico.

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The extent of vegetation used by free browsing goats on a rangeland is a practical measure to determine rangeland productivity and may be measured by the similarity indices between the botanical composition of diet and the rangeland. The aims of this study were to evaluate and compare, seasonally the similarity indices of forage species and goats diets under the Sonoran desert conditions. Samplings were carried out in summer and autumn of 2006, and winter 2007 within a 200-ha rangeland with an animal density of 0.13 to 0.36 individuals/ha. Twenty two fixed transects (30 m long), distributed randomly were used to measure the botanical composition and importance value (IV) for plant types by the line-intercept method. Identified species were classified as non legumes trees and shrubs (NLTS), legumes trees and shrubs (LTS), cacti, forbs, agaves or grasses. Five castrated Creole-Nubio goats (29 kg of BW) provided with esophageal fistula were used to obtain diet samples and determine botanical composition of diets by microhistological analyses. Botanical composition of diet (A) and IV values (B) were used to calculate the similarity indices (SI) according to $SI=2(W)(100)/A+B$, being W the lower value between A and B. Sixty plant species were founded in the study area, but only 23 species were in diet of goats, similarity indices indicated that NLTS were more utilized in all seasons than other plant types. The SI between seasons indicated a gradient of forage utilization in the following order ($P<.05$): In summer NLTS (30.4) > LTS (14.9) = forbs (10.7) = grasses (9.7) > cactus (3.6), in autumn; NLTS (26.7) > forbs (13.1) > grasses (8.6) = cactus (8.6) > LTS (5.5) and in winter; NLTS (31.7) > forbs (13.9) > LTS (3.9) > cactus (0.0) = grasses (0.0). Goats utilized only 30% of the vegetation on rangeland in all seasons and showed light change in their forage utilization pattern because of the opportunistic feeding behavior of these animals; however they maintain a high utilization on shrubs and trees.

73. Ruminal methane emissions by goats consuming dry hay of condensed tannin-containing lespedeza with or without polyethylene glycol, alfalfa, or sorghum-sudangrass

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Twenty-four yearling Boer Spanish wethers (initial BW of 37.7 ± 1.09) were used to assess effects of different sources of dry hay on ruminal methane emission. Treatments were a legume (Sericea lespedeza, *Lespedeza cuneata*) high in condensed tannins (CT; 15.3%) without (S) or with (P) polyethylene glycol (25 g/d mixed with 50 g/d of ground corn), a legume without appreciable CT (alfalfa, *Medicago sativa*, 0.2% CT; A), and also a grass low in CT (sorghum-sudangrass, *Sorghum bicolor*, 0.2% CT; G). Hay was fed at approximately 1.3 times the maintenance energy requirement. The experiment lasted 15 days, with the first 7 days for adaptation. Intake of DM was 849, 937, 732, and 655 g/day for S, P, A, and G, respectively (SE = 50.5). There were differences ($P < 0.05$) in OM digestibility (54.5, 60.1, 62.7, and 62.6%; SE = 1.29), digested OM (438, 534, 429, and 378 g/day; SE = 33.7), and energy expenditure (370, 435, 459, and 405 kJ/kg BW^{0.75} for S, P, A, and G, respectively; SE = 16.4). Methane emission was 14.3, 19.5, 19.8, and 17.9 l/day for S, P, A, and G, respectively (SE = 1.05), being lowest among treatments for S ($P < 0.05$). Similarly, methane emission relative to digested OM was lowest ($P < 0.05$) for S (43.5, 55.4, 60.7, and 62.8 l/kg for S, P, A, and G, respectively; SE = 4.17). Treatment differences also existed ($P < 0.05$) in vitro methane release by ruminal fluid incubated for 3 weeks with conditions promoting activity by methanogens (7.8, 11.7, 13.1, and 13.5 ml for S, P, A, and G, respectively; SE = 1.23). Findings in a previous experiment with fresh forage were similar (15.8, 20.2, 21.3, and 21.6 l of methane/day; 35.2, 45.4, 48.6, and 45.2 l of methane/kg digested OM; 12.9, 21.8, 25.3, and 28.5 ml in vitro methane release for S, P, A, and G, respectively). In summary, effects of CT in S in depressing ruminal methane emission by goats appear similar with dry hay and fresh forage.

74. Botanical Distance: an accurate indicator to assess the impact of goat grazing on vegetal communities: six years of monitoring in Tenerife and La Gomera (Canary Islands)

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The management of extensive goat production systems in the Canary Islands traditionally involves managing grazing, pastures and local breeds. The future of these traditional animal production systems, the breeds and ecotypes related to them and their derived products are in danger of disappearing unless the grazed ecosystems are better managed. In order to better facilitate the planning and management of grazing and to ensure its survival in a complex environment, we propose a new, comprehensive and dynamic methodology. In addition to the traditionally used calculations of stocking rate and carrying capacity, new plant-based indicators are developed which better show the responses of ecosystems under grazing conditions so that grazing pressure can be better managed. The new indicators are the Botanical Distance (BD), based on the specific contribution of each plant species present in the study area and the Qualification of Vegetal Cover (QVC) related to vegetal cover. These variables are determined from annual measurements using point-quadrants in transects located in both grazed and non-grazed areas. Relative frequencies of plant species are compared with reference situations. Relationships were found between different plant functional groups and values of BD, which provides a more rapid method of assessing areas. Results show a marked influence of grazing on the BD regardless of the annual variability. In contrast, the QVC and number of plant species (NS) are more strongly influenced by years. BD provides a better measure of grazing impact for managing these ecosystems.

75. Towards a participatory research approach to improve small ruminant production systems in the Mexican semi arids: I. Socioeconomic and ecological characterization

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A research Project has been carried out since 2004 in a microwatershed located in Panuco, Zacatecas, Mexico. The study area includes two villages (Casa de Cerros and Panuco). The objective of the project is to generate technological options, which can help to improve the goats' productivity in that microwatershed. In order to organize the information and to identify problems that constraint productivity, a model based on the systems theory was used. According to the model, the information covers ecological and socioeconomic aspects in three levels, macro-system (secondary information), which is showed here, and system and subsystem (primary information) that is not included. The macro-system level includes several studies performed outside and inside the study area. The first study allowed determining the suitability for goats rising. It was based on geographical information systems. Another study was dedicated to the identification of areas to reconvert croplands to rangelands; other studies included water erosion levels, botanical and quality analysis of the native vegetation of rangelands. As results of the macro level, the limited participation of woman in economical activities was detected and their involvement should be part of the future research. The microwatershed was categorized as good, which may favor goat to easily adapt to the environment and production system. Secondly, the surface determined as susceptible to be included in a program for reconversion was 807 ha, which reconvert from agricultural uses to rangelands, as well as, 208 ha of the rangeland area which, were categorized as high risk water erosion. The availability of native vegetation and its quality analysis across the year was determined which may help to determine the forage needs during the dry season. That secondary information was released to householders and used to justify research activities. Several research activities were developed to give an answer to householders. Socioeconomic and ecological characterization may be used as a base line for future impact studies.

76. Basic steps towards a participatory research approach to improve goat and sheep production systems in the Mexican semi arid: II. Demand detection

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The second part of the study (primary information of the system level) is reported here. The system level, a survey was carried out where 63 householders who raise goats and sheep, were included. Questionnaires included socioeconomic and technology aspects of the herd management. Agricultural activities are the main purpose of the householders interviewed. They raise goats and sheep as a saving purpose, thus, technology level given to goats, corresponds to the necessary to survive. The stubble constitutes the only supplementation given to goats and sheep and that is given during the drought season (December to May), which lead to a reduced milking season; vaccination for brucella is high (84%), but no other sickness is controlled, deworming is made once a year, as examples of the technology level. Some research activities which can improve the householder's inputs were detected, such as kid goat sales as well as increment of milk production. However, householders expressed in workshops, which are mechanisms to obtain additional information, some concerns about the lack of new crops which can be a better option than beans, which is the main crop grown in the State. That implies more interest on agricultural activities instead of animal production. Several research activities were developed to give an answer to householders.

77. Maintenance of protected biotopes in Germany by goats keeping

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The very diverse cultural landscapes of Europe landscapes have been created by man's activities over many thousand of years. With the agricultural development farming in remote and hilly areas decreased. Landscapes and biotopes became endangered without farming. Especially abandoned farmland becomes rapidly invaded by shrubs and need maintenance (92/43/EU). But, mechanical or manual shrub clearance costs are high. Goats, however, can help to conserve and maintain shrub-endangered pastures (Rahmann, 2000). In Germany, goats are usually kept on grassland that is free of shrubs. There is no practical experience of goat-grazing on protected and shrub-invaded grassland (Rahmann, 2007). In a six-year experiment an investigation was conducted to analyse the ecological effect of goat-browsing on protected biotopes (*Gentiano-Koelerietum*), aspects of animal welfare and the impact on the economics and production performance of goat farming. The research was carried out on 14 ha of protected biotopes (*Gentiano-Koelerietum*) in the hilly area of middle Germany. It involved 50 female goats (German Alpine goats, Bure goats, Cashmere goats). The management of the goats was undertaken according to organic farming rules (1804/99/EU) (Rahmann, 2004). The biotopes were steeply inclined ($>15^\circ$; no tractor access possible), dry (xero- and oligotrophic vegetation) with swallow soils (type: *calcareous Rendcina*), and 50 % to 100 % covered with invaded shrubs (max. of 20 % is acceptable by the biotope conservation concept). The biotopes were managed under the nature conservation rules of the EU-biotope management standards of 2078/92/EU. These standards are even more restrictive than the rules of organic farming: no supplemental feeding of the animals, short grazing period (summer), no melioration of the natural flora, fauna or habitat other than the impact of the grazing and the definition of specific husbandry techniques (mobile fences, no shelter). The results of the experiment showed, that goats can help to maintain shrub invaded biotopes without in-acceptable negative impacts on the protected biodiversity of the pastures. The animal welfare is improved with shrub browsing. The growth performance of boer goat kids was better than alpine and cashmere goat kids. The maintenance costs with goats are fare lower than mechanical and manual clearance costs.

78. The impact of meat goats in a managed grazing system on vegetative browse and subsequent pasture improvement for a sustainable forage/livestock system

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Demand for goat meat among emerging ethnic and faith driven consumer markets, far exceeds supply (Smith 1992, Glimp 1995). Limited numbers of grazing livestock enterprises has allowed browse to dominate much of southeastern Ohio's farm landscape. Invasive species such as multiflora rose, honey suckle, and autumn olive (browse) present a management challenge to landowners utilizing a rotational grazing system. Traditional control methods involve use of chemical herbicides, mechanical mowing, hand removal, or a combination of these methods. All of these methods are labor intensive and carry significant economic costs. The use of chemicals in some areas must be weighed against a possible environmental risk of surface or groundwater contamination. In other areas topography with slopes exceeding 20% limits the practicality of mechanical mowing and/or chemical application. The use of goats in a rotational grazing system offers landowners an alternative control method that is ecologically sound and economically viable. The objectives of the study were to identify and evaluate browse species acceptable to goats, evaluate the browsing impact made by goats on brushy and invasive species, observe goat grazing behavior in plots with varying degrees of browse/pasture grass combinations. On-farm demonstration included three replicated plots of low, medium and high density for a total of 24 plots. Plots were managed under a rotational grazing strategy. An animal stocking rate density of low (4 goats per plot) and high (8 goats per plot) levels were applied across the replicated plot design. All plots were grazed twice during the study. Goats were rotated through plots measuring 5,625 square feet, their individual ear tag numbers recorded and a body condition score (1-5 scale) assigned to them on a weekly basis. Goats were managed within plots using electro net fencing. Goat body condition increased an average of 1 score over the course of the study. Goats behaviorally are categorized as browsers. The percentage of browse consumed was typically greater than 90%, and, when given a choice, was preferred over pasture grasses. This on-farm study demonstrated an improved pasture quality and species profile. Browse species do not tolerate grazing pressure even under sound rotational grazing management. The recovery period for browse versus traditional pasture forages is significantly greater. Goats are the most suitable farm animals for non-mechanical or herbicide free control of browse and weed species. Data and observations made during this study documents that goats can be used as an economically viable option to clear land of browse and improve the forage profile of the pasture, creating a sustainable forage livestock system.

79. Developing a conservation practice standard using goats to control woody invasive plant species in West Virginia hill pastures

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Appalachian hill pastures have several invasive weedy species that limits the productive potential of these areas. Conventional methods to control these weedy species typically include chemical herbicides and or mechanical mowing. The undulating topography and steep slopes of West Virginia pastures makes these conventional control treatments difficult to accomplish. The benefits of using Goats to control woody invasive species in pasture systems have been well documented but adoption by cattle and sheep producers in West Virginia has been limited. Two factors reduce the adoption of goats to manage and eliminate invasive weedy species in West Virginia Livestock operations. One is the threat of predation from dogs and coyotes, the other are adequate fencing systems to contain goats in the targeted grazing areas. A new portable fence system is now available that combines electric netting panels with solar powered energizers. This fencing system should alleviate the predation and containment concerns that have inhibited livestock producers from adding goats to their grazing systems. This step in electric fencing system allows the farmer to increase the browsing pressure on the weedy species so the goats can eliminate these plants over a 2-3 year period. A USDA funded project was initiated in 2006 to evaluate the adoption of electric net fence with goats to control invasive weeds in pastures. 18 livestock producers have agreed to cooperate for a 3 year period to determine the suitability of this management system. The agreement includes a cost share requirement. The project supplies the fence system and the farmer agrees to purchase a goat herd of equal or greater value of the fence system. The initial results of this study were the 18 individuals willing to adopt this brush control method. Cooperators established treatment areas during fall of 2007. Weed control measurements will be determined this summer and also a survey instrument will determine the initial suitability of this management system for the cooperating farmers. Due to the interest generated by this evaluation project, USDA NRCS in West Virginia added this biological control method to it EQIP Eligible practices for 2008.

80. Evaluation of growth of the sorghum (*Sorghum vulgare*) in different substrates (goat dung and litter poultry)

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With the objective of evaluating the growing process of sorghum in two different kinds of organic manures such as litter poultry and caprinaza, the sorghum was sowed in five treatments: the first treatment CAP100; second treatment CAP75; third treatment CAP50; fourth treatment CAP25; fifth treatment GAL100, each one with five replicas. We determined the amount of dry matter, the height of the plant, number of germinated seeds. We made an ANOVA to determine the differences between the averages of the analyzed variables in each treatment. We did not find any significant differences between treatment 1 and 2 but there was a significant difference between treatments 1 and 2 concerning treatments 3,4 and 5 because in these there was no growth in the plants due to the high levels of litter poultry which was not compost, therefore it had great amount of nitrogen

81. Characterization physical-chemistry and biological of process of composting of caprinaza of Creoles goats Santandereanos.

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As an important sub product of the caprine industry, one of the most important economic activities in Santander, Colombia, caprinaza (goat dung) has been used as organic installment, when is applied in fresh, due to its high nutrient content. The aim of this work was to characterize chemical, biological and physical issues of caprinaza (100%) (CAP100) and caprinaza (75%) plus litter poultry (25%) (CAP75) composting. Both treatments were placed within wood boxes (1 x 1.5 x 1.5 mts.); 8 boxes were filled with CAP100 while 4 were filled with CAP75. Each box was measured on week 1,2,3,4,5,6,7,9,11,and 13 to determine pH, humidity, density, capacity of water retention (CRA), nitrogen (N), organic carbon (CO), capacity of cationic interchange (CIC), organic matter (MO), ashes, pH, relation carbon/nitrogen (C/N) and quantified the total content of facultative mesophilic (UFC), moulds and leavenings (UFT). In additions, nematodes and protozoon presence or absence were evaluated. The last week (week 13) was used to determined Calcium (Ca), magnesium (Mg) and phosphorus (P) availability, and as a finally, fitotoxicity *in vitro* was evaluated (on *Raphanus sativus* seeds). The data was evaluated initially by descriptonal statistic, MANOVA and Tukey ($p < 0.05$); additionally, to determine correlations between them, a Spearman probe was applied. The results, regardless of treatment, showed physical, chemical and biological changes: increased density, CRA, CIC, ashes and UFT, while, on the other hand, MO, CO, C/N, pH and UFC decreased along the process. There was statistical difference ($p < 0.05$) between treatments to pH, CO, humidity, C/N and CRA, favoring CAP100, and to CIC favoring CAP75. Regarding values observed in both treatments related to temperature, density, CRA, CO, CIC, pH, C/N and fitotoxicity, final evaluation determine the stability and maturity of caprinaza composting product.

82. Semiarid agroecosystems and conservation of naturalized goats in Brazil: peasant forage diversity in Inhamuns, Ceará, Brazil.

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The contribution of Brazilian goat systems to the rural sustainability is important, mainly from the semiarid regions where play an important rule for the peasant economy. In these regions, the official model of rural development that is working since the 50's promoted the introduction and productive intensification of exotic goat breeds, which caused the loss of diversity of the naturalized goat breeds (NGB). The structural relationship between NGB and the indigenous forage resources in the configuration of peasant agro ecosystems were analyzed in the semiarid region of Inhamuns, Ceará, Brazil. The assessment was carried out by multivariate methods (clusters and principal elements analysis) were stratified 57 peasant unities, where the goats are the predominant domestic animal. Four factors explain the 73.3 % of the agro ecosystems total variance in relation to the structural diversity: i) sheep and goat flock size and the grazing pressure on the use of natural areas of native forages non cultivated (caatinga), ii) cultivation of irrigate and temporal crops without caatinga, iii) relationship among irrigation frequency, size land of cultivated forages on the useful agricultural surface and farmyard availability and iv) significance of the grazing of sheep and goats over land forage cultivation in drought season associated with wage work. Ten different agro ecosystems were identified using cluster analysis, where the identification criteria utilized was the utilization of resource management of caatinga and NGB. As the surface of forage area increase in the agricultural zone, the natural vegetation of caatinga have a positive influence over the area of forage composition, NGB Canindé, Blue and the animals without clear phenotype goat were the dominated. In these agro ecosystems are given the relationship between forage components and animals genetic resources, there is not exist association between the availability of forage cultivation or stubble shepherd areas. Its show the strong variability and adaptation of the NGB in the Brazilian semiarid environment that is developed over shepherd and stubble areas. These in a way considered the importance of natural forage resources cultivated or not in the traditional agro ecosystems.

83. Dairy goat production in Turkey

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Goat farming is the most important animal production activity in mountainous area of Mediterranean Region - Turkey. People, living in this area, are very poor and do not have any other alternative for their subsistence's. In addition, milk and meat products derived from animals are very important for population, living in marginal areas. Animals provided home supplies and supported self-sufficiencies of families. Some research activity on for improving dairy goat production in Turkey were analyzed and explained in this study. Improvement studies of dairy goat has been started 40 years ago and nowadays some crossbred dairy goat types have been raised by farmers especially at the west part of the country. Dairy goat improvement in Turkey is based particularly on Saanen goats. Dairy goat production in Turkey has been soared in last five years in Aegean and Mediterranean region. Some crossbred types have been improved by public farms and universities and they have been distributed and well-adapted some parts of the Turkey. Otherwise, due to economical aspects there are some financial problems. Goat production has not been supported yet by government, as well. It has been reported that pure and crossbred of Saanen are well-adapted to Aegean and Mediterranean part of Turkey. Besides crossbred of German Fawn, improved by Çukurova University, is also distributed and raised under farmer's conditions in high-plain of Eastern Mediterranean region of Turkey. The lactation milk yield of improved dairy goats were 400-450 kg/lactation for Taurus Fawn, 300-350 kg/lactation for Cukurova Saanen, 400-500 kg/lactation for Anglo Nubian crossbred, 200-450 kg/lactation for Turkish Saanen. The prolificacy and fertility of above mentioned crossbreds was higher than that of native breeds.

84. Determination of the attributes of the vegetation of the rangeland for goats of the community Monte del Toro, Ejutla, Oaxaca

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The present study was conducted to evaluate the seasonal attributes of the vegetation in a rangeland grazed by goats at the community of Monte del Toro, Ejutla, Oaxaca, from July to October 2006. The sampling sites were located according with the grazing routes using a Stratified Random Sampling. To determine vegetation cover, in each sampling site four Canfield Lines version PROGAN were established of 30 m length; inside the four quadrants obtained by interceptions of Canfield Lines nine plots were established by quadrants of 10 x 10 m where grasses were harvested to estimate herbage production. To estimate bushes yield the reference unit method was used and to determine plant density the quadrant method was used. The qualitative rangeland condition was measured according with the National Resource Council rules (1994). The results indicated that native grasses and *Acacia farnesiana* yields were 348 and 112 kg DM ha⁻¹, respectively. The rangeland ratio was 7.7 ha AU⁻¹, with a vegetation cover of 33% and 67 % of bare soil. Population density was 635,972 grasses plants ha⁻¹, 1,704 plants of *Acacia farnesiana* and 222 plants of *Dalea sp.* ha⁻¹. Grasses contributed with 54% of yield and legumes 46%; the rangeland is at risk of losing health and the value obtained from the observation sites (on scale of 1 to 3) is 1.66, so it is necessary to take the necessary measures leading to improve its condition.

85. Organic supplementation for bio sustainable goat feeding systems

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During 17 years a three stage techniques were eased to obtain bio sustainability in a semiarid pastoral environment. Initial result showed 33% sustainability from shrubland pasture and 77% dependency from elsewhere in the dry matter input. First research work was developing a pastoral system using a solar mobile grazing (SMG), allowing high instant animal stocking rate followed by a long idle period and vigorous re-growth. After ten years, the original vegetation and plant diversity in this system increased up to 70%. Corn stubble was introduced to reduce expensive forage input. Secondly, augment fibrous feed utilization from 48% to 82% was achieved throughout a slow intake urea supplementation (SIUS) used at less 20% of total DMI. Thirdly we developed LAB probiotics for goats. Methods, results and techniques are presented in the paper. With SMG leaves were low on CF in autumn (20.9%); CP had been two peaks, one to 21.5% and other to 25.3%. Behaviour intake changed from grazing to browsing. Restricted use was a key to reforestation and bio sustainable use of semiarid grasses and shrub land vegetation. Finally LAB probiotics improved production when added to the diet, *Lactobacillus plantarum*, *L. helveticus*, *L. delbrueckii*, *Lactococcus lactis cremoris* and *Leuconostoc mesenteroides* were utilized and later identified in the rumen fluid of treated goats. Goats fed probiotics had LAB total counts of 12.5 million/ml, increasing BW gain and milk production by improving digestibility, microbial protein and rumen kinetics. SMG, corn stubble, SIUS and probiotics allowed duplicating DM per Ha from 600 to 1,700 kg/year sustaining 2 lactating goats with 650 Kg milk per year without concentrate supplementation, 24 Has of dry semiarid shrubland and 5 Has/corn stubble sustained 85 dairy goats yearling yielding 55 tons of goat milk in a sustainable farming system without chemical fertilization or irrigation, increasing steadily vegetation on the land.

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86. Performance of Damascus goat crosses with the Bedouin at the arid coastal zone of Egypt

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The objective of the study was to assess the performance of the Damascus crossbred versus the local Barki goats under the producer's conditions in the dry area of Egypt and its socio-economic impact of on the producers. Early in the 80's a group of 78 Damascus bucks were distributed to producers over the arid coastal zone of Egypt (CZWD) extended over 400 km. The breeding plan was to introduce 25 % of the Damascus blood to the native goats. The study covers 159 breeders, individual performance (milk, kid and reproductive performance) of random samples from different crosses and local goats in 30 flocks were measured and recorded. After two decades of initiating the crossbreeding trial, three quarter of the studied flocks are using Damascus crossbred bucks and more than 80% of their flocks are Damascus crossbreds. The main advantages of the Damascus as reported by the breeders were its heavier body weight, better body conformation and equally its higher milk production. These were followed by higher selling price of their kids by around 50% of the market price. Damascus crossbreds were heavier at 1st mating than Barki by more than 7 kg and earlier at 1st mating by more than 3 months. They were insignificantly different in their litter size. Superiority percentage of Damascus crosses in their milk production amount to 48% during suckling. More important they continue milking for at 2-3 months after weaning providing the breeders with recognizable amount of surplus milk for selling ,besides producing heavier kids and relatively better reproductive performance. The results indicated that the Damascus crossbred are well adapted to the prevailing environment, poor ranges and harsh management conditions in the CZWD (<150 mm annual rain fall). In summary, crossing local Barki with the Damascus goats doubled the income of the breeders from raising their goats. Such package can be recommended for out scaling in similar arid areas of the NE.

87. Quantitative analysis of official milk control in Valencia community (Spain) by self organizing maps

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Breeding programs in dairy goats are mainly based on milk production and composition. Murciano-Granadina goats are located principally in the central and southern regions of Spain. This study is focused in Valencia Community (Spain) and the objective is to study the Murciano-Granadina livestock based on the database from Murciano-Granadina Goat Breeders Association of Valencia (AMURVAL). The aim of this study is to analyze the relationship among different variables related with milk production; milk yield, fat, protein, lactose, SCC, the number of births, lactation number and season. This analysis is carried out by using the Self Organizing Map. This tool allows mapping high-dimensional input spaces into much lower-dimensional spaces, thus making much more straightforward to understand any representation of data. These representations enable to visually extract qualitative relationships among variables (Visual Data Mining). A total of 3221 Murciano-Granadina dairy goats from AMURVAL were chosen. Self Organizing Maps (SOM) were used to analyze data with the system identification toolbox of MATLAB v7. Data were obtained from Official Milk Control during 2006 campaign. SOM considered in this study is formed by 21 × 14 neurons (294 neurons); the chosen architecture is given by the range of the input variables and the dimensionality of the proposed problem surveys and management practices were evaluated. The map shown that 70% of the goats has milk yield greater than 300 kg per lactation and goat, indicating good performance of farms. Besides, the SOM obtained indicate a group of neurons that included goats with high SCC (10%). The use of Self Organizing Maps in the descriptive analysis of this kind of data sets has proven to be highly valuable in extracting qualitative conclusions and guiding in improving the performance of farms.

88. Comparison of different in vivo estimators of body fat and muscle content in adult Creole goats

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Objective was to compare effectiveness of ultrasound measurements (ULT), body condition score (BCS) and body mass index (BMI) to predict body fat and muscle in goats. 24 adult, ovariectomized, creole goats were fed individually to achieve dissimilar stable body weights (26 to 66 kg). After 6 week period of stabilization BCS was evaluated (average of 4 independent evaluations) and BMI calculated ($BW/(\text{length} \times \text{height}) \times 10$; average of 2 independent length and height measurements). Fat and muscle coverage over the dorsal (12-13th), lumbar (1st) and coxal (1st) vertebrae were measured by ultrasound. Animals were slaughtered and visceral fat dissected and weighed. Left half carcass weights were obtained and muscle and fat were dissected and weighed. Left half carcass data were adjusted to whole carcass data. Regression analysis was performed with ULT, BCS and BMI as predictors and visceral (VF), carcass (CF) and total fat (TF), and muscle (MU) as response variables. Coefficients of variation (CV) were calculated for BCS and BMI estimations. ULT measurement of total tissue (fat + muscle) coverage over dorsal vertebrae presented the highest predictive value for ULT measurements thus are the only reported. Coefficients of determination (R²) for VF, CF and TF were .55, .76 and .68; .78, .82 and .87; .81, .81 and .88; when ULT, BCS and BMI were used as predictors. R² for MU were .67; .84; .76 using ULT, BCS and BMI as predictors. R² for proportions of VF/BW, CF/BW and TF/BW were .47, .73 and .65; .75, .78 and .88; .74, .71 and .85; when ULT, BCS and BMI were used as predictors. R² for MS/BW were $\leq .10$ using ULT, BCS and BMI as predictors. CV was greater in BCS estimation as compared to BMI estimation (9.7 vs. 3.1 %). BCS and BMI were better in vivo predictors than ULT for body fat content, fat as proportion of BW and body muscle content. Predictive value of ULT, BCS and BMI for muscle as proportion of BW was negligible. BMI estimation was less variable than BCS estimation. Predictive value of BMI for body fat and muscle content is reported for the first time in goats. Key words; Body muscle, Body fat, In vivo estimation, Goats

89. Examination of goat production in the humid gulf coast of Texas.

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The objective of this paper is to examine our research efforts and determine where we can be more productive, sustainable and efficient. Our activities are designed to support increased economic opportunities and improved quality of life for the rural American farmer. Goat research activities using Tennessee Stiff-legged (TS), Spanish (SP), Nubian (NU) and Boer (BR) breeds in different production systems at the International Goat Research Center at Prairie View A&M University have been examined. The Center is located on the northeastern corridor of the Gulf Coast region of Texas, approximately 45 miles from Houston. From a diallel crossing experiment we recommended the use of terminal sire TS on the cross of NUxSP females. Goats that were fed at intermediate level of a ration (70% of ad libitum) were significantly more efficient in converting feed to gain. Comparison of intensive and pasture rearing systems indicated that pasture raised SP kids were significantly heavier than intensively raised SP kids, while the opposite was true for BR and TS kids. It would appear that on pasture, the SP kids grew faster than the TS kids. Within breeds, growth performance was higher for the BR and TS breeds in the intensive system, while growth performance was higher for the SP in the pasture system. It would appear that the SP breed is more adapted to production under pasture (or extensive) production system. Even though the TS breed is smaller, under intensive system it grows more efficiently than the SP. Under conditions existing in the Gulf Coast region of Texas, breeds that are adapted to the environment are recommended for use in initiating goat production programs. Tremendous potential exist to make a living with goats in this region.

90. Organic vs. conventional herd effects on the weights and daily gains in Murciano-Granadina kids

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The present work is testing the meat production ability of the Murciano-Granadina dairy kids maintained under organic and conventional management conditions. The weights of 89 kids of both sexes were recorded weekly from birth to slaughtering at the age reaching seven Kg, according the local commercial customs. 573 weights records were obtained in the three herds involved in the experience. These data were submitted to a statistical descriptive analysis enclosing central and descriptive statistics. We can stand out mean values around 5,5 Kg. for conventional farms, while the organic representative showed a mean value slightly lower, near 5 kg, the standard deviation was stable for all the herds around 1,8 and 2 kg, what demonstrates a high variability. The ANOVA developed under the GLM model demonstrates significant effect of the herd, sex and its interaction. The Duncan “a posteriori” test of means homogeneity showed the effect of the organic herd as responsible of the significant differences. Also, a sexual dimorphism was detected in this analysis. The main conclusion of this work is the necessity of a differential commercialization of the organic kids to get an added value supported in their quality. In the present conditions, the sub production of organic kids in dairy organic farms is not competitive.

91. Effect of management system in Cashmere quality characteristics

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The objective of this study was to compare fiber characteristics of Raeini Cashmere goat at government station (GS) with those raised in nomadic condition (NC). Cashmere fibers were sampled from 24 and 48 goats (aged <1.5 years old) from GS and NC respectively. The staple length (SL), cashmere mean fiber diameter (CMFD), coefficient of variation of cashmere's fiber diameter (CVFD), percentage of cashmere in a fleece (CH), percentage of guard hair cashmere in a fleece (H) percentage, and cashmere tenacity (CT) were measured. Data obtained were analyzed by multivariate and general linear model (GLM) using SAS software package. Mean SL, CD, CVCD, CH, H and CT in GS and NC management system were 4.92±0.23 and 4.5±0.17 cm, 18.3±0.2 and 18.26±0.16 µ, 21.28±0.61 and 21.11±0.46 %, 67.06±2.2 and 62.42±1.67 %, 32.93±2.2 and 37.57±1.67 %, and 2.79±0.28 and 1.6±0.23 gf/tex respectively. The result indicated that two groups significantly affected ($P<0.0005$) only CT character. There were significant differences ($P<0.0001$) between female and male in CT (1.8±0.2 and 2.6±0.34 gf/tex) too. There was no significant difference between two age groups. The nomadic goats have most cashmere and longest staple length fibers (91.22 % and 7.7 cm) but finest cashmere (15.6 µ) and most strength (5.62 gf/tex) was related to station goats. The younger and male goat had longer SL, finer and more cashmere staple length.

92. An experimental approach to the standardized weight and daily gain of the Blanca Andaluza kids

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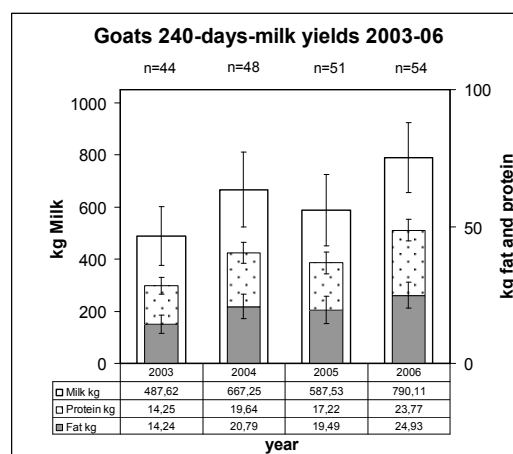
Forty animals of both sexes were weighted every fifteen days from birth to slaughtering. These animals were maintained half in intensive and half in extensive conditions, with the purpose of the study of their productive behavior in early ages. These are the first data existent over the productive ability of this meat specialized goat breed, something very important for its conservation and put in value. Using the real weight recorded in these animals we have firstly calculated the daily gain, and using these data as regression coefficient we have calculated the standardized weight of the animals at birth, 7, 14, 21, 28, 35, 42, 49, 56, 63, 70, 77, 91, 105, 119, 123, 137, 141, 155, 173, 191 and 220 days old. We present the descriptive statistics of central tendency and dispersion, where it is easy to recognize homogeneity of records between sexes, and management systems, during all the development. Only we could stand out a bigger loss of intensive kids in front of the natural system. With respect to other international references we have to mention the meat specialization of the breed, observed in the level of weight appreciated. Also we have to stand out the high level of diversity inside the established groups (sexes, systems) bigger than the diversity obtained between groups. Anyway, the growth is slow, delaying the reaching of the traditional slaughtering weight until 137 days old.

93. Goat milk production under organic farming standards

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Organic goat milk production does increase in the Alpine areas significantly. High prices for milk motivate farmers even to convert from dairy cows towards dairy goats. Organic goat milk production becomes standards in many dairy factories (e.g. the Andechs-dairy factory in Bavaria with more than 7 mio. kg of goat milk per year). High performance dairy goats demand excellent feedstuff, environment and management. It was not clear how organic farming could fulfill these demands. The restrictive factors influencing the productivity of the animals in organic farming are as follows: limited concentrate feeding (<40% of ration), grazing systems with seasonal and annual changes in roughage qualities due to weather conditions and the prohibition of preventive and allopathic veterinary intervention, in particular endoparasite control. Since 2003, at the experimental station of the German Federal Institute of Organic Farming about 70 dairy goats are kept to assess the production potential of high performance goats under the standards of Organic farming. The goats are kept in modern stables, have seasonal access to pasture (Mai – November) and get only farm produced feedstuff. The monitoring of the herd comprises feed intake, health, milk yield, labour demand and economics. The 240-days milk, fat and protein yields are presented in the figure. It shows that organic dairy milk production is influenced by annual effects (roughage qualities) but can perform high yields. With consideration of the higher price (70 EU-Cent/kg) organic goat milk is a profitable product.



94. Reproductive, growth, and fitness traits among Boer, Kiko, and Spanish meat goats semi-intensively managed in the southeastern us

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During three falls (2003-2005), Boer (B; n=81), Kiko (K; n=64), and Spanish (S; n=59) straight bred does were exposed to B (n=11), K (n=9), and S (n=8) bucks in a three breed diallel to assess meat goat breeds for doe-kid performance on southeastern US pasture. There were 157 B, 152 K, and 150 S doe exposures. Birth and 90-day weaning weights were recorded for 781 and 635 kids, respectively. The proportion of does delivering live kids was lower ($P<0.01$) for B (82%) than for S (93%) and K ($96 \pm 3\%$). Litter size and litter weight at birth were not affected by dam breed. The sire breed x dam breed interaction affected ($P<0.05$) birth and weaning weights. Birth weights were heaviest for BxS, BxB, and BxK (3.44, 3.35, and 3.32 kg, respectively) and lightest for KxK and SxS kids (2.95 and 2.99 ± 0.09 kg). Weaning weights were heaviest for BxK and KxK (16.3 and 15.9 kg) and lightest for BxB and SxS (13.8 and 13.9 ± 0.4 kg). The proportion of exposed does weaning kids at 3 months was lower ($P<0.01$) for B (72%) than for K and S does ($88 \pm 4\%$ each). Litter size at weaning was smaller ($P<0.01$) for B (1.55 kids) than for S dams (1.8 ± 0.06 kids); K were intermediate (1.65 kids). Litter weaning weight was lighter ($P<0.01$) for B (25.7 kg) than for K dams (29.5 ± 1 kg); S dams were intermediate (28.2 kg). Based on all does exposed, B does weaned a lower ($P<0.01$) kid crop percent and litter weight (112%, 18.5 kg) compared to K (144%, 25.8 kg) and S ($157 \pm 9\%$, 24.5 ± 1.5 kg). Annual lameness, internal parasitism and attrition rates were higher ($P<0.01$) for B (71, 50, and 21%) than for S (39, 24, and 8%) and K does ($31 \pm 5\%$, $17 \pm 5\%$, and $7 \pm 4\%$). Fecal parasite egg counts differed ($P<0.01$) among all dam breeds: B = 523, K = 331, and S = 233

95. Method for evaluating sheep and goat production systems, devoted to development

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The Sub-network FAO-CIHEAM on sheep and goat production systems did set up a method for evaluating sheep and goat production systems based on technical and economic indicators validated by a group of experts. Such method enables to characterize their specificities and process, and also to compare between various systems located in a same basin or in different basins of production so as to improve the farmers' know-how. This method has been experienced and validated with semi-extensive dairy goat systems in Andalusia (Spain) and with more extensive dairy systems in Romania. This method can now be presented to extension officers so as helping them to proceed with the characterization of production systems in their own area of activity and so as to provide to farmers technical support and also for setting up regional data banks. Nevertheless, so as to reach a maximal efficiency of this method, it is essential to apply it by being in compliance with some different conditions: availability of reliable records collected rigorously from the farmers; taking into account agro-climatic and socio-economic environmental conditions; this method must not apply on very particular production systems; the method users must take into account advices from experts accredited by the Sub-network and attend training courses aimed at teaching them how to apply such method.

96. Study the Impact of breeding seasons in the dynamics of dairy goat herds

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The reduction of goat milk production and the competitiveness of other more profitable activities have increased the adoption of measurements to enhance goat milk and meat around the world. It has been proposed that by increasing the number of reproduction seasons would increase income over costs. The objectives of this study were to evaluate the impact of 1 or 2 annual reproductive cycles on production and economical health of dairy goats and to identify differences of production costs and revenues associated with changes in the herd dynamics as predicted by a mathematical model. A previously developed goat model using the System Dynamics approach to study long-term changes in the dynamics of the herd was used in these simulations. The model simulations used feeds, labor, and fixed costs as inputs and the outputs were revenues from milk production sales and sales of animals from all categories of the herd. The simulation time unit was “month” and a long-term horizon of 10 years was considered for these simulations. The model was set up to simulate a free-stall facility of a herd in equilibrium with 100 does in lactation. All parameters considered in this model assumed average values reported in production systems in the Southeast region of Brazil. Our simulations indicated that improvements of 10% in the fertility rate would increase the number animals in the herd up to 185% and 35% for one and two breeding season, respectively. Establishing a milk price as US\$0.68 the break even for one and two breeding seasons was respectively US\$0.62, and US\$0.50, giving the systems with two breeding a capacity to support reductions on milk price up to 26% against 9% with one breeding season. The comparison of models with 1 or 2 breeding seasons indicated that the 2 breeding seasons scenario was considerably more profitable and had a higher turnover than the model with 1 breeding season. Our findings indicated the use of a second (artificial) breeding season might be an important management strategy in providing flexibility and increasing income in dairy goat production systems.

97. A dairy goat model to study the impact of management strategies on herd dynamics

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The understanding of a dairy goat production system is crucial to establish a more competitive activity. Therefore, a simulation model was built to evaluate the dynamics of dairy goat herd under different scenarios of production. A System Dynamics approach was used to identify management policies that affect the behavior of the herd. All parameters considered in this model assumed average values reported in production systems in the Southeast region of Brazil. The first simulation tested the behavior of a system without any change in production policies. We analyzed the dynamics of feed consumption, milk production, and changes in the herd profile. In the second simulation, the culling and retention rates were changed to reach a herd in dynamic equilibrium. Thereafter, simulations were performed based on changes in reproductive and mortality rates. These simulations were designed to capture the variation in herd development based on simple management strategies over 10 years of simulation. The dynamic equilibrium of 100 lactating does was obtained when fixed culling and retention rates of 20 and 70%, respectively, were assigned to the does after 36 months of simulation. A sensitivity analysis was made and indicated that an increase of 30% in the reproduction rates increased the number of animals in the herd in 53%. A decrease in the reproduction rate of 30% reduced the number of animals in 39%. A third simulation indicated that increasing mortality rate from 6 to 20% of the female kids decreased the number of lactating does by 19%. These results indicated that small changes in reproduction and mortality rates can considerably affect the dynamics of the herd, even though the herd may not be immediately affected because of the intrinsic delays in the system. This result is extremely important to justify the need of activity planning to consider the gap between a measurement taken and the consequences, preparing the producers to potential delays in the system. The use of mathematical models is important to understand the relationships between variables and the dynamic of the system and to assist in applying best management strategies to enhance productivity of dairy goats.

98. Effects of cattle grazing alone and with goats on nutritive values and animal performance

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The grazing behavior of animals can have a profound impact on the botanical composition, production, and persistence of plant species as well as forage quality and animal performance. A grazing experiment was conducted on reclaimed coal-mined lands during the 2006 and 2007 growing season in Virginia. The objective of the experiment was to compare the effects of mixed grazing cattle and goats, cattle alone grazing and uncontrolled grazing. We wanted to evaluate changes in nutrient values of pasture, autumn olive (*Elaeagnus umbellata* Thunb.), sericea lespedeza (*Lespedeza cuneata* (Dum.-Cours.) G. Don), and multiflora rose (*Rosa multiflora* Thunb. Ex Murr.), as well as animal performance. Experimental design was a completely randomized design with three replications for the grazed treatments and two replications for the no grazing control. Three times during the grazing season, forage samples for the nutrient value analysis were obtained randomly in each replicate. Animals were weighed three times during the grazing season. The nutritive values of sericea lespedeza, autumn olive, and multiflora rose generally were within the acceptable level for all livestock classes and thus animal gains were not compromised. The nutritive values of these three species were better than pasture. Cattle performance was not different among the grazing treatments. The sum of cattle and goat gains in the mixed grazing treatment resulted in greater total animal output compared to cattle grazing alone. Our two year research showed that nutritive values of undesirable invasive plant species were greater than pasture and that overall total animal output was greater under mixed grazing than cattle grazing alone.

99. Characterization of milk farms of Murciano-Granadina goat in Granada province

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The objective of the study was to characterize farms of Murciano-Granadina dairy goats in the province of Granada, Spain. Twenty two farms (representing 38% of the farms enrolled in the Association of Murciano-Granadina Goat) distributed in four zones of the province (Highlands, Vicinity of Granada, Guadix and Marquesado, and Poniente Granadino), were interviewed in the year of 2005. Information collected in the interviews included socio-economic aspects, installations and equipment, infrastructure, hygiene and health, herd makeup and feeding. It was verified that 45.46% of farms had between 101 and 200 lactating does. Milk yield per doe varied between 114 to 342 kg for 150-day lactation. Seventy three percent of the farms used natural insemination, 77,27% follow a vaccination program, 72,73% used milking machines, 86,36% possessed cooling tanks. Although all interviewed farms were using various whole grain mixtures, only 16% owned grain silos. Pasture was used in 54,55% of the farms and 83.33% of those monitored their animals while the remainder let animals free on pasture; with respect to feed bunk, 57.89% of farms offered hay, 59.09% offered straw while only 13.64% offered total mixed diets to their animals. Commercial concentrates were offered by 26.32% of the farms and 68.18% of the farms offered mineral mix to their animals. None of the farms used silages.

100. Milking frequency and production level effects on milk partitioning in Tinerfeña dairy goats

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During the second lactation in 65 Tinerfeña dairy goats, 2 milking frequencies were studied recording machine milk (MM), machine stripping milk (MSM) and residual milk (RM). At the end of lactation, animals were grouped in high production medium production and low production within each milking frequency groups. MM parameter was not affected by milking frequency but X2 MSM was always significantly higher than X1 (41.0 to 84.0%) and RM was higher in X1 (28.3 to 48.3%). No significant differences were observed when were evaluated the milking partitioning percentages in reference to production level groups, which support the milkability dependence of genetics factors.

101. Impacts of Anglo-Nubian goats in smallholder farms in Bolivia; a case study

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The impact of the introduction of Anglo Nubian goats in Bolivia is examined as an example of the introduction of an improved, high performing tropical goat, to predominantly extensive smallholder production conditions. Anglo Nubian goats have been imported to Bolivia from the late 1960's up to the present. Animals originated from Argentina, Brazil, Paraguay or the USA; semen was introduced from Germany. There have also been exchanges between different parts of the country. The impact of success and failure on local goat keepers, the environment and biodiversity of goats were studied. Factors playing a role for positive and negative impacts were identified. Information was compiled through project reports, literature and interviews with experts. Introduction of purebred Anglo Nubians was successful in intensive or semi-intensive production systems, whereas no benefits were observed in semi-extensive and extensive production systems. Here, in cases of persistence of the breed, most often no use could be made of its production potential with actual performance not being superior to Criollo goats. However, introducing Anglo Nubians into intensive production systems had also positive side effects through improved pasture and herd management. The impact of the introduction and promotion of the Anglo Nubian breed in Bolivia on the local goat population in predominantly extensive production conditions was largely unsuccessful and unsustainable. The focus on Anglo Nubians in development projects and research resulted in a waste of resources invested and thus limited the allocation of resources for Criollo goat improvement. Only in exceptional cases, under more intensive management conditions, positive economic and environmental effects could be stated. Prior to breed introduction the prevailing production conditions should be analysed and breed introduction only targeted to those situations where the exploitation of the higher genetic potential for performance is likely to succeed.

102. Effect of management system on the regional composition and offal distribution in Blanca Andaluza goat kids

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The objective of the present study was to evaluate the effect of two management systems (conventional vs. organic) on regional composition and offal distribution of Blanca Andaluza goat kids. Twenty-four male kids (12 from a conventional system and 12 from an organic system) were used. Both groups came from twin born progeny with kindling's occurring in October, 2006. They were raised with natural goat milk and slaughtered at 8.4 kg of average farm life weight. After chilling, carcasses were manually split down at the dorsal midline within 24 hours post-exsanguination. The left side was divided into six standardized primal cuts (long leg, shoulder, neck, ribs, flanks and tail). The loin weight, kidney fat and pelvic fat were weighted. The same was done for the components of the offal distribution (kidneys, blood, skin, head, fore/hind feet, testis, penis, heart, lung/trachea, liver, spleen, gastro-intestinal tract and timus). The effect of production system was evaluated on each studied variable. Some differences between production systems were observed in pelvic fat (4.2 vs. 8.2 g; $p < 0.01$), kidneys fat (23.0 vs. 41.1 g; $p < 0.001$) and flanks (181.6 vs. 192.0 g) ($p < 0.05$); with higher values in goat kids from the organic system. The results revealed differences ($p < 0.05$) in long leg weight (653.2 vs. 588.7 g) and loin percentage contribution from left side carcass (5.71 vs. 3.90 %), with higher values in kids raised conventionally. Regarding the offal distribution, significant differences ($p < 0.05$) in the left testis weight (4.1 vs. 3.2 g), blood (410.0 vs. 354.2 g) and head (513.3 vs. 530.0 g) were observed. Likewise, management systems affected ($p < 0.001$) heart weight (47.7 vs. 36.4 g) and liver weight (184.0 vs. 153.1 g for conventional and organic systems; $P < 0.01$). Offal distribution was affected ($p < 0.05$) by production system (3.261,4 vs. 3.015,0 g, to conventional and organic kids, respectively). We can conclude that the production system (conventional vs. organic) does not have an important effect in regional carcass composition in Blanca Andaluza kids. However, offal distribution showed higher scores in suckling Blanca Andaluza kids raised under conventional system compared with kids raised under the organic system

103. Effects of two fattening systems on feedlot performance and carcass characteristics of Fars native male goat kids

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With two factor factorial experiment in a completely randomized design, effects of two systems of fattening and different ages of kids on feedlot performance and carcass characteristics of Fars native male goat kids were studied. The first factor was two fattening systems (system 1; fattening of kids at 3 months of ages just after weaning and system 2; fattening of kids at 6 months of ages after 3 months of range grazing) and second factor was different ages of fattening (fattening from 3 to 12 months of ages). Sixty six male kids at 3 months of age were considered for experiment. Six kids were slaughtered at the first day of experiment and sixty kids were divided into two groups. The first group were keep in feedlot in individual boxes and the second group were grazed in range and after 3 months were keep in feedlot in individual boxes. The fattening period for first and second groups were 9 and 6 months respectively. Forage and concentrate were pelleted and were offered to kids ad libitum. Live body weight and feed intake were recorded for each month. Eight kids from each group at the 6, 9 and 12 months of ages (3-months interval) were slaughtered randomly and carcass characteristics were measured. Initial live body weights of kids of two systems were 16.23 and 15.96 kg respectively ($P>0.05$). Live body weights at 6, 9 and 12 month of ages for system 1 were 25.5, 30.09, and 37.56 kg respectively ($P<0.01$) and for system 2 were 18.54, 26.6 and 33.3 kg respectively ($P<0.01$). Differences of live body weight at 6, 9 and 12 months of ages between two systems were significant ($P<0.01$). Daily gains for periods of 3 to 6, 6 to 9 and 9 to 12 months of ages for system 1 were 103, 51 and 83 g ($P<0.01$) and for system 2 were 29, 90 and 74 g respectively ($P<0.01$). Differences of daily gains for periods of 3 to 6 and 6 to 9 months of ages between two systems were significant ($P<0.01$), but for periods of 9 to 12 months of ages between two systems were not significant ($P>0.05$). Daily feed intake for periods of 3 to 6, 6 to 9 and 9 to 12 months of ages for system 1 were 764, 721 and 820 g ($P>0.05$) and for system 2 for periods of 6 to 9 and 9 to 12 months of ages were 778 and 880 g respectively ($P>0.05$). Differences of daily feed intake for periods of 6 to 9 and 9 to 12 months of ages between two systems were not significant ($P>0.05$). Feed conversion ratio for periods of 3 to 6, 6 to 9 and 9 to 12 months of ages for system 1 were 7.42, 14.14 and 9.88 ($P<0.01$) and for system 2 for periods of 6 to 9 and 9 to 12 months of ages were 8.64 and 11.89 respectively ($P<0.01$). Differences of feed conversion ratio for periods of 3 to 6 and 6 to 9 months of ages between two systems were significant ($P<0.01$), but for periods of 9 to 12 months of ages were not significant ($P>0.05$). Dressing percentages at 3, 6, 9 and 12 month of ages for system 1 were 45.71, 44.4, 49.41 and 48.25 respectively ($P<0.01$) and for system 2 were 45.71, 38.41, 46.59 and 46.39 respectively ($P<0.01$). Differences of dressing percentages at 6 and 9 months of ages between two systems were significant ($P<0.01$), but at 12 months of ages were not significant ($P>0.05$). Valuable carcass cuts (leg, loin and shoulder) percentages at 3, 6, 9 and 12 month of ages in each system were significant ($P<0.01$), but in each age between two system were not significant ($P>0.05$). Carcass meat, deposited fat and bone percentages at 3, 6, 9 and 12 month of ages in each system were significant ($P<0.01$), but in each age between two system were not significant ($P>0.05$). **Keyword:** goat kid, fattening system, age, fattening performance, carcass characteristics.

104. Chemical composition of the *longissimus dorsi* muscle in young goats from different racial groups

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Chemical composition of goat meat is based on its macro constituents: water, fat and protein. Water is the larger component of muscle, representing 73,92 to 80,54% of its content and can vary mainly in function of racial group and age. The purpose of this study was to estimate meat chemical composition in young goats affected by racial group and sex, based on the analysis of the *Longissimus dorsi* muscle. Seventy-eight goat kids from both sexes and from five racial groups were used in this study: 12 Alpine (8 male and 4 female), 16 ½ Boer + ½ Alpine (5 male and 11 female), 18 ½ Anglo-Nubian + ½ Alpine (8 male and 10 female), 17 ¾ Boer + ¼ Alpine (10 male and 7 female), ½ Anglo-Nubian + ¼ Alpine + ¼ Boer, a Tricross (9 male, 6 female), which were slaughtered between 86 to 122 days of age. The animals were raised on a feedlot system, weaned at 60 days of age and fed a complete pelleted diet containing 70% concentrate and 30% hay. Diet was formulated according to NRC (1981) requirements for an estimated weight gain of 150 g/day. Mean live weight at slaughter was 18.97 kg and mean loin weight was 0.407 kg. From loin, the *L. dorsi* muscle was cut, identified, packed and stored for later chemical analysis. Proximate composition of the *L. dorsi* was determined according to the Association of Official Analytical Chemists (AOAC, 1995). The analysis included determination of moisture, protein (N x 6.25), ether extract and ash. Analyses of variance were performed on all the variables measured using the general linear models procedure of SAS (1990). The chemical analysis of the *Longissimus dorsi* muscle showed 78.83% moisture; 1.20% ash; 26.60% protein; and 2.31% ether extract. Chemical composition of *L. dorsi* muscle was not affected by racial group and sex, except by ether extract content that were affected by racial group. The increase of age decreases moisture content and increases ether extract content.

105. Loin tissue proportion in young goats from different racial groups

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The present study was carried out at Goat Production Area of FMVZ/Unesp-Botucatu, Sao Paulo, Brazil. Seventy-eight goats from both sexes and from five racial groups were used in this trial: 12 Alpine (8 male and 4 female), 16 $\frac{1}{2}$ Boer + $\frac{1}{2}$ Alpine (5 male and 11 female), 18 $\frac{1}{2}$ Anglo-Nubian + $\frac{1}{2}$ Alpine (8 male and 10 female), 17 $\frac{3}{4}$ Boer + $\frac{1}{4}$ Alpine (10 male and 7 female), $\frac{1}{2}$ Anglo-Nubian + $\frac{1}{4}$ Alpine + $\frac{1}{4}$ Boer, a Tricross (9 male, 6 female), which were slaughtered between 86 to 122 days of age. The animals were raised on feedlot system, weaned at 60 days of age and fed a complete pelleted diet containing 70% concentrate and 30% hay. The diet was formulated according to NRC (1981). After slaughter, carcasses were divided and the right half carcasses were sectioned on seven anatomic regions. Loins were stored to posterior dissection. After weighing, loin was separated into muscle, bone and fat tissue. Subcutaneous, intramuscular and renal fat depots were recorded separately. The results were expressed as percentage of loin weight. Analyses of variance were performed on all the variables measured using the general linear models procedure of SAS (1990). The mean live weight at slaughter was 18.97 kg and mean loin weight was 0.407 kg. Mean values obtained in this study were: 25,05% of *Longissimus dorsi*, 61,83% of muscle, 15,94% of total fat, 7,15% of subcutaneous fat, 1,53% of intramuscular fat, 7,26% of renal fat and 19,85% of bone. Tissue composition was influenced by sex. Females had higher amount of total and renal fat, representing 17,54% and 8,61% to females and 14,34% and 5,90% for males, respectively. Males presented higher amount of muscle in comparison to females (63,18 vs. 60,49%). Total fat percentage was influenced by racial group; Alpines had smaller amount (11,97%) in comparison to others groups. Animals from $\frac{3}{4}$ Boer + $\frac{1}{4}$ Alpine group had higher proportion of subcutaneous fat (8,72%), followed by $\frac{1}{2}$ Anglo Nubian + $\frac{1}{2}$ Alpine (7,81%), Tricross (7,33%), $\frac{1}{2}$ Boer + $\frac{1}{2}$ Alpine (6,95%) and Alpines (4,92%).

106. Slaughter performance, carcass quality and meat composition of Tianfu goats: an emerging meat goat breed

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Slaughter performances, meat quality and chemical composition of Tianfu goats, an emerging new meat goat breed, were studied. Tianfu goats belong to a breed through the selection of body size and carcass quality for more than 20 years in Sichuan Agriculture University, China. The results were compared to Chendu Ma goats (CM, female parent) and Nanjiang Yellow goats (NY), the official meat goat breed recognized by the Ministry of Agriculture in China. Live weight at slaughter, carcass weight, dressing percentage and meat weight of Tianfu were 28.3 kg, 16.1 kg, 14.4% and 13.3 kg respectively, and higher than those of NY and CM ($P < 0.05$). The conformations of carcass portion of Tianfu goats were more uniform than NY and CM. Meat quality measured as water retention, storage lose, cooked meat percentage, and pH were not different ($P > 0.05$) between Tianfu and NY, with Tianfu slightly higher than NY. Muscle fiber diameters of triceps, longissimus muscle and biceps femoris were 54.6 μm , 44.9 μm and 46.9 μm respectively in Tianfu, and slightly higher than NY ($P > 0.05$). Contents of crude protein, fat, water and ash in meat were not different ($P > 0.05$) between two Tianfu and NY, although the crude fat content of Tianfu is slightly higher. The total amount of amino acids of the muscle in Tianfu goats is 19.8%, comparing to the reported value of 16.6% in Boer goats.

107. Effect of age on carcass composition and meat quality in Jianyang big ear goats

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The carcass composition, meat quality, chemical component and edible characteristic of meat from male and female Jianyang Big Ear goats (JB) at 4 month, 9 month and 3 year of age (n = 20) were determined. The results indicated that JB goat in general has a large body size with good carcass characteristic and meat quality. Live weights at 9 month of age averaged 42.5 kg and 36.8 kg for males and females, respectively. Dressing percentage was 52.4 for the 9 month old females, the highest among all groups. Shear force values of meat from 4 month old male and female goats (5.30 and 6.54 kg/cm²) were lower ($p < 0.05$) than that from 9 month old males and females (8.85 and 8.49 kg/cm²) and adult does (8.96 kg/cm²). Calcium contents were higher in goats of 4 month of age (male: 9.09×10^{-3} , female: 8.69×10^{-3} %) than those in goats of 9 month (male: 6.19×10^{-3} , female: 8.88×10^{-3} %) and 3 year of age (3.78×10^{-3} %). Weeping loses were not affected by age with highest vales observed at 3 month of age (male: 4.16%, female: 4.41%). Contents of total amino acid, Fe and Zn were the lowest in goats of 4 month of age. Crude protein contents of meat were higher ($p < 0.05$) in 9 month old males and females (22.5% and 21.5%) than that in 4 month old and adult does. Neck proportion as a percentage of slaughter weight in females was lower than that in 9 month old males and adult does. Total taste score of the meat was the highest (9.51) in the 9 month age group. Contents of total amino acids, glutamic acid, Fe and Zn of meat from the 3 year old adult does were higher than those from other age groups, but the taste score of the meat was the lowest (8.74) with more hardness meat and a thickness abnormal flavor. Considering feeding cost, carcass composition, chemical component, edible characteristic and market value; it appears that optimum slaughter age for JB goats is at 9 month of age.

Key word: goats; carcass; meat quality; chemical component; Jianguyang Big Ear

108. Growth performance of Osmanabadi weaned kids to various housing patterns

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The main purpose of goat housing is to moderate the range of microenvironment to which the animals are exposed and optimize their growth and better survivability by protecting them from extreme climates. Twenty four Osmanabadi weaned kids of similar age and body weights were randomly allotted to six housing patterns viz., T₀: Floor *murum* with no ventilator + thatch roof (control), T₁: Floor *murum* with no ventilation + tin roof, T₂: Floor *murum* with one ventilator + thatch roof, T₃: floor *murum* with one ventilator + tin roof, T₄: floor *murum* with two ventilators + thatch roof and T₅: Floor *murum* with two ventilators + tin roof. All the kids were maintained on the common feeding regime of available roughages and home-made concentrate mixture. The data were subjected to FRBD. The observations on body weight gains showed significant (P<0.01) differences among the treatments means. The kids kept under T₂ (12.30 kg) and T₄ (12.42 kg) showed superior growth to those under other treatments. Providing ventilation proved significantly superior (P<0.01) for body weight gains as compared with no floor ventilation. However, no significant gains in live weight could be recorded by providing either one or two floor ventilators. Provision of various roofs to the shed resulted in significant differences among the mean values of body weight gains. Covering the roof with a thatching materials proved beneficial and resulted significantly (P<0.01) higher body weight gains over to tin roofing. The cost of one kg gain in body weight was highest (Rs.9.41) in T₁ (tin roof with no ventilator) whereas lowest (Rs. 7.80) in T₂ (thatch roof with two ventilators). It is concluded that thatch roofed house with floor ventilation is economical for the better comfort and growth of the kids.

109. Influence of feeding frequency on changes in body measurements and carcass characteristics of Red Sokoto goats

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Changes in body measurements and carcass characteristics were studied in Red Sokoto goats raised for 108d on three feeding regimes. Twenty one growing intact male goats with average weight of 8.70 ± 0.23 kg were randomly grouped into three of seven, corresponding to the number of feeding per day; once OPD (08.00h), twice TPD (08.00h and 13.00h) and thrice HPD (08.00, 13.00, 18.00) representing the three treatments respectively, in a completely randomized design. Animals were fed 1kg/head/day of the basal diet, *Panicum maximum*, supplemented with concentrate diet (17% CP and 3.97 ME, Mcal/kgDM) fed 5% body weight, and served based on the prescribed level of feeding. Body weights and linear body measurements were taken weekly. Four representative goats were slaughtered at the close of the feeding periods to evaluate effect of level of feeding on carcass characteristics. Goats fed twice per day, TPD, had highest ($P < 0.05$) average weight gain (g/d) of 81.01, against 37.03 and 69.44 obtained for OPD and HPD fed goats. There were significant differences ($P < 0.05$) in the changes in body length, chest girth, and wither height values of goats as the trial progressed. Skeletal growth as represented by the wither height WH was observed in all goats but more prominent and steady in OPD and TPD fed goats. Changes (cm) in WH of goats monitored in three stages of 36 days each of 108d trial were: OPD goats; 3.50, 2.00, and 1.50; TPD goats, 1.00, 5.00 and 0.05; HPD goats, 6.00, 3.00 and 0.20. Regression of body measurements on changes in body weight ($P < 0.01$) showed that chest girth was best in predicting changes in body weight on account of its highly significant correlation ($r = 0.77$). Body condition score varied significantly ($P < 0.05$) across treatment groups with TPD goats having ($P < 0.05$) the highest value of 3.20. Similarly, TPD fed goats had highest ($P < 0.05$) dressing % (58.30), carcass weight (7.90kg) and carcass condition score (2.50). Corresponding values of 47.48 and 55.70 %, 5.00 and 7.00kg, and 1.00 and 1.90 were obtained for OPD and HPD fed goats respectively. TPD fed goats also had highest ($P < 0.05$) mean offal component values (kg) of 1.25, 0.68 and 0.88 for head, rumen, and pluck respectively. Performance of goats fed twice per day was numerically higher but not significantly ($P < 0.05$) varied from those of their counterparts fed thrice (HPD) in most of the studied parameters. Feeding goats twice per day not only improves production but prevents waste of farmer's resources that is associated with higher feeding regime.

110. Effect of management systems on semen attributes in Osmanabadi goat

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Eighteen weaned Osmanabadi bucks were selected and randomly distributed among three groups of feeding, each consisting of six male kids viz. extensive (T_1), Complete Stall fed (T_2) and Semi stall fed (T_3). Semen characteristics of the buck viz. color, semen volume, sperm motility, live and dead sperm count and sperm concentration were recorded during experimental period from the age of 6 month to the age of 15 months. Data recorded was analyzed under CRD. The semen samples obtained from all three groups were creamy white in color. The average values for semen volume recorded were 0.62 ± 0.12 , 0.71 ± 0.16 and 0.78 ± 0.18 ml in T_1 , T_2 and T_3 management systems, respectively. The differences among the treatments were significant at all the months of age. The semen volume recorded from the bucks fed on T_3 treatment had significantly higher volume followed by T_2 and T_1 . Mean values of initial sperm motility were 74.783 ± 0.043 , 83.100 ± 0.056 and 87.600 ± 0.66 in T_1 , T_2 and T_3 respectively. The differences among the treatments at all month of age were significant. Mean initial sperm motility was found significantly highest in T_3 and T_2 , but which were statistically at par, among themselves. The average values for total semen concentration of bucks were, 277.25 ± 3.75 , 288.77 ± 4.28 and 306.71 ± 3.56 (10^7 /ml) in T_1 , T_2 and T_3 respectively. Among the treatments the values recorded in T_3 treatment were significantly higher than T_2 and T_1 . The average means values of live sperm count were 74.683 ± 0.68 , 78.516 ± 0.71 and 83.500 ± 0.63 per cent in T_1 , T_2 and T_3 respectively. Among the treatments T_3 was found to be significantly superior in entire experimental period which was followed by T_2 and T_1 . The average value of dead sperm percent recorded was 25.516 ± 0.15 , 21.649 ± 0.11 and 16.499 ± 0.14 per cent in T_1 , T_2 and T_3 respectively. The values recorded for the bucks fed on T_3 treatment was significantly lower than other two treatments.

111. Production and marketing of Pashmina in cold arid region of Jammu and Kashmir: implications towards livelihood and sustainability

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The state of Jammu and Kashmir in India with its diverse climatic conditions and geographical features is famous for pashmina, produced from Changthangi breed of goats reared by a nomadic Changpa race in its cold arid zone. The study carried out in breeding tract (Changthang sub division) of Changthangi goats in Ladakh, comprised of three zones viz Kurzok, Nyoma & Durbuk with 17 villages and 2282 households rearing 1,96,000 pashmina goats. The sampling of the final stage of pashmina goats was affected through multi stage stratified random sampling technique. The study revealed that economical crop cultivation was hardly possible in Changthang, but the area is congenial for efficient Changthangi pashmina goat based small ruminant production systems. The primary data on altitude, population, demographic trend, flock structure, sex, age, flock size and grade of pashmina showed high correlation between altitude and flock size vis-à-vis fibre quality (pashmina). Generally cold aridity and availability of quality pasture were important contributing factors for lower fiber diameter in Kurzok zone and Anlay, Koyul, Meerak and Chusul areas of the tract. Common diseases of Changthangi goats were parasitic diseases, FMD, Ecthyma and Caprine Pleuro Pneumonia. The animals were highly inbred which influenced the production parameters negatively. The flocks from Kurzok zone showed better performance in production traits than those of Nyoma and Durbuk zones. Prolificacy or multiple births was a rear phenomenon in Changthangi goats. Pashmina production was highest in castrated bucks and lowest in does with body weight, higher in castrated and lower in breeding bucks. The livestock in Changthang are reared under extensive and transhumance production system with camp movement 6 to 10 times in a year on traditional and socially established annual routes. The best pasture grasses/ bushes for pashmina and wool production are Gypshen, Nayargal (*Astragalus*) and Tama (*Caragana*). Overall net returns for all sexes clubbed together revealed that net profits were highly encouraging in pashmina production. The important benefits from Changthangi goat rearing were in terms of fibre, animal sales, and changes in flock inventory, milk and manure. The fiber had average diameter 8-14 μ and is unique in firmness, fineness, warmth, durability, softness and ability to absorb dyes and moisture compared to mohair and other wools. The breed proved most promising source of livelihood in Changthang followed by Changluk sheep. The project evaluation analysis exhibited a high BCR, IRR, NPV and PBP indicating thereby the pashmina goat rearing is profitable and financially viable. The traders and butchers from Leh being important market functionaries handled 80 per cent raw pashmina. A kilogram of raw pashmina yields 330 gm of cleaned pashmina. Hand spinning cost of cleaned pashmina was Rs 6000/- per kilogram and spinning weaving and embroidery was source of livelihood for thousands of people in the state. Three types of apparels viz shawl, stole and rumal are weaved from hand spin pashmina with high demand in domestic and international market and with embroidery work has recorded its name in Guinness Book of World Records for being costliest cloth in the world after trade ban of most precious natural fiber Shahtoosh (king of fibre) of small Tibetan Antelope known as Chiru. The study suggests an urgent need for pragmatic planning that could take into account constraints with essential measure in



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breeding, feeding, animal health, pastures, marketing of pashmina/ chevon, socio-economic problems, extension and finance for the development of breed which may contribute to livelihood, nutritional security/employment generation / sustainability of cold arid zone and export earning of the country.



112. Performance of crossbred goats in systems different of manage in northeastern semi-arid

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The objective of this experiment was to determine three manage systems (extensive, confined, semi-confined) for goats in Northeastern Semi-Arid. The experiment was conducted in Perna D'ema small Farm, which works together with Santarém Farm of little Producers Association - Casa Nova - BA. The small farm have the totally 100 ha of area, there are native grassing (brushwood) and nature wood (caatinga), corn production, cassava, sorghum and leucena. The experiment lasted 60 days, beginning in February and finishing in April of 2006. The precipitation was 350 to 800 mm and the temperature of 27 °C. Fifteen goats SRD were used (Anglu-Nubiano and Saanen mestizo). The animals was dividing in ages and body weight between three homogeneous groups: confined (T1), confined-semi (T2) and extensive (T3). The diet had corn meal (15%), cassava (15%), leucena (20%), wheat meal (20%) and cotton cake (30%), mixed and yield tardy and morning. The bory weight and day weight were 12,6; 8,70 and 4,6, and 0,21, 0,15 e 0,08 to confined-semi, confined and extensive, respectively. The biggest economic income for the system was semi-extensive.

113. Description of a low-input goat production system in the north of Mexico

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Goats play an important role for the livelihood of farmers in marginal areas world-wide. In Mexico, goats are kept under various climatic conditions, ranging from humid and tropical to arid zones. The present study focuses on the characterization of a production system in the Coahuila State in the North of Mexico, where goats are an important part of agriculture, and identifies constraints related to breeding activities. In a first step, household interviews with 64 farmers were carried out to capture general information about the production system. Major constraints for the improvement of productivity were identified. The system can be characterized as a low input and a mixed crop-livestock system. Goats are kept on natural pasture all year and are supplemented with crop residuals after harvest. Kids are sold at the age of about 45 days to cities nearby. The sale of milk is an important source of income for the farmers. The goat population was described phenotypically. Body measurements of 404 adult females and 94 adult males were taken; coat colors, shape and orientation of horns were recorded. In a second step, perceptions and opinions about the current breeding practices were discussed with farmers in workshops. Farmers expressed their concern with purchasing new bucks of exotic breeds like Saanen, Toggenburg or Alpine, because these breeds are not adapted to the harsh environment. As there are not enough young bucks available in the communities, farmers rely on the purchase of bucks with un-known ancestry. Based on the findings of the workshops, strategies for the implementation of community-based breeding programs were designed in a participatory approach.

114. Evolution and dynamic of the goat population in Brazil between 1975 and 2003

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This study was proposed to analyze the dynamic of goat production in Brazil, considering the evolution of livestock during the period of 1975 to 2003. The spatial dynamic of goat activity in Brazil was analyzed and evaluated, through the following indexes: asymmetry, concentration and distance, and the use of the center of gravity. The data analyzed was from the Instituto Brasileiro de Geografia e Estatística (IBGE). The analysis was performed following the methodology of ordering micro-regions; frequency distribution; asymmetry of frequency distribution; concentration measures; distance with geographic entities; agreement coefficient and the center of gravity. An increase of 35% in the Brazilian goat livestock was observed. In terms of regional dynamic, the results didn't show reverse in the relative participation of the regions concerning the goat livestock. The Northeast region concentrates 93% of the total goat livestock in Brazil. The number of micro-regions with the presence of goats increased from 531 to 552 between 1975 and 2003. The biggest spatial changes, measured by Cantor and trans-variation distances, happened between 1975 and 2003. The micro-region of Juazeiro in Bahia state had 17.6% of the Brazilian goat livestock. Also, less than 25% of the micro-regions that had goats were enough to gather almost 75% of the goat livestock. In 1975, the micro-region of Petrolina, in Pernambuco state, presented the higher density of goats by square meters in Brazil, but was losing importance, and in 2003, finished in tenth position, losing the first place for Itaparica, also in Pernambuco. The centre of gravity was used to evaluate the mobility of the goat herd. It was observed that the centre of gravity for goat production in Brazil has always been in Juazeiro, in Bahia state. It's possible to conclude that, in the period analyzed, the variation that occurred was smooth. A few micro-regions were enough to gather 75% of the goat livestock in the country. Many regions that rear goats showed an increase in density and adaptability of the species, indicating that the goat activity is important as an economical and social alternative in the Brazilian regions.

115. Impact of the service period under the dynamic of a semi-intensive dairy goat herd

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The dynamic of herds is created by production indexes being distinct the behavior that each one produces in the herd. The reproduction and sanitary indexes appear to be responsible for the main deviation in an evolution of a herd which the service period could be highlighted as one of the major indexes. This way, the objective of this study was to analyze the effect of the service period under the dynamic of a semi-intensive dairy goat herd. Using a dairy goat model programmed in Vensim® the indexes based on the *Brazilian Agricultural Research Corporations (Embrapa-Goats)* were used for parameterization. Were simulated different scenarios with the service period of 90 and 210 days and a retention rate of young does of 50, 75 and 100%. All simulations began with 20 nuliparous does in the beginning of the breeding season, seeking to stabilize the herd with 65 animals. By increasing the period service from 90 to 210 days two distinct results were obtained. Considering a service period of 90 days the time necessary to reach the equilibrium was 56.3, 44.2 and 37.9 months, respectively for 50, 75 and 100% of retention rates. On the other hand, when considering a service period of 210 days the time to reach the equilibrium was 73.9, 52.6 and 41.7 months, respectively for 50, 75 e 100% of retention rates. For this reason, the increase in the service period raised the time to reach the equilibrium to 17.6, 8.4 and 3.8 months, respectively for 50, 75 e 100% of retention rates. The variation in the service period showed major impacts in a growing herd when a smaller retention rate was taken. Although the smaller time to stabilize the herd using a retention rate of 100%, this situation did not create a selection pressure for milk production with absence or very small genetic gain. The reproductive performance of the herd is important to reduce the service period, becoming the system more efficient. This way, the impacts in the production system under different service period and retention rates must be well understood to help in the decision making.

116. Influence of the artificial long days during winter on anestrus postpartum and milk production in dairy goats from subtropics

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The aims of the present study were investigate if exposure to artificial long days (16 h of light/day) in Saanen goats from subtropical region kidding during late autumn may increase the milk production and the postpartum anestrus duration. To this end, we used two balanced groups of Saanen goats with regard to date of parturition, initial milk production, parity, live weight and condition score. On December 16th (day 8±0.6 postpartum = day 0 of the study) one group of goats (n=19) was submitted daily during 70 days to artificial long days (16 h light/day), followed by the natural short days up to 134 days of lactation. Simultaneously, another group of goats (n=19) were maintained under natural variations of photoperiod (10 h and 19 min of natural light/day during winter solstice) during 112 days of the study (134 days of lactation). In both groups the weaning of the kids was performed at day 30 postpartum. All goats were maintained under intensive conditions and were fed alfalfa hay (18% CP) and 300 g of commercial concentrate (14% CP). In both groups, no females showed ovarian activity during the study (P>0.05). Before the weaning of the kids (at 0, 14 and 28 days of the study), the milk production did not differ significantly between the two groups (3.1±0.1 kg in both groups; P>0.05). In contrast, at days 42, 56 and 70 post-light exposition, goats from long days treated group yielded in average 3.0 kg of milk/day, and goats from control group only 2.5 kg of milk/day (P<0.02). This increase in milk production in treated goats lasted only up to 14 days after the end of photoperiodic treatment (2.5 kg vs. 3.0 kg in control and treated group, respectively; P<0.05). However, at day 30 after remove the artificial long days milk production did not differed between two groups (2.5 vs. 2.6, respectively; P>0.05). We conclude that in Saanen goats from subtropics that initiate their lactation during winter, exposure to artificial long days increase the milk production level. Furthermore, the anestrus postpartum duration is not influenced by this treatment, possibly due to all animals were into seasonal anestrus.

117. Characteristics of goats and goat keepers in Adilo small ruminant market shed of southern Ethiopia

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Ethiopian goats are primarily reared for meat production, milk production being of secondary importance. Assessing the composition of goats sold or retained in the household could help to identify probable marketing decisions and constraints. A study was conducted in Adilo small ruminant market-shed situated in southern Ethiopia in September 2005 aiming at determining the characteristics of goats and their keepers. Adilo represents the most densely populated areas in the Ethiopian highlands and the recognized suppliers of small ruminants to the neighboring big cities and Addis Ababa. Before the current investigation, a pilot survey was carried out on half of the total registered households in the area. A minimum of one goat with an average flock size of 2 were kept by seventeen percent of the total 1000 households included in the pilot survey. Forty four goat keepers were randomly selected for detailed appraisal. The mean age of the surveyed keepers was 48 years, with an average 21 years experience in goat farming indicating the familiarity of the practice in the area. Sixteen different colors and color mixtures were observed. About half of the total goats had uniform colors white being the frequent color and black the least frequent. Births accounted for 46% of entries while 37% of them were purchased. The results indicated that the transaction level was high and large proportion of animals was apparently retained in the system through purchases. Females clearly outnumbered after weaning particularly for animals above one year of age. The surveyed flocks consisted of 38% adult does of two years of age or more. Most of the flocks did not have a breeding male, and goat keepers relied on bucks from other flocks to service the females. The fastest growing animals might be sold first that may possibly indicate the selection of bucks against growth. The high proportion of does might help to have a large crop of kids after a drought year with feed scarcity. The lower sale price of does in the market could further discourage farmers from selling but keep them at home for breeding. **Key words:** *Entry type; Ethiopia; Flock structure; Goats*

118. Racial and gender groups influence on performance and biometrics traits of confined kid goats

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The goat effective flock, as well as the meat production has been growing in Brazil, because of the larger demand for low fat meat. Thinking about this rising business, this work was accomplished with the objective of evaluating the effect of racial and gender groups on performance and biometrics traits of confined kid goats. For such study, 91 animals of five racial groups were used (Alpine – A, $\frac{1}{2}$ Boer + $\frac{1}{2}$ Alpine - $\frac{1}{2}$ BA, $\frac{1}{2}$ Anglo Nubiano + $\frac{1}{2}$ Alpine - $\frac{1}{2}$ ANA, $\frac{3}{4}$ Boer + $\frac{1}{4}$ Alpine – $\frac{3}{4}$ BA, $\frac{1}{2}$ Anglo Nubiano + $\frac{1}{4}$ Boer + $\frac{1}{4}$ Alpino –TC). The birth weight (BW), weight at 110 days of age (W110), shrunk weight on slaughter (SW), total weight gain (TAG), average daily gain (ADG), slaughter age (SA), were evaluated. The total intake of animals by pen was measured and the gain with feeding was calculated. On the day before the slaughter, the cheek chest (CC), wither height (WT), body score (BS), and tissue height between 3rd and 4th sternum bone (3-4THC) and loin height between 12th and 13th rib (LH), were measured by ultrasound. It was observed some racial group influence on CC, BS and 3-4THC, higher to $\frac{3}{4}$ BA and a higher WT for A. Gender influence was observed on the traits: WT and 3-4THC higher to males and BS to females. There were no observed difference ($P>0.05$) to other traits. The racial group gain with feeding, respectively for males and females, was of 0.278 and 0.231 to Alpine; 0.281 e 0.242 to $\frac{1}{2}$ ANA, 0,304 and 0.270 to $\frac{1}{2}$ BA, 0,370 and 0.299 to $\frac{3}{4}$ BA, 0.280 and 0.279 to TC, being observed a better gain with feeding for males $\frac{3}{4}$ BA and $\frac{1}{2}$ BA. The expenses with feeding represent costs around R\$ 8.77, 8.54, 8.54, 8.98 and 8.38 per kilogram of carcass produced by A, $\frac{1}{2}$ BA, $\frac{1}{2}$ ANA, $\frac{3}{4}$ BA and TC, respectively demonstrating that the costs on the feedlot system are high, and should be reviewed by the producer and are only justified in cases where the remuneration is above these values. On the point of view of weight gain and carcass production, both racial and gender groups studied can be used seeking meat production in feedlot systems.

119. Carcass characteristics of kid goats from different racial groups on feedlot system

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This study was accomplished aiming to evaluate racial and gender groups on carcass traits for confined kid goat. For this, 91 animals were used, 52 male and 39 female, belonging to five racial groups: Alpine, $\frac{1}{2}$ Boer + $\frac{1}{2}$ Alpine, $\frac{1}{2}$ Anglo Nubian + $\frac{1}{2}$ Alpine, $\frac{3}{4}$ Boer + $\frac{1}{4}$ Alpine e TC – $\frac{1}{2}$ Anglo Nubian + $\frac{1}{4}$ Boer + $\frac{1}{4}$ Alpine. The shrunk weight, on slaughter day, after 24 hours of solids deprivation was measured. After the slaughter and evisceration, immediately before the cold camera, the hot carcass weight (HCW), cold carcass weight (CCW), after 24 hour of chilling was measured, and the chilling loss calculated. The pH and temperature 1 and 24 hours *post-mortem* on *Longissimus dorsi* e *Semimembranosus* muscle were gauged. The carcass was evaluated subjectively regarding conformation (CCO) and fat score (FS) and the carcass internal (CIL) and external (CEL) and leg length (CL), the thoracic (TP), leg (LP) and rump perimeter (RP), chest (CW) and rump width (RW) were measured. Also, the tissue height in a 3rd (3THE) and 4th (4THE) sternum chest bone was measured, and the commercial carcass yield, compactness index at the carcass (CIC) and the compactness index at the leg (CIL) was calculated. Some influence of racial group to CIL, CEL, CL was observed with superiority for Alpine, as well as for CIC, CIL, FS with superiority of animals with Boer blood, showing that those are more slender, while these are more compact. Concerning gender, the males were superior on 3THE and 4THE, without difference on other evaluated traits. In this experiment there was an average 6.24% of chilling loss, and average temperature after 2 hours of chilling of 17.25°C on *L. dorsi* and 16,06°C on *Semimembranosus*. The characteristics of HCW, CCW, CIL, CEL, CCO, FS, TP, RP, RW, CW and LP increased linearly with the increase of shrunk weight. The Alpine were taller and longer than Boer group animals, and crossing between them reduced the carcass size and increased the deposited tissue. The male carcasses were superior to females, but regarding tissue deposition were similar. The muscle transformation parameters in meat (pH and temperature), were not affected by racial and gender groups studied.

120. Effect of management system on carcass yield and conformation in Blanca Andaluza goat kids

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The aim of this study was to determine the effect of management system (conventional vs. organic) has affect carcass yield and quality in Blanca Andaluza goat kids. Twenty-four male kids (12 from conventional system and 12 from organic system) were used. Both groups were formed with kids coming from twin births occurred in October, 2006. They were raised with natural milk and slaughtered at 8.4 kg of farm live weight. Fasting losses, empty body weight (EBW), hot carcass weight, chilling losses and external carcass fat measurements were recorded. Different carcass yield measurements were calculated: real, farm, slaughter, commercial and biological yield. There were obtained also measurements of carcass conformation: leg length, hind limb width, hind limb perimeter, chest depth, chest width, carcass external length, carcass internal length, chest perimeter, OS₁ and OS₂, to obtain different indexes: fleshiness, carcass compactness, leg compactness (LCI), chest roundness, relation carcass depth/length, relation carcass length/width, relation depth/width and bone index. The effect of production system was evaluated on each studied variable. There were differences between management systems in OS₁ measurements ($p < 0.05$) (2.2 vs. 2.0 cm, for kids from conventional and organic systems, respectively), and in LCI ($p < 0.05$) (27.34 for conventional kids and 24.10 for organic kids). We can conclude that the production system studied (conventional vs. organic) do not modify, in any case, carcass yield and conformation in Blanca Andaluza kids.

121. Effect of castration on carcass yield, composition and meat quality on French Alpine kids

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To evaluate the effects of the castration on carcass yield and composition, and on meat tenderness, fourteen French Alpine kids were used. Animals were assigned randomly to two groups: group 1 (n=7) were non-castrated kids and group 2 (n=7) were castrated kids (castration was done when kids were 2 years old). When final weight was reached (35 kg) animals were slaughtered and carcass weights (hot and cold) and yield were obtained. Carcasses were classified according to the amount of covering fat and kidney and pelvic fat proposed by Colomer-Rocher (1988). Carcass cutability was obtained fabricating the carcass into the following cuts: shoulder, rack, loin, leg, flank, shank, and breast. Dissection was performed on each cut to obtain bone, muscle, fat (intermuscular and subcutaneous) and others (ligaments, fascias, nerves). *Longissimus dorsi* muscle and *Psoas major* were used to analyze meat tenderness with the Warner-Bratzler shear machine. Data were analyzed according to a linear model. Results indicated that castrated animals had greater ($P<0.05$) yield grades and higher ($P<0.05$) amount of fat (15.5%) than non-castrated ones (10.3%). Bone and muscle percentage was similar for both groups of animals. Shear force results indicated that meat from non-castrated animals were significantly tougher (5.03 Kg; $P<0.05$) than that from castrated ones (3.69 kg). In conclusion, this study has shown castration to be responsible for the increase in fat and meat tenderness.

122. Dairy goat production system model

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A four year study was conducted to design a dairy goat production system model to predict the projection of intensive dairy goat farming systems in the arid zone of northern Mexico and it's an important contribution for decision making processes. One output matrix using several spreadsheet of Excel was used, to allow analyze different scenarios, which consisted of fifteen books and nine components that the data input requires, information of the characteristics of the goat milk production system such as: number of animals, productive and reproductive value parameters, diet ingredients, that the model used such as restrictions in the scenarios. The results show that the model was successful in predicting the performance of the main components of the intensive dairy goat production system. The model was able to predict with a certain technology according to the input parameters and made an important contribution in the development of decision support systems. The model in the output matrix allows simulation the dynamics of the herd composition, productive and reproductive parameters, milk production, and economic aspects as well as the Internal Rate of Return (IRR). Furthermore, it included in the output matrix another component that provides information about the percentage of birth, mortality, weaning, and animal's sale. Also, the feed component allows us to know the quantity of food per stage and level production by month and year that provides a tool for the producers involved in decision making to purchase of ingredients when the price and market are more advantageous. The results indicated that the Internal Rate of Return is influenced widely by three parameters values which were: milk production level, milk price and the cost of the alfalfa hay.

123. Hormonal induction of lactation in non-pregnant Saanen and Toggenburg goats

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The objective of this study was to induce lactation in dairy goats by means of hormonal administration. Twenty-two nulliparous (NUL, n=5) or pluriparous (PLU, n=17) Saanen (n=8) and Toggenburg (n=14) goats, ageing 2.5 to 10 years, not pregnant for at least two subsequent breeding seasons were equally assigned according to parity, weight and body condition score (1 to 5) to two treatments: T1 (n=11; 51.3±9.6 kg ;3.4±0.4) and T2: (n=11; 50.7±8.4 kg; 3.5±0.5). In T1, animals received 0.25 mg/Kg i.w. of estradiol benzoate and 0.75 mg/Kg i.w. of progesterone on days 0, 2, 4, 6, 8, 10 and 12. In T2, estradiol was administered at the same days but progesterone administration was done on the first seven days (D0 to D6). Milking started twice daily eight days (D20) after the end of treatment. Milk samples were collected on D25, D27, D34 and D43. Transretal ultrasound evaluation (5 MHz probe) was done before, during and after the hormonal treatment. Statistical analysis was performed using a significance at the 95% interval. Parametric variables were done by chi-square test. Non-parametric variables were submitted to one-way analysis of variance and compared by SNK-test using a SAEG program. The efficacy of induced-lactation was similar (P>0.05) between T1 (81.8%) and T2 (90.9%) or between nulliparous (90.9%) and pluriparous (81.8%). Daily milk production in responsive females in the first month was similar between T1 (923 ± 362g) and T2 (1239 ±588g) or between NUL (791 ± 546g) and PLU (668 ± 637g) (P>0.05). Qualitative milk analysis were in the normal range for goats, being for T1 and T2, respectively, 4.1 ± 0.2 and 4.0 ± 0.2 fat, 3.7 ± 0.1 and 3.7 ± 0.3 protein, 4.3 ± 0.1 and 4.2 ± 0.3 lactose, 13.1 ± 0.3 and 13.2 ± 0.4 total milk solids and 1,904 ± 430 and 2,567 ± 613 somatic cell count (P>0.05). The ultrasound exams showed no alteration of uterus or ovaries. Lactation can be quickly induced by hormonal administration, which can be a valuable tool to meet market demands.

124. Effect of the management system on the yield and conformation in the carcass of goat Payoya kids

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The objective of this study was to evaluate the effect of management system (conventional vs. organic) on carcass yield and carcass quality characteristics of Spanish Payoya goat kids. Twenty-four male kids (12 from conventional system and 12 from organic system) were used. Kids in both groups were born from twin births and during a reduced period of time (October, 2006). They were raised with natural milk and slaughtered at 8.9 kg of farm live weight. Fasting losses, empty body weight (EBW), hot carcass weight, chilling losses and external carcass fat measurements were recorded. Different carcass yield measurements were calculated: real, farm (CFY), slaughter, commercial and biological yield. Measurements of carcass conformation: leg length, hind limb width, hind limb perimeter (HLP), chest depth, chest width (CW), carcass external length, carcass internal length, chest perimeter, OS₁ and OS₂, were carried out to obtain different indexes: fleshiness, carcass compactness, leg compactness, chest roundness (CRI), relation carcass depth/length (RDL), relation carcass length/width, relation depth/width and bone index. The effect of production system was evaluated on each studied variable. The results shows some differences in fasting losses (3.83 vs. 5.74 %; p<0.001), in EBW (8.32 vs. 7.98 kg; p<0.01) and in CFY (52.7 vs. 50.5%; p<0.01), for conventional and organic system, respectively. For carcass conformation measurements we found differences (p<0.001) in HLP (31.1 vs. 27.9 cm) and in CW (10.7 vs. 9 cm), for conventional and organic system, respectively. Significant differences were established in some of the calculated indexes, like CRI (0.62 vs. 0.54; p<0.01) and the RDL (0.44 vs. 0.46; p<0.05), for kids from conventional and organic production systems, respectively. There were no significant differences in the rest of the parameters included in the present study between production systems. We can conclude that Payoya kids raised in organic production system differ little, particularly in carcass yield and conformation, respect to kids raised in a conventional production system.

125. Prewaning performance of crossbred goat kids, from Juventino Rosas, Guanajuato

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Birth and weaning weights were recorded, to valuate pre-weaning performance of crossbred kids, in eighth small milk goat flocks, from J. Rosas., Gto, Mexico. The annual means of rain and temperature were 628 mm and 19.5° C, respectively. Records of 234 kid dings were used, the goats were kept under grazing rangeland with supplementation of commercial concentrate. The kids were crossbred, of the breeds Sannen, Alpine and Toggenburg, the data were analyzed by a statistical model in which were considered the effects of flock (FL), contemporary group (CG), parity number (PN), litter size (LS) and sex of the kid (SK). Birth weights averaged 3.4 ± 0.5 kg (range 2 to 5.5 kg) and weight at 60 days of age averaged 13.7 ± 1.8 kg (range 8.0 to 17.5 kg); and daily weight gain averaged 0.17 ± 0.02 kg (range 0.08 to 0.23 kg). Birth weight were affected ($P < 0.01$) by FL, CG, PN, LS and SK. However, weight at 60 days and daily weight gain were affected ($P < 0.05$) by FL and SK.

126. The effect of feeding yoke traps on waste of food, milk production and body weight of milk housed goats

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Waste of food in a goat farm can represent important economic losses. Modifying housing conditions might be helpful to decrease that waste. The objective of this study was to determine the effect of feeding yoke traps on the waste of food, milk production and body weight in a herd of 25 milk goats. During 10 days (first phase), goats were housed in a pen with a free-access feeder and the food waste and milk production were registered daily; goats were moved to another pen with feeding yoke traps and, in a second (non activated traps) and third phase (activated traps), same measures were done; goats were weighted at the beginning and at the end of every phase and were at their fifth month of lactation. Data was analyzed using anova and t tests for paired samples. The use of feeding yoke traps significantly reduced the daily waste of food (21.1 ± 0.6 , 3.6 ± 0.1 , 2.5 ± 0.1 , $\text{kg} \pm \text{se}$, first, second and third phase respectively, $p < 0.01$). Altogether, waste of food was reduced from a 26% in the free access feeder, to a 3-4% in feeders using yoke traps. Milk production was lower in second and third phases (0.95 ± 0.01 , 0.94 ± 0.01) than in first (1.02 ± 0.01 , $L \pm \text{ee}$), which could be due to the natural fall of the lactation curve of goats. The body weight was not negatively affected in any of the phases, and it was increased in $2.20 (\pm 0.53, \text{kg} \pm \text{ee}, p < 0.05)$ during the use of the yoke traps. It is concluded that the use of feeding yoke traps significantly reduces the waste of food in housed goats without affecting the body weight of does.

127. Yield and composition of milk of Alpine and Boer crosses under two feeding systems in Brazil

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The present study was carried out at Goat Production Area of FMVZ/Unesp-Botucatu, Sao Paulo, Brazil. The aim of the study was to investigate the effect of breed and feeding systems on yield and composition of goat milk. Thirty-six female goats (18 Alpine and 18 Boer x Alpine (F1)) were assigned to two treatments 4 weeks after kidding: *ad libitum* grazing (group 1) and grazing plus daily supplementation (1 kg per animal for 2.5 kg milk produced) composed of 52% ground corn, 29% soybean meal, 15% wheat meal, and 4% mineral and vitamin premix (group 2). The milk production and composition and body weight change was recorded biweekly. Analyses of variance were performed on all the variables measured using the general linear models procedure of SAS (1990). Boer x Alpine (F1) goats had the highest mean live weight (53.9 kg) when compared to Alpine goats (47.9 kg). Overall Alpine and 18 Boer x Alpine (F1) produced more milk on group 1 than on group 2 (2.1 kg vs. 0.8 kg). Breed group had a significant effect on milk composition, Boer x Alpine (F1) goat produced milk with higher fat (4.6%), protein (3.4%) and total solids (13.1%) contents. Feeding system affected milk composition; group 2 goats produced milk with higher lactose (4.3 vs. 3.9%) and urea nitrogen content (19.4 vs. 14.7%) than group 1. Breed group and supplementation did not affected somatic cell count. From week 1 to 14 of lactation, animals from group 1 lost more body weight than those of group 2 (-0.10 kg versus -0.02 kg). Viability of both feeding system depends on local milk price conditions and needs further studies.

128. Effect of the production system on the regional composition and offal distribution of Payoya goat kids

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This study evaluated the effect of production system (conventional vs. organic) on the regional composition and offal distribution of Payoya goat kids. Twenty-four intact male kids (12 from conventional system and 12 from organic system) were used. Both groups came from twin births occurring in October, 2006. Goat kids were raised with natural goat milk and slaughtered at 8.9 kg live weight. After chilling, carcasses were splitted along the dorsal midline. The left side was divided into six standardized primal cuts (long leg, shoulder, neck, ribs, flanks and tail). The loin weight was recorded. Kidney fat and pelvic fat weight was also recorded; the same as was done with the components of the offal distribution (kidneys, blood, skin, head, fore/hind feet, testis, penis, heart, lung/trachea, liver, spleen, gastro-intestinal tract and timus). The effect of production system was evaluated on each studied variable. Left side carcasses were heavier for kids raised conventionally compared with organic farm-raised kids (2.32 vs. 2.18 kg; $p < 0.05$). There were no differences in regional composition, except for shoulder (21.47 vs. 22.38 %, for kids from conventional and organic production systems, respectively; $p < 0.05$). Regarding the offal distribution, kidneys weight, skin weight, timus weight and weight of all these parts of the carcass were also significantly lighter ($p < 0.05$) in carcasses originating in the organic system than the conventional farm-raised kids. We can conclude that, from this study, the production system does not have an important effect on regional composition of kids; however, offal distribution showed higher scores in suckling Payoya kids from conventional system than kids from organic system

129. Morphostructural and phaneroptical study of Creole goats in the west of Formosa, Argentina

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With the objective of characterizing the Creole goat population of the centre west of Formosa Province, Argentina, a research project is being carried on. To reach this aim, qualitative, quantitative variables and zoometric indexes were studied from a simple random sample of 210 females older than two years. Frequencies for each qualitative variable were calculated, founding different colours of coat: spotted (40%), pigmented mucus's (88,5%) and hoofs (91%) , thin (71%) and short hair (62%), middle size ears (57%) with different orientation, straight forehead profile (70%), presence of mamellas (82%) and beard (92%), funnel (38%) and bowl udders (40%). Descriptive statistics of the quantitative variables and zoometric indexes were done. Data obtained from a main component multivariant analysis demonstrated that 9 out of 15 zoometric variables are those which characterized in a reliable way the population studied. They are (weights in kg, lengths and width in cm): bodyweight (37.87 ± 6.73), thorax perimeter (82.45 ± 6.14), metacarpus perimeter (8.55 ± 0.57), face length (13.22 ± 0.91), face width (8.78 ± 0.77), head width (8.04 ± 0.62), height at withers (62.01 ± 3.38), hip height (62.62 ± 3.49), and hip length (21.83 ± 1.19). Six associated factors explained the 75% of the total variation and 5 characters did not contribute to explain the variability (head length 20.65 ± 0.94 , body length 70.45 ± 3.83 , thorax width 18.61 ± 1.73 , hip wide 15.26 ± 1.01 and chest wide 16.01 ± 1.25). Most of the studied quantitative characters and zoometric indexes has shown a low coefficient of variation (5-9%), with the exception of bodyweight (18%), as well as those indexes that include bodyweight in its formula, that could be attributable to the high influenced of the environment. The results found by quantitative variables analyses showed a very homogeneous population and therefore can not be established varieties based on these variables. By the cephalic index, this goat population could be defined as mesocephalic. This information completes the morphological characterization as a first step for the standardization of the Creole goats of the West of Formosa, while genetic and productive characterizations are being developed.

130. Characterization of two goat production systems in the highlands of Mexico

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The aim of this work is to characterize goat production systems in two regions of the Mexican highlands. One study area is located in the province of Zacatecas, where the main production purpose is meat from older kids or adult animals. In the other site which is located in the province of San Luis Potosí, farmers sell young kids and produce milk as well. The research work focuses on the description of the local Criollo breed, the feeding management of farmers and general socio-economic aspects. In interviews and participatory workshops, farmers gave valuable information about their production systems and the socioeconomic circumstances which they live in. Body measurements were taken from 100 female goats per region and a phenotypical description was made. In both regions the animals have nearly the same weight, height at withers, chest girth and body length at the age of two years. Afterwards, the goats in Zacatecas stop growing and at the age of four years goats in San Luis Potosí are approximately 13 kg heavier; also, all their body measurements are between seven and nine centimeters greater. Chemical analysis of 43 fodder plants from semiarid rangeland collected during the dry season showed mostly poor nutrient contents. However, some legumes and composites showed reasonable feeding values, although potentially suitable fodder plants sometimes possess defense mechanisms preventing them from being eaten by goats or other animals. As far as feeding is concerned, the goats graze the whole year on rangeland but additional stubble grazing is very common during dry season. Furthermore, other aspects of the production systems were recorded such as mating and kidding season, mating methods, marketing etc. It can be concluded that the two systems are different: farmers in Zacatecas rely on very traditional farming methods, while farmers in San Luis Potosí constantly look for new options of farming, such as the use of specific feeds, technologies, etc. Therefore, the money which was invested lately in the San Luis Potosí site could result in a more modern system which could act as a model for other regions in Mexico.

131. Body condition score and blood metabolites in Creoles goats under intensive and extensive production systems in La Rioja, Argentina

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In the La Rioja an arid and semiarid region of Argentina, the goat farming system is extensive and is based mainly on natural feed resources. The seasonal changeability in quality and quantity of food is one of the main factors that impact in nutritional state of goats, what can cause reduction in the production of milk, growth of the kids and changes in the body condition score (BCS). The nutritional factors are perhaps the most crucial for goat production on harsh environments. Hence, there is a need to pay particular attention to the interaction between nutrition and system production in arid ecosystems. The objective of the present study was to evaluate some blood metabolites in dairy goats under intensive and extensive production systems in La Rioja, Argentina. The experiment was carried out in autumn in the experimental field INTA (30°22'S; 66°17'W) La Rioja, ecological district of the Chaco Arid. Goat under extensive production system (EPS) was grazing on native pasture without any additional feed supply. The animals under intensive production system (IPS) were kept under forage fraction and with supplement to sure a nutritional balance adequate (alfalfa hay, raygrass, corn (0.6 g/day) and mineral-vitamin complement (0.05%)). The groups used were homogeneous in age, parity, BCS. Blood samples were collected from the jugular vein in the morning before grazing and Glucose, Cholesterol, Triglycerides, Urea and Total Proteins were determined. After blood sampling, BCS was evaluated. Ten goats adult non-pregnant, non-lactating with BCS of 2.7 of each group were used. The values found are similar among the groups, except to Glucose and Triglycerides. Glucose concentration (mmol/L) was 3.42 ± 0.53 in goats under EPS vs. 2.46 ± 0.11 in goats under IPS ($p \leq 0.05$). Triglycerides concentration (mmol/L) was 0.57 ± 0.05 in goats under EPS vs. 0.19 ± 0.02 in goats under IPS ($p \leq 0.05$). The glucose blood concentration is considered as a useful metabolism energetic index and seems to indicate the availability of nutrient in the diet. These results seem to indicate that in the study period the nutrient intake was adequate in goats under extensive system.

132. Hematological parameters of Nubian kids artificially raised with a milk replacer

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A nine-week study was conducted with the aim to determine hematological parameters (erythrocytes, hematocrit, and hemoglobin) in Nubian kids artificially raised with a milk replacer at the Goat Unit, Facultad de Agronomía, Universidad Autónoma de San Luis Potosí, México. Treatments were: T₁: 0.0 % soy protein concentrate + cow lard, T₂: 20.0 % soy protein concentrate + cow lard, T₃: 40.0 % soy protein concentrate + cow lard, T₄: 0.0 % soy protein concentrate + pork lard, T₅: 20.0 % soy protein concentrate + pork lard, T₆: 40.0 % soy protein concentrate + pork lard. Statistical analysis was performed with the “R” statistical package. Kids fed the milk replacer + 0.0 % concentrate of soy protein had a higher ($P<0.05$) concentration of erythrocytes, hematocrit and hemoglobin ($10.3 \pm 0.0 \times 10^6\text{mL}$, $32.2 \pm 0.3 \%$ and $11.5 \pm 0.1 \text{ g dL}^{-1}$, respectively) than those fed 20.0 and 40.0 % concentrate of soy protein. The concentrations of erythrocytes and hematocrit in kids that consumed the milk replacer + cow lard were higher than those found in kids fed the milk replacer + pork lard (10.3 ± 0.0 vs. $10.0 \pm 0.0 \times 10^6\text{mL}$), (31.5 ± 0.3 vs. $30.1 \pm 0.2 \%$) ($P<0.05$). Female kids had a higher concentration ($P<0.05$) of erythrocytes (10.2 ± 0.0 vs. $10.1 \pm 0.0 \times 10^6\text{mL}$) and hemoglobin (11.3 ± 0.21 vs. $10.9 \pm 0.1 \text{ g dL}^{-1}$) than male kids. Week did not have an effect ($P>0.05$) on any hematological parameter. Despite physiological differences, milk replacers prepared with soy protein plus cow and pork lard offer the possibility to be successfully used to artificially raise Nubian kids during lactation.

133. Goat farming systems in Basilicata region (south Italy)

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The general aim of this study is to determine the situation of goat farming systems in Basilicata region of southern Italy. The survey was carried out by EU co-financing project Interreg III B ARCHIMED “T-Cheese.Med – New technologies supporting the traditional and historical dairy in the Archimed zone”. The farms investigated (146) are representative of the productive reality in Basilicata region. The results concerning the rearing system, mainly grazing systems, showed a large diffusion of sheep and goat mixed herd (MH), mostly with autochthonous breeds and marginal presence of farms specialized in goat milk production (GM). In the MH farms the average flock size was 93 head of goat and 204 head of sheep and the 56.2% of the farms was classified semi-extensive (pasture and supplementation), 40.4% extensive (only pasture) and 3.4% intensive (housing and fed by hay and concentrate). Only 42% of the farms used mechanical milking machines, the others milked manually. In the GM farms the flock size with an average of 188 head (range 45-500), the intensive systems (86%) and milking machine (60%) was greater. In the MH farms the milk was transformed directly into mixed “Pecorino” cheese and in the summer in goat cheese “Cacioricotta”. The more representative goat cheeses produced, exclusively with raw milk in the GM farms were “Cacioricotta”, “Caprino”, “Casiaddu”, “Casiello” and commercial cheeses. The general main problems found during the study were the purchase price (greatly fluctuating from area to area) and the absence of any marketing strategy. The strengths of MH farms was the high quality of cheese and meat (sheep and goat autochthonous breeds) and unique flora containing aromatic herbs that give special aromas to the cheese. The weaknesses were identified in absence of technological innovations and organizational models. The strengths in GM farms were the prevalent presence of large-size farms specialised for cheese productions. The weaknesses were identified in commercial cheeses without any quality differentiation.

134. Systems of goat milk production in Serbia

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Goat production is very important for the economy of Serbia, especially in a hilly-mountain region. In total agricultural surfaces this region makes 54% with about 50% inhabitants who breed about 98% of total goat breeding stock in our country. Today in Serbia there are 218 000 goats out of which about 98% animals are raised on the small farms and that mostly in hilly-mountainous regions. However, the number of goats shows the tendency of falling year after year, but we can see too tendency of stabilization. From the total number of goat in Serbia, 70 percent are of the local White goat breed and 20 percent are other breeds as Saanen, Alpine and their crosses, with average milk yield from 300-500 lit. Goat's milk production in Serbia exhibit a great diversity of systems: from extensive to intensive management combined to a great diversity of genetic material. The milk yield of goat in our systems of production depends too from feeding condition. That is reason why good genetic material goat can not to give better milk production. However, due to low milkiness of local goat population it is necessary to devote more activities to genetic improvement of the populations that are being raised. Breeding dairy program in Serbia today are based on numerous factors which are included in analysis, all data relating to milk traits are considered to be important. Efficient work on improvement of milk yield in goats demands knowledge of heritability and genetic correlations of milk traits but also good models for estimation of breeding value. Regarding of milk recording we are use of traditional methodology, but too start activity for ICAR implementation.

135. Dairy goat production in Turkey

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Goat farming is the most important animal production activity in mountainous area of Mediterranean Region - Turkey. People, living in this area, are very poor and do not have any other alternative for their subsistence's. In addition, milk and meat products derived from animals are very important for population, living in marginal areas. Animals provided home supplies and supported self-sufficiencies of families. Some research activity on for improving dairy goat production in Turkey were analyzed and explained in this study. Improvement studies of dairy goat has been started 40 years ago and nowadays some crossbred dairy goat types have been raised by farmers especially at the west part of the country. Dairy goat improvement in Turkey is based particularly on Saanen goats. Dairy goat production in Turkey has been soared in last five years in Aegean and Mediterranean region. Some crossbred types have been improved by public farms and universities and they have been distributed and well-adapted some parts of the Turkey. Otherwise, due to economical aspects there are some financial problems. Goat production has not been supported yet by government, as well. It has been reported that pure and crossbred of Saanen are well-adapted to Aegean and Mediterranean part of Turkey. Besides crossbred of German Fawn, improved by Çukurova University, is also distributed and raised under farmer's conditions in high-plain of Eastern Mediterranean region of Turkey. The lactation milk yield of improved dairy goats were 400-450 kg/lactation for Taurus Fawn, 300-350 kg/lactation for Cukurova Saanen, 400-500 kg/lactation for Anglo Nubian crossbred, 200-450 kg/lactation for Turkish Saanen. Besides, the prolificacy and fertility of above mentioned crossbreds were higher than that of native breeds.

136. Performance of goats under traditional systems on al Jabal Al Akhdar mountains in Oman

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This study was carried out at in Al Jabal Al Akhdar mountainous region in Oman. The region ranges between 1500-2000 m above sea level and specialized in goat production under traditional systems. Farmers send their goats grazing during the day and feed them supplementary feeds upon arrival. However, there are apparent signs of overgrazing on the region. This study aimed to demonstrate to local farmers the virtues of stall feeding versus range grazing. Five local farmers had been selected for the study. Each farmer provided 10 goats, half were fed and managed in pens and the other half was allowed free ranging plus some supplemental feeding. Penned animals were fed in groups of five and offered one bale of Rhodes grass hay (average weight 9 kg), 1 kg of dates, 1.5 kg of commercial concentrate and 0.5 kg dried sardines. Range-fed animals were fed approximately 200 g of mixed dates and sardines after grazing. Daily feed weight was recorded by farmers and residues were collected to be weighed at the time of weighing animals. Goat health was monitored by haematological and fecal examination. The trial continued for 84 days. Experimental animals were in good health as reflected in physical examination, hematology and fecal analyses. Stall-fed animals gained at a slightly higher rate (112 vs. 105 g/d). There were differences in initial body weight of goats between various farmers which were sustained throughout the study period. The cost of feeding the five goats per day was equivalent to 1.170 Omani rial (R.O. = 2.60 USD) or 98.3 R.O. (USD 255) for the 84 d period (R.O. 19.6; USD 51 per goat). Goats gained about 10 kg, which indicates approximately R.O. 2.000 (5 dollars) cost of a kg live weight gain. This appears to be cost effective as goats in this region are sold for more than R.O. 100 (USD 250) per head. This study indicated that pen feeding would not compromise animal productivity or farmer's revenue. Farmers should be encouraged to adopt this management system to reduce grazing pressure and consequently help improving range productivity.

137. Influence of extensive and rotational grazing systems on kid goat weight and plants

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The range condition, grass growth and animal production is influenced negatively by extensive animal production. Regards to rotational grazing it promotes soil-water and key species plant conservation, the animals can grazing more uniformly of the rangelands, harvesting almost all the forage production. Other consequence is that the plants re-grow quickly and can produce seeds, finally is possible to obtain more animal production. The objective was to compare the animal and plant response under two types of grazing: a) extensive (continue) and b) rotational grazing system. The hypothesis is that grazing systems can improve rangeland condition instead of extensive grazing. The area of study was Ejido “Casa de Cerros” located in Panuco, Zacatecas, México; this area is represented mainly by shrubs composed by Opuntias, Acacias, Prosopis and some grasses such as Boutelouas, Aristidas and Lycurus. The animal variable considered was weight gained, for plants the measured variables were soil cover, botanical composition and dry matter production (g m^{-2}). Results; the weight gained for kid goats in average under extensive grazing and rotational grazing were 65.7 and 81.0 g per day respectively ($\alpha=0.01$). The basal cover was less important in extensive grazing areas in comparison to rotational grazing. The botanical composition was different between both grazing treatments; 59 species were observed under rotational system, whereas 27 species were observed in extensive system. The forage production expressed as dry matter was 996 opposite to 280 kg ha^{-1} in rotational and extensive system respectively ($\alpha=0.01$). In conclusion the rotational grazing system showed better results because the plant diversity is promoted, the soil cover is higher than extensive system, and the forage production is four times more than extensive system. Finally, the animal production was better in rotational system. All the study can support the hypothesis that the rangeland under grazing system or at least with controlled animal charge can improve the range condition.

138. Replacement of goat milk for whey cheese cattle in artificial feeding of Saanen and Alpine kids

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The use of cheese whey in animal feeding has contributed to reduce the amount of effluent rejected in the environment by milk industry. This sub-product can replace until 60% of the whole goat milk in the nursing of kids. The objective of this trial was to evaluate the effects of the replacement of whole goat milk for different cattle cheese whey levels in the artificial nursing of Saanen and Alpina kids on performance of animals. Animals were assigned to a completely randomized design in a 4 x 2 factorial arrangement of treatments (four whey levels: 0, 15, 30 or 45% and two sexes). There was no difference ($P>0.05$) for growth of kids from seven to 42 days of age. Kids feeding whole goat milk showed largest final weights, 13.0 kg; the goat milk consumption was 490 L, 172.0 g DM/day of concentrate and gained 137.5 g/day. Final weights for animals of treatments with 15, 30 and 45% of whey were: 11.1; 9.88 and 10.27 kg; the whole goat milk consumption was 416.5, 343.0 and 269.0 L; of the whey 70.35, 147.0 and 220.5 L; concentrate was 148, 117,0 and 135,0 g DM/day e gains of 122.2; 99.5 and 100.8 g/day, respectively. The total dry matter intake was 318.1; 313.7; 263.3, and 250.3 g/day, but there was no difference among treatments for feed: gain ratio. The sex effect ($P<0.05$) showed to the 21 days of age, without interaction treatment vs. sex. Male kids were heavier what females, with variation from 5,48 to 12,4 and 4,38 to 10,6 kg, respectively. The better financial yield, 168,15%, was obtained as kids received maximum level of whey. The level of whey cheese cattle of 45% is viable because do not affect the performance of the animals, beyond to increase the economic return. We do not recommend the whole milk goat in the nursing kids under economic point of view.

139. Present situation of goat production sector and economic policies of small ruminants in Turkey

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Goat husbandry has been part of agriculture since the first use of domestic animals and presently its popularity is increasing throughout the world. This increase is reflected to a greater degree by the rise in the number of small herds maintained by individuals either as a source of income or as an avocation however, it is decreasing dramatically in Turkey. Poor performance of local breeds, non-optimal farm size, non-cooperating, insufficient management strategies and policies has been the important structural problems of dairy goat farming in Turkey. Nowadays, an increasing interest in dairy goat production sector and dairy products are reforming in Turkey. On the other hand, goat production sector is picking up again with little changes in the agricultural policies in the negotiation period. Present situation of goat products are intensively evaluated. Goat milk in Turkey is generally consumed in local regions and in home market and the organization net is changing depending on the development levels of the region. The Turkish goat meat industry is built around rural population demand for the product. Although there is no ethnic demand for goat meat related to religious and social traditions, quite much demand can be observed for the goats in the scarify feast (celebrated during four days in a year) which is celebrated once in a year. Improving management and feeding systems and providing technical assistance to the farmers may have a positive impact on the development of the rural areas via increasing productivity per animal. The objective of this paper was to determine the present situation of goat production sector, goat meat and milk sector, economic policies and some suggestions for the future.

140. Prospects of commercialization of goat production in India

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Traditionally, goat rearing in India has been a subsistence activity of resource-poor rural people. Its commercialization has taken place only recently. Rearing goats under intensive and semi-intensive system for commercial production using improved technologies has become imperative not only for realizing their full potential but also to meet the increasing demand of chevon (goat meat) in the domestic as well as international market. To assess the status and prospects of commercialization of goat production, first, 157 commercial goat farms spread over 16 states of the country were identified. Further an in-depth analysis was carried out using primary data collected from randomly selected 18 commercial goat farms located in Maharashtra, Madhya Pradesh, Rajasthan and Uttar Pradesh States of the country during the year 2005-2006. Seventy-five per cent of these farms started operating in the past six years. These farms were classified in to three flock-size categories viz., I (<100 goats), II (100-500 goats) and III (>500 goats). All these commercial goat farmers were well educated and had good access to technical and market information. The size of operational landholding of these farmers in all the categories was found large, from 10.53 ha to 31.78 ha. The analysis revealed that the majority of commercial goat farms were operating with positive net returns with 39 per cent of them earning good profit. Goat rearing as an enterprise was found equally rewarding under both intensive and semi-intensive systems of management. Among the farms under intensive system, 22 per cent were in loss, whereas among the farms under semi-intensive system, 33 per cent were in loss. The reasons for negative net returns were higher cost of rearing per doe, high mortality and morbidity losses and realization of low prices for their market surplus. Thirty three per cent of the goat farms had only small positive net returns but needed to increase them to make their business economically viable and sustainable. Since a majority of the commercial farms have come up only during the past few years, they were learning from their experiences and some of them will have to increase the flock sizes for proper capacity utilization. Most of the farms with below average performance are likely to improve in the next 1-2 years. A regression analysis was carried out to explain the relationship between the annual net returns per doe and the factors affecting them. The annual losses due to diseases per doe and average price of goats realized (Rs/kg live body weight) were the most important factors, which influenced the annual net returns per doe on the commercial farms. The relationship between losses due to diseases and the net returns from goats was negative and highly significant, indicating the importance of disease prevention for the sustainability of commercial goat production. The average price of live goats realized by the farmers influenced the net returns positively and significantly. The reasons for higher price realization by some farmers were mainly their effective marketing strategy and better quality of animals (pure breed and good health). The system of management had no significant effect on the net returns and the goats may be profitably raised under both intensive as well as semi-intensive systems of management. The commercial goat farming under intensive and semi-intensive systems of management may therefore be declared as profitable and promising enterprise. Moreover, the entry of large farmers, who have better access to knowledge, resources and market, would help in realizing the potential of goat-enterprise. However, the use of technological interventions, particularly prophylaxis, superior germ plasm, low-cost feeds and



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fodders and innovative marketing of the produce would be the pre-conditions for successful commercial goat production.



141. Feasibility of the artificial raising and productive performance of Nubian kids: an experience of Mexico

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Milk production has increased in the last years, particularly in the cheese industry. As a result, the price of this product has increased at both the national and international markets. Nevertheless, most of the milk production is utilized to raise kids, which has led to develop systems of artificial raising; this allows that all the milk production is sent to the markets, thus increasing gains. The artificial colostrum, milk substitutes, serum and cow colostrum, have been used successful in many operations, giving as a result the survival of the kids, which one way or the other, would have died. The objectives of the present study were to evaluate the productive performance of Nubian kids that were artificially raised with goat milk, cow colostrum plus cheese serum, as well as to compare the costs of colostrum feeding plus cheese serum and goat milk. There were no differences in consumption of the liquid diet, solid diet, weight daily gains, and feed conversion between the kids fed cow colostrum plus cheese serum and those fed goat milk. Feeding costs were significantly reduced when using cow colostrum plus cheese serum, therefore concluding that it is economically feasible to raise kids with this system.

142. Development of a mathematical model to study the impacts of production and management policies on the dynamics of a dairy goat herd in the northeast of Brazil

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A mathematical model of a dairy goat farm was built to study the dynamics of a herd over time under different management policies. A system dynamics approach was used to develop the feedback structure of the model, which was programmed into Vensim[®]. The time unit was day with a time step of 0.05. The model was developed to simulate a semi-intensive system where all parameters assumed average values reported in the production system at the *Brazilian Agricultural Research Corporations (Embrapa-Goats)*. The pregnancy rate and the number of kids born per doe were assumed to be respectively, 0.47% and 1.0 for nuliparous and 0.67% and 1.67 for multiparous does. The present model assumed the natural condition in the northeast of Brazil where the animals are not affected by photoperiod. The gestation and lactation length was respectively, 5 and 6 months and does would stay in the herd for up to 8 lactations. Management policies were manipulated through modifications of two key indexes: culling rate (CR), which is the percentage of culled animals per year; retention rate (RR), which is the percentage of retained animals that were born in the herd per year. Were established a maximum of 75 animals in the herd. In the first simulation, 20 nuliparous does, 0%/yr of CR and 100%/yr of RR were assumed to simulate a growing herd. In this scenario, 3.3 years were necessary to reach the herd capacity. When increasing the pregnancy rate by 20% the time to reach the herd capacity decrease 1.7 months but, when the pregnancy rate was decreased by 20% the impact was 3.6 more months to reach the equilibrium. The increase in the time to reach the equilibrium could represent a smaller amount of animals for sale and also for genetic selection. Based on these results, a special attention, by farmers, on reproductive characteristics is decisive to avoid great losses in the production system. This model is important to further understand major feedback loops affecting dairy goat production systems in the Brazilian northeast.

143. Impact of puberty and lactation order of a dairy goat herd in the northeast of Brazil

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A dairy goat model was built to study the impacts of puberty and lactation order in a herd over time. A system dynamics approach was used to develop the feedback structure of the model, which was programmed into Vensim[®]. The model was developed to simulate a semi-intensive system where all parameters assumed average values reported in the production system at the *Brazilian Agricultural Research Corporations (Embrapa-Goats)*. The pregnancy rate and the number of kids born per doe were assumed to be respectively, 0.47% and 1.0 for nuliparous and 0.67% and 1.67 for multiparous does. The present model assumed the natural condition in the Northeast of Brazil where the animals are not affected by photoperiod. The gestation and lactation length was respectively, 5 and 6 months and the number of lactation allowed per doe, were manipulated to verify the impact in the herd. Also the time to reach the adult phase (puberty) was changed to simulate an ideal situation and small farmer's reality (food limitation). An equilibrium herd of 75 animals was modeled. In the first simulation where the time to reach the adult phase was 8 months, keeping does until the 6th lactation had 1.2% more milk production compared to systems keeping does until the 8th lactation. Results indicated that although the volume of milk was higher for the 6th lactation, when considering until the 8th lactation, the number of young does available in the system was 5.9% higher. In the second simulation the age of puberty was increased from 8 to 12 months. Keeping does only until the 6th lactation had 1.9% more milk production and 3.8% less young does available compared to systems until the 8th lactation. Comparing the whole system by age of puberty, the herd that had animals breeding at 8th months had 4.1% more animals available for selling or for genetic selection. Although being a preliminary study, it gives very important insights of better management policies to improve the efficiency of the system by changing the profile of animals in the herd and the age of puberty by changing nutritional conditions.

144. Selection result and extension perspective of Begda Cashmere goat

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Begda Cashmere Goat a new cashmere goat breed of China , with high production and good quality of its down, which is breed by using remote blood cross techniques, its father are Liaoning Cashmere Goat and wild goat while its maternal is local goat of Xinjiang. It has been the first breed for improvement of Xinjiang Cashmere Goat with low production, has broad extension perspective. In recent decade, by taking integrated techniques, which are pure breeding, registration, selection cooperation with household, raising in special direction, elite sire semen bank, selection and selected mating, genetic parameter, the performances of Begda Cashmere Goat has been enhanced, and this breed has been extended in whole Xinjiang. By now, 6400 goat of this breed have been extended, 0.7 million Xinjiang Goat have been improved, down yield of its crossbred are 320-480g, increase 1.5 times to twice, length increase 20-23 mm, net down rate increase 18-24 percent, down yield of F1 generation increase 150-200g. Performances of its nuclear flock are as following: Yearling ram: down yield 514g (ranged 400-810g), length 5.4cm (grazing), length 7.4cm (pen feeding). Adult ram : down yield 1033g (760-1320g, length 11.07cm. Down yield: Yearling ewe 403g (390-710g) , mature ewe 535g (450-1160g). Down fiber diameter : containing wild type 12.7-14.48 micron, non-wild blood type 14-16 micron. Maximum down yield : adult ram 1570g, yearling ram 1150g, adult ewe 1220g, fiber diameter 13.3-15.8micron. Key words: Begda Cashmere Goat; down yield; length; fiber diameter

145. Marketing and commercialization channels of goat meat (*Capra hircus*) in Lara State Venezuela

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The main objective of this paper is to identify the different channels of commercialization of the goats products and byproducts in the traditional and nontraditional goats farms in the state of Lara, Venezuela. Eleven years of systematic information is presented. This information was taken among Goat farmers, intermediaries, industrial, retailers, consumers and government agencies. Surveys were applied to the different actors related to the commercialization of the goat products and byproducts. The main detected channels of commercialization for the goat meat were: 1. Goat producers-consumers, 2. Goat producers-intermediaries (carriers)-retailers-consumers and 3. Goat producers-middlemen-slaughterhouse-retailers-consumers. Also, prices per kilogram of the animals at the farm and for the consumers were determined nominally (in Bs.) and both increased during 1989-2006 period, while the expression at constant prices showed a decrease during the same period.

146. The effect of ink color and tattooing technique on the quality of tattoo in goats

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Identification of goats should be permanent and easy to read. The objective of this study was to evaluate the effect of ink color and tattooing technique on quality of tattoos on goat's ears. The experiment was carried out at the Center of Research and Training in Goats - CPTCapri, Campus II of the Center Regional Universitário de Pinhal - UNIPINHAL – Fazenda Morro Azul, and in Capril Serra de Andradas, in Espírito Santo do Pinhal - SP, Brazil. Two trials were made, one with 21 crossed Saanen x Boer female kids and other with 28 feral goats, both with a 2 x 2, factorial arrangement with two ink colors (green and black), two tattooing techniques (application of ink before or after the use of the tattoo applicator) and its interactions. Effects of application technique, ink color, interaction, and time since application until evaluation (60, 120, and 180 days) were included in the statistical model. Statistical analyses were performed by general linear model procedure and differences between means were obtained by the Tukey Test. A scale 0 to 5 was used to evaluate the amount of visible points, with an average of 4.40±0.92 for green ink and 2.34±1.92 for black ink. Regarding quality of those points, the average for green ink was 4.08±1.15 and 1.97±1.76 for black inks, in the trial 1, and 3.04± and 1.15± for amount of visible points with ink green or black, and 2.72 and 0.97 for the quality of those points, in trial 2. There were no differences for technique used in none of the trials. From these results, it was concluded that green ink provides tattoos of better quality, independent of the tattooing technique.

147. Sensibility analysis of goat farms: internal and external factors

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This study was conducted in order to evaluate the internal and external factors impacting the economical performance of goat farms in Brazil, using sensibility analysis. Internal factors were fertility, herd size, voluntary culling rate, and level of milk production. External factors were Interest Rate, goat milk price, live animal price, hay price, and concentrate price. The external situation considered as reference was a 100-goat dairy operation, goat milk price US\$ 0.80, doe price US\$ 170.00, hay price US\$ 0.18/kg, concentrate price US\$ 0.27/kg, and interest rate 6%. Internal reference situation was 70% voluntary culling rate, 600 liters average total milk yield per lactation, and 90% fertility. Others productive and reproductive values were included for this simulation, but they were not evaluated in sensibility analysis. Parameters evaluated were Internal Rate of Return, Simple Pay Back Period, Economical Pay Back Period, Benefit-Cost Ratio, and Net Present Value. Sensibility analysis technique works with a reference situation, changing each parameter one at a time in order to quantify its impact on economical parameters, in a logical interval of values. Under the conditions that calculations were made, a herd size of 50 adult goats, milk yield of 400 liters per lactation or 80% fertility were considered the minimum values for economical feasibility, as internal factors. All parameters influenced profitability of the investment, but milk price (external factor) was the most decisive parameter. The impact of feed prices was similar (hay and concentrate), besides the differences in daily quantity consumed.

148. Effect of milking procedures on efficiency of mechanical milking of Saanen goats

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The objective of the present study was to evaluate the effect of sequence of milking procedures on time efficacy of mechanical milking of Saanen goats. The experiment was carried out in the Capril Serra de Andradas and Capritec, in Espírito Santo do Pinhal, SP, Brazil. Twenty Saanen goats were used in a parallel double-6 milking parlor, canalized, with central line, model TF 80, DeLaval®. An entirely casualized experimental design was used, with six replicates for the following treatments: fore-stripping, pre-dip, towel, attachment of the milking unit, detachment of the milking unit, and post-dip of six goats at a time (treatment 1) or goats at a time (treatment 3); fore-strip and pre-dip, towel and attachment of the unit, detachment of the unit and post-dip of six goats at a time (treatment 2) two sequences of three goats at a time (treatment 4). Elapsed time for each stage was different among treatments (Tukey Test; $P < 0.05$). In treatment 3 the pre-dip procedure was too fast (24.1 seconds), while in treatment 2 it was very slow (138.5 seconds). Treatment 1 was the best for pre-dip (41.8 seconds), as it permitted an appropriate disinfection. Considering length of time until the beginning of milking, effective milking time, total milking time, and post-dip time, treatments 3 and 4 presented the best results. It was concluded that, in a double-6 parallel milking parlor, with one operator, the preparation and milking of three goats at a time was more advantageous than six goats at a time. The milking routines tested did not affect milk production.

149. Sustainable development of low scale goat production systems in Iberian countries of South America

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Animal production demands on nature of basic resources, and the current trend threatens the capacity of future generations to produce the amount and quality of food they will need. The effort of Albert Arnold to build up and disseminate knowledge about this issue merited him for the Nobel Peace Prize 2007. Nevertheless, technological progress and socioeconomic regulations are commonly the only development indicators used regardless sustainability. In this paper, progress is understood as a favorable transformation where all components are consistent in order for the system to be sustainable, viz., regarding the most recent paradigms, the genetic resource and the biophysical, cultural, and extrinsic, as the market and others regulations, environments. Considerations in this respect are given for the development of low scale goat production units in Iberian countries of South America. Contrary to the world trend, the goat shows none significant progress in these countries. For the lapse 1961 to 2000, the population and the amount of meat and milk in a per capita basis have decreased from 0.12 to 0.06 heads, from 0.42 to 0.24, and from 1.06 to 0.55 kg, and relative to total of meat and milk available from 1.0 to 0.3 and from 1.1 to 0.4% respectively. However, the population size is indicative of the important this specie is for the region; in particular due to that most of the population is in hands of rural contingencies of high poverty, where the social seems to predominate over the economic. There has not been a genuine technological development. The production is based in the exploitation of natural resources; when being drained the resources, productivity shrinks generating more poverty. Regarding the genetic resources, in addition of the Creole, there also exist a wide variety of specialized breeds recently introduced from all over as an official strategy of development, in correspondence with global paradigms, but breeding programs are almost nonexistent. The necessities to overcome are: to achieve a sustainable market economy and the human development of producers. Both seem to be beyond producers' possibility, and governments have failure to build up coherent policies to this regard. Local knowledge that allows a minimum understanding of most restrictive factors is fundamental and the lack of scientists and opportune grants for the sectors are among others the main added difficulties to reach this objective. Under the assumption that a market economy is previous to a true and sustainable rural development, a direct incentive for a fixed period of time to young producers, willing and able to progress, is suggested. During this time, while being trained and properly supervised, the producer must progress until reach self-sufficiency. The time that is required depends on the orientation of the system, but in any case should go beyond eight years. The approach is more an investment that a cost; since it will increase production significantly, at the mean time that producers become aware of the need of a sustainable agricultural development. Only through understanding is possible to change the cultural pattern of the producer.

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Technology Transfer & Producer Organization



150. Farmers' feedback on goat production technology in Kwara State, Nigeria

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The paper examines the provision of feedback on goat production technology by farmers in Kwara State. This is based on the fact that extension and research are well organized systems which design and disseminate technological innovations to farmers. Despite all the technological innovation transfer, the wide gap between the levels of production which research contends is attainable and that which farmers achieve suggests a missing link. Feedback is a critical part of effective communication. It is viewed as the farmers' reaction to technological innovation by the communicator. Weak linkages between the farmer, extension and researcher mean that the farmers are not included in the planning of the innovation, despite the fact they are the end users. The study was conducted in Kwara State. Kwara State lies in the West-central part of Nigeria and covers an area of 74,256 square kilometers or 80% of the total area of Nigeria. The livestock sector consists mainly of goat rearing. Kwara State is divided into four zones by the Agricultural Development Project for administrative purposes. The zones comprise Kaioma, Lafajaji, Ilorin West, South and East, and Igbaja areas. The two latter zones are known predominantly for rabbit, pig and poultry production. The Ilorin West zone was purposely selected for the study. There was no definite sampling frame so the procedure was to take a large sample ($n > 30$) in selecting the respondents. Primary data from respondents were collected through an interview schedule. The data were then analyzed and presented as frequencies and percentages and linear multiple regressions. The results showed that prominent technologies adopted by farmers were those to control mange and ectoparasites (75.8%), improved feeding (93.3%) and vaccination (83.3%). On these same sets of technologies, feedback was regularly provided. Also, socioeconomic characteristics are important variables as determinants of provision of feedback among goat farmers. The study concludes with pragmatic suggestions on how farmer's feedback can improve the innovation systems for sustainable goat production.

151. Meeting the challenge of establishing commercial mohair enterprises by building an interactive enterprise management and financial model

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Both business modeling and benchmarking are critical to expanding mohair production in Australia. A business model should enable farmers to think about how a business will work, what it might achieve and why. We built and transferred a learning and support tool for the mohair enterprise that reduces search time and thinking costs about management strategies and financial feasibility. Relevant physical and financial data were collated using iThink[®] software (iseesystems Inc., Lebanon, New Hampshire, USA). This software separates formulas from model structure and the user interface, is suited to simulation and feeds data into other spreadsheets. The model easily allows herd population structure to change over time based on parameters set by the farmer. Animals aged, died, were bought and sold, and as animals aged, the volume, quality and value of mohair changed. The model runs over a 12-year time frame to allow the farmer to think about how they might manage the enterprise. Various management strategies and assumptions were applied to a case study with 300 breeding Angora does. The range in results were: internal rate of return 9.3-21.2%; median gross margin per effective hectare \$82-167; cash at bank in year 12, \$8,700-56,800; and net enterprise assets \$69,900-115,700. Decisions made early in the establishment of the mohair enterprise had significant effects on the return on investment and on delivery of mohair to supply chains. The analysis suggests a new mohair farmer will benefit from a 5-8 year plan to optimize enterprise performance. The average total enterprise cash flow becomes positive after year 4 and approaches its maximum by year 8. The model was tested with farmers and they were pleased with the outputs. Such a model tested the financial competency of farmers and guided use and support for using this model is essential if adoption and improved farm business outcomes are to be achieved in practice. A key benefit of the model was its ability to allow farmers to explore management strategies and their assumptions about a future enterprise before investing. Outputs are suitable for inclusion in business plans for presentation to financial institutions.

152. Introduction of an electronic record keeping system for meat goat producers: the Alabama experience

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On-farm record keeping is often a neglected practice among livestock producers. A custom-designed, simple-to-use, MS Excel-based computer program for meat goat producers was developed and made available to encourage farmers to adopt a record keeping system in their operation. An exploratory extension/research case study was initiated by selecting 20 meat goat producers in Alabama who possess a home computer and expressed an interest in participating in the project. A full day workshop that included hands-on training was provided in a computer laboratory facility for participants to become familiar with the program module and enable implementation in their own operations. Participants were very pleased with the record keeping tool-kit and have agreed to submit performance records of their market kids for across-herds meta-data analyses. Plans are underway to provide a similar training workshop for another group of producers in the summer of 2008 in partnership with producer organizations. Preliminary analyses of data gathered from 18 herds on 283 meat goat kids (2007 kid crop) indicated that for male kids, the mean birth weight was 3.8 ± 0.9 kg, the mean weaning weight was 22.7 ± 7.2 kg and the mean market weight was 26.7 ± 6.0 kg. Corresponding mean weights for female kids were 3.4 ± 0.9 , 22.8 ± 6.6 and 24.1 ± 7.7 kg, respectively. Mean age at weaning of all kids was 98 days. The mean average daily gain and adjusted 60-day weight for the male kids were 204 ± 54 g and 16.1 ± 4.0 kg and that for female kids were 199 ± 49 g and 15.5 ± 3.7 kg, respectively. The software program will be available for on-site demonstration. Further inquiries and expressions of interest from research and extension personnel from neighboring states have been received to implement the program for meat goat producers in their states. Thus, a large group of producers contributing performance records to a database should help the meat goat industry to develop genetic improvement programs in the future.

153. Suitability of an on-line certification program for goat producers

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In 2006, a Langston University-led consortium of 11 universities and 5 meat goat producer groups unveiled an on-line training and certification program (<http://www2.luresext.edu/training/ga.html>). The program consists of 22 learning modules. Participants take pre- and post-test to pass the 16 required and a minimum of 3 elective modules for certification. As of November, 2007, 416 participants from 12 countries (US – 385, Canada – 12, India – 4, Malaysia – 2, Pakistan – 2, Australia, Jamaica, Mexico, Nigeria, Peoples Republic of China, Romania, and Zimbabwe – 1 each) have registered for the program. Forty-four states are represented with the top 6 states representing 51% of total participants (OK – 76, MO – 35, TX – 35, TN – 23, KS – 16 and AR – 12). Thirty-nine participants have been certified. Of those certified 37 are from the USA and 2 from Canada. The states with the largest number of certified producers are TX and TN with 5 each and OK with 4. Of those certified, 16 respondents farm 5 – 20 acres (2 - 8 ha), 5 respondents farmed either 21 – 40 acres (8 – 16 ha) or 161 – 320 acres (64 – 128 ha). Two respondents farmed less than 5 acres (2 ha). Twenty-seven respondents (69%) owned less than 50 goats and only 1 producer had over 250 animals. Of those certified participants responding, 20 reported that goats provide less than 10% of their total income and only one reported that goats are responsible for a majority of their annual income (76% or above). The farm and herd size of producers receiving certification is indicative of the current US goat industry. Results indicate that goat producers will access production information in a web-based format. Such a format is one method to reach large numbers of people and can successfully augment a more traditional extension/outreach component of one-on-one interaction of extension specialists and producer.

154. Gender differences in an on-line certification program for goat producers

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In 2006, a Langston University-led consortium of 11 universities and 5 meat goat producer groups unveiled an on-line training and certification program (<http://www2.luresext.edu/training/ga.html>). The program consists of 22 learning modules. Participants take pre- and post-tests and must record a minimum score of 85% to pass the 16 required and a minimum of 3 elective modules for certification. Should a score of 85% be achieved on the pre-test, the participant has no need to take a post-test. As of November, 2007, 416 participants had registered for the program and 39 had completed the requirements for certification. A greater proportion of males (230) than females (186) enrolled in the certification program ($\Pi^2=4.65$; $P<0.05$). The same gender proportion of enrolled participants also existed for those becoming certified, 24 males vs. 15 females, ($\Pi^2=0.45$; $P=0.45$). For those responding to a question concerning employment, a greater proportion of females than males enrolled in the program were engaged in full- vs. part-time farming: 51 and 113 females engaged in full- or in part-time farming vs. 36 and 145 males, respectively, ($\Pi^2=5.73$; $P<0.02$). However, this proportion changed for certified participants as 7 and 6 certified females engaged in full- or in part-time farming vs. 4 and 15 certified males, respectively, ($\Pi^2=3.67$; $P<0.06$). No differences were found between males and female participants in farm size ($\Pi^2=8.29$; $P=0.30$) or herd size ($\Pi^2=2.22$; $P=0.70$). Females tended to score higher on pre-tests than males (85.4 vs. 80.3%, $P<0.06$) and a proportionately higher percentage of males than females were required to take post-tests ($\Pi^2=6.94$; $P<0.01$). There was no difference in post-test scores between genders. Males tended to record a greater difference between pre- and post-test scores than females (11.0 vs. 5.2%, $P<0.06$). Results show that women goat farmers will actively participate in an on-line certification program. Pre-test scores show that the knowledge of women producers was on par or above that of male producers. The similarity in post-test scores is an indicator of the effectiveness of the training modules.

155. A milk goat production model to support South African rural small scale farming communities

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The South African National Department of Agriculture (DoA)'s Livestock Development Strategy (LDS), through the Goat Productivity Improvement Program (GPIP), aims at improving rural small scale milk goat farmer's production systems. Rural communities face challenges regarding productivity of milk goats within limiting environmental conditions. Hence, adapting production systems is key to the process of improving productivity of these enterprises. The development of the milk goat production model has involved collaboration with the University of Pretoria on adaptive milk goat production systems research to develop suitable production systems for the diverse conditions across the country. The plan is to address key components of milk goat production including: planning of the enterprise, general management, housing, health care, nutrition, fodder flow, kid rearing, fertility management, record keeping, milk processing, and marketing. The project will include capacity building in the form of training of trainers who are already supporting milk goat development programs in all provinces of South Africa, as well as neighboring SADC partners such as Swaziland. This will augment the good work of organizations such as Heifer International and FARMAfrica.

156. Tools for technology transfer in the French caprine sector

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The modernization and the dairy specialization of the French caprine breeds have both been the result of an organized strategy at a national level for 50 years. Thanks to this strategy, called the “chain of progress”, the French production of cheese from goat milk has increased three fold during the last 50 years (production around 100,000 tons in 2007). The chain of progress – which involves organizations of research and development and professional breeders organizations - is divided into 4 steps: 1) identification of technical, economic or social brakes to modernization and productivity, 2) development of research programmes, 3) tests of application methods with critical evaluation, 4) diffusion with various tools : training courses for technicians and breeders, technical days and systematic use of the review *La Chèvre* which celebrates 50 years of existence in 2008. The newspaper *La Chèvre* (French term for “goat”) has always been a powerful tool which disseminates technical news quickly. It has shortened the time between the acquisition of research results and their dissemination to breeders. Nowadays, *La Chèvre* distributes 4,000 issues every two months. It is read by more than half of the French goat breeders (3,500 subscribers out of the 7,000 breeders who owned more than 10 goats in 2007 in France). The review, which is about 50 pages, gives a progress report on caprine news with a recurring article on current markets and milk prices. A complete file gives details about techniques for breeding: feeding, animal health, reproduction and selection, equipment and buildings, farm management of exploitation, transformation and marketing of cheeses. Since July 2007, the website “<http://www.la-chevre.fr>” supplements the review and brings additional information and services to breeders (weather, links, small advertisements, breeding schedule).

157. Working conditions in goat milk and hand-made cheese farms: cooperation of development structures and a producer organization

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The Fédération Nationale des Eleveurs de Chèvres (FNEC) is the French national federation of goat farmers. It is a producers' organization, whose purpose is to represent goat farmers in national institutions, and defend their interests. In 2005, FNEC identified "working conditions" as an essential issue for research and development in the goat milk sector: indeed, goat farmers increasingly express the need of having their workload lightened. The burden of constraints and the number of hours and weekend work make this profession less attractive to young people. As a result, FNEC decided to lead a large research and development project on this issue, involving research centers, development structures, technical support organizations, etc. Forty-eight partners from all parts of France were part of this program. The Centre Fromager de Carmejane, a technical research and development center from the south of France, carried out the technical and administrative management of the program. The first activity of the program consisted in collecting data about how to reduce or how to ease goat farmers' workload. Groups of farmers and livestock technicians gathered bibliographical references and used their own knowledge (often useful, but not formalized) to create a synthesis on several subjects: farm building, feeding, kid breeding, etc. In the second activity, partners who had experimental means carried out experiments concerned with breeding practices that could reduce workload, and examined the consequences on work time, on constraints, but also on profitability, and on product quality. For example, experiments were conducted concerning milking once per day as opposed to milking twice day, for different methods of cleaning, and surveys were carried out on food distribution. At the end of the program, 23 technical articles were written intended for farmers. The FNEC and its partners wanted to extend these results to every goat farmer in France. Six thousand CD-Roms were produced, and given to farmers through local development structures involved in the program, or during one of three regional symposiums organized for producers on this issue. All articles are also available on Internet at: www.fnec.fr.

158. Impacts of technology adoption in extensive systems of goat production in Guanajuato, México: GGAVATT “Noria de Camarena” case.

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In Guanajuato, México, the most important goat production system is the extensive system. It comprises small producers with few animals, scarce use of technology and mostly low production parameters. Seven years ago, the State and Federal Government promoted the use of technology through a transfer model: Livestock Group of Technology Transfer and Validation (GGAVATT). The technology is supplied for the National Institute of Forestry, Agricultural and Livestock Research (INIFAP) and the technical inputs are supported through the government program: Development of Integral Projects Agriculture and Livestock (DPAI). In this study, we studied the technology performance of the GGAVATT “Noria de Camarena”, which is situated in Irapuato, Guanajuato. It has 13 members averaging 47 years of age and each owning an average, of 35.7 animals. Milk is the most important product generated and it is marketed to the processing industry. Four years ago, a productive and economical register was implemented in this group to evaluate the impacts of technology adoption. Before the technical adviser began his work, he completed a baseline study concerning the productive and technological situation of each farm and then he proposed technical activities to improve this initial situation. After three years of work, the most important technologies adopted were: technical register 0-92%; improved milking hygiene 46-92%; use of balanced diets 23-53%; use of the California milk test 0-38%. The productive parameters obtained were: birth weight, 3.47 kg (n=867); weaning weight to 60 days, 14 kg (n=139); production of milk to 215 days of milking, 273 kg (n=272); and an average profit per year of US \$ 1,318. In conclusion, the transfer of technologies and their adoption may be an option that provides employment and economic benefits to the goat producer in family production systems.

159. Considerations for on-farm research and demonstration of useful feeding/nutrition practices for small ruminants in Ethiopia

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Many funding organizations view on-farm research as having greater impact than 'on-station' trials, a feeling shared by farmers because of the opportunity to see and evaluate findings first-hand. Langston University provides technical assistance in a 5-year project supported by USAID, entitled Ethiopia Sheep and Goat Productivity Improvement Program (ESGPIP), which includes on-farm research and demonstration of useful feeding/nutrition practices. ESGPIP partners with research and extension entities throughout Ethiopia in implementing specific activities. The wide arrays of feeding/nutrition topics and activities range from providing materials and training for ammoniation of crop residues with associated field days to collaboration with export abattoirs in testing pre-slaughter management practices to extend shelf-life of carcasses from Highland areas. One effective strategy for on-farm research/demonstration used by some partners involves Farming Research Groups (FRG). The first such activity was conducted by the Adami Tulu Agricultural Research Center (ATARC). Five FRG were formed, each consisting of 9 or 10 farmers contributing 3 or 6 young male goats. Materials and funds were provided to each FRG to construct a simple barn with three pens. Ten young goats were supplemented and resided in pens at night, with 1 or 2 animals per farmer subjected to three different supplemental concentrate treatments. ATARC personnel closely monitored activities, with a minimum of two weekly visits. This approach allows for statistical analysis of data, desirable for publication of the findings and, perhaps more importantly, true value or meaning of any differences noted. With use of farmer-owned animals, it may not be feasible to impose negative control treatments, but an appropriate common or standard supplemental feedstuff treatment allows for an adequate basis of comparison. This implementation method is but one of many that can be effectively employed for on-farm research, each with unique advantages and disadvantages to be considered. Notable challenges exist in conducting on-farm research, although there are tradeoffs such as lesser facility and labor needs on-station. Numerous technologies are ready to be taken to on-farm settings, but it should also be realized that in some instances on-station research is first required to ascertain how best to implement a particular technology on-farm.

160. Under what conditions would adoption of exotic dairy goats in the tropical highlands of eastern Kenya increase farm incomes?

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Increasing milk production and productivity of local goats through crossbreeding with exotic dairy breeds from Europe has been widely viewed as one of the promising ways of enhancing food security and farm incomes of smallholder farmers in most tropical African highlands. To this end, FARM Africa, an international non-governmental organization, introduced diverse dairy goat crossbreds in the Kenyan Meru South and Meru Central Districts about a decade ago. Although there has been some documentation of the “success” of this initiative, to-date there is little empirical evidence as to whether incomes of the smallholder farmers who have adopted the dairy goat technology have increased. FARM Africa has documented what can be considered as key factors contributing to the successful uptake of this technology. Nevertheless, ex-post analysis of factors or conditions that would facilitate dairy goat farmers to increase their farm income has not been undertaken. Against this background, this paper assesses the farm income of adopters and non-adopters of dairy goat crossbreds in Meru South and Meru Central Districts of Kenya. In addition, this paper determines factors that are likely to contribute to increased financial gains after adoption. The results are generated from a household survey of 260 randomly-sampled smallholder farmers who were interviewed using a semi-structured questionnaire in mid 2007. The results indicate that adoption of dairy goats may not always lead to increased farm income. Using a two-stage econometric model, the results also indicate the kinds of factors that are likely to make farmers benefit financially from dairy goat rearing. These include favorable agro-ecological conditions, market access, and farmers’ levels of human, financial and social forms of capital. The paper derives important policy implications that are geared towards enhancement of targeting and prioritization for increased returns after adoption of dairy goats.

161. Productive progress in the goat producers' association "Caprinocultores Unidos de Guanajuato AC" through the technology transfer system GGAVATT (group livestock validation and technology transfer) (2001-2007).

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The aim of this study was to analyze the effect of technology adoption in milk goat producers in central México. The association has 13 producers averaging 41.5 years of age. The average level of schooling is 3rd year of high school and the average number of dependents per family is 6. The average number of female goats per herd is 246, with a total of 3,447 females, and income in relation to investment is 36%. The technological practices implemented to date and the percentage of use are: weighing milk (100%), animal nutrition consulting (71%), estrus synchronization and reproductive management techniques (40%), gestation diagnosis (93%), brucellosis herd control program (100%), raising of kids on slats (46%), disease diagnosis and management (61%), certification of good milking practices (53%), linear and genetics evaluation (87%), evaluation of genetic records (61%), forage conservation by silage (93%), milk components analysis (100%), dispersion of genetic material (71%), data analysis and data processing for replacement selection and animal sales [sires and females] (100%), bacteriological analysis of milk (93%), cryoscopic point of milk (100%), diagnosis of subclinical mastitis (cytometric flow) (100%). Eighty percent of the producers have adopted different practices, and the association has promoted and implemented different programs such as: controlled milk production, quality of milk, genealogical records, disease control, marketing in groups, sales of fluid and dehydrated milk. The technical results are as follows: of 11,180 kids born, 52% were females and 48% males, 56.9% were twin births, 24.3% were triplet births, 15.7% were singletons and 2.9% were quadruplet births. The mean birth weight and weaning weight at 60 days were 3.32 kg and 15.7 kg, respectively, with a daily weight gain of 206.33 g. Concerning milk production, 3,534 lactations were analyzed from 1999 to 2007: 90.4% were animals from 1 to 4 lactations, and 9.6% from 5 to 11 lactations, with 35% in the 1st lactation. An ANOVA was performed using a randomized design considering the effect of lactation number. The lactation number influenced the number of open days ($P < 0.05$) with an average of 221.6 ± 6.5 d, which figure was greater from the 5th lactation onwards. The number of days in milk was 301.2 ± 6.8 d and differed ($P < 0.05$) but without a trend with lactation number. The production of milk per lactation was 987.2 ± 33.9 kg, with higher production ($P < 0.05$) during the 2nd lactation ($1,105 \pm 11.4$), 3rd lactation ($1,101.8 \pm 13.5$) and 4th lactation ($1,089 \pm 18.53$). This resulted in a daily production average of 3.27 ± 0.93 kg/day, which was higher ($P < 0.05$) during the 2nd (3.50 ± 0.8), 3rd (3.63 ± 0.9) and 4th (3.63 ± 0.97) lactations. In conclusion, the implementation of various technological tools such as: production controls, management consulting and food conservation, disease control, and genetic evaluations, have yielded a higher production and could be appropriate tools for making decisions in goat production systems.

162. Using a participatory approach to research and extension with small-scale goat farmers in South Africa

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A study was undertaken in a small-scale goat farming community of south-western KwaZulu-Natal Province, South Africa, where farmers considered that the major problems affecting goat health and productivity (diarrhoea, gastro-intestinal helminth infection and poor reproductive performance) were exacerbated by a lack of information on goat health and management. The objective was to collaborate with the farmers and develop a flexible framework for the acquisition of skills and knowledge which could address these problems. If successfully accomplished, the dissemination of such knowledge and skills would nurture 'champions' in the local farming community. These farmer champions could potentially then act as important role models and as a local source of advice and encouragement for other farmers. This presentation describes the resultant on-farm goat health research and the development of a "Goatkeepers' animal health care manual". The methodology encompassed a thorough preparatory phase, on-farm experimentation and regular meetings with farmers geared to their current levels of expertise. The approach was a departure from the traditional 'transfer of technology' method of extension. Benefits accrued through the direct engagement and participation of local farmers in the process, but the success of the project was also related to the active involvement of staff from universities, researchers, extension practitioners and farmers i.e. the 'crossing of institutional divides'. A case is made for this type of collaboration to continue so that the long-term sustainability and development of small-scale farming communities is ensured. The approach is equally applicable to other similar agro-ecological zones.

163. Goat Forum: opening an economic window for smallholder goat farmers through sector wide approaches (SWAPs)

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Goat farmers in Zimbabwe mainly practice subsistence farming resulting in poor quality goats that fetch low prices in the market. Results from surveys carried out by Goat Forum in Matabeleland North, South and Masvingo Provinces, indicated that very few farmers use appropriate husbandry practices which include vaccination (< 10%), drenching (< 1%), supplementary feeding (54.5 %), proper housing (39.6 %) and dipping (49 %). As a result, productivity levels are generally low due to high mortality rates which range between 20% and 45%, and low kidding rates (76%). The goats die from diseases and parasites such as pulpy kidney, heart water, liver fluke, orf, round worms and others. While productivity is low, the market for goats is underdeveloped and it provides limited options and incentives for the producers. It is characterized by informal transactions. The main market outlets are farm gate sales to traders and local consumers. Goats for sometime in Zimbabwe have been rated second to cattle in terms of livestock ownership and contribution to the meat industry. At the beginning of the 21st century, goats are seen as an avenue for alleviating poverty and improving the livelihoods of the rural population. Opportunities exist for the development of an organized marketing system in the country and regionally. This is in line with localizing the Millennium Development Goals (MDG), particularly MDG 1 which aims to reduce hunger and poverty. An analysis of some of the efforts being undertaken by various development agencies and government institutions gave “birth” to the *Goat Forum (SNV, ICRISAT, MRS and DLPD)*. The forum was formed on the basis of a common vision in promoting goat production and marketing in the country. The forum recognizes what each partner brings in the value addition to the development of the goat sub sector. The Goat Forum formulated strategic actions to build partnerships among various sub-sector actors to commercialize smallholder goat farming to increase goat production, incomes and employment opportunities.

164. Dispersed community based nucleus breeding scheme in practice: raising Toggenburg dairy goats under smallholder systems in Kenya

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A high population of small-scale rural resource-poor farmers poses a challenge to developing countries aiming to achieve substantive adoption of sustainable agricultural practices. Examples of successful community-based livestock improvement programs which focus on direct improvement of the livelihoods of the poor are few. Where improvement includes the introduction of new livestock genotypes to these communities, the choice of breed needs to consider adaptability and productivity of the breeds/genotypes of interest under the intended production systems. This paper presents information on performance of Toggenburg dairy goats under smallholder production systems in a marginal environment in Kenya under a community-based set up. Environmental factors affecting growth, fertility and milk production of 607 goats were evaluated using general linear model procedures of SAS as part of the characterization of the Toggenburg's adaptive and productive ability under the smallholder conditions. The results indicated that the smallholder farmers were able to maintain comparably high levels of milk production (503±8 liters in 225 days) and good rates of growth to weaning (135.7±3 g/day) for the goats. Though initially long, kidding intervals decreased with time to acceptable levels (301.67±117 days). Animal numbers increased over time and the producers were able to obtain premium prices for their animals when sold. The study verifies that when the views, goals and knowledge of the livestock keepers are sought, and where practical, incorporated in the management practices and organizational structures, sustainable livestock improvement programs can be achieved.

165. Technology adoption by family goat producers for sustainable milk and meat production in Guanajuato, Mexico

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Milk and meat from goats in Guanajuato, Mexico are produced under two main systems: intensive and family. The first one incorporates high technological and industrial innovations, representing 10% of the goat population and 40% of the production. The second comprises small units, with low levels of technology and industrialization, representing 90% of the goat population but only 60% of the production. In the state of Guanajuato, milk and meat goat production have increased by more than 100 and 60%, respectively, in the last 26 years. As the number of animals remained constant, this change in production is indicative of technological improvements. Therefore, the main objective of this study was to identify changes in the use of technological innovations by goat producers in family systems in the state of Guanajuato. In the study, 230 family goat producers with an average of 44 reproductive females per herd were surveyed. The producers were organized in 15 groups of about 15 producers. Each group was visited by a technical adviser who promoted the adoption of innovations that had been used by a small number of producers or were not used at all. An initial assessment was conducted, followed by the implementation of technical and economical records for 3 years. At the initiation, the percentage of producers using technological components was low: disease treatment 30%, forage conservation 10%, concentrate feed supplementation 30%, mastitis and pregnancy diagnosis less than 20%, economical and technical records less than 20%. After 3 years, the adoption of technologies by producers were as follows: disease treatment 80%, forage conservation 30%, concentrate feed supplementation 65%, diagnosis of mastitis and pregnancy from 40 to 80%, economic and technical records from 50 to 70%. It was also observed that there was an increase in the use of technologies that protect the environment, such as the use of manure management systems (mainly composting and biogas production) which increased from 10 to 30%. In addition, the use of alternative crops by producers increased from 20 to 60%.

166. Building leadership capacity in an emerging goat industry

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Leadership development has been a primary objective of Extension educators directing Ohio Meat Goat Task Force efforts. Producer members have been instrumental in the formation of the Ohio Meat Goat Marketing Alliance. This group has developed by-laws and articles of incorporation for the purpose of promoting and marketing commercial meat goat producers in Ohio. Nationwide market centers have been accessed through the establishment of graded pool sales. Cooperation between producer networks, industry, and the Department of Agriculture were responsible for establishing a certified livestock grader position. Producers have enhanced the effectiveness of their efforts by partnering with agencies such as the Ohio Cooperative Development Center, Somalia and East African Organization, Jewish Family Services and Institute for Social and Economic Development. Extension educators have developed the Ohio Meat Goat Production and Budgeting Fact Sheet as a guide for establishing this value added enterprise. Extension has designed and conducted regional workshops, seminars, and on-farm tours to transfer knowledge to over 2,100 participants. Education, production, and marketing topics are discussed in the Buckeye Meat Goat Newsletter. The website <http://www.ohiomarketgoat.com> has been developed to enhance the exchange of production and marketing information. The task force has received \$63,000 in Research and Extension grants to conduct on-going feasibility studies of ethnic markets and of Ohio's processing infrastructure, and to develop farmer/consumer cooperatives. On-farm meat goat research encompasses breed comparisons, forage utilization, and developing benchmark data. Progress continues in the ability to market fresh and safe chevon products directly to emerging ethnic and faith-based consumer populations to capture the most value. This task force is taking a unique approach to building industry infrastructure by utilizing a social approach to market development within emerging consumer niches. This foundation infrastructure will create value-added opportunities at the rural/urban interface for refugees in our urban centers and small farms in Ohio. Behavioral changes include an increase in farmers producing for emerging markets, an increase in communication abilities between producers and markets, and coordination for consumers, retailers, and producers through functional marketing partnerships that fit the social and ecological paradigm.

167. Traditional cheese types in the Mediterranean region of Turkey: some properties of Künefe and Sünme cheeses

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Künefe and Sünme cheeses, traditional dairy products from the Southeastern part of Turkey, are produced according to local artisan cheese-making procedures. Künefe and Sünme cheeses are made mostly from goat milk, although cow milk, or a mixture of both, is sometimes used. Whereas Künefe cheese is sold fresh as soft cheese for a special dessert (Künefe), Sünme cheese is usually consumed for breakfast. The objective of the present paper is to characterize the processing stages of Künefe and Sünme cheeses produced from goat milk and to describe their compositional characteristics. A better knowledge of their characteristics would support the improvement of the production technology and help to obtain a constant quality product capable of being successfully introduced into national and international markets.

168. History and production changes after technology transference in a goat farm in central Mexico

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The aim of this paper was to analyze the development of a goat-cheese production farm in central Mexico. The farm was established in 1973 with 50 Creole goats and the manufacture of cheese was initiated in 1982. In 1995, the first artificial insemination was carried out on the farm, and in 1997 a quality milk and mastitis control program was implemented. Since 2001, the farm has participated in a regional production control and technology transfer program (GGAVATT). This plan includes health management, mastitis and production control programs, feeding programs and genetic evaluations. Currently, the farm has 247 goats, of which 33% are Saanens, 35% Toggenburgs and 32% Alpines. In 1980, milk production was 1.5 kg / goat day. From 2001 (when the farm started GGAVATT) to 2007 production results averaged: 791.5 ± 11.4 kg milk produced during a period of 310.9 ± 3.0 lactation days/year; 2.6 ± 0.03 kg milk produced per day; 3.35 ± 0.05% butterfat ; 2.9 ± 0.02% milk protein; 227.3 ± 2.9 days open; and 45.4 ± 1.7 days dry. Six hundred and eighty-seven lactating animals were studied (1st to 7th lactation). Analyzing the effect of lactation number on certain production parameters showed the following: the second to fourth lactations were characterized by the highest milk yield (P <0.05; 840, 864, and 831 kg milk in 307, 304 and 305 days, respectively). The highest butterfat (P <0.05; 3.36, 3.57 and 3.32%, respectively) and milk protein (P < 0.05; 2.86, 2.94 and 2.76%, respectively) percentages occurred in the fourth to sixth lactations. The highest number of days open occurred in primiparous animals (240.6 days; P <0.05). Conversely, the number of days dry were higher in the fourth lactation (73 ± 3.3 days; P <0.05). Milk production costs reached US\$0.38 per liter, for an income of only US\$0.50 per liter of milk. Nevertheless, the artisan transformation of milk into cheese makes goat farming economically feasible. Six liters of milk were used for the manufacture of each kilogram of cheese. Production costs and selling price of a kilogram of cheese averaged US\$ 3.26 and US\$ 8.57, respectively.

169. Goat production in the State of Nuevo León, Mexico

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Goat production is the second most economically important animal production system in the state of Nuevo León, although it is most important in terms of social development. Goats provide meat and milk for consumption by small producers. In the northeast semi-arid region of Mexico, particularly in the state of Nuevo León, goat kid (cabrito) is fed exclusively with milk or milk substitute. Cabrito is sold to restaurants of the metropolitan area of Monterrey, the capital of Nuevo León, as a specialty dish to visitors and the local population. Goat kid sales in the metropolitan area of Monterrey total about 200,000 goats per year, a demand which can not be satisfied by local producers. Thus, more than 60% of the demand has to be covered by purchasing goat kids from other states, primarily Coahuila, San Luis Potosi and Zacatecas. In Nuevo León, most of the goat kid production is confined to two municipalities, Galeana with 48% and Apodaca with 30%. Although demand has been growing, goat kid availability is low because goat production is one of the most neglected production system in terms of infrastructure, and there are limitations on feed and water resources. In the last 20 years, goat production in Nuevo León has decreased by about 50%. The goat population was maintained at more than 700,000 goats during the 1980s. After 1990, a drastic decrease in goat population was recorded, and in the year 2000, there were only 380,000 goats. Since the beginning of the 21st century, however, the tendency has been reversed in response to strategies implemented by producers and as a result of support from municipal, state and federal government institutions which have contributed to promote extensive, and to a lesser extent, intensive goat production. The most important factors which affect the production system are: (a) production, (b) industrial processing and transformation, and (c) commercialization and distribution. Nevertheless, most of the problems identified were related to the production sector. In the State Development Plan 2004-2009 of the Agriculture Development Corporation of Nuevo León, the state government supported goat repopulation by offering a subsidy of 50% on the cost of replacement does to small producers, the objective being improving the economic income of the rural human population. Emphasis is being directed to producers' organizations, and to issues such as health, technology transfer and application, labor, infrastructure, and the use and conservation of natural resources, among others. Research into replacement doe husbandry is considering feed resource management, and appropriate administration and prevention of health problems, to attain low kid mortality rates and normal growth of the replacement doe.

170. Technology transfer to goat producers in Brazil - Capritec experience

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Capritec is a company devoted to the dissemination of technology in the form of courses, consulting, lectures and events for producers, students and technicians involved with goat production. Capritec headquarters are located in Espírito Santo do Pinhal, in the state of Sao Paulo, in the Southeastern region of Brazil. In the state of Sao Paulo, dairy goat production is well developed. Meat goat production is more modest, but has increased steadily in recent years. The main objective of Capritec is to transfer technology a) to enable interested producers, students, technicians and entrepreneurs to invest in goat production, b) to give them the necessary tools to avoid business failures in these enterprises and c) to contribute to the development of Brazil goat production. The company's owners and collaborators have extensive experience with goats in the areas of animal production, reproduction and food processing. Between 2003 and 2006, 58 extension courses were offered, attended by 422 participants. The courses themes were goat production for beginners (4 courses), meat goat production (9 courses), dairy goat production (5 courses), processing of goat milk into cheese (12 courses), yoghurt, ice cream and sweets from goat milk (1 course), cosmetics from goat milk (2 courses), artificial insemination (7 courses), ultrasonography (2 courses), breeding soundness examination and fresh semen processing (2 courses), general management practices (7 courses), preparation and evaluation of the economics of projects (6 courses), and goat health (2 courses). Courses emphasize practical hands-on activities and are taught in small groups. Women were in the minority, accounting for 23.51% of course participants, whereas men accounted for 71.49%. Between 2003 and 2006, 4 extension workshops were organized, attended by 826 participants. After each event, the participants were invited to answer a questionnaire, to mention the strengths and weaknesses of the course, and to score and give suggestions for future courses. The ratings and suggestions were evaluated at meetings with the instructors to improve the quality of the courses. The ratings, on a scale from 0 to 10, were above 9, on average, indicating the high level of satisfaction of the participants.

171. Twenty-two years of development and the state of art of the Dutch Goat Milk chain

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The Netherlands is well known as a small country in North West Europe with an innovative agro-food complex, the third largest exporter of agricultural products worldwide. Dutch flowers, vegetables, potatoes, meat and dairy-products are especially well known and respected everywhere. My presentation will give an overview resulting from 22 years of development in the Dutch dairy goat fluid milk industry. During the mid eighties, young farmers as well as consumers in the Netherlands became interested in milk from livestock species other than cows. In 1986, the first farmers started milking goats for the production of goat milk [50 farmers starting producing some 2.5 million litres]. Twenty-two years later, after some cyclic economic periods, dairy-processors collect about 150.0 million litres of goat milk from 350 professional goat farmers. The success for the upcoming and energetic growth of the Dutch dairy goat fluid milk industry can be found in the following key-arguments: 1) young, well educated and very motivated farmers, 2) a lot of knowledge and help from the dairy cow fluid milk industry, 3) an opportune worldwide growing demand for goat milk, 4) product and market knowledge and development of new markets (the right usp / “unique selling point” and the right pmc / “product market combination”), 5) strong quality assurance programs. In our young history, a professional market-oriented sector was founded in the Dutch agriculture and food complex.

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172. Electrophoretic identification of Caprine α_{S1} - and α_{S2} -Casein genetic polymorphism at the protein level

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The aim of this work was to characterize, by electrophoretic analysis of proteins, the CSN1S1 and CSN1S2 loci in the White Shorthaired goat, the most commonly distributed breed in Czech Republic. The CSN1S1 locus exceeds with massive polymorphism. Among alleles is a decisive difference, regarding the synthesized protein level of milk. There were detected seventeen genetic variants of this protein, linked with autosomal alleles. Alleles, marked as „strong”, „medium”, „weak” and „null”, are associated with 3.5 g/L, 1.1 g/L, 0.5 g/L and null α_{S1} -casein content in milk, respectively. These quantitative differences between variants of protein can affect technological (rennet coagulation time, cheesemaking yield, firmness of curd) and nutritional properties of milk. At least seven alleles have been identified at the gene CSN1S2, connected with three synthesis levels. Normal (2 g/l), lower and null α_{S2} -casein synthesis levels are known. Milk samples from 103 White Shorthaired lactating goats were collected. For separation of α_{S1} -casein A, B, C and E variants and that of α_{S2} -casein isoelectric focusing in ultrathin polyacrylamide gel was used (Krause *et al.*, 1988). In case, when no α_{S1} -casein band was found on gel, identification of variants was undertaken by Grosclaude *et al.* (1987) SDS-PAGE method. Five variants of α_{S1} -casein were detected, namely A, B („strong”), E („medium”), F („weak”) and O. The observed frequencies of these were 0.115; 0.317; 0.157; 0.285 and 0.125, respectively. These variants have occurred in 13 different genotypes. In the same herd (in four genotypes) three normal variants of α_{S2} -casein were found, A, B and C, with frequencies 0.772; 0.058, and 0.170, respectively. Our results revealed higher, but balanced presence of α_{S1} -casein „strong” and „weak” variants in the breed, while in case of α_{S2} -casein normal variants were only found. *Granted by MŠMT (Czech Republic), MSM 2678846201 and LA 331 (INGO) projects.*

173. A preliminary study on lactation curves in West African Dwarf and Red Sokoto goats

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Four mathematical functions (incomplete gamma, non linear regression, mixed log, and polynomial regression) were fitted to 202 weekly lactations of 8 West African Dwarf and 9 Red Sokoto goats to ascertain the accuracy of prediction of individual's milk production. The accuracy was assessed by the magnitude of R^2 and the proportion of individual lactations well predicted. All the functions tested generally gave good fit to the observed data with slight tendency to consistently underestimate daily milk yield. The pooled R^2 estimates for all models exceeded 0.700. Both breeds showed similar peak yields ($P>0.05$) averaging 420.65 ml during first week of lactation. The proportion of individual lactations accurately predicted most of the models (incomplete gamma, mixed log and polynomial regression) were moderate (66.67%) for Red Sokoto breed to high (87.5%) for West African Dwarf breed. R^2 values generated from the fit of non-linear regression model however showed significant ($P<0.05$) breed difference with indication that more West African Dwarf goats (87.5%) had better fit ($R^2 = 0.863$) than Red Sokoto goats (44.44%) with R^2 estimated at 0.693. The apparently reasonable trends in goodness of fit shown by the models despite the limitation in number of records points to the fact that predictive equations could be developed with increase in data size to predict future yields from incomplete lactation records.

174. PrP variability and susceptibility of Pakistani goat breeds to scrapie

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Prion protein (PrP) gene coding sequences of different Pakistani goat populations were analyzed to determine amino acid variability and genetic susceptibility/resistance of Pakistani goats to an invariably fatal neurodegenerative disorder, scrapie. Genotype analyses for scrapie-associated PrP gene codons 142, 143, 154 and 222 in 283 goats explored a single amino acid variation at codon 154 (A→H). This amino acid variation H¹⁵⁴ that confers moderate resistance to scrapie in goats was seen in a few animals indicating the need of further comprehensive investigation of Pakistani goats in perspectives of scrapie. The remaining animals showed no PrP variability i.e. they were wild type in context of both PrP DNA and protein sequence. Next to genotyping, PrP gene sequencing was performed to discover additional PrP variability in 283 PrP genotyped goats. A total of 6 PrP codons were detected with DNA sequence variations, amongst which codons 42, 138 and 240 variations were present with predominance in all goat populations studied. The DNA variants of codons 42 and 138 had no effect on amino acid translation, while the DNA variant of codon 240 was predicted to translate a different amino acid Serine instead of Proline. In brief, this study provides useful information about scrapie susceptibility of Pakistani goats.

175. Determination of allelic frequencies of alpha_{S1}-casein gene in a herd of dairy goat in the southeastern region of Brazil*

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Among the caseins found in the milk (α_{S1} , β , α_{S2} and κ), α_{S1} -casein (α_{S1} -Cn) represents more than 40% in bovine milk, while in goat milk it varies from 0 to 25% due to the occurrence of a complex polymorphism in the gene (*CSN1S1*), which codifies this protein. This gene presents at least 18 alleles in goats, all classified into four levels of expression (high, medium, low and null). In this study the objective was to estimate the frequency of defective alleles, named E (medium), F (low), and O₁ (null expression of the protein) as well as those of high expression of the α_{S1} -Cn gene (A + B + C) in both the Saanen and Alpine breeds of a goat herd raised in the southeastern region of Brazil. Genomic DNA samples were obtained from leukocytes of 145 dairy goats. Regions of interest in the gene were amplified by Polymerase Chain Reaction (PCR) and evaluated in both agarose and polyacrylamide gels. Some fragments were evaluated by using a PCR- RFLP (PCR-Restriction Fragment Length Polymorphism) study. The allelic frequencies of the α_{S1} -Cn gene were determined by direct counting, assuming Hardy-Weinberg's equilibrium. The allelic frequencies in the herd of 62 Saanen goats were: $CSN1S1^E = 0.35$; $CSN1S1^F = 0.30$; $CSN1S1^{O1} = 0.02$; $CSN1S1^{A+B+C} = 0.30$, other alleles = 0.03 (expression not identified). In another group of 83 animals of the Alpine breed, the frequencies were: $CSN1S1^E = 0.48$; $CSN1S1^F = 0.28$; $CSN1S1^{O1} = 0.01$; $CSN1S1^{A+B+C} = 0.20$, others alleles = 0.03. The higher frequency found for the defective alleles E and F in both the Saanen and Alpine breeds is in agreement with results published elsewhere and it is suggested that this occurrence may be a response to breeding programs developed in Brazil by using semen imported especially from France during the decades of 80's and 90's. Financial support: Fundação de Amparo à Pesquisa do Estado de Minas Gerais – FAPEMIG

176. Brazilian goat breeding programs

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Historically in Brazil, little has been done by the government and breeder's associations regarding to the development of goat breeding programs. However, the interest demonstrated by breeders has increased recently. In this country, goats are exploited for meat, pelt and milk production. However, studies about breeding objectives and economic values have not been conducted in Brazil. The only breeding program fully dedicated to meat goats in Brazil is the "Programa de Melhoramento Genético de Caprinos e Ovinos de Corte" (GENECOC – Breeding Program for Meat Goats and Sheep). The GENECOC has as main objective to give support to the breeders on the utilization of the available genetic resources to optimize their production systems. At present, 1,516 goats are involved in GENECOC, of the breeds Anglo-Nubian (meat line), Boer, Savanah, Moxotó, Canindé, Undefined Breed ("Criola") and some crossbred animals. The Brazilian Dairy Goat Breeding Program aimed to structure the national dairy goat databank and to conduct progeny testing for the main dairy breeds raised in the country. This organization would also allow carrying out studies about genetic structure of Brazilian goat population, QTL/gene identification and the development of statistical methods for genetic evaluation such as test-day models. This program is already in progress, but there are difficulties to carry it out, mainly for progeny testing. Today, 4,374 goats are involved in this program, of the breeds Anglo-Nubian (dairy line), Saanen, Toggenburg, French-Alpine, American-Alpine, undefined Breed ("Criola") and some crossbred animals. The main difficulties for the developing of these breeding programs in Brazil are the great territorial extension of the country with its large diversity of genetic groups, reduced interest from the private sector, lack of organization of breeders/producers, no breeder sector developed and lack of funding from the government and loans for technological development.

177. Growth curve analysis in tropical breed goats and its crosses with temperate breed goats

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Growth patterns of 208 crossbred female goats belonging to various crossbreeding genotypes were investigated. Data originated from a crossbreeding program involving the temperate German Fawn (GF) goats and the tropical Kambing Katjang (KK) goats in Malaysia from 1980 to 1990. Longitudinal weight-age data were individually fitted to the five growth curve functions, Brody, Bertalanffy, Gompertz, Logistic and Richards function. Estimates of growth parameters, A for mature weight, B for constant of integration, k for maturing rate and m for inflection parameter, and degrees of maturity at the inflection point (U_i) which represent a time point when the growth rate ceases to increase, were obtained. The goodness of fit determined by R^2 was higher in Brody function than in the other functions. Effects of genotype and litter type on each parameter were also analyzed. A comparison of R^2 among genotypes showed the highest value for KK. The values of A for KK were significantly lower ($P < 0.05$) than for GF x KK (F_1), backcrosses with 75% GF genes (BC) and $F_1 \times F_1$ (F_2) in Bertalanffy, Gompertz and Logistic functions. Estimated mature weights obtained from Brody function were 31.8, 33.7, 35.5 and 34.9 kg for KK, F_1 , BC and F_2 , respectively. The corresponding mature weights from Bertalanffy function were 28.8, 32.2, 34.2 and 33.3 kg. Maturing rate of BC was significantly higher ($P < 0.05$) than that of the other genotypes. The correlation between mature weight (A) and the maturing rate (k) were negative both for single and multiple births in all functions. The correlation between A and k were negative and highest for KK and lowest for BC. Estimated values for U_i in Richard function were about 0.2 for all genotypes. The present study showed that the crossbreeding between temperate and tropical breed altered growth patterns of goats.

178. Sequencing of introns of goat beta-defensins

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Defensins are the important component of innate immunity in many organisms. There are known two caprine defensins. Using primers that amplify both defensin genes, expression was proved in digestive and respiratory tissues and in udder tissues, kidney, spinal core, and also in somatic cells in milk. Expression of beta-1defensin predominated in the tongue, trachea, bronchi and lung, while expression of beta-2 defensin prevailed in stomach, jejunum, ileum, colon and rectum. Only the expression of beta-2defensin was confirmed in somatic cells from goat milk and level of expression depended on stadium of lactation but did not depended on somatic cells count. Till now, only sequence of exons was available in GenBank. The aim of this study was sequencing of introns of both caprine beta-defensin genes. The material covered DNA of goats (Polish White Improved) from the herd maintained in Institute of Genetics and Animal Breeding PAS in Jastrzębiec, Poland. The DNA amplification was performed using primers designed based on sequences given in GenBank. The PCR reaction was conducted in a GenAmp PCR System 9600 Thermal Cycler (AB). Purified PCR products (about 1600 base pair length) were sequenced with *BigDye® Terminator v1.1 Cycle Sequencing Kit* (AB) in a DNA sequencer ABI PRISM 3730 (AB). The data were collected by the Data Collection v.2.1. Software (AB) and analyzed by the Sequencing Analysis v.3.0. Software (AB). The sequences obtained were aligned applying the Blast software package (GenBank). In the present study six positions in intron nucleotide sequence differing between goat β -1defensin and β -2defensin genes were found. The potential functional significance of recognized difference remains unknown and further investigations should be conducted. Financed by the Ministry of Science and Higher Education, grant nr 2P06Z 01330.

179. Polymorphism in goat growth hormone receptor gene promoter region

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The human GHR gene is highly polymorphic. Some of nucleotide sequence polymorphisms were identified as the causative mutations of growth retardation, e.g. Laron's syndrome. In farm animals, genes coding for GHR are promising candidates for quantitative trait markers. Several polymorphic sites have been identified in the bovine GHR gene and the association between GHR gene polymorphism and performance traits were found. Detection of polymorphisms of GHR gene in another dairy species – the goat – may be also interesting. The aim of this study was to find the polymorphism of GHR gene dairy goat. The studies were conducted on dairy Polish White and Coloured Improved goats. Based on the sequence of the *Capra hircus* growth hormone receptor gene (GeneBank no. AY358031) the following primers were designed for the amplification of 392-bp GHR gene fragment: forward – 5'-TAACTCTCACTGT-CTTCAGCC-3'; reverse – 5'-GGTTGGAGGAGGAATATGGTG. DNAs derived from 6 unrelated goats were amplified and the PCR products were sequenced. The nucleotide sequence polymorphism was found in the promoter region of the goat GHR gene – a G→C transition at position -172, relative to the transcription initiation site. This mutation created an additional *Acil* restriction site and therefore could be recognized by RFLP method upon digestion with *Acil* endonuclease. The restriction resulted in two DNA bands (353 and 39 bp) for homozygote GG and four bands (353, 185, 168 and 39 bp) for heterozygote GC. The frequency of genotypes was 0.92 and 0.08 for GG and GC, respectively. The CC genotype was not found. The frequency of allele G was 0.92 and of allele C – 0.04. There were no significant differences between expected and observed frequencies of genotypes according the Hardy-Weinberg rule.

180. Genetic polymorphism of milk proteins in Barbari goats

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Milk samples of 179 Barbari goats, maintained at the Central Institute for Research on Goats, Makhdoom, Farah, Mathura, Uttar Pradesh, India, were analysed to study the genetic polymorphisms of milk proteins in this breed. The genetic variants in milk samples were detected by sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS – PAGE) method. The electrophoretic pattern revealed the milk sample of Barbari goats contained four major casein variants, i.e., α_{S1} - casein, α_{S2} - casein, β -Cn, and κ -Cn and two whey proteins, viz., β - lactoglobulin and α - lactalbumin. Three α_{S1} - casein alleles viz. α_{S1} - Cn^A, α_{S1} - Cn^B and α_{S1} -Cn^F were identified in this study. The predominant allele of α_{S1} - casein was α_{S1} -Cn B, with a frequency of 0.565, whereas the frequencies of α_{S1} -Cn A allele was 0.329. Very low frequency (0.073) of the α_{S1} -Cn^F variant occurred in the milk of this breed. The α_{S1} - casein locus in this population also showed the presence of null allele (i.e., absent of this particular allele in the population). The frequency of null allele for this locus (α_{S1} -Cn⁰) was 0.034. The α_{S2} -locus showed two variants namely A and B and the frequencies of these variants were 0.531 and 0.469, respectively. Two genetic variants (A and B) were also observed in the κ -casein locus having the frequencies of 0.708 and 0.292, respectively. No polymorphism was observed at β - casein locus in our study. The electrophoretic pattern of β - lactoglobulin showed the presence of two genetic variants at β -lactoglobulin (β -LG) locus (viz., A and B) and the gene frequency of β -LG A and β -LG B was 0.910 and 0.090, respectively. Regarding the α -lactalbumin locus, two genetic variants of α -lactalbumin (α -LA) viz., A and B was identified in this breed. The gene frequency of predominant allele i.e, α -LA A allele was 0.966 whereas, the frequency of rare allele i.e., α -LA B was 0.034, respectively.

181. Is fertility mediated by production or composition milk traits when Murciano Granadina goats are inseminated out of sexual season?

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An artificial insemination scheme using frozen semen out of the sexual season was drawn in Murciano-Granadina (MG) goats, assembled to a goat breeding program to study the effect of factors such as depth of semen deposition, male, age, time up to insemination and milk yield and composition discounting herd-year-season on fertility (FR) and on kidding rates (KR). Does (727 goats in 17 herds) were inseminated on with frozen semen doses coming from 9 males. Herds were distributed throughout the Valencian Community area (Spain). Fertility rate was determined at 6 weeks after insemination by transabdominal echography. Overall fertility was 53.9%, KR was 48.8%, average number of kids born (PR) was 1.88 and percentage of single-kidding (SK) was 28.3%. Depth of semen deposition affected FR and KR. Post-cervical insemination presented significantly greater fertility and kidding rates (65% and 60%) than deposition in the vagina (33% and 31%). No effect of the buck was noticed. Total milk yield was negative correlated with FR, KR and PR, and single-kidding were favored. Contrary effect was produced by adjusted protein yield on all the traits. Kidding rate was penalized when adjusted fat yield increased. Prolificacy and multiple-kidding rate were reduced when does were early inseminated after parturition (2.0 vs. 1.5 kids and 81 vs. 52%). Fertility results may be improved increasing the insemination depth and defining a minimum interval from the last parity up to insemination. Selection focused on milk yield might mar slowly reproductive records.

182. Growth performance of Jamunapari goats in semi-arid region of India

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Growth performance of 3754 Jamunapari goats, maintained at the Central Institute for Research on Goats, Makhdoom, Mathura, Uttar Pradesh, India were studied for a period of 24 years (1982 through 2005). Majority of the animals were maintained under semi-intensive feeding systems, where animals are allowed to graze during the day for 5 to 6 h and supplemented with some amount of concentrate according to age and physiological category of animals. Weaning of kids was done at the age of 3 months. At weaning, some kids were put under the intensive system of feeding up to 12 months of age, in which they were provided with *ad lib.* concentrate, consisting of 72% TDN and 16% DCP, on daily basis. The traits analyzed for this study were birth weight (BW), 3-month weight, 6-month weight, 9-month weight and 12-month weight. The data were analysed using a mixed model least-squares analysis for fitting constants including different fixed effects (viz., year of birth, season of birth, parity of dam, feeding management, sex and birth status of kid) in the model. The weight of the does at kidding was considered by linear regression on the body weights of the kid. The average weights at birth, 3, 6, 9 and 12 months of age were 2.88 ± 0.02 , 9.33 ± 0.08 , 14.06 ± 0.15 , 20.04 ± 0.20 and 24.94 ± 0.24 kg, respectively. Marked year-wise differences ($P < 0.01$) of all growth traits of kids were observed but no definite pattern was observed among different years. The parity of doe had also significant ($P < 0.05$) influence for all growth traits except 9- and 12-month of body weights of kids. The kids maintained under an intensive system of feeding management performed better in terms of growth than kids maintained under semi-intensive system from 6 months to 12 months of age. Males were heavier than females at all stages of growth and the sex differences tended to increase with age. Single kids had a distinct advantage over those born in multiple births at all stages of growth up to one year. The regression of weight of dam at kidding showed significant ($P < 0.01$) effect on body weights at all the ages.

183. Characterization of exon 2 and intron 2 of leptin gene in Indian goats

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Leptin, the hormonal product of the leptin (obese) gene, has multiple physiological effects and plays a pivotal role in the control of body growth, immune function and reproduction. Leptin gene polymorphism has been analyzed in cattle, buffalo and pigs but no report was available for caprine species. Therefore the present study has been designed to analyze polymorphism in exon 2 and intron 2 region of leptin gene in Indian goats and to establish the relationship of polymorphic pattern with growth parameter. Genotyping was carried out in 111 kids including 70 samples from Barbari and 41 samples from Jamunapari breeds. The exon 2 and intron 2 region of leptin gene showed amplified product about 152 bp and 400 bp, respectively in both the breed. Sequencing of the exon 2 and intron 2 region of leptin gene was carried out to analyze the leptin gene polymorphism in goats. Five major haplotypes were observed in exon 2 region and six major haplotypes observed in intron 2 region in both the breeds. Sequences of exon 2 region of goats were unique as compared to other livestock species in BLAST analysis. Similarly BLAST analysis of intron 2 region (intron between exon 2 and 3) exhibited sequence similarity with cattle and buffaloes. Restriction fragment analysis confirmed the mutation at 60bp position of exon2 and 100bp position in intron2 in all the analyzed samples, a deviation from the polymorphic pattern of cattle and swine.

184. Electrophoretic separation of myofibrillar protein isoforms in skeletal muscle of Indian goats

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Muscle fiber formation (myogenesis) occurs only during embryonic development and muscle fiber characteristics influence meat quality. An investigation was carried out to identify major myofibrillar protein isoforms of skeletal muscle in 143 meat samples of four different Indian goat breeds. Salt soluble proteins were extracted from muscle with STB buffer, and electrophoretic pattern was analyzed in SDS-PAGE. The analyzed samples revealed two isoforms of myosin heavy chain (MHC) designated as type-1 (MW 208 Kda) and type-II (MW 192 Kda) which is quite different from other meat animals. Three fastest migrating myosin light chains were also identified as light chain-1 (LC-1), Light chain-2 (LC-2), and light chain -3 (LC-3) .The SDS-PAGE pattern showed only one isoform of actin , two isoforms of tropomyosin (α and β) and three isoforms of troponin .

185. Genetic parameter estimates for direct and maternal effects on pre-weaning weight gain of Muzaffarnagari sheep in India

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Genetic parameters for pre-weaning weight gain from birth to 90 days (weaning age) of Muzaffarnagari sheep, maintained at the Central Institute for Research on Goats, Makhdoom, Mathura, India, over a period of 25 years (1976 through 2000), were estimated by restricted maximum likelihood (REML), fitting six animal models, including various combinations of maternal effects. Model 1 was a simple animal model considering animal as the only random effect. Models 2 and 3 included in addition to the direct effect of the animal, the permanent environmental maternal and additive maternal effects, respectively. Model 4 was same as model 3, except a covariance between the direct and the maternal additive effects was included. Models 5 and 6 were corresponded to model 3 and 4, respectively. But fitted both dams' genetic and permanent environmental effects i.e. three random factors altogether. Records of 4184 lambs descended from 146 rams and 1298 ewes were used for the study. Direct heritability estimates were substantially higher when maternal effects were ignored. The direct heritability estimates for pre-weaning daily weight gain ranged between 0.16 and 0.24 depending on the model applied. The permanent environmental maternal effects accounted for 9% of the phenotypic variance, irrespective of the models used. The additive maternal effects varied from 0.00 to 0.07 in different models in this study. Estimated genetic correlations between additive direct and additive maternal genetic effects for this trait ranged from 0.18 to -0.99, depending on the model used. Results suggest that both direct and maternal effects were important for pre-weaning daily weight gain in this breed.

186. Development and worldwide distribution of the Anglo Nubian goat

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The present study describes the formation of the Anglo Nubian breed in Britain and follows up the original transfer of the founder breeds to Britain in the 19th century. An overview on the worldwide spread of the Anglo Nubian from Britain to the USA and Canada, later to Africa and Asia as well as Latin America is given. Information was compiled through project reports, literature, statistical records where available and accessible and interviews with experts. It is concluded that the Anglo Nubian is an example of a breed developed by combining genetic resources from different parts of the world joining performance and adaptation to tropical conditions. The breed spread to all continents. Apart from being kept as purebreds, it is more often used in crossbreeding programs in different regions of the world. The value of this genetic resource has been recognized a long time ago, but there seem to be no efforts to counteract the danger of losing it by excessive use in uncontrolled crossbreeding.

187. Prion protein genotypes detected in Pakistani goats

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PCR-amplified prion protein (PrP) gene was sequenced to determine the frequency of scrapie-associated as well as novel PrP genotypes in 72 healthy goats representing five breeds. A total of six genotypes were detected, resulting from the three reported 143 (H/R), 154 (R/H) and 240 (S/P) and the two novel 39 (S/R) and 185 (I/F) amino acid polymorphisms. Of the four silent mutations 42 (a→g), 138 (c→t), 231 (c→a) and 237 (g→c) detected in this study, 237 (g→c) is novel. A genotype (SIP/RFP) harboring three amino acid polymorphisms 39 (S/R), 185 (I/F) and 240 (S/P) was found in few goats. Although both scrapie-associated genotypes with 143 (H/R) and 154 (R/H) polymorphisms and others with 39 (S/R), 185 (I/F) and 240 (S/P) polymorphisms were present in the studied Pakistani goats, their frequency was lower than that of the wild-type genotype SHRIS/SHRIS (34.7%). These results emphasize on further sequencing of the PrP gene in a large number of goats representing the five studied breeds, so that the overall PrP variability could be assessed in these breeds for the future concerns about scrapie research.

188. Genetic parameters for milk yield and kidding interval in dairy goats

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The objective of this study was to estimate heritability and genetic and environmental correlations between milk production and kidding interval in goats. Data was first lactation 305-day milk production and the interval between first and second kidding, during the period 1975 to 2005 for Alpine, Nubian, Saanen and Toggenburg goats. Data was supplied by the American Dairy Goat Association from the United States and included 23,827 goats with information on milk production that were daughters of 5,180 bucks, and 12,813 goats with data for kidding interval. The bivariate animal model included the fixed effects of month of kidding and breed-flock-year of kidding. The ASREML software was used to apply restricted maximum likelihood methodology. Random effects were the animal and the error. Heritability of milk production was 0.36 ± 0.02 and the heritability of kidding interval was 0.05 ± 0.02 . The genetic correlation between milk production and kidding interval was unfavorable (0.39 ± 0.12) ($P < 0.01$). The environmental correlation was also unfavorable (0.21 ± 0.02) ($P < 0.01$). The phenotypic correlation was 0.22 ± 0.01 ($P < 0.01$). These results indicate the presence of additive genetic variation for kidding interval in goats and unfavorable genetic and environmental associations between milk production and kidding interval. Inclusion of reproduction traits in dairy goat selection programs may be necessary to reduce the negative effects of the selection for milk traits in reproductive performance.

189. Co-variance estimation for longevity and production traits in goats

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Heritability (h^2), genetic (r_g) and phenotypic correlations (r_f) for length of life to second lactation in months (LL2), cumulated milk production to second lactation in kg (CM2), cumulated fat production to second lactation in kg (CF2), cumulated protein production to second lactation in kg (CP2), total useful matter to second lactation in kg (UM2), functional herd life until 24 and 36 months of age, (HL24 and HL36 respectively), and first lactation milk yield in kg (MY1), were estimated from data from the American Dairy Goat Association for the period 1978 to 2005. Data were from 40,721 does that were daughters of 5777 bucks, from 763 flocks. Univariate and bivariate animal models were used to estimate co-variances with the REML procedure and the model included the effects of breed-flock-year and month of kidding, considered fixed, and the random effects of animal and error. For HL24 and HL36 model included MY1 as covariate. Averages for LL2, CM2, CF2, CP2 and UM2 were 31.4 months, 1601 kg, 54.4 kg, 44.2 kg and 99.8 kg, respectively. Heritability for LL2, CM2, CF2, CP2, UM2, HL24, HL36 and MY1 were 0.13, 0.20, 0.19, 0.11, 0.16, 0.08 and 0.09, respectively. All standard error of h^2 were ≤ 0.02 . All r_g and r_f were positive. The r_g estimated for LL2 with PY1, HL24 and UM2 were 0.76, 0.72 and 0.55, respectively. Values of r_g for HL24 with MY1, HL36 and UM2 were 0.83, 0.72 and 0.52 respectively, and for CM2 with MY1, UM2 and LL2 were 0.86, 0.84 and 0.53 respectively. All standard error of r_g were ≤ 0.09 . Some of the studied traits could be used as selection criterion, for example HL24 or LL2, to be incorporated as early indicators of longevity in genetic improvement programs of dairy goats.

190. Preliminary detection of QTL associated with resistance to gastrointestinal nematode in the Creole goat.

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This study aimed to identify quantitative trait loci (QTL) associated with resistance to gastrointestinal nematode by performing interval mapping analysis in a Creole goat population. This population was continually exposed to a mixed nematode infection by grazing on irrigated pasture. A total of 383 offspring from 12 half-sib families were genotyped for 104 microsatellite markers. The traits analysed were faecal egg counts (FEC), packed cell volume (PCV) and eosinophils counts at 7 and 11 months of age. QTL associated with resistance were identified on chromosomes 1, 4, 5, 13, 17 and 26. QTL associated with FEC and PCV at 11 months were detected in the same family on chromosome 1. This result may suggest that a gene associated with parasite resistance is segregating in this family. Two QTL were detected on chromosome 5 for PCV and eosinophils counts at 7 months. A candidate gene, the interferon gamma, is located on chromosome 5 and a more precise localization is needed to confirm exact position of these QTL. QTL on chromosome 17 and 22 (caprine chromosome 26) have never been reported in sheep as well as QTL associated with eosinophils counts. Further studies with additional markers, animals, and immunological traits will be performed to confirm these first results of QTL associated with nematode resistance in goat.

191. Polymorphisms in *CSN1S1* and *CSN3* genes in Creole and crossbred goats: effects on milk production traits

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In goats, the four caseins represent about 80% of the protein milk. At genetic level they are encoded by four clustered genes (κ_{s1} -casein, *CSN1S1*; κ -casein, *CSN2*, κ_{s2} -casein, *CSN1S2* and λ -casein, *CSN3*). The *CSN1S1* gene was grouped according its protein expression into: “strong” alleles (A, B, C, H, L and M), “intermediate” alleles (E, I), “weak” alleles (D, F, and G), and “null” alleles (O and N). The objective of this study was to determinate the effect of *CSN1S1* and *CSN3* genes on the milk production traits in goats. An experimental flock of 155 Creole goats was used to estimate allelic frequencies and 86 goats (Creole and Creole x Saanen) to estimate the influence of the haplotypic variants on milk yield and protein and fat contents. The allelic variants for *CSN1S1* gene were detected using the PCR-AS and PCR-RFLP technique. For *CSN3* gene, the PCR technique was used and the amplified product was sequenced in both senses. For the *CSN3* gene 3 alleles were founded and the highest frequency was for the B allele (73.4%). The frequency for A and D alleles were 24.4% and 2.2%, respectively. The most common haplotype, *CSN1S1*-*CSN3*, was E-B. We did not find any significant effect ($P > 0.05$) of the *CSN3* gene on the milk traits. By grouping them into phenotypic classes, the highest frequency was found for the haplotype, *CSN1S1*-*CSN3*, “Strong”-B. In assessing haplotypes, it was found that animals with haplotypes “Strong”-A or B were higher for fat and protein contents than the haplotypes “Strong”-D. Due to most of the report do not take account this haplotype effect, and this work was performed using a small number of animals, it would be necessary to confirm this results in other populations and/or in a large number of animals.

192. Detection of QTL for body weights on chromosomes 1 and 2 in Angora goats

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Genome-wide screening with molecular markers has successfully focused on the detection of QTL in animal populations. In a previous report we found QTL affecting conformation traits in Angora goats. The aim of this study was to identify new QTL for body weight on CHI1 and CHI2 using new microsatellites and enlarged families in Angora goats from the preview report. A total of 634 kids were analyzed from 14 Angora bucks. The number of half-sib offspring per buck ranged between 20 to 85 kids. Two phenotypic traits were record: birth weight (BW) and weaning weight (WW). An interval analysis was performed under a half-sib model using the *QTL Express* program. The fixed effects included in the analysis were: sex, year of birth (2000, 2001, 2002, 2003 or 2004), birth type (single or twin) and flock (8 levels). Two putative QTL were found, one affecting BW in the interstitial region, between markers INRA011 and BM1312 on CHI1 and one for WW in the centromeric region, near to marker ILSTS082 on CHI2. Taking into account the homology between cattle and goat maps and conserved segments between both species, these QTL found here could be related with PIT-1 (growth hormone factor 1) gene and MSTN (myostatin) gene on CHI1 and CHI2, respectively. This study provides the first evidence for QTL involved in body weights traits in Angora goats, and will stimulate further investigations into the genetic architecture of these traits in this species.

193. Effect of genotype on the anatomical and tissue composition of carcass of goats finished in native pasture¹

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The objective of this study was to evaluate the effect of three goat genotypes, on anatomical and tissue composition of carcass, raised under native pasture of the Northeast of Brazil plus a wheat-soybean meal based protein supplement. The genotypes used were: Without Defined Breed Type (SRD), 1/2 Boer x 1/2 SRD, and 3/4 Boer x 1/4 SRD (3/4 B x SRD). The sample was composed by twenty one kids, (seven per genotype) with an average of age and live weight at slaughter of 280 days and of 32.0 kg respectively. There was no significant effect ($P>0,05$) of the genotypes on the anatomical composition of the carcass. The values for the anatomical proportion of carcass cuts (leg, loin, ribs, shoulders and neck) were, respectively 9.57; 21.19; 26.56, 12.50 and 30.48%; for SRD kids; 9.57; 23.76; 32.67; 13.33 and 34.22% for (1/2 B x SRD) kids and 8.54; 20.80; 27.35; 12.81 and 30.30% for (3/4 B x SRD) kids. In addition, the tissue composition of the carcass was similar ($P>0,05$) among the genotypes, where the proportions of muscles, bones and fat were, respectively, of 69.00; 26.00 and 5.00% for SRD kids; 69.00, 27.00 and 4.00% for (1/2 B x SRD) and 68.00, 26, 00 and 6.00% for (3/4 B x SRD) ones. According to our findings it can be inferred that the crossbred kids from SRD does with Boer bucks, under native pasture of the Northeast of Brazil has presented similar figure for in all anatomical and tissues composition of carcass studied

194. Genetic diversity analysis of Tianfu goats and three relative breeds using microsatellite DNA markers

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Microsatellite DNA Markers were used to analyze genetic diversity of 3 subpopulations of Tianfu goats (SAU-B, SAU-R and SAU-W) and related 3 breeds (Boer, Chengdu Ma, and Nanjiang Yellow goats) to determine the genetic diversity of these breeds. A total of 262 animals were tested. Frequency of alleles and heterozygosity (H), polymorphism information content (PIC), and genetic distance were calculated and utilized for evaluating genetic diversity and phylogenetic relationship of these goats. Ninety two alleles were detected across 11 loci of 262 blood samples with an average of 8.36. Effective allelic numbers of all loci were between 4.13 and 7.35. PIC values of 11 microsatellite locus were high (0.637 to 0.795) with an average of 0.711. The expected heterozygosity and genetic diversity of the 6 subpopulations and breeds were abundance. The average genetic differentiation index (F_{ST}) of these subpopulations and related breeds was 0.0765, and gene flow was 3.0176. Tianfu goats showed a high diversity value (7.3030). The phylogenetic trees constructed from D_A by the UPGMA and N-J method revealed a pattern consistent with the breeding history of populations and the geographic origin. All three subpopulations of Tianfu goats have strong genetic similarities, and should be considered as belonging to the same population with a distinct differentiation from the blood-related breeds. A high level of gene flow among subpopulations and breeds conformed that the breeding objectives over twenty years have met.

195. Breed and time period effects on production and reproduction traits in US goats

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The objective of this study was to evaluate the evolution of differences in US goat breeds across time periods for 305-day mature equivalent milk, fat and protein yield, fat and protein contents, protein to fat ratio, age at first kidding and kidding interval. Data were obtained from the American Dairy Goat Association and processed by the AIPL-USDA from 1975 to 2005. Only data from flocks with a minimum of 100 lactation records and 5 records from goats of a second breed were retained for analysis. Three time periods were considered in the analyses; (1) 1975-1984, (2) 1985-1994 and (3) 1995-2005. Breeds were Alpine, LaMancha, Nubian, Obeshasli, Saanen and Toggenburg. The analyses for each trait were performed using a repeatability animal model with ASREML software. The model included the fixed effects of breed, period, breed-period interaction, and linear and quadratic effects of lactation number and month of kidding, as covariates. The random effects were flock-year effect nested on period, animal and permanent environment. The pedigree file contained 52,795 animals. Number of records for the analyzed traits ranged from 36,368 to 74,255. Breed, period and breed-period interaction effects were significant ($P < 0.01$) for all traits. Results for Oberhasli were erratic due to large standard errors associated to low number of observations. Increases across time were observed for calving interval, age at first calving, protein content and protein to fat ratio in Alpine, LaMancha, Nubian, Saanen and Toggenburg. Increases were observed for milk yield, fat and protein yield across periods Alpine, LaMancha, Saanen and Toggenburg, but changes for Nubian and Toggenburg for fat yield between periods 2 and 3 were negative and a declining trend was observed for these two breeds for protein yield beginning close to period 3. For period 3, Alpine, Saanen and Nubian were highest for fat+protein yield, LaMancha was intermediate and Toggenburg was the lowest. Nubian was superior for fat and protein contents. There is evidence of unfavorable trends for reproduction traits in all breeds and for milk yield in Nubian and Toggenburg between periods 2 and 3.

196. Genetic parameters for production and reproduction traits in US goats

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The objective of this study was to estimate heritabilities and repeatabilities in US goats for 305-day mature equivalent milk, fat and protein production, fat and protein contents, protein to fat ratio, age at first kidding and kidding interval. Data were obtained from the American Dairy Goat Association from 1975 to 2005. Only data from herds with at least 100 total lactations records and sires with a minimum of 10 records were retained for analysis. Three time periods were considered in the analysis; 1975-1984, 1985-1994 and 1995-2005. Breeds were Alpine, LaMancha, Nubian, Obeshasli, Saanen and Toggenburg. The analyses for each trait were performed using a repeatability animal model with ASREML software and restricted maximum likelihood methodology. The model included the fixed effects of breed, period, breed-period interaction, and linear and quadratic effects of lactation number and month of kidding, as covariates. The random effects were flock-year effect nested in period, animal and permanent environment. The pedigree file contained 52,795 animals. Number of records for the analyzed traits ranged from 36,368 to 74,255. Heritabilities for 305-day mature equivalent milk, fat and protein production, fat and protein contents, protein to fat ratio, kidding interval and age at first kidding were 0.342 ± 0.009 , 0.341 ± 0.009 , 0.360 ± 0.011 , 0.514 ± 0.009 , 0.532 ± 0.011 , 0.375 ± 0.010 , 0.052 ± 0.006 and 0.348 ± 0.015 respectively. Repeatabilities for 305-day mature equivalent milk, fat and protein production, fat and protein contents, protein to fat ratio and kidding interval were 0.506 ± 0.004 , 0.480 ± 0.005 , 0.511 ± 0.005 , 0.599 ± 0.004 , 0.624 ± 0.004 , 0.462 ± 0.005 and 0.052 ± 0.006 respectively. Results indicate opportunities for selection of dairy goats for economic objectives involving production, content and reproduction traits.

197. Effects of the polymorphism for the α s1-casein locus on milk production traits for dairy goats in Mexico

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The objective of this study was to estimate the effects of the polymorphism for the α s1-casein locus (CSN1S1) on milk yield and composition traits in Mexican dairy goats. Genotypes for the CSN1S1 locus of Saanen (n=104), Alpine (n=55) and Toggenburg (n=72) goats were identified using PCR and PCR-RFLP methodologies. Five groups of alleles were identified: A*: comprising allele A and O₁; B*: comprising all B alleles; D*: comprising all other unidentified alleles; plus E and F as individual alleles. Lactation data (n=496-514), were obtained from goats kidding in 2003-2006 from three flocks and included 305-day milk yield, fat yield, protein yield, total solid yield, fat content, protein content and total solid content. Data were analyzed with linear mixed models that included the fixed effects of herd-breed, lactation number, season, year of kidding, additive allele group effect coded as 0 and 1 and 2 for no allele, heterozygous and homozygous genotypes (with equation for F allele=0), dominance effects for pair of allele groups coded as 0 and 1, random goat effects and residual. Significant (P<0.01) additive genetic effects for allele group A* vs. F were found for protein content, total solid content and lactose content of 0.21±0.07%, 0.66±0.23% and -0.25±0.11% respectively. From the analysis of all breed data, no significant additive genetic effects for A* vs. F allele groups were found for yield traits, however, from the analysis of Alpine data, a significant (P<0.05) negative effect (-81.4±40.2 kg) was found for milk yield. Additive effects of allele group B* vs. F were not significant (P>0.10) for all studied traits. Significant dominance effects (P<0.01 to P<0.10) were found on all analyzed traits for several allele group combinations. Additive effect-year of kidding interactions (P<0.10) were found for several alleles. Strategies involving economic evaluations need to be developed for optimal use of these results in dairy goat breeding programs in Mexico.

198. Forecast of the heterosis of Imported Bore goat by genetic polymorphism of microsatellite DNA

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Forecast of the heterosis of indigenous Taihang goat and Hebei goat crossed with imported Bore goat by genetic polymorphism of microsatellite DNA was done. Gene frequency, polymorphism information contents, number of effective alleles, heterozygosity, and genetic distances were studied in Bore goat, Taihang goat and Hebei goat using four microsatellite markers. The actual crossing effects on the Taihang goat and Hebei goat with Bore goat were tested. The results indicated that there are genetic polymorphisms at four microsatellite markers in three goat breeds. Four microsatellite markers can be used for genetic polymorphism evaluation in goat breeds. The genetic variability of Taihang goat is the highest, and that of the Bore goat is the lowest in three goat breeds. Genetic distances between Bore goat and Hebei goat is bigger than that between Bore goat and Taihang goat. The heterosis between Bore goat and Hebei goat is higher than that between Bore goat and Taihang goat. This turns out to be in accordance with the testing results on actual heterosis. It is feasible to forecast the heterosis of indigenous goat crossed with imported Bore goat by genetic polymorphism of microsatellite DNA, which will have an important value for goat breeding in future.

199. Effect of inbreeding on growth performance of Teddy Goats

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The effect of inbreeding on growth performance of Teddy goat flock maintained at Livestock Production Research Institute was studied. The data included were pedigree and performance records during the years 1976 to 1999. After this time the animals were used in a crossbreeding trial which led to a few births of pure Teddy kids (10th and above generations). The number of inbred animals was 622 out of 1453 (1652 records) total animals. There were 488 animals with progeny (457dams sired by 31 billies) and 965 animal were without any progeny. The flock was started with 107 base animals (8 sires and 99 dams) which produced 345 kids. Inbreeding coefficient of average goat increased by 0.43% each year and inbred proportion of population also increased by 3.91% each year. The traits studied included birth weight, weaning weight, yearling weight, pre-weaning average daily weight gain (PRADG) and post-weaning average daily weight gain (POADG). The average phenotypic performance deteriorated with each percent increase in inbreeding except for the birth weight which was somewhat more in inbred than non inbred goats but had no significance. All other included traits were significantly decreased by the increase in inbreeding level ($P < 0.05$). Adoption of planned mating system to avoid inbreeding is suggested.

200. Comparison of electronic versus direct microscopic somatic cell counting of goat milk

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Twenty-three individual and four bulk tank goat milk samples were collected from the Langston University Grade-A goat farm to compare the SomaScope electronic somatic cell counter (ESCC) against the pyronin-Y methyl green (PYMG) direct microscopic somatic cell count (DMSCC) method. The PYMG method is considered the standard confirmatory test for somatic cell counts in goat milk for regulatory purposes. The electronic method is used for screening purposes and a conversion factor must be used if the ESCC is calibrated with standards other than that of goat milk matrices. The SomaScope electronic counting device was calibrated using goat milk SCC standards prepared by a certified third party. Instrument SCC of all goat milk samples were obtained following the manufacturer's instructions using the FDA 2400 form and the DMSCC with PYMG were conducted immediately after instrument analysis. All samples were analyzed in duplicate. Data were transformed into log base 10 format and statistically analyzed using a Student t-Test. Results indicated that there was no significant difference in SCC between the electronic and the PYMG direct microscopic methods ($P>0.05$) with means of 5.4227 ± 0.3124 and 5.4196 ± 0.3457 , respectively. Further statistical analysis showed that these two methods had a correlation coefficient of 0.9292. The data indicated that the SomaScope ESCC and PYMG DMSCC methods are comparable and the SomaScope instrument may be used to determine SCC in goat milk when calibrated with goat milk standards.

201. Characterization of the growing behavior of the Murciano-Granadina kids

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The Murciana-Granadina is the most important dairy goat breed of Spain. This breed has been largely studied from the milking ability point of view. Presently, the meat production is a very important complementary input of the farms. In the present study we are presenting the results obtained in a research involving 87 kids from three herds of the breed, distributed in 44 males and 43 females; 18 from single, 38 from double and 7 from triple litters. The results of factorial ANOVA enclosing the fixed effect of the herd and the sex together with their interaction applied on the weight at birth, at 7,14,21, 28, 35, 42, 49 and 56 days old, and the daily gains between these reference ages, have shown a clear sexual dimorphism evident from the birth until the last weight recorded. The effect of the herd was also significant, while showing lower level of signification. Also the interaction herd-sex showed significant until the weight at 35 days, from this point the large quantity of missing cells do not permit us its inclusion in the model. The daily gain behavior was slightly different. At the beginning of the experiment we observe a clear sex effect but no herd effect was evident, at the end of the experiment also the behavior of both sexes was homogeneous. The interaction was always not significant. The main conclusion of this work point out starting differences in weights among sexes and herds, which are present during almost all the commercial period of the kid life, but the daily gains do not differs significantly among the levels of these factors, specially the herd, what it is demonstrating an homogeneous management among breeders. It is given the opportunity of the commercialization of a specific and differentiated meat product of the breed.

202. Comparison of the growth curves in goat kids, males and female, of the Saanen and $\frac{7}{8}$ Boer crossed during the nurse phase

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The present investigations aim was to study the use of biometrics parameters in the elaboration of development curves for goat's young, males and female, of the races: Saanen and $\frac{7}{8}$ Boer crossed. The experiment was accomplished in the State University of São Paulo, Campus of Jaboticabal. The study involved 49 females (24 Saanen and 25 of the $\frac{7}{8}$ Boer crossed), and 29 males (14 of the Saanen and 15 of the $\frac{7}{8}$ Boer crossed), from birth to wean. They received colostrums in the first two days. From the 3rd to the 45th day they received 1,5 liters of milk/animal, in two meals. From the 45th to the 60th day they just received a single meal (1,5 liters of milk/animal). Starting on the 5th day of life, the animals had access to Tifton hay and 100 g/animal of a concentrated ration. The wean ages were associated to the weights and biometrics values through simple lineal regressions. The growth curves did present similar behaviors amongst themselves, although the numeric values obtained in the female Saanen are significantly larger than obtained in the female $\frac{7}{8}$ Boer crossed. That same behavior was observed in the males of both races. Comparing males and females of both races, we observed that the behavior of the curves is similar. Males tend to have higher values. It can be concluded that the growth curve can be elaborated from measured biometrics and routine weightings, and could be used for corporal growth between different sexes and races.

203. The milk yield aptitudes of the “Carpatina” goat breed reared in Romania

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The researches we've done on the milk yielding potential of the goats shown that the individuals within the studied species could produce, within usual conditions, during normal milking periods, more than 15 times milk quantity than their own body weight. According to the researches set up on “Carpatina” breed goats, reared in Romania, the milk yield of those females is not quite similar to that obtained by the females belonging to some high milk specialized breeds, although the Romanian goats gave average yields of 200 l per lactation, during the 3rd, 4th and 5th lactation. Within a milking period, the milk secretion process follows the same evolutions like in ovine species, increasing during the first three months and reaching monthly productions over 30 l, continuing with a plateau period, during two months and following a gradual decreasing until the end of the milking period. Milk quality was evaluated through monthly assessments on its chemical composition. According to the analyzed data, it could be stated that the values of the three main component of the milk increased toward the final period of the lactation, maximal values being recorded during its two last months. The high values given by the variability coefficient leded us to state that the chemical composition of the milk depends on the analyzed individual as good as on the milking month. To complete the effectuated study, we have determined the level of the somatic milk celli and the different correlations that are between characters and features specific to the goat population from the Romanian areas. The main conclusions show that the “Carpatina” breed is characterized through a high heterogeneity, concerning the quantitative and qualitative milk yield. Par consequence, it imposes to elaborate competent breeding programs for the goat populations in Romania, in order to improve their milking potential.

204. Characteristics and diversity of the dairy goat production systems and industry around the world. Structural, market and organizational conditions for their development

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This paper reviews the characteristics of goat dairy systems and conditions for their development. It presents indicators for developing goat dairy systems and industry. Comparative examples from several cases are considered and the consequences relating to their productivity, specialization and feeding systems elucidated. A typology of the main dairy goat sectors is proposed. Goat dairy products can be produced as high quality, low cost products, but they need to meet their local, national or international market. Goat dairy systems have an important potential social impact and they can optimally utilize marginal areas. The advantages of collective organizations and the value of technical support from the public services or NGOs are set out. The possible impact of the dairy goats activity for the new challenges the world will face, is discussed

205. Effect of genotype on carcass characteristics of goats finished on native pastures in the northeast of Brazil¹

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The study was carried out to evaluate the effect of goat genotypes on carcass characteristics under rangeland and environmental conditions of the Northeast of Brazil plus a corn-soybean meal based protein supplement. There were used twenty one kids, seven per each genotype: Without Defined Breed Type (SRD), 1/2 Boer x 1/2 SRD, (1/2 B x SRD) and 3/4 Boer x 1/4 SRD (3/4 B x SRD). At slaughter, the averages for age and live weight were 280 days and 32.0 kg respectively. The characteristics evaluated were: hot carcass weight (HCW), cold carcass weight (CCW), hot carcass dressing (HCD), and cooling weight loss (CWL). There was no difference ($P > 0,05$) for HCW and CCW among the genotypes. The averages for HCW of (SRD), (1/2 Boer x SRD) and (3/4 Boer x SRD) kids were 14.82, 13.80 and 14.89 kg, and for CCW were 14.60, 13.53 and 14.70 kg, respectively. The values for CWL were considered low and did not differ ($P > 0,05$) among the genotypes with values of 1.53, 2.11 and 1.45% respectively for (SRD), (1/2 Boer x SRD) and (3/4 Boer x SRD) kids. In Addition, there was no significant ($P > 0,05$) effect among genotypes for the true, commercial and biological carcass dressing. The values for HCD were 49.68, 48.38 and 54.86% for SRD, 44.37, 43.42 and 48.90% for (1/2 Boer x SRD) and 44.00, 43.38 and 48.90% for (3/4 B x SRD). The partial conclusions were that under native pasture conditions of the Northeast of Brazil, the crossbred kids from SRD does with Boer bucks did not improve the values of carcass weight and carcass dressing of the kids.

206. The effect of genotype on the performance of kids finishing in feedlot in northeast Brazil¹

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The objective of this trial was to evaluate the effect of genotype on the performance of the kids.. Forty intact male kids, from five deferments genotypes: ½ Boer + ½ undefined-breed type (SRD); undefined-breed type (SRD); ½ Anglo Nubian + ½ SRD; ¾ ½ Boer + ¼ SRD and ¾ British Alpine + ¼ (SRD), finished in feedlot, with initial average weight of 16,60 kg and average age of 120 days. The kids had access to a complete ration containing 35% of maniçoba hay (*Manihot pseudoglaziovii*) and 65% of concentrate. The kids were randomly assigned according to five genotypes and eight repetitions and the data was analyzed according to the GLM procedures in the SAS statistics package in which the means were compared according to the Tukey test at 5%. The ½ Boer + (SRD) and ¾ Boer + ¼ SRD kids presented greater dry matter feed intakes and average daily weight gain, when compared to the SRD, ½ Anglo Nubian and ¾ British Alpine; however there was no significant difference among the genotypes on feed conversion and feed efficiency .

207. Bayesian analysis in the genetic study of exotic and native goat populations of Brazil

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To the present work analyzed 511 skim samples of 14 goat populations. Eleven of those were Brazilian (six native, one non-descript breed-NDB and four exotic breed) and three Spanish breed (Murciana, Murciana-Granadina and Granadina). Twenty three were genotyped by microsatellite loci and all were polymorphic. The animals studied were assigned probabilistically through Bayesian inference, being probabilistically used the Markov method and Monte Carlo algorithm, calculated by each individual the probability of one determined genotype X belong to a population k: $\ln Pr(X/K)$, the two or more populations by Structure program, using the ancestry of the admixture model. It was firstly executed with all ($k=2$ for $k=16$). The best value to explain k was four ($\ln P(X/K) = -34601.0$) that correspond to the ancestral populations which they were derived ($k=4$). Those subdivisions were stronger in NDB group. In the native group, the great proportion of alleles was destined in the populations P1 and P4, showing the structure of the studied groups. It was observed a part of alleles of those groups in NDB animals, with value of 0,086 to P1 and 0.285 to P4, respectively. These values demonstrate the high genetic contribution of the native ones in the studied population, reflecting greater genetic identity among them. In the rest of the inferred populations there was clear subdivision among them according to its groups. These results demonstrated a particularity of the groups, showing a genetic isolation in the population. In the Spanish herds it was observed a big inclusion in P4 population, showing small sub-structuring indicating a big distance between native and exotic populations. The native group presented great genetic identity and a big distance of the exotic group. The genetic markers were very informative to assign individual to unknown population.

208. Preliminary results of kappa-casein variation in South African local goat types

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The purpose of the study was to describe genetic variability in the kappa-casein gene in local goat types in South Africa. Milk is becoming an increasingly important source of protein, particularly in developing countries such as South Africa, where poverty and malnutrition are rife. Milk can be marketed as such or can be processed, for example, into cheese. The best κ -casein genotype for cheese-making is the BB type, which includes the D, E, K, and M alleles. If the desired alleles are frequent in South African goat populations, the opportunity will arise to select for improved cheese-making ability, thereby creating an additional source of income for small farmers. Genetic variation for milk protein genes has primarily been studied in dairy cattle and goats in the developed countries where cheese processing is an important product in the dairy industry. However, to date no attempt has been made to study these polymorphisms in local goat types in South Africa. Blood samples were collected from a total of 87 goats, including South African Boer goats and indigenous types. Saanen goats were included as a control, together with four control samples of the A and B alleles donated by the University of Milan. PCR-RFLP analysis was performed on 56 samples (14 indigenous, 27 SA Boer, and 15 control samples), using three restriction enzymes: *Alw44I*, *HaeIII*, and *BseNI*. DNA restriction fragments were separated by electrophoresis in a 2% agarose gel and compared to a size standard. For all samples tested, an A or B allele was observed, with no significant differences between the goat types tested. Similar results were obtained by Yahyaoui *et al.* (2003) in an analysis on European goat breeds where kappa-casein A and B were the most common variants in the majority of breeds. DNA sequencing was used to confirm results obtained by RFLP. Preliminary DNA sequencing data confirm the RFLP analysis, with the current data indicating a high frequency of the B allele.

209. Design of a community-based goat breeding program in Northern Mexico

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Transfer of genetic improvement procedures from developed to developing countries has been unsuccessful, particularly in small ruminant production. Popular options, including government managed centralized breeding schemes, with minimal participation of farmers, or more advanced recording schemes that evaluate animals for selection, have failed to make improved animals available to farmers on a sustainable basis. Therefore new approaches have to be developed in order to make breeding plans sustainable. In this study a community-based breeding program was developed for goat keepers in Coahuila State in the northern part of Mexico. Goats are kept for dairy production and kids are sold at the age of around 45 days. In a first step the current breeding strategy was evaluated by farmers and researchers and constraints and options identified. In a next step possible alternatives of a breeding program were discussed. Finally, seven farmers agreed to select three young bucks each from their best does, based on prior experience with milk production and other traits considered important by the farmer. These 3 young males stay with the farmer until the age of 3 months and can go to pasture with the rest of the herd. From 3 to 6 months of age, all young bucks are kept together in a central corral to make sure that they are kept under the same environmental conditions. The milk yields of the dams and weight gains of the young bucks are recorded monthly. After six months each farmer selects one male from this group, which is not from his own herd. If a farmer would like to have more than one male, he can choose another one in a second round. Males which are not selected can be sold either as breeding males to other farmers or can be sold for slaughter.

210. Detection of QTL affecting fleece traits on CHI 19 in Angora goats

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In recent decades, the molecular biology techniques developed have made possible to construct comprehensive marker maps in different species which allow mapping of Quantitative Traits Loci (QTL) influencing economically important traits, including fleece and wool traits. The aim of the present study was to search QTL associated with fleece qualitative and quantitative traits on Angora goat chromosome 19 (CHI19). The population analyzed had a total of 727 kids from 17 bucks. Five microsatellite markers distributed over 25 cM on chromosome CHI19 were used (*IDVGA46*, *LSCV36*, *BP20*, *MAF48* and *OarFCB193*). Nine phenotypic fleece traits were recorded. An interval analysis was performed under a half-sib model using the *QTL Express* program. The fixed effects included in the analysis were: sex, year of birth (2000 - 2006), birth type (single or twin) and flock (8 levels). To estimate the confidence intervals of the QTL locations the LOD drop-off method was used. Our results allow us to confirm a previous putative QTL affecting Coefficient of Variation of Average Fiber Diameter (CVAFD) in Angora goat on CHI19. Besides, we found two new QTL for Staple Length (SL) and Greasy Fleece Weight (GFW) on CHI19. Taking into account the homology between sheep and goat maps and the conserved segments between the human and ruminant, the QTL found here could be related with keratin-associated proteins (*KRTAP*) and keratin (*KRT*) genes family. The putative QTL reported here, could be related with those *KRT* and *KRTAP* genes family. *KRT* and *KRTAP* genes could be good candidates for the associated QTL on CHI19. Further investigations should concern diminishing the confidence interval increasing the number of kids in existing families and making a fine mapping on the candidate regions before these results can be used in breeding via Marker Assisted Selection (MAS).

211. Utilization of the body condition and the measurement of the number and diameter of the adipocytes to determine fat depots and his distribution in the carcass of goats of meat genotype

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The objective of this work was to utilize the body condition score described for goats of milky genotype, and the use of the diameter and number of adipocytes and the use of anatomic measures to determine the distribution and deposition of the fat depots and his relation with the adipocytes diameter. 12 goats in maintenance between 2 and 6 parturitions were used. They were grouped in 3 categories of body condition (BC) with 4 goats each. Group A (Low) included goats with LBC under 2, group B (medium) included goats with LBC between 2 and 3, and group C (High) by goats with LBC greater than 3. The results observed for the corporal condition of the three groups were different ($P < 0,05$). Measures anatomicals were equal for the groups, except the correspondents to perimeters, where the group (Cc3) was the greater to the the rest of the groups. In the evaluation of adipocytes diameter, at the region esternal three the groups were different ($P < 0,05$); In the caudal area, omental and perirenal the group (Cc3) has bigger diameter ($P < 0,05$); In the mesenteric area the group (Cc1) was the minor ($P < 0,05$). Concluding that the diameter of the adipocytes at the caudal places, omental, perirenal and mesenteric relate with the status of body condition hig (Cc3) and low (Cc1).

212. Population divergence for the *cs1*-casein locus in five populations of goats from Mexico

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The objective of this study was to estimate genotype and allele frequencies and testing for population divergence for the CSN1S1 locus in Mexican goat populations. Genotypes of animals from five populations; Saanen (n=97), Alpine (n=81), Toggenburg (n=92), local goats with external appearance similar to the Murciana-Granadina breed (n=26) and heterogeneous local animals denominated *Mosaico Lagunero* (n=30) from Mexico, were identified using PCR and PCR-RFLP methodologies. In Saanen, Alpine and Toggenburg, the sum of E and F alleles had the largest frequencies (from 0.468 to 0.789). Genic differentiation between populations and F statistics were evaluated using Genepop software. For local Murciana-Granadina like and *Mosaico Lagunero* populations, the sum of the most frequent alleles (A and B), were 0.385 and 0.533 respectively. Both local populations showed heterozygote excess ($P < 0.08$). The percentage of the total genetic variation (F_{ST}) explained by population differences was 5.16. There was genic differentiation for most of the comparison between pairs of populations ($P < 0.05$), excepting for Alpine with Toggenburg and Toggenburg with *Mosaico Lagunero* ($P > 0.05$). In Saanen and Alpine populations, the frequencies of alleles E and F were similar to the same breeds previously analyzed in Europe. In these breeds, it exists opportunities for increasing the frequency of the strong alleles for increasing the protein content by making use of the gene assisted selection. In Toggenburg, the most frequent alleles were F (0.32) and B (0.21). These Results indicated genic differentiation between most populations for this locus. On the other hand, the heterozygote excess in local populations indicate breed admixture, which is consistent with other information about the use of goat breeds in México.

213. Genetic and phenotypic parameters for production and milk composition traits for Saanen goats in Mexico

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Heritabilities and genetic and phenotypic correlations for 305-day milk yield (MY), fat yield (FY), protein yield (PY), fat content (FC), protein content (PC), protein to fat ratio (PFR), lactose yield (LY), lactose content (LC), total solid yield (TSY), total solid content (TSC) and age at first kidding (AFK), were estimated from the analysis of 4521 pedigreed records (1613 goats) obtained from a Saanen goat flocks in Guanajuato, Mexico, from 1999 to 2006. (Co) variance components were estimated using a restricted maximum likelihood procedure with single and two-trait repeatability animal models. The models included the fixed effects of season, flock-year of kidding, lactation number, and random effects of animal, permanent environment and residual. For MY, FY, PY, FC, PC, PFR, LY, LC, TSY, TSC and AFK the heritability estimates were 0.17 ± 0.04 , 0.22 ± 0.05 , 0.19 ± 0.05 , 0.25 ± 0.06 , 0.29 ± 0.05 , 0.33 ± 0.06 , 0.14 ± 0.05 , 0.14 ± 0.04 , 0.12 ± 0.05 , 0.08 ± 0.04 and 0.16 ± 0.07 respectively. Genetic correlations between MY and other production traits were high and positive (from 0.78 to 0.89), and genetic correlations between MY and content traits were negative (from -0.39 to -0.16). Genetic correlations between FY, PY, LY and STY with their respective contents were all positive (0.29 to 0.62). Phenotypic correlations between MY with other production traits were all high and positive (from 0.75 to 0.93). Phenotypic correlations between MY and contents were negative (from -0.30 to -0.11), excepting for MY and LC that was close to zero (0.02). Genetic correlations between AFK and production traits were negative (from -0.24 to -0.15), and phenotypic correlations of AFK with MY, FY and PY were close to zero (from 0.01 to 0.06). Most of the heritability estimates in this study (MY, FY, PY, FC, PC and AFK) are within the range of previous estimates found in the literature for several goat populations. The heritability for LY was lower than estimates for dairy cattle. These estimates may allow the design of more efficient breeding programs for Saanen goats in Mexico considering both production and composition traits.

214. Longevity in six breeds of dairy goats in the United States

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The objective of this study was to analyze longevity traits for six breeds of dairy goats in four regions of the United States and three time periods of birth: 1973 to 1980; 1981 to 1990, and 1991 to 2003. Data were provided by the American Dairy Goat Association. We included only flocks that continuously reported kiddings during at least two time periods, goats that stayed in the same flock, with ages at first kidding no younger than 200 d, and at least 3 goats per flock-year. After edits, data on 18,400 Alpine, 1,151 Boer, 6,596 La Mancha, 19,114 Nubian, 7,487 Saanen, and 7,487 Toggenburg goats were analyzed. The longevity traits were: Days from birth to death or disappearance (Lifespan), Days from first kidding to death or disappearance (Prodlife), Lifetime days in lactation (TDM), Total number of lactations (LACs), Sum of real or projected amount of milk produced in lifetime (TMILK), and Phenotypic correlations among variables. The analyses were done using the mixed and genmod (for number of lactations) procedures of SAS. The models fitted age at first kidding as covariate, breed, region, and period, and the breed by region, and period, interactions as fixed effects, and flock-year of birth and flock within region as random effects. The results showed significant differences among breeds for most traits (except LACs) and effects (except period). Breed effects showed that Saanen, Alpine, Toggenburg, Nubia, La Mancha and Boer, in that order, had higher to lower longevity for all traits, i.e.: Lifespan 1020±14.2, 1018±10.1, 996±13.5, 954±9.2, 942±15.2, and 905±99.2, respectively; Prodlife 517±14.1, 515±10.1, 493±13.5, 451±9.2, 439±15.2, and 402±99.2, respectively; TDM 402±9.9, 399±7, 390±9.4, 344±6.4, 342±10.6, and 336±69.2, respectively; Tmilk (kg) 1995±90.3, 1901±28.7, 1839±38.6, 1486±26.2, 1480±43.4, and 1312±282.5 respectively. LACs was similar for all breeds, and close to 2. Breed by region interaction showed that for Southeast higher longevity were obtained by Nubia and Toggenburg, except for Tmilk, for which Saanen had the highest productions. All the traits were highly correlated ($P < 0.001$ $r = 0.44-0.98$). We concluded that Saanen, Alpine and Toggenburg had the greatest longevity.

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215. Peripartal propylene glycol supplementation on some biochemical parameters in dairy goats

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The effect of peripartal supplementation with diet enriched with propylene glycol on some biochemical parameters was studied on 60 Maltese multiparous goats, from 10th day prepartum to 40th day postpartum. Goats were divided into two groups of 30, homogeneous for age (3 ± 1 years), milk yield of the previous lactation (2 ± 0.5 kg/head/day) and body condition score (2.25 ± 0.5) and raised in two multiple boxes. The groups, called "Glycol" and "Control", received concentrate (0.7kg/head/day) and vetch hay (1.5kg/head/day). The hay of the Glycol group was integrated with 100mL/kg of the propylene glycol (Liqui-Beef®, San Marco-Italy). Blood samples were collected from 10th to 1st day prepartum and from 1st to 40th day postpartum for the determination of Non Esterified Fatty Acids (NEFA), β -hydroxybutyrate (BHBA), Triglycerides, Total cholesterol, High Density Lipoprotein (HDL), activities of Aspartate aminotransferase (AST), Alanine aminotransferase (ALT) and Creatine Kinase (CK). Data were analysed as a two-factor ANOVA with diet (Control and Glycol) and period (pre- and postpartum) as the main effects. As regards the energetic metabolism, "Glycol" group showed significant lower levels only during the prepartum period; specifically for BHBA (Glycol 0.28 mmol/l vs. Control 0.33 mmol/l; $P=0.047$), Triglycerides (Glycol 0.36 mmol/l vs. Control 0.50; $P=0.043$), Total cholesterol (Glycol 1.50 mmol/l vs. Control 1.66 mmol/l; $P=0.07$) and HDL (Glycol 0.79 mmol/l vs. Control 0.93 mmol/l; $P=0.004$). The parameters concerning hepatic functionality (AST and ALT) were significantly lower in the Glycol group during the prepartum (AST: Glycol 51.43 U/l vs. Control 62.00 U/l; $P=0.006$. ALT: Glycol 11.55 U/l vs. Control 14.21 U/l; $P=0.005$) as well as postpartum period (AST: Glycol 69.00 U/l vs. Control 74.28 U/l; $P=0.008$. ALT: Glycol 12.02 U/l vs. Control 15.05 U/l; $P=0.005$). The same trend was observed for the CK values (prepartum: Glycol 42.79 U/l vs. Control 62.63 U/l, $P=0.004$; postpartum: Glycol 77.70 U/l vs. Control 89.60 U/l, $P=0.02$). Peripartal use of propylene glycol enriched diet, improving the metabolic-nutritional *status* of the animals and consequently the productive performances (as previously observed), represents an interesting nutritional strategy for the economic benefits of dairy farms.

216. Influence of betaine on goat milk yield and blood metabolites

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Betaine is a natural occurring compound with methyl donor properties which is increasingly being used in animal feeding. Betaine, an oxidative product of choline is able to replace methionine in some physiologically important body processes. The subject of this work was to study the effect of betaine added to the diet on milk production and blood metabolites on Murciano-Granadina dairy goats. Sixty lactating goats were selected from a commercial Murciano-Granadina goat herd (EXCAMUR S.L.) located in Murcia Region (Spain). Goats were selected from a 250 goats herd, taken into account the age, stage of lactation (2.5 as average), sanitary status of the udder half, live weight (36 kg as average) and type of birth (2 kids). Two homogenous groups of 30 goats were made and fed with 1.5 kg of compound feed and 1 kg of alfalfa hay per day and goat. Goats were fed twice a day and water was provided *ad libitum*. Both groups received the same diet but for the second group the diet was supplemented with 4 g·kg⁻¹ betaine (betaine anhydrous, Danisco Animal Nutrition). The feeds, presented in pellets, were formulated in based on recommendations of NRC (2006). The experimental period was 7 months and the experimental diets were provided 15 days before parturition. The herd was machine milked once at day. Chemical composition, milk production and blood metabolites of each goat were recorded and analyzed at the end of the trial. Variance analysis and means comparison were carried out using the general lineal model procedure, and Tukey test for mean comparison (SPSS v15, 2006). Goats fed with betaine diet had higher milk fat than goats fed control diet (4.8 vs. 5.2 % for control and betaine respectively; P<0.05). No significant differences were found for milk production (1.8 kg d⁻¹ as average). Within blood metabolites, significant differences were found for the level of triglycerides, goats feeding with betaine were lower triglycerides level (13.5 vs. 8.5 mg/dl for control and betaine respectively; P<0.05). Further studies are necessary to understand the mechanism of action of betaine on physical-chemical characteristics of milk.

217. Chemical composition and comparative total intake of tropical tanniferous plants by goats and sheep

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The intake of tropical tanniferous plants (TTP) (*Lisyloma latisiliquum* and *Piscidia piscipula*) when offered as a single feed to small ruminants could help to design a supplementation strategy looking for an anthelmintic effect. The objectives of the current study were: i) to determine the chemical composition of TTP offered to goats and sheep, ii) to determine and compare the total intake of TTP by goats and sheep. Animals, with experience in the intake of TTP, were allocated to individual pens. Two consecutive experimental period (15 d) separated by seven days were used. Each period consisted of 10 d adaptation, where 40 g of leaves of each plant (*P. piscipula* or *L. latisiliquum*), fresh grass and concentrate were offered on a daily basis. Then, fresh grass and concentrate was suspended and TTP was offered *ad libitum* during five days. Between each period, animals were fed with fresh grass (*ad libitum*) and concentrate (200 g). Crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber and lignin were determined from each TTP. Total polyphenols (TP), total tannins (TT) and condensed tannins (CT) were also analyzed. During each experimental period, refusal plants and intake were measured every 24 h. Multivariate analysis was used in order to know the effect of factors (animal species, plant species and individual animal within specie) on the intake of dry matter. Then, factors with statistical effect ($P < 0.05$) were analyzed by ANOVA (one way). Both TTP had a similar quantity of CP and NDF. *Lisyloma latisiliquum* had the highest levels of TP, TT and CT. The intake of TTP varied ($P < 0.01$) between animal species. The intake of TTP was different ($P < 0.05$) between TTP species. No effect ($P > 0.05$) was found among individuals within each animal species. The intake of *L. latisiliquum*, the TTP with the highest levels of tannins, was similar between goats and sheep. But, goats were able to eat more *P. piscipula* than sheep ($P < 0.05$). It is concluded that TTP were accepted by both animal species and could be evaluated as anthelmintic in small ruminant systems. Acknowledgments. This work was supported by project CONACYT-SAGARPA-COFUPRO No. 12441 and ECOS-Nord, France – CONACYT-ANUIES, Mexico (Project No. M03-A03). M.A. Alonso-Díaz acknowledges receiving a scholarship from Consejo Nacional de Ciencia y Tecnología (CONACYT, México) to undergo his Ph.D studies.

218. Assessment of macro-minerals status in soil, water, feed resources and its influence on blood plasma of sheep and goats in central mix cropping zone of Punjab, Pakistan

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This study was undertaken to assess the effects of season, soil, water and feedstuffs on macro-mineral status of blood plasma of sheep and goats of central mix cropping zone of Punjab, Pakistan. Five sub-locations were selected randomly from the study area. From each sub-location, blood samples were collected from adult sheep and goats as well as from kids and lambs, both in winter and summer season. Lower sodium (Na) and potassium (K) levels were found in soil and feedstuffs of the area. However, in different sources of water, Na values were nearly within the range but K was slightly higher. This was followed by lower plasma Na concentration both in sheep (114.23 ± 10.21 mEq / L) and goat (121.78 ± 12.35 mEq / L). However, concentration of K was within the critical limit in sheep (4.05 ± 0.40 mEq/L) and goat (5.10 ± 1.24 mEq/L). Plasma Na, and K in both species showed effects of season, animal class and interaction by season and animal class ($P \leq 0.05$). Lower calcium (Ca) concentrations were found in soil, feedstuffs and water. The similar trend was observed in plasma Ca concentration of sheep (3.2 ± 0.98 mg / 100 ml) and goat (3.4 ± 1.26 mg / 100 ml) during winter. In contrast, phosphorus (P) was marginally deficient in soil, water and feedstuffs as well as in blood plasma of sheep (3.12 ± 2.25 mg/100ml) and goat (3.60 ± 2.25 mg/100ml) during winter and summer. The levels of Ca and P were marginally deficient in summer season in adult animals. Soil magnesium (Mg) values were slightly higher, whereas, water and feedstuffs were found to be deficient. Blood plasma concentration of Mg was higher many folds both in sheep (5.25 ± 1.85 mg/100ml) and goat (4.76 ± 1.23 mg/100ml). However, plasma Mg showed only interaction effect between season and animal class ($P \leq 0.05$). The data thus obtained was analyzed using one way ANOVA test and significant differences between means was tested by Duncan's multiple range test. From these blood analyses, it was concluded that the macro-mineral levels was significantly different ($P \leq 0.05$) in blood plasma of sheep and goats on this specific ranch of Punjab and needs supplementation with the implication of similar needs for other regions of Pakistan.

219. Protein and energy metabolism in dairy goats presenting different α_{S1} -casein genotypes*

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In goats the polymorphism in the locus of α_{S1} -casein gene is classified in four levels of expression and associated with production of 3.6, 1.6, 0.6, and 0g/L/allele. The hypothesis that variations in genotypes for α_{S1} -casein in milk may interfere on efficiency of use of nutrients for milk purposes and nutritional requirements was considered. A 14-day assay with collection of feces and urine and milk yield recorded for 60 days were conducted to evaluate animal performance, the energy and N efficiency to milk synthesis by using forty goats of four genotypes named AA (high), AF and EE (medium), and EF (low) and fed two isocaloric diets of 14 and 17% crude protein (CP). No difference ($P>0.05$) was found for the interaction level of protein and genotype to all variables tested. Intake of dry matter, of metabolizable energy (ME) and protein (MP) were higher for animals carrying the AA genotype as compared the AF group. Increased level of CP in diet did not alter intake of other nutrients. Production of milk and components were similar among genotypes and levels of CP in the diet. Concentrations of crude and true protein in milk were higher for animals of AA genotype as compared to EF, with no difference for the AF and EE genotype. The net efficiency of use of ME for milk purpose (K_L) was similar, regardless of genotype or protein level of diets, averaging 66.2%. Higher efficiency of use of N for milk purpose was obtained for goats fed diets with 14% CP. Use of 17%CP in diet led to higher N balance but the increase in N excreted in urine, and in plasma as urea N, reduced net efficiency for using MP which leads to suggest that the amount of MP used was over protein requirement for lactation. It is concluded that variations in genotype are not sufficient to promote differences in efficiency of both ME and MP for milk purposes, and the use of diets with higher concentration of protein leads to increased loss of N. Financial support: Fundação de Amparo à Pesquisa do Estado de Minas Gerais - FAPEMIG

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220. Cumulative effect of environmental enrichment on behaviour and productivity of dairy goats kids after weaning

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The objective of this study was to evaluate the cumulative effect of environmental enrichment on behavior and productive performance of weaned Alpine French female kids under confinement. Thirty-two female kids were randomly assigned from birth to two treatments (enriched (E) and non-enriched (NE)), with two replicates each (N=8). Scan sampling was used every 5 minutes for 4 hours a day until completion of 150 hours of observation of individual time budgets from weaning (10 Kg) until the onset of first estrous. The Kids were weighed every 15 days. Blood samples were taken to measure cortisol and progesterone levels. Cortisol and progesterone levels were measured using a commercial kit. A complete randomized design and multivariate analyses for repeated measures were used to assess the effect of enrichment on the variables studied. The kids in the enriched group had a lower average frequency of agonistics encounters ($P < 0.01$), exploration ($P = 0.05$) and tended to spend less time in body care ($P = 0.07$) than the non-enriched ones (E: 21.7 ± 3.01 , 38.7 ± 5.1 and 35.1 ± 3.05 ; NE: 3.6 ± 3.01 , 4.7 ± 5.1 and 17.05 ± 3.05 , respectively). The difference in weight gain between the two groups was significant ($P < 0.05$), the enriched group gained more weight (108.8 ± 5.9 g) than the non-enriched one (87.9 ± 5.9 g). Cortisol and progesterone levels did not show statistically significant differences ($P > 0.05$). This study suggests that simple and low cost changes for environmental enrichment from birth have significant effects on the behavior and weight gain of goat kids after weaning. Explorative behavior of the non-enriched group was directed toward the enclosure, affecting facilities which can increase costs to the producer. The increase in agonistic encounters in the same group can be an indicator of poor welfare. Increase in weight gain in the enriched group may be decisive factor for adopting this practice. We suggest the consideration of another method as indicator of stress.

221. Effect of exogenous glutamate supply on the onset of puberty in goats: I. serum levels of insulin

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Glutamate, the main neuroexcitatory amino acid of the central nervous system has a marked stimulatory effect on the reproductive axis in mammals. Occurrence of a precocious puberty in response to agonists to glutamate administration has been reported in several species. The aim of this work was to evaluate the effect of exogenous glutamate supply upon the onset of puberty and possible links to changes in serum insulin levels in prepuberal goats reared in northern Mexico. The study was carried out in the Southern Goat Research Unit, URUZA-UACH (26° NL, 103° WL, 1,117 m altitude), from June to September. Five month old 7/8 Saanen-1/8 Criollo goats (n=20, 14 kg LW), received a diet to cover 120% of their nutritional requirements adjusted to LW. Both LW and body condition score (BCS) were registered every 15 days prior to feeding. In June, goats were randomly allocated to two experimental groups: 1). Excitatory amino acids (**AA**, n=10; 16.52±1.04 kg, 3.4±0.12 BCS) and Control, (**CC**, n=10; 16.1±1.04 kg, 3.1±0.12 BCS). The AA group received an intravenous infusion, 7 mg kg⁻¹ LW of L-glutamate, while the CC group received saline. At mid-June and up to late September, intermittent blood samples (once a week) were obtained from goats, to asses P4, by RIA. Goats with two consecutive serum samples with P4 ≥ 1 ng mL⁻¹ were declared reproductively active considering this event as the onset of puberty. Comparisons between groups for both LW and BCS were made using ANOVA-CRD. Percentage of goats depicting or not ovarian activity was tested with a χ^2 analysis. The initial averages for LW and BCS were 16.65±1.04 kg, and 3.31±0.12 units, with no differences (P>0.05) between treatments. Goats in the AA group showed earlier (P<0.05) onset of puberty and a greater (P<0.05) response in ovarian activity. The overall average for serum insulin (INS) was of 1.2 ng mL⁻¹ with no differences between treatments (P>0.50). Moreover, serum insulin concentrations were not associated with the onset of puberty observed in the glutamate-supplemented goats. Therefore, establishment of puberty seems to involve an insulin-independent mechanism for regulating the hypothalamic-hypophyseal-ovarian axis function in peripuberal goats.

222. Effect of exogenous glutamate supply on the onset of puberty in goats: II. serum levels of triiodothyronine

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Thyroid hormones and their receptors at the ovarian level have been described to be active regulators of reproductive function; both hyper- and hypo-thyroidism may result in estrous cycle disturbances. In addition, thyroid hormones elicit an extraordinary multiplicity of biochemical, cellular, and physiological responses, both in the simplest and the most complex organisms. On the other hand, glutamate, the main excitatory amino acid of the central nervous system has a marked stimulatory effect on the reproductive axis in mammals. In fact, occurrence of precocious puberty in response to administration of agonists to glutamate has been reported in several species. The aim of the present study was to evaluate the effect of exogenous glutamate supply on the onset of puberty, and relationship with serum levels of Triiodothyronine (T3), as a possible metabolic signal for the onset of ovarian activity in prepubertal goats. The study was carried out in northern Mexico (26° NL) from June to September at the Southern Goat Research Unit, URUZA-UACH. Goats (n=20) were offered alfalfa hay (14% PC; 1.14 Mkal Kg⁻¹ ENm), corn silage (8.1% PC, 1.62 ENm Mcal kg⁻¹), and corn grain (11.2% PC, 2.38 ENm Mcal kg⁻¹) under natural photoperiod. Location, animals, treatment design, preparation of the glutamate buffer solution, blood sampling scheme and quantification of serum P4 were described in the first part of this study. Serum samples were also evaluated for their content of T3 by RIA. Final averages for LW and BC did not differ (P>0.05) between the Glutamate-supplemented and control groups (23.7±0.72 vs. 22.7±0.72 kg) and (3.69±0.10 vs. 3.38±0.10 units), respectively. The overall average for T3 during the study was 1.47 ng mL⁻¹, with differences between treatments in favor of the glutamate-supplemented goats (1.55 vs. 1.39±0.04 ng mL⁻¹). Results provides evidence that exogenous glutamate supply accelerated onset of puberty and that such scenario was positively related to high levels of serum T3. Our observations prompt the hypothesis that goats may be able to transduce exogenous glutamate infusions into cues for sexual maturation during peripubertal-pubertal transition and that T3 could be considered a metabolic modulator of the process leading to puberty in goats.

223. Effect of microclimate of various housing patterns on the physiological behavior of Osmanabadi weaned Kids

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Considering the housing situation in rural areas, an attempt was made to see the feasibility of suitable housing pattern with special reference to the type of roofing materials and verification at the floor. Twenty four homogenous Osmanabadi weaned kids were randomly allotted to six housing patterns having common murum floor with either thatch (T0) or tin sheet (T1) roof but no floor ventilation, with thatch (T2) or tin sheet roof (T3) with one floor ventilation and with thatch (T4) or tin sheet roof (T5) with two floor ventilations. All the kids were maintained on a common feeding regime of available roughages and home- made concentrate mixture. The data were subjected to FRBD. The lowest micro temperature was recorded in thatch roof with two ventilators (T4) where as it was highest in tin roof with no ventilation house (T1). The physiological response of the kids was highest in tin roof with no ventilation house where as it was lowest in thatch roof with two ventilators. When the data analyzed under factorial RBD by taking two different roofs and three floor ventilations, it was found that the values of heart beats during each month revealed significant ($P < 0.05$) differences during first five months, whereas non-significant differences were observed during later period of the study. Respiration rate of the kids housed in shed with no floor ventilation and tin roof (T1) was higher as compared to the sheds with thatch roof. The mean values of body temperature under various types of floor ventilation showed non-significant differences where as under roof type it was significantly higher during March through May. It can be inferred that thatched roof shed with either one or two floor ventilations is more comfortable for the physiological comfort of the growing kids under the agroclimatic situations of the region.

224. The Effect of milking frequency on milk production and milk secretion in Tinerfeña goats

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24 third lactation goats belonging to Tinerfeña breed (Canary Islands, Spain) were allocated into two herds (n= 12 each) taking in account the previous milking frequency used during their first and second lactation (once, X1 vs. twice daily, X2), in order to perform two experiments. The first trial lasted 5 weeks. During the first one each goat was milked according to its frequency; either once or twice a day. In the second all the goats were milked twice daily; the third three times a day; the fourth twice daily again and the fifth once a day. Daily milk production was estimated as a mean of three consecutive days each week. In the second experiment the same goats, continuing with their original milking frequency, were milked in the morning and one hour later were injected with *atosiban*®, an oxytocin receptor inhibitor, and then milking was repeated. Afterwards the goats received 2 U.I. of exogenous oxytocin and immediately were milked yet again. The next day the procedure was repeated but, just after the morning milking the goats were injected with the same doses of oxytocin one hour before receiving *atosiban*®. Finally, 8 hours later the procedure was repeated without the previous oxytocin injection.

No significant differences were found due to herd effect in the first experiment. The records, ranged from 3404 vs. 3067 ml in the third week to 2645 vs. 2606 ml in last week (X2 and X1, respectively), were ever higher in X2 group.

The rate of secretion was the same in both groups (250 ml/hour) and no significant differences were found for the parameters studied in the second experiment, suggesting that in these goats the effect of milking frequency on milk production and milk secretion was low

225. Effect of homozygous and heterozygous genotypes for α_{S1} -casein on mammary gland cell morphology in dairy goats*

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In general, the process for secreting milk casein (α_{S1} , β , α_{S2} and κ) involves synthesis in the rough endoplasmic reticulum (RER), transport and processing by Golgi apparatus (GA) and then exocytose reaching the lumen of alveolus in mammary gland. In goats a complex polymorphism was found in the locus of the gene for α_{S1} -casein, presenting at least 18 alleles grouped in 4 levels of expression, named high, medium, low and null. Studies elsewhere showed that secretory cells of animals with homozygous defective genotype, as EE, FF, and OO expressing medium, low, and null amount of α_{S1} -casein, presented increase in volume of the RER and GA probably due to dysfunction of secretory mechanism. It is suggested a dependency of the α_{S1} -casein for the correct transport of other caseins and micelle formation. Considering the hypothesis that a higher expression of α_{S1} -casein in the cell, characterized by the presence of at least one allele for high expression, may enhance the efficiency of secretion process and as a consequence attenuate dilation of ER a study was conducted objecting to investigate the morphology of secretion cells from 40 lactating goats with homozygous (AA and EE) and heterozygous (EF and AF) for α_{S1} -casein. Animals were genotyped by molecular procedures and using DNA samples isolated from leucocytes and milk casein fractions by liquid chromatography of reverse phase. Ultra structural analyzes of secretory cells from mammary gland were made from tissue biopsy and using transmission electronic microscopy. Casein concentrations differed among genotypes AA, AF, EE, and EF, presenting values of 6.1, 5.1, 3.6 e 3.2 g/L respectively. Ultra structure of epithelial cells from AA genotype revealed the cytoplasm almost filled by RER and GA, besides numerous mitochondria. Cytoplasm characteristics of secretory cells of EE and EF genotypes were different of those observed on AA group which presented a much dilated RER and cisterns of GA. The ultra structure of cells in AF genotype showed an intermediate pattern of dilation. It is concluded that a higher concentration of α_{S1} -casein is needed in order for the process of transport and formation of casein to occur, attenuating dilation of those organelles. *Financial support: Fundação de Amparo à Pesquisa do Estado de Minas Gerais - FAPEMIG

226. Plasma insulin and IGF-1 and hepatic activity in Saanen goat kids, around weaning

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Weaning is a crucial event in the life of young ruminants. At weaning rumen functions and digestive activity are still incomplete, so weaning may coincide with a period of growth stasis. Since insulin and IGF-1 can play a fundamental role in postnatal development, the aim of the present study was to evaluate plasma variations of insulin and IGF-1 levels and their relationships with the hepatic activity, around weaning. For this purpose, eleven 3-days-old Saanen goat kids were randomly divided into MILK (6 animals) and WMIX (5 animals) groups. All kids were fed goat milk to age 29 days. After that, MILK kids continued to receive milk, while WMIX ones underwent weaning, based on the progressive replacement of milk with solid feed. WMIX kids were completely weaned on day 48. Blood samples were weekly analyzed for metabolic traits, insulin and IGF-1 levels, alanine aminotransferase (ALT) and aspartate aminotransferase (AST) activities. On day 50, all animals were slaughtered, liver weight was recorded and liver samples were analyzed for DNA, RNA, phospholipids, glycogen and soluble protein content, ALT and AST activity. On day 50, plasma insulin and IGF-1 were lower in WMIX group, as possible consequence of the lower plasma glucose and amino acids levels. Liver weight was not different between groups, but liver weight expressed as percentage of body weight was lower in WMIX kids and highly correlated to plasma IGF-1. Liver glycogen was also lower in WMIX kids, as possible consequence of the lower plasma glucose. Hepatic ALT and AST activities were not different between groups and both were strongly correlated to plasma insulin. Moreover, insulin was positively correlated to the proteosynthetic capability per cell (RNA/DNA) of the liver. Our results indicate that weaning alters plasma insulin and IGF-1, without affecting neither hepatic activity of aminotransferases, nor hepatic DNA and RNA content. Interestingly, plasma insulin was positively correlated to hepatic ALT and AST activity and proteosynthetic capability per cell, suggesting a role for insulin as indicator of hepatic aminotransferase and proteosynthetic activity.

227. Leptin circadian rhythm expression in goats with different body mass index and during different seasons

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The objective was to determine if serum leptin expresses a circadian rhythm in goats, and the effect of body mass index (BMI) and season of the year on such expression. Eight mature, ovariectomized, female goats with s.c. sylvastic implants containing 17 β -estradiol were maintained in a high (HBMI, n=4) or low (LBMI, n=4) BMI during the breeding (BS-december, n=8) and transition into anestrus (TS-february, n=8) seasons. Blood samples were obtained every hour throughout a 48 h period and serum leptin determined (Lynco Res. Inc.). Results were analyzed by COSINOR program (fit of data to a cosine curve) obtaining the MESOR (mean leptin concentration), AMPLITUDE (half difference between highest and lowest leptin concentration) and ACROPHASE (time of highest leptin concentration). Frequency of occurrence of a circadian rhythm was analyzed by Fisher's Exact test. A leptin circadian rhythm was evident (P<0.10) in 5/8 goats. BMI tended to influence the expression of leptin circadian rhythms (P=0.13); 50% (4/8) vs. 12.5% (1/8) of goats w/leptin circadian rhythm in HBMI vs. LBMI. Season did not affect (P=0.36) the expression of leptin circadian rhythm; 37.5% (3/8) and 25% (2/8) goats w/leptin circadian rhythm in BS and TS. Goats w/leptin circadian rhythm showed a diurnal ACROPHASE between 11:30 to 15:30 h. Frequency of leptin circadian rhythm in TS was low and similar in BMI groups (1/4 for HBMI and LBMI). There was a differential response between BMI groups during the BS with HBMI goats showing the highest frequency of leptin circadian rhythm (3/4 and 0/4 for HBMI and LBMI, P<0.001). The LBMI group had higher MESOR (P<0.05) and basal leptin concentrations (1.9 vs. 1.4 and 1.2 vs. 0.5 ng/ml in LBMI vs. HBMI). There were no differences (P>0.05) in AMPLITUDE for any effect or their interaction. Evidence of a serum leptin circadian rhythm in female goats, with a diurnal increase in serum leptin was found and reported for the first time. Moreover, an effect of interaction between BMI and season in the expression of such rhythm was observed. Studies involving serum leptin in goats should take into account its circadian variation; otherwise under- or over-estimations might occur.

228. IgG colostrum concentration effects on blood serum kids IgG and IgG absorption efficiency

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Forte Majorera newborn goat kids were enrolled in four groups in order to determinate the effects of IgG concentration on IgG blood serum and efficiency of absorption in goat kids. All kids received 4 g of IgG per kg of birth weight, and four IgG colostrum concentrations were tested 20, 40, 60 and 80 mg/ml. Kids received the colostrum in four meals during two days. IgG absorption efficiency was not affected by IgG colostrum concentration and ranged from 9.8 to 6.5 %. No statistical differences were observed in any day tested for IgG blood serum concentration in any IgG colostrum concentration tested. Values of blood serum kids IgG were 10.1, 10.5, 10.1, 8.7 and 8.2 in day 1, 2, 3, 4 and 5.

229. Comparison and correlation of some biochemical metabolites related to the lipid metabolism of dairy and meat goats around the parturition period

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The aim of this study was to evaluate some biochemical metabolites related to the lipid metabolism as well as to estimate their correlations around parturition of dairy and meat goats. Alpine and Boer goats (N=46) were used, divided in two groups: 25 dairy and 21 meat goats. Blood samples were taken 3-7 days before parturition and 10 and 20 days postpartum. Serum concentrations of glucose, urea, cholesterol, total serum proteins (PT), globulins, aspartate aminotransferase (AST), gamma glutamyltranspeptidase (GGT), creatin kinase (CK), glutamate dehydrogenase (GLDH), β -hydroxybutyrate (BHBA), and NEFA were determined. Obtained data was evaluated by means of an analysis of variance for a completely randomized model for repeated observations, as well as a correlation analysis using the statistical program SAS. Significant differences between genotypes were found in serum concentrations of PT, albumin and CK ($P < 0.05$), means obtained for dairy goats were: (in that order) 78.34 g/L, 31.24 g/L y 130.91 U/L. Meat goats: 71.4 g/L, 28.99 g/L y 268.66 U/L respectively. Significant correlations ($P < 0.05$) were found in blood metabolites of meat goats for the three evaluated periods: in the prepartum period there were positive correlations between BHBA and NEFA ($r = 0.6900$, $P = 0.0004$), NEFA and AST ($r = 0.6602$, $P = 0.0008$), 10 days postpartum there were positive correlations between AST and CK ($r = 0.9594$, $P = 0.0000$), and negative correlation between NEFA and urea ($r = -0.5466$, $P = 0.0085$), 20 days postpartum positive correlations between CK and AST ($r = 0.6999$, $P = 0.0003$), NEFA and AST ($r = 0.4661$, $P = 0.0288$) and BHBA and AST ($r = 0.5280$, $P = 0.0115$), negative correlations between NEFA and urea ($r = -0.4784$, $P = 0.0243$). Dairy goats showed following results for correlation analysis: before parturition there weren't significant correlations ($P > 0.05$), at 10 days postpartum they presented positive correlations between CK and AST ($r = 0.5394$, $P = 0.0054$), BHBA and NEFA ($r = 0.4661$, $P = 0.0288$), and negative correlation between NEFA and glucose ($r = -0.4811$, $P = 0.0149$) at 20 days postpartum positive correlations between albumin and AST ($r = 0.5219$, $P = 0.0075$), CK and AST ($r = 0.4070$, $P = 0.0435$), BHBA and GGT ($r = 0.4735$, $P = 0.0168$). Differences between blood metabolites of dairy and meat goats indicate a difference in the metabolism of each genotype, while correlations show physiological and metabolic changes related to different stages of lactation and gestation.

230. Effect of the time of separation of the kid on the behavior and milk production of French Alpine goats.

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In order to determine the effect of the time of separation of the kid on the behavior and milk production of French Alpine goats, a behavioral and milk production study was carried out using two groups of goats (n=6). Kids of group one were immediately separated from the mother after birth, without allowing the mother to clean them. In group two, kids were separated after they tried to suckle for the first time letting the mother lick them. Mother behaviors after parturition and milk production weekly during 12 weeks were registered in both groups, as well as the colostrum 10 minutes after separation of the kids. Goats in group two tended to have a higher number of vocalizations (P=0.08) and longer distance traveled inside the pen in the first 24 h (P=0.08), as well as a higher frequency in the search behavior directed towards their kids (P =0.001) in the first 12 h. Milk production average was similar in both groups (P>0.1). It is concluded that the separation of the kids without letting the mothers have any contact with them reduced behaviors of agitation in the mothers, without affecting milk production between the separation strategies used.

231. Monthly comparison of the concentrations of milk protein and urea in dairy goats and ewes

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Monthly concentrations of protein and urea in goats and ewes' milk and their correlations were investigated in 220 dairy goats and 136 ewes in 2005-6 in Urmia. The amount of 50 ml milk was prepared monthly up to 5 months. Milk urea was evaluated by Bertholet method using urea kit (Ziest-Chimi, Iran) in spectrophotometer and milk protein by titration method. Mean for goats milk protein (GMP) from one to five months of lactation and overall were 3.68, 3.43, 3.89, 4.29, 3.92, 3.88%, and for goats milk urea (GMU) were 35.2, 30.9, 19.7, 27, 35.1, 28.6 and for ewes milk urea (EMU) were 21.7, 41.9, 41.2, 36.9, 50.2, 36.7 mg/dl, respectively. The lowest amount for GMP was observed at two and the highest was at 4 months of lactation. GMU concentration decreased irregularly while EMU increased regularly during the lactation. The range for whole period of lactation for GMP, GMU and EMU were from 1.5 to 7.5%, 7.74 to 72.7 and 11.9 to 89.1 mg/dl, respectively. Mean comparison of the GMP, GMU and EMU showed differences ($P < 0.01$) among lactation months. Mean GMP at first and two months were different from 4 months of lactation. Mean GMU at 3 months and EME at first month were different from other months of lactation. There were no correlations between GMP and GMU concentrations. There was also no correlations among lactation months in EMU, but correlations were found between GMU at 2 and 4 months of lactation ($r = 0.40$, $P < 0.01$), GMU at 4 months and GMP at 3 months ($r = 0.41$, $P < 0.01$), GMU at 3 months and GMP at 4 months ($r = 0.45$, $P < 0.01$). It is concluded that milk protein and urea concentrations in goats and ewes were different during the lactation months but they were at the level recommended by bibliography. The present of differences between GMP, GMU and EMU during the lactating months were the reflection of the metabolism and physiological procedures, but the differences were statistical and not biological values. Urea was confirmed in milk goats and ewes, the concentration in ewes milk was greater than in goats milk, that required for further studied in relation to economic and hygiene importance. The lack of correlations between GMP and GMU show their non-independent characteristic in source of their production.

232. Apoptosis is related to immune passive transfer in newborn ruminant

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Eight goat kids were slaughtered at birth, at 24, at 48, at 72 hours and at 60 days after partum to evaluate the relationship between apoptosis and immune passive transfer in neonate enterocytes. A samples of duodenum of each animal were taken after slaughter, fixed, dehydrated and embedded in paraffin wax. Sections were stained using a TUNEL assay for visualizing apoptotic cells. Immunohistochemistry using a commercial polyclonal anti-IgG antibody was performed to evaluate the presence of IgG. The main observation in the present experiment is the evidence that the responsibility to absorb IgG is in apoptotic enterocytes. In the future the delay in apoptosis development may increase the possibilities to avoid the failure in immune passive transfer.

233. Chitotriosidase activity in goat and kids blood and colostrum

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Chitotriosidase (ChT) activity has not been investigated in ruminants, and therefore we studied this activity in blood and colostrum of 15 pregnant goats and 30 goat kids. Blood samples were taken from pregnant goats at 3, 2 and 1 d prepartum, at partum, and at 1, 2, 3 and 4 d postpartum. Colostrum samples were obtained by machine milking at partum, and 1, 2, 3, and 4 d postpartum. Goat kid blood was collected at birth and every 7 d thereafter until goats kids were 56 d old. ChT activity ranged from 2464 to 3568 nmol/mL/h in goat blood serum, and no statistical differences were detected through time. However, activity tended to decrease from 3 d prepartum to 2 d postpartum. Colostrum ChT activity was 3834 nmol/mL/h and 421 nmol/mL/h on the d of delivery and 4 d postpartum, respectively. Colostrum ChT activity was significantly higher at partum than at any other time. ChT activity in colostrum was significantly greater at 1 d postpartum than at 2, 3 and 4 d postpartum. ChT activity did not differ in colostrum collected on d 2, 3, and 4 postpartum. ChT activity in goat kid blood serum ranged from 2521 to 9987 nmol/mL/h at birth and 49 d of life, respectively. ChT activity in the blood serum increased with age: at birth, activity was significantly less than at 28, 35, 42, 49 and 56 d postpartum. The maximum ChT activity in blood serum was observed at 49 d postpartum.

234. Immunoglobulin G concentration in colostrum and prolactin plasma levels in response to induced parturition in goats

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The effect of induction of parturition on IgG concentration in colostrum and plasma, and on prolactin plasma levels was studied in sixteen pregnant Majorera goats. Treatment goats (TG), i.e. those with induced parturition, had higher prolactin values than control goats (CG) ($p < 0.05$) at 24 hours prior to parturition (6.6 and 51.1 ng/ml, CG and TG respectively) and at 48 hours after parturition (37.8 and 64.4 ng/ml, CG and TG respectively), while CG had higher prolactin values ($p < 0.05$) than TG at 96 hours after parturition (53.7 and 20.9 ng/ml, CG and TG respectively). The plasma IgG concentration at parturition did not differ between groups (20.4 and 20.9 mg/ml in CG and TG, respectively). Colostrum IgG concentration in CG was higher ($p < 0.05$) than in TG (140.7 and 89.6 mg/ml, respectively).

235. Feed selection and dietary preferences of browse species by goats on a natural pasture in Ninh Thuan province in the Central regions of Vietnam

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The objectives of this study were to study the behavior of goats on a natural pasture in Ninh Thuan province and to determine the most consumed browse species and plant height reached when browsing by goats. Two animals in a herd of goats belonging to the farmers was followed on pasture during three consecutive days each months by two observers from January to August 2007, and their activities were recorded regularly every 15 minutes as well as the browse species selected and the height reached while browsing. New goats were randomly selected each observation day. Samples of ten most selected browse species were collected for analyzing dry matter (DM) and crude protein (CP) contents. During the time on pasture, the goats spent 79.9% of their time on pasture browsing, 1.8% grazing, 1.2% drinking, 12.4% walking and 4.7% for other activities. Browsing leaves was the most important part of the browsing activities. During the whole observation period, goats browsed 50 species with the species *Derris elliptica*; *Ficus pumila* and *Opuntia monacantha* most preferred, 12.8%; 11.1% and 10.2% of the browsing time respectively. Average browsing height of the goats was 0.83 m and they could reach a maximum height of 2.3 m. DM contents of the ten most consumed browse species ranged from 68 g/kg in *Opuntia monacantha* to 443 g/kg in *Ficus pumila*. The highest CP content was obtained in *Corissa cochinchinesis* (271 g/kg DM) and the lowest in *Opuntia monacantha* (131 g/kg DM).

236. Solubility effect of feeding phosphate upon the microbial activity into rumen

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The objective of this study was to determine impacts of dietary phosphate solubility on ruminal fermentation activity. Two groups of four ruminal-cannulated goats (BW=60±1.4kg) each one were formed. Animals were in early lactation (42-52 DIM) and were housed indoor in individual stalls. During adaptation and experimental periods, goats received twice daily (0800 and 1500) a diet consisting of 400, 300 and 300g/kg DM of sugar beet pulp silage, grass hay and experimental semi-purified concentrates, which supplied 71% of total P as soluble (monocalcium phosphate, group **HSP**) or insoluble (dicalcium phosphate, group **LSP**). Total P dietary content was 3.3g/kg DM. Feeds and water were available *ad libitum*. Liquid ruminal content was obtained at time 0 (before feeding), then, 90, 180 and 360 min after morning feeding. DM intake (DMI) was recorded at each sampling time. Volatile fatty acids [VFA, acetic (C2), propionic (C3) and butyric (C4)] were quantified by gas chromatography. Kinetic data were adjusted using Model Maker 3.0.3 (1997). The model for DMI was: $DMI = DMI_{maximal} \times (1 - \exp(-k_{safety} \times time))$, whereas the VFA model was:

$\frac{dVFA}{dt} = k_{input} \times VFA_{initial} - k_{output} \times VFA_{instantly}$. Initial DMI rate (IDMI) and initial rate of VFA

concentration (IIVFA) were calculated $IDMI = DMI_{maximal} \times k_{safety}$;

$IIVFA = ((VFA_{initial} \times k_{input}) - (VFA_{initial} \times k_{output}))$. Adjusted parameters were analyzed by

GLM (Minitab, 1998) with a model including the treatment and the animal nested within the treatment. DMI observed at time 360 was used as covariable for VFA statistical analysis. Treatment affected ($p < 0.05$) the DMI at the time 360 (LSP=829, HSP=1017g). The LSP group presented higher values for k_{input} of VFA, C2 and C3, (LSP=3.3, 2.6, 2.3; HSP=1.7, 1.3, 1.4%/h) and k_{output} of VFA and C2 (LSP=1.8, 1.4; HSP=0.93, 0.65%/h). The k_{output} of C4 was lower for LSP group (0.33 vs. 0.54). A trend ($p < 0.10$) for the treatment effect was observed on initial concentrations of VFA, C2 and C4 (LSP=79.6, 49.42, 7.68; HSP=89.6, 54.9, 9.19 mmol/L). Hence, VFA pattern after feeding was more marked for LSP than for HSP group. In this study, where 71% of dietary P was supplied as inorganic phosphate, the kinetics of DMI and VFA were related and they were affected by P solubility.

237. Effect of phosphorus solubility supply on P post-prandial variations in ruminal phases

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The purpose of this study was to evaluate the effect of phosphorus (P) solubility supply upon P post-prandial variations into both liquid and bacteria from rumen. For the first time, fractional disappearance rate of P from ruminal liquid was estimated. Two groups of four rumen-cannulated goats (BW=60±1.4kg, 42-52 DIM) each one were used. Goats were individually penned indoors, received twice daily (0800 and 1500h) a diet comprising sugar beet pulp silage, grass hay and experimental semi-purified concentrates (400, 300, 300 g/kg DM, respectively). Concentrates supplied 71% of total dietary P as soluble (monocalcium phosphate, group **HSP**) or insoluble (dicalcium phosphate, group **LSP**). Animals had free access to water and feed. Ruminal content from each goat was taken four times, before feeding (time 0), then at 90, 180 and 360min after morning feeding. Filtration and serial centrifugation were used to obtain the following fractions: bacterial free ruminal liquid (L), liquid- (LAB) and solid-associated bacteria (SAB). P was determined on these fractions by molybdovanadate method. Data of P content of L (PL) were transformed [$\log_{10}(1+PL)$] in order to estimate the fractional disappearance rates of P (DRP). Data from bacterial organic mass (LAB and SAB) as well as those from bacterial P concentrations (P-LAB and P-SAB) were analyzed by GLM (Minitab, 1998) using a model which included treatment (T) and the animal nested within T. A trend ($p=0.069$) was observed on PL before feeding (HSP=0.87, LSP=0.71g/L). PL observed at the time 360 were higher ($p<0.05$) for HSP group (0.69 vs 0.53g/L). DRP was unaffected by T (-0.68%/h). Solubility effect was observed ($p<0.05$) on P-LAB which showed more important variations in time, mainly in LSP group. The principal difference ($p<0.05$) was observed at the time 90 (HSP=1.6, LSP=1.4g of P/100g LAB). P-SAB was unaffected ($P>0.05$) by treatment (0.59g/100g SAB). Slowing P liberation from feedstuffs could induce a transitory phase of P deficiency mainly in LAB during the first post-prandial period. It seems that, both LAB and SAB could adapt themselves to support those variations of P concentrations into rumen.

238. Effect of phosphorus solubility supply on digestive and metabolic P utilization in dairy goats

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The objective of this work was to ascertain the effect of phosphorus (P) solubility on digestive and metabolic utilization during goat lactation. Ten animals (BW= 57±7kg, 56 DIM) were assigned to two experimental groups. Two different concentrates with monocalcium- (HSP) or dicalcium-phosphate (LSP) as the main soluble or insoluble P source (2.4g/kg DM) were offered during experimental period (345d), together with sugar beet pulp silage, grass hay and alfalfa hay. The total P dietary supply was 3.3g/kg DM. Goats had free access to feeds and water. *In vivo* digestibility trials were carried out at early-(EAR=14-21 DIM), pick- (PIC=70-77 DIM), full (FULL=140-147 DIM) and end-lactation (END=294-311 DIM). Plasma samples were taken once a week at each digestibility trial, in order to quantify P and the serum cross-Laps[®] (CTX) as a marker of bone resorption. Milk yield was recorded once weekly. Colorimetric methods were used for P determination. Data from P intake, P fecal, P milk yield, P urine, P retention, apparent absorption coefficient (AAC), P plasma and CTX were analyzed (Minitab, 12.2) with a model including the treatment (T), the lactating state (LS) and their interaction (T×LS). Whole studied variables were unaffected by T×LS (p>0.05). Digestive utilization and P retention were unaffected (p>0.05) by T. However, a treatment effect was observed on P urine (HSP=2.3, LSP=0.3mg/kg BW), P plasma (HSP=6.9, LSP=5.9 mg/100mL) and CTX (HSP=1.53, LSP=1.26 ng/mL). LS affected digestive P utilization, P retention and CTX. The only one variable unaffected (p>0.05) by LS was P plasma. The most important effect was observed on AAC (EAR=41, PIC=35, FULL=30, END=26 %). This result seems to be specific of dairy goat, because, the highest value of AAC is observed at the early lactation. In ewes, the highest P absorption is observed on the second half of lactation. CTX concentrations were higher (p<0.05) at first lactating states (EAR=1.72, PIC=1.89, FULL=1.28, END=0.74ng/L), indicating that, bone resorption was mainly observed at the beginning of lactation. In this way, mineral restoration of bone could occur towards mid lactation.

239. Effect of some selected browse species on growth, carcass characteristics and parasite infestation in Sahelian goats

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The leaves and pods of *Pterocarpus lucens* and the pods of *Acacia senegal*, two browse species well utilised in the Sahelian zone of Burkina Faso, were used to study the growth and carcass characteristics and the effect on internal parasite using Sahelian goats, 10-12 months old. Four groups of eight animals were allocated randomly to four diets consisting of the three browse fodders and a control diet. The browse fodders were offered *ad libitum* and supplemented with 200 g of hay of *Schoenefeldia gracilis* and 200 g of millet bran while the control group received 200 g of millet bran, 200 g of cottonseed cake and hay *ad libitum*. The faecal egg count was done for each animal at four occasions. The highest DM intake was observed for goats fed the diet with *A. senegal* pods, which also resulted in higher nutrient intake (CP, NDF). The intake of the diet with *P. leaves* was higher than that of the control diet, but the CP intakes were similar. The lowest consumption was of pods of *P. lucens* resulting in lower CP intake. The goats fed *A. senegal* pods grew faster (56 g/day), similar to the ones receiving *P. lucens* leaves and the control diets (55 and 51 g/day respectively). However, the feed conversion ratio was lowest for the control diet, and higher for the *P. lucens* pods diet. The carcass weight, dressing percentage and weight of the primal cuts were higher for goats fed *A. senegal* pods and similar to those fed *P. lucens* leaves and the control diet. The parasite control showed occurrence of coccidian oocysts in all animals with similar fluctuations in oocyst count, indicating no significant effect of diet on faecal egg count. In conclusion, *A. senegal* pods and *P. lucens* leaves can be recommended as supplemental feed to low quality roughage.

240. Effect of time of day, ambient temperature, and relative humidity on feeding behavior of growing meat goats

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Heat stress decreases feed intake in livestock. However, little information on feeding behavior and heat stress is known in goats. The objective of this research was to examine the effects of time of day and heat stress on feeding behavior in growing meat bucks. In a 12-wk buck performance test, feed intake of 55 bucks (27 in 2005 and 28 in 2006) was recorded using a completely automated electronic feeding system, which records feed intake of each individual animal's visit. Dry matter intake (DMI), feeding duration (DUR), and consumption rate (RATE) were calculated for daytime (06:00 to 18:00 h) and nighttime (18:00 to 06:00 h) feeding behavior. Relative humidity and ambient temperature were recorded every 10 min and an average temperature-humidity index (THI) calculated for the corresponding period. Heat stress was classified according to THI; NO stress (THI < 72), MILD stress (72 < THI < 78), and SEVERE stress (79 < THI < 89). A repeated measures design using mixed model methodology was employed to analyze feeding behavior. DMI, DUR, and RATE were dependent variables. Independent variables included year (2005 or 2006), time of day (day or night), and heat stress level (NO, MILD, or SEVERE) as classification variables and the linear and quadratic effects of age in days. Night DMI was less ($P < 0.05$) than day DMI (528g vs. 700g) and NO was greater ($P < 0.05$) than MILD or SEVERE (650g vs. 591 and 602 g, respectively). DMI during night was 558, 507, and 520 g and during day was 742, 676, and 684 for NO, MILD, and SEVERE, respectively. DUR was less ($P < 0.05$) during night than day (29 min vs. 41 min) and greater ($P < 0.05$) for NO than for MILD or SEVERE (37 min vs. 35 and 35, respectively). DUR at night was 32, 28, and 29 min and during day was 42, 41, and 41 min for NO, MILD, and SEVERE, respectively. RATE (20 g/min) was not affected ($P > 0.05$) by time of day or stress level. Generally, time of day and heat stress level significantly affected the feeding behavior of growing meat bucks.

241. Intake and digestibility of tropical forages according to reproductive status and supplementation levels in Creole reproductive goats

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In Guadeloupe, goats are raised in suckling system for meat production. Strategies have to be defined in farming systems to optimise the use of grasslands while maintaining high productivity. There is a need to assess the levels of intake and the efficient use of forages of the reproductive does according to their physiological status and the level of supplementation. Three groups of Creole goats (six per group), raised in individual pens were compared on the basis of their diet and physiological status. The SWC group (suckling with concentrate, live weight LW: 30.9 ± 5.0 kg) received the basal diet plus 500 g of concentrate daily, the SNC (suckling no concentrate, LW: 30.6 ± 5.2 kg) and DG (dry goats, LW: 30.0 ± 5.6 kg) groups received the basal diet without concentrate. The forage was cut on average at 33 days of regrowth. The concentrate was mainly composed of maize (68%), soybean cake (15%), and wheat bran (11%). The chemical composition of the forage was 76 CP, 723 NDF, 380 ADF and 52 ADL g·kg⁻¹ DM. No significant differences were observed between DG and SNC for the forage DM intake and digestibilities: 750 g·d⁻¹ and 61 %. The inclusion of concentrate (39% of DMI) resulted in a significant increase (comparison SWC vs. SNC, P<0.05) in DM digestibility (15 points more) and consequently the intake of digestible organic matter (380 g more). Milk production and LW change of SWC were significantly (P<0.05) higher than for SNC: 766 vs. 533 g·d⁻¹; +1.4 vs. -0.2kg, respectively. The kids growth difference was only + 20 %. Body condition scores did not vary and remained at an adequate level for further reproduction. Results favour the mixed diet for suckling females reared under intensive reproduction rate since it affords good levels of milk production and kid growth while maintaining the body weight and condition of females. The lack of a difference between dry and suckling does (whose requirements differ) in the way of exploiting the forage would underline that there are still challenges to predicting responses to nutrients during the reproductive cycle of suckling breed.

242. Profile of casein and fatty acids in milk of dairy goats with different genotypes of α_{S1} -casein*

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Caseins (α_{S1} , β , α_{S2} e κ) are major proteins found in milk of ruminant animals. In goats there is an occurrence of high polymorphism in the locus of α_{S1} -casein gene with at least 18 alleles yet identified and classified in four levels of expression, named high (A, B₁₋₄, C, L and H), medium (E and I) low (D, F, and G), associated with production of 3.6, 1.6 and 0.6 g/L/allele, respectively, whereas null allele (O₁₋₃) associated with the lack of such protein. Considering the hypotheses that the genotype for α_{S1} -casein may interfere on synthesis of milk components the study was conducted to investigate possible variations on composition and profile of both casein and fatty acids by using forty dairy goats of different genotypes named AA, EE, EF and AF for the α_{S1} -casein. Genotypes were determined by molecular procedures, and both casein and fatty acid profile by liquid and gas chromatography, respectively. Higher concentration of crude protein in milk was observed as AA (31.7 g/L) genotype was compared with the EF (29.0 g/L) genotype with no difference for the others genotypes. Significant differences ($P < 0.05$) on amount of α_{S1} -casein were found among all genotype of 6.10, 5.10, 3.60 and 3.22 g/L for the AA, AF, EE and EF group respectively. In a almost conversely manner higher amounts of β -casein were found for both the EF (4.46g/L) and AF (4.31g/L) genotypes as compared with the homozygous genotypes EE (3.32 g/L) and AA (2.87 g/L). Higher concentration of α_{S2} was found for the AA (3.35 g/L) whereas for β -casein higher concentration was verified in milk of animals carrying the genotype EE (13.99 g/L). Genotype did not interfere ($P > 0.05$) on fatty acids profile. Ratios of saturated:unsaturated, of polyunsaturated:saturated, the atherogenicity index ((C12:0 + (4xC14:0) + C16:0)/(C18:1 + C18:2 + C18:3) did not differ among genotypes and averaged 2.23, 0.04 and 2.62 respectively. It is concluded that due the low amount of the α_{S1} -casein in milk of animals carrying defective alleles a compensatory, although incomplete, mechanism is observed for production of other caseins and no consequence on profile of fatty acids in milk. *Financial support: Fundação de Amparo à Pesquisa do Estado de Minas Gerais – FAPEMIG

243. Profile of casein and fatty acids in milk of dairy goats with different genotypes of α_{S1} -casein*

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Caseins (α_{S1} , β , α_{S2} e κ) are major proteins found in milk of ruminant animals. In goats there is an occurrence of high polymorphism in the locus of α_{S1} -casein gene with at least 18 alleles yet identified and classified in four levels of expression, named high (A, B₁₋₄, C, L and H), medium (E and I) low (D, F, and G), associated with production of 3.6, 1.6 and 0.6 g/L/allele, respectively, whereas null allele (O₁₋₃) associated with the lack of such protein. Considering the hypotheses that the genotype for α_{S1} -casein may interfere on synthesis of milk components the study was conducted to investigate possible variations on composition and profile of both casein and fatty acids by using forty dairy goats of different genotypes named AA, EE, EF and AF for the α_{S1} -casein. Genotypes were determined by molecular procedures, and both casein and fatty acid profile by liquid and gas chromatography, respectively. Higher concentration of crude protein in milk was observed as AA (31.7 g/L) genotype was compared with the EF (29.0 g/L) genotype with no difference for the others genotypes. Significant differences ($P < 0.05$) on amount of α_{S1} -casein were found among all genotype of 6.10, 5.10, 3.60 and 3.22 g/L for the AA, AF, EE and EF group respectively. In a almost conversely manner higher amounts of β -casein were found for both the EF (4.46g/L) and AF (4.31g/L) genotypes as compared with the homozygous genotypes EE (3.32 g/L) and AA (2.87 g/L). Higher concentration of α_{S2} was found for the AA (3.35 g/L) whereas for β -casein higher concentration was verified in milk of animals carrying the genotype EE (13.99 g/L). Genotype did not interfere ($P > 0.05$) on fatty acids profile. Ratios of saturated:unsaturated, of polyunsaturated:saturated, the atherogenicity index ((C12:0 + (4xC14:0) + C16:0)/(C18:1 + C18:2 + C18:3) did not differ among genotypes and averaged 2.23, 0.04 and 2.62 respectively. It is concluded that due the low amount of the α_{S1} -casein in milk of animals carrying defective alleles a compensatory, although incomplete, mechanism is observed for production of other caseins and no consequence on profile of fatty acids in milk. *Financial support: Fundação de Amparo à Pesquisa do Estado de Minas Gerais – FAPEMIG

244. Leptin and glucose concentration of Creole does with different body condition scores (BCS) under tropical latitude (22° NL)

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The aim of the experiment was to measure and compare leptin and glucose concentrations of Creole does with different Body Condition Score (BCS) under growing photoperiod influence in center Mexico (22° 14 ' LN). Since leptin has differential effect in regulating glucose utilization among tissues, and leptin responses to glucose infusions; Mature Creole goats (n=24) were used and assigned to one out of four experiment group according to their BCS. Hence four groups of six does each resulted: BCS excellent (4; n=6), BCS good (3; n=6), BCS regular (2; n=6) and BCS poor (1; n=6). Blood samples were collected in five random dates. Leptin levels were analyzed by the RIA method using a commercial kit for leptin (LINCO®); and glucose levels were analyzed by Spectrophotometric method. Initial and final mean (\pm SEM) BW (kg) differed ($P < 0.01$) between BCS 1 (28.4 \pm 2.9 and 30.33 \pm 0.14), BCS 2 (29.3 \pm 2.6 and 31.6 \pm 0.4), BCS 3 (34.1 \pm 5.3 and 36.6 \pm 1.2) and BCS 4 (39.9 \pm 4.9 and 42.3 \pm 1.4). Initial and final mean (\pm SEM) Glucose (mg mL⁻¹) differed ($P < 0.05$) between BCS 1 (48.7 \pm 3.2 and 56.3 \pm 0.1), BCS 2 (60.9 \pm 0.6 and 61.6 \pm 0.3) BCS 3 (67.3 \pm 2.5 and 67.9 \pm 1.3), and BCS 4 (70.3 \pm 1.9 and 73 \pm 1.4) does. Dietary treatment and day did influence ($P < 0.05$) serum Glucose concentration. Initial and final mean (\pm SEM) Leptin (ng mL⁻¹) of BCS 1, BCS 2 BCS 3, and BCS 4 does were 1.8 \pm 0.1 and 2.3 \pm 0.14, 6.4 \pm 0.5 and 7.4 \pm 0.9, 8.01 \pm 1 and 10.1 \pm 1.2, 7.4 \pm 1.2 and 9.9 \pm 1, respectively. The higher leptin concentration was observed in does of BCS 3 and 4. On the other hand, in BCS 1 does, leptin concentration was minimum and statistically different to the other three BCS ($P < 0.05$). We concluded that leptin and glucose concentrations were affected by BCS. If BCS increase, leptin and glucose concentrations will increase in blood.

245. Physiological and behavioral alterations in disbudded kids with and without local anesthesia

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In order to evaluate the physiological and behavioral response in disbudded kids with or without prior local anesthesia, two experiments were conducted. In the first experiment, 4 groups were randomly formed: Anesthesia (A, n=12), kids receiving 2ml of lidocaine 2% (L2%) around each horn bud 20 minutes before disbudding with thermal cauterization; Saline (Sa, n=11), kids receiving 2ml of Sa before disbudding; Simulation (S, n=11), the complete procedure was only simulated; and Control (C, n=11), kids disbudded without any previous treatment. Kids were Saanen and French Alpine, 21±0.6 days old. Plasmatic cortisol levels, respiratory and cardiac frequency were measured from 20 minutes before and to 4 hours after disbudding; frequency and intensity of kicks and vocalizations during the procedure were also measured. In the second experiment, to elucidate the real effect of injecting the anesthetic, plasmatic cortisol was determined in 13 kids injected with 2ml of L2% around each horn bud (7 disbudded, 6 control). A repeated measures anova, Kruskal-Wallis, Mann-Whitney and the Fisher test were used to analyze the data. Disbudding originated a significant increase in the cortisol levels that lasted 2 hours. The cortisol levels were higher in the disbudded kids ($p<0.05$) than in control during 1 hour after disbudding. Respiratory and cardiac frequencies were not significantly affected by treatment. In kids A, Sa and C, the percentage of animals showing high intensity behaviors (kicks: 83, 72 and 100%; vocalizations: 83, 81 and 100% respectively) were greater than in kids S (0 and 9% respectively; $p<0.05$). Injecting the anesthetic induced a slight increase in cortisol levels by itself; when the injection was followed by disbudding, the cortisol elevation was significantly higher (71.3 ± 16.8 vs. 115.4 ± 15.5 , nmol/L, $p<0.05$) and more extended, suggesting that anesthesia was not effective. It is concluded that disbudding by thermal cauterization induces an acute cortisol elevation and increases the presentation of behaviors indicative of discomfort and pain. Local anesthesia, using L2% around each horn bud, did not inhibit these alterations. These results highlight the importance of developing strategies that can be used in reducing stress and pain in goats during common practices.

246. The determination of growth function in young hair goat

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In this study, it was aimed that the estimating of growth curves for live weight from birth to twelfth month age in young Hair goats. For the determining of the variation for the live weight, Gompertz, Logistic, Brody, Negative Exponential and Bertalanffy growth models were used. In the young Hair goat, straightness degrees of these models for growth estimate are $R^2=0.977$, $R^2=0.964$, $R^2=0.989$, $R^2=0.974$ and $R^2=0.982$, respectively. The Brody growth model has a highest straightness degrees for growth estimate in the Hair goat ($R^2=0.989$). Second model is the Bertalanffy growth model ($R^2=0.982$). It was leant on this finding reached a decision that the Brody and Bertalanffy growth models are suitable for identification of variations in live weight of young Hair goats.

247. Effect of propylene glycol on pre- and postpartum performance by dairy goats and suckling kids

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The transition period (prepartum - postpartum) is a critical phase in the productive cycle of the goat because nutritional requirements increase significantly. Poor nutritional status of the Doe may expose her to prepartum ketosis and may impede the birth weight of the kids. The aim of this study was to study the effect of supplementing (carried out in order to determine the effects, after feeding) propylene glycol (Liqui-Beef®, San Marco-Italy) to Maltese goats 10 days prepartum and 45 days postpartum on milk production, body weight, body condition score and the average daily gain of the kids at 45 days of age. Sixty multiparous goats were divided in two homogeneous groups, "Control" and "Glycol", by number (30), age (3 ± 1 years), milk yield (2 ± 0.5 kg/goat/day, previous milk production) and body condition score (2.25 ± 0.5). The goats were fed with the same kind of diet: hay (1.5 kg/goat/day) and concentrate (0.7 kg/goat/day). In the "Glycol" group the ingestion of propylene glycol (150 ml/goat/day) was achieved by spraying it on the hay. Milk production, body weight, body condition score and the average daily gain of the kids were recorded. The data were analyzed using the PROC GLM procedure (SAS). The results show a positive effect of propylene glycol in the "Glycol" group in terms of milk production ("Glycol" 2166 g/goat/day vs. "Control" 1864 g/goat/day; $P < 0.05$), body weight ("Glycol" 46.02 kg vs. "Control" 38.37 kg; $P < 0.05$) and body condition score ("Glycol" 2.6 vs. "Control" 2.25; $P < 0.05$). Furthermore, despite the similar birth weight of the kids in the two groups ("Glycol" 3.2 kg vs. "Control" 3.3 kg), weaning weight at 45 days of age was higher in "Glycol" than in "control's" ("Glycol" 8.2 kg vs. "Control" 7.6 kg; $P < 0.05$). Thus, the results indicate that the addition of propylene glycol improved the performances of goats during the transition period and the growth of nursing kids.

248. Feeding behavior and water balance in goats fed with wet brewers grain

Carlos Elysio Moreira da Fonseca, Veridiana Basoni Silva, Mirton José Frota Morenz

This work was accomplished to evaluate feeding behavior and water balance in lactating goats, fed with diets containing different levels of substitution of the concentrate by wet brewery grains (WBG): 0, 25, 50, 75 and 100%. Five goats Boer x Saanen and five Saanen goats were randomly assigned in two 5x5 Latin squares. The five experimental periods had duration length of 15 days, 10 for adaptation and five days for data and sample collections. The roughage used was Tifton Bermudagrass hay, in roughage:concentrate rate of 40:60. The animals were allocated in metabolic cages, fed twice a day. For the feeding behavior, the feeding times (FT), idle time (IT) and rumination time (RT) were evaluated for each animal every 20 minutes during 24 hours. The feeding times (FT) and idles times (IT) weren't affected by increasing of levels of WBG in the diet, however, the rumination times and total chewing time had growing linear effect with increase of levels of WBG in the diet. The water balance was influenced by the increase of the levels of WBG in diet, where larger intakes and excretions were obtained by animals that consumed diet without WBG in its composition. Increases of levels of WBG decreased the intake and the excretion of water. The use of WBG in goat's diet does not affect the feeding times, but increases rumination time.

249. Milk restriction on the estomach compartments development in Nubian kids goat

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In the suckling phase the higher milk intake results in higher performance of the kid goat, however it delays the development and functioning of rumen. The milk restriction can increase the solid food consumption, which is positively correlated to the development of the reticulum-rumen. The experiment was assigned to evaluate the development of the stomach compartments of kids goat fed with different milk offers. 18 animals, 15 days old, being nine males and nine females had been used. They were allocated in three groups based on three levels of goat milk offer: 10, 15 or 20% of the live weight, supplied in two daily meals in collective bottles. During all the experimental period, the animals had been kept in collective stalls, having water, forage and concentrate “ad libitum”. The animals had been weighed weekly and the amount of offered milk was corrected in accordance with the average live weight of the treatment. From 42o day after-birth, offers of milk were fixed until weaning, that it occurred to the 63 days. The males had been slaughtered for evaluation of the compartments of the stomach. The data had been express in percentage of the live weight and had been compared by Test T (P<0.05). There are not significant difference among the treatments for the weight of the compartments, whose averages had been 2.21, 0.14 and 0.86% of the live weight for rumen-reticulum, omasum and abomasum, respectively. The data of literature have indicated that the reduction in the milk consumption results in bigger development of the reticulum-rumen and minor development of abomasum. The absence of significant effect in this experiment can have occurred because the fixed offer of milk to the 42 days, stimulated the solid food consumption and the development of the reticulum-rumen in the last weeks of the experiment, being a good strategy to prepare the kids to weaning. The consumption of different milk levels does not affect the development of the compartments of the stomach of kids of the race Anglo-Nubiana. However, it has necessity of new experiments with a bigger number of animals to confirm these data.

250. Nutrition and dietary preference indices for range goats on a sarcocaulous scrubland of Baja California Sur, Mexico

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The nutritional value of the diet markedly varies under browsing conditions because of the natural composition of the vegetation. With the aim to identify the food habits of range goats, five esophageally fistulated Creole-Nubio female goats (29 kg of BW), were used to obtain extrusa samples. Collections were carried out in a rangeland of 200 ha in summer and autumn of 2006, and in winter of 2007. Twenty two fixed transects (30 m long) distributed randomly were used to measure the botanical composition of the study area by the line-intercept method. Identified species were classified as non legumes trees and shrubs (NLTS), legumes trees and shrubs (LTS), cacti, forbs, agaves or grasses. Relative frequency of occurrence, relative density, relative canopy cover, importance value (IV) and preference indices (PI) for each plant type were also measured. The NLTS were the most preferred plant type during all seasons, being higher ($p < .05$) in winter. During fall, goats increased preferences for cacti and forb species thereafter decreased. The same tendency occurred for LTS and grasses. In fall after NLTS, forbs were the most preferred plant type. Dietary crude protein (CP) was significantly different among seasons being higher in summer (14.8% DM) than fall (9.0) and winter (7.0). Metabolizable energy (ME) content followed the same pattern as CP (3.3 Mcal kg⁻¹ DM, 2.2, 2.3, respectively). Conversely, dietary cell wall was significantly lower in summer (41.5% DM) than other seasons (52.0 and 56.4, respectively). Dietary hemicellulose, cellulose and lignin followed the same tendency as cell wall. In all seasons, goats selected diets with ME values in substantial amounts to meet the energy requirements of growing range goats weighing 30 kg BW gaining 100 g d⁻¹ and consuming 1.6 kg DM d⁻¹; however, they could need protein supplementation to promote productivity in fall and winter.

251. Degraded intake protein in diet of browsing goats on a rangeland of northwest Mexico

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Quantitative expressions of rumen digestion are needed to estimate rumen degraded intake protein to meet requirements. This study was carried out with the aim of evaluate and compare the dietary degraded intake protein (DIP) by range goats under the Sonorant desert conditions. Samplings were carried out in summer and autumn 2006 and winter 2007 in a 200-ha rangeland with an animal density of 0.13 to 0.36 individuals/ha. Five free ranging Creole-Nubio castrated male goats (37 kg BW) fitted with fecal collection bags were utilized to determine daily fecal output (FO), and five esophageal fistulated Creole-Nubio female goats (29 kg BW) were also used to obtain extrusa samples to determine *in vitro* digestibility of dry matter (IVDMD). Dry matter intake (DMI) was calculated as $DMI = FO / (100 - IVDMD)$. Three ruminal cannulated goats were used for the *in situ* incubation procedure, the rate constant of degradation (kd) was determined to estimate the effective degradability (ED) of CP as $CP-ED = CP \cdot (kd / (kd + kp))$, and kp the rate of rumen passage that was assumed to be 5.0%. The DIP was calculated as a proportion of DMI. The DMI of goats was significantly different between seasons being higher in summer ($127.7 \text{ g} \cdot \text{kg}^{-1} \text{ BW}^{-0.75}$) than autumn (68.4), or winter (86.9). From summer to winter, decreasing a fraction (from 29.8 to 7.7) and increasing b fraction (from 39.6 to 56.8) resulted in a decreasing effective degradation of CP (from 52.8 to 41.1). Similarly, DIP was also significantly higher in summer (86.0) than other seasons (44.0, 38.2, respectively). According to these results, only during summer, goats selected diets with DIP levels that were sufficient to promote growth in a 30-kg BW male goat gaining $100 \text{ g} \cdot \text{d}^{-1}$.

252. Circulating eritron and living weight change of anemic goats feeding with silage of citrus pulp.

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The aim of this study was to evaluate the influence of the use of citrus pulp over the increase of circulating erythrocytes and live weight change of anemic female goats. Fifty days before the trial started, animals were dewormed, weight and were subjected to blood extraction by jugular veinepuncture. Goats were randomly distributed in two groups. A group (n=4) was fed with citrus pulp and corn stubble silage in an inclusion level of 50:50% (T1), B group (n=4) was fed with silage in an inclusion level of 75:25% (T2); they were placed in pens. The 0,30,60,90,120 and 150 days of the trial, blood samples were collected; female body weight was taken in days 0, 75 and 150. Treatments were randomly distributed on a quadruple repetition randomly design. Statistic analysis was done using Statgraphics plus 4.1 and significant group differences were compared by T Student Test (α 0.05). There was significant difference in the circulating erythrocytes variable from the 90 day of the experiment. T2 was more effective to increase circulating erythrocytes and to combat the anemia. There was no significant difference in the live weight between diets means, but there was an average increase of 10.1 Kg in relation to initial live weight ($p < 0.05$). We conclude that citrus pulp can be used as an energetic food, helping to overcome the anemia and increasing live weight of goats that suffer nutritional stress.

253. α S1-casein alleles frequency in carpathian goat

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In goat milk, among the four caseins, the most polymorphic is α S1 casein. Many alleles with four different expression levels have been identified so far: strong alleles: **A, B1, B2, B3, B4, C, H, L, M** producing 3,6g/l; intermediate alleles: E, I with 1,6g/l; weak alleles: D, F, G with 0,6g/l and null alleles: O₁, O₂, N, with no α S1 casein in homozygous animals milk. The A allele has a significant positive effect on milk protein, casein, fat content and manufacturing properties, in comparison with E and F. Cheese yield was with up to 15 % higher in AA genotypes in comparison with FF and had a lower goat flavor. In Romania the unimproved Carpathian goat has a high heterogeneity in milk quality (fat: 3,2-6,9% and protein: 2,5-5%), representing a high breeding potential. The present study goal was to investigate α S1 casein locus polymorphisms, in order to establish the nature of protein and fat content variation. To our knowledge milk proteins polymorphism in this breed has never been investigated so far. Genotyping was carried out on 212 milk samples (belonging to 5 populations from Transylvania and Moldavia regions), by isoelectric focusing. Alleles frequencies found in α S1-casein locus were: A=0,419, B=0,235, E=0,162, F=0,181. Relatively low frequencies of high expression alleles can explain in part the variation in protein and fat content of Carpathian goat milk. Due to the heterogeneity of each herd, studies in Carpathian goat populations are in progress in order to establish the frequencies of these alleles at national level and to study the possibility of using this genetic marker in Romanian goat breeding programs.

254. Total and partial digestibility and fluxes of nutrients in dairy goats fed with different sources of proteins

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Diets formulated with protein sources presenting different resistance to ruminal degradation were compared by evaluating intake, total and partial digestibility, nitrogen balance, fluxes of nutrients to omasum, production and microbial efficiency and ruminal parameters in goats. Eight rumen cannulated non-lactating, non-pregnant goats were distributed in a 4 x 4 Latin square design with two repeats. Treatments consisted of four diets where different source of plant protein account for the major protein source named soybean meal (SM), roasted soybean (RS), corn gluten meal (CGM), and cottonseed cake (CC). No difference was found as both intake and apparent digestibility of dry matter and nutrients were compared among diets. Reduction of ruminal digestibility for dry matter, crude protein and non fiber carbohydrates by using ration with RS, CGM and CC. Biological values and true digestibility for diets were similar. Amount of rumen protein were similar among rations, however fluxes of dry matter, protein and non fiber carbohydrate to omasum were higher for rations using roasted soybean, corn gluten meal and cottonseed cake. Ammonia nitrogen concentration was higher for ration with soybean meal as major protein source. Values of pH higher values were obtained for rations with RS and CC. Regarding kinetic of transit similar values were found among rations. Rations containing RS, CGM and CC as major protein source presented degradability smaller than diet using soybean meal as the major source of protein, but no difference among rations were found as availability and use by animals were compared. Diets with protein sources presenting reduced ruminal degradation do not compromised the bacterial growth, increasing flux of nutrients to omasum. Although pH and rumen ammonia are altered no compromise is observed in both production and microbial efficiency as those sources are used for dairy goats, which grant their use with similar efficiency to rations using source of more degradable protein.

255. A dynamic model of N excretion in the lactating dairy goat

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Murciano-Granadina goats are located principally in the central and southern regions of Spain. Improving N utilization in dairy goats and specially reducing N output in excreta is desirable due to global concerns of agricultural contribution of N to environmental pollution, particularly as ammonia. Data from two balance experiments were used to develop a dynamic model that was evaluated with independent data. The two balanced experiments were conducted at the Experimental farm EXCAMUR S.L. (Murcia) with 12 goats per trial. Goats were Murciano Granadina breed, allocated in metabolic cages, mid (4th month) through third lactation, with similar live weight (38.4 ± 0.3 kg), same number of births, similar previous milk production (461.53 ± 24.7 kg milk/210 standard lactation days, as average) and similar recording of somatic cell count; geometric mean of 220×10^3 cell/mL as average. The range of crude protein of the diet was 14 and 18%. Model was developed with the software Stella v9. Model predictions of faeces, urine, and milk outputs were close to observed values. Statistical analysis showed that 91% of mean square prediction error for faeces and urine output predictions was due to random variations. However, the model tends to overpredict milk N output, especially at higher N intake levels. Evaluation of model predictions for independent experimental observations showed good agreement between predicted and observed urine N output (93% due to random variations). The model predictions of N outputs in excreta were sensitive to changes in protein concentration of the diet. Therefore, reducing crude protein concentration in the diet to about 10% could reduce the N production by 15%. The model is the first step towards a mechanistic approach of nutrient modelling, and it would be a valuable method for predicting N excretions and estimating N emissions from dairy goat systems.

256. Polyethylene glycol (PEG) did not modify preference for tanniferous plants in cafeteria trials of sheep and goats with browsing experience

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Four browse trees were evaluated for plant density, chemical composition, selectivity index, preference and intake rate (IR) by goats and sheep. Trees were selected for their condensed tannin content and high biological activity (*Havardia albicans*), medium biological activity (*Leucaena leucocephala*) and low biological activity (*Acacia gaureri*). 10 Criollo Kids (16.9 kg \pm 0.71 kg live weight (LW)) and 10 sheep (23.7 kg \pm 1.43 LW) with 8 months of browsing experience in native vegetation were used in the study. Cafeteria experiments were performed. Polyethylene glycol (PEG), was administered to five goats and five sheep during all experiments. In experiment 1 and 3 fresh foliage of *Acacia gaureri*, *Havardia albicans*, *Leucaena leucocephala* and *Brosimum alicastrum* were offered *ad libitum* for 4 h periods. In experiment 2 and 4, *B. alicastrum* was withdrawn and preference of remaining tree foliages was measured. Samples were collected for chemical composition, and phenolic compounds (Total phenols, Total Tannins, Condensed Tannins and biological activity) determination. Effective intake time and Intake Rate (IR) (g dry matter (DM)/min) were measured for the first and fourth hour. Preference for goats in exp 1 was: *B. alicastrum* (16.23 g DM/kg LW) > *A. gaureri* (8.84 g DM/kg LW) > *H. albicans* (5.98 g DM/kg LW) = *L. leucocephala* (4.08 g DM/kg LW) ($P < 0.05$). Preference for sheep in exp 3 was: *A. gaureri* (14.77 g DM/kg LW) > *B. alicastrum* (11.77 g DM/kg LW) > *H. albicans* (3.71 g DM/kg LW) = *L. leucocephala* (1.87 g DM/kg LW) ($P < 0.05$). Preference for goats and sheep in experiment 2 and 4 was: *A. gaureri* > *H. albicans* = *L. leucocephala*. Condensed tannins intake was higher in goats than in sheep. PEG administration, however, had no effect in preference or intake rate during all experiments in goats and sheep. Through the experiments, sheep Selectivity Index was higher than goats ($P > 0.001$). Intake rate seemed to have been associated with plant density. Also, fiber components (lignin, ADF, NDF, cellulose, Hemicellulose+cellulose) were found to be better predictors intake than measured polyphenolic compounds and its biological activity, at levels typically found in the evaluated forages.

257. Voluntary herbage intake in grazing dairy goats on the Mexican plateau

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The objective of this study was to determine the voluntary intake and herbage selectivity in goats under extensive grazing conditions in the dry and rainy season in the south-west of the Tlaxcala state, in the central Mexico plateau. Six goats grazing in an extensive system of each season were used to estimate the voluntary intake (VI g/day = fecal output (gDM/day) / (1-(*In vitro* DM digestibility/100))). Fecal output was estimating using 6 g of chromium oxide as an external marker, and it was dosed in gelatin capsules before and after the grazing period, during 14 days prior to initiation of a 6 days fecal collection period. A total of 10 composite forage samples, representative of the diet ingested by the goats were collected, each composite forage sample was obtained from 15 to 20 sub-samples. Forage samples were determinate: *In vitro* dry matter digestibility, DM, OM, protein, NDF and ash concentration. The dominant forage species that were most frequently grazed by the goats were collected and identified to assess goat preferences. All data were analyzed with the T-student test. There was difference in the voluntary intake (2450 vs. 1835.7 g/day, $p \leq 0.01$) during the dry and rainy seasons, respectively. There were not differences in the concentration of OM, NDF and ash in the herbage collected during the dry and rainy season. But the herbage in rainy season had a significantly higher ($p \leq 0.01$) content of protein (15.03 vs. 9.28%) and a significantly lower ($p \leq 0.01$) content of dry matter (94.04 vs. 96.96%). The relationship in protein intake according with voluntary intake, the goats consumed more protein grams (21.3%) in the rainy season. However, protein intake goats was enough to cover the maintain requirement under these conditions.

258. Ingestive behavior of lactating goats fed whole sugar cane (*Saccharum officinarum*)¹

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Five multiparous lactating Saanen goats (43.5 ± 6.8 kg body weight and 30 days in lactation) were used in a 5 x 5 Latin square experiment. Each period lasted 17 days with the first 10 days for diet adaptation followed by 7 days for data collection. Goats were housed in individual pens with wooden floor and had free access to water. Dietary treatments consisted of a control diet with chopped (5 mm) tifton hay (TH) as the only forage with chopped (7 mm) whole sugarcane (WSC) replacing 25, 50, 75 and 100% of TH in the other four diets. All diets were formulated to be isonitrogenous. Whole sugar cane was chopped daily and then treated with urea solution at the rate of 50g/kg DM. Treated WSC was thoroughly mixed with the other ingredients prior to feeding. Diets were offered as TMR twice daily in two equal meals at 8:00 and 14:00 for ad libitum intake and the amounts fed and refused were recorded daily. Behavior observations were made at five minutes intervals during 24 hr on the first day of observation period. Data were subjected to analysis of variance for a Latin square design using PROC MIXED of SAS. Differences were considered significant if $P \leq 0.05$. Drinking Water reduced linearly as function of sugarcane inclusion. However, water intake (drinking water + water from feed) was not affected by sugar cane inclusion (mean 3.36 kg water/kg DM intake). Time expended with feeding reduced and with rumination increased linearly ($P < 0.05$) as the level of WSC in the diet increased. Feeding efficiency varied from 8.9 to 6.4 g DM/minute and 3.2 to 1.5 g NDF/minute. Chewing efficiency varied from 5.0 to 2.8 g DM/minute and 1.8 to 0.7 g NDF/minute. Goats spent more time ruminating than sheep, however, chewing less DM and neutral detergent fiber/minute.

259. Ventricular coronary arteries in goats (*Capra hircus*)

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Twelve hearts, along with great vessels, were dismembered from carcasses of immediately slaughtered goats (*Capra hircus*), and flushed adequately with tap water and then perfused with heparinized normal saline. Six of such specimens were subjected for injection of lead-oxide-soap-water suspension and the rest were subjected to injection of activated resin polymer, into the coronary arteries, for angiographic and three dimensional corrosion cast study, respectively. The findings of angiographs and corrosion casts were compiled. The heart of goat is typically a left coronary type and has two main coronary arteries, left and right, originating from their respective sinuses in the bulbus aortae. The left coronary artery (*arteria coronaria sinister*) showed two major offshoots of arteries - i) through sulcus interventricularis paraconalis the left anterior descending artery (LAD: *ramus interventricularis paraconalis*) to incisura apicis and ii) the left circumflex artery (LCFX: *ramus circumflexus sinister*). LAD provides offshoot of the septal artery (*ramus septi interventricularis*) for the interventricular septum. Initially, LCFX runs through the left part of the coronary groove (*sulcus coronaries sin.*) beneath the cover of the left auricle into the sulcus interventricularis subsinuosus on the atrial surface of the heart and then finally, it runs towards the apex of the heart (*apex cordis*) as posterior descending artery (PDA: *ramus interventricularis subsinuosus*). Right coronary artery (RCA: *arteria coronaria dexter*) is quantitatively very small and after its origin enters the right coronary groove and then traverses the caudal aspect of the left ventricle for anastomosis with the branches of PDA.

260. Blood and liver mineral concentrations of goat kids in semiarid rangelands of northeast Mexico, during the dry season

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Charcoal grilled goat kid (cabrito al pastor) is a high value regional dish in restaurants of the state of Nuevo Leon. Goat kids are generally purchased within 20 to 40 days of age, from various regions of Northeast Mexico. Goat kid diet is exclusively milk. The objective of this study was to detect mineral deficiencies of goat kids from un-supplemented dams in semi-arid rangelands, during the dry winter season. Thirty eight goat kids were transported 300 km from a ranch in the state of Coahuila to the city of Monterrey, in the state of Nuevo Leon. Macro-minerals (calcium, phosphorus, sodium, magnesium and potassium) in blood serum and trace minerals (iron, manganese, zinc, copper, selenium and molybdenum) in liver were determined using an Optima 2000 DV Inductively Coupled Plasma with Optical Emission Spectrometer (ICP-OES). Pre-slaughter average body weight was 7.12 kg (SE = 0.12). Carcass mean weight was 4.37 kg (SEM ± 0.08). Carcass dressing percent averaged 61.4% (SEM ± 0.19). Serum macromineral concentrations were: Ca, 16.8 mg/dl (SEM ± 3.0); P, 10.8 mg/dl (SEM ± 2.9); K, 382 ppm (SEM ± 4.0); Mg, 28 ppm (SEM ± 1.2); and Na, 2162 ppm (SEM ± 41.8). Liver macro-mineral concentrations were: Ca, 460 ppm (SEM ± 10.2); P, 8,673 ppm (SEM ± 158), Mg, 564 ppm (SEM ± 13.5); K, 6,520 ppm (SEM ± 252); and Na, 2,142 ppm (SEM ± 48). Serum trace mineral concentrations were: Fe, 21 ppm (SEM ± 2.7); Mn, 0.6 ppm (SEM ± 0.1); Zn, 13 ppm (SEM ± 2.1); Cu, 1.0 (SEM ± 0.07); and Se, 0.112 ppm (SEM ± .008). Liver trace mineral concentrations were: Fe, 318 ppm (SEM ± 45.2); Mn, 11.4 ppm (SEM ± 0.8), Zn, 205 ppm (SEM ± 14.0); Cu, 142 ppm (SEM ± 12.5); Se, 0.29 ppm (SEM ± 0.006); and Mo, 2.6 ppm (SEM ± 0.1). Although P concentration in serum was within normal range, Ca was much higher than reported in the literature. High concentrations of Ca and P in blood of kids may reflect the high amounts of these elements consumed in milk. Trace minerals concentrations in liver were above normal. Goat kids may have had enough of these trace elements in milk. However, offering dams a mineral supplement may help prevent deficiencies of these elements in both dams and kids, improving their performance.

261. Mammary gland size and nipple sphincter size in relation to milking time in Criollo goats

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For milk production, it is important the time used at milking parlor, since the great amount of time invested in this activity reduces time for other farm chores such as feeding, among other. In order to study some practical measurements of the udder and their correlation with milking time, the present research was done at the Facultad de Estudios Superiores Cuautitlan, Mexico, with the following geographic location, latitude 19°45'57", longitude 99°12'01" and 2,240 meters above sea level. 50 lactations were revised in three different periods; in each goat were measured upper diameter of the udder, inferior diameter at nipple separation and udder height using a tape measure in centimetres; nipple sphincter was classified in two categories: small and big depending on milk flow by hand before using a milking machine. A portable machine (Alfa-Laval) was used with 40 Kpa in pressure. Milking time was measured with a chronometer. Milk production was measured in milliliters at 15 days intervals. For statistical evaluation lineal correlation and analysis of variance were used. Significant correlations were upper diameter of the udder with milking time 0.38 (P<0.02); milk production, 0.72 (P<0.0007). Inferior diameter of right nipple with milking time 0.39 (P<0.02) and with milk production 0.75 (P<0.0001). Udder height with milk production 0.69 (P<0.001) and sphincter size with milking time -0.45 (P<0.04). For the milking time, comparing small versus big sphincter, no significant differences were found, 78.77 ± 10.63 versus 74.40 ± 9.11. The right udder produced more milk than the left side; this means that in animals with ¾ Nubian blood, and relatively low production, udder halves work unevenly. It can be concluded that in order to carry out animal selection under udder measurements the most useful parameter was upper diameter of the udder.

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262. Intake, digestibility, rumen metabolism and growth performance of goat kids raised under different production systems

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Forty-five wether goat kids (BW of 21.76 ± 0.76) were randomly assigned to one of three production systems for 14 weeks to evaluate intake, digestibility and goat performance. Production systems were: 1) feedlot (FL), housed in individual pens and fed 40% protein pellets, 40% soybean hulls and 20% Bermudagrass hay; 2) grazing continuously on 1 hectare bahia grass pasture (BP) supplemented daily with 150 g of protein pellets/hd; and 3) browsing rotationally on 4, 0.5 hectare mimosa (MB) supplemented daily with 100 g cracked corn/hd. Body weights were recorded every two weeks. Feed intake and digestibility were measured on eight goats from each treatment groups. Goats were fitted with canvas fecal collection bags, allowed for 3 days of adjustments followed by 5 days of fecal collection. Feces, feed offered, pasture and browse samples were analyzed for acid insoluble ash to determine digestibility and predict intake. Rumen fluid and blood samples were collected to measure volatile fatty acids and blood urea nitrogen (BUN). Goats on FL system gained faster ($P < 0.05$) and reached highest ($P < 0.05$) final BW in less days as compared with MB and BP-BP goats had lowest ($P < 0.05$) growth performance. Estimated DMI and digestibility for goats on FL system was highest ($P < 0.05$) when compared to other systems-goats on MB having the least ($P < 0.05$) intake and digestibility. However, gain efficiency was highest ($P < 0.05$) for goats on MB when compared to others, with goats on BP having the least ($P < 0.05$) gain efficiency. Rumen pH was lowest ($P < 0.05$) for FL goats and highest ($P < 0.05$) for MB goats. Molar proportion of acetate was lowest ($P < 0.05$), and isobutyrate and isovalerate were highest ($P < 0.05$) for MB goats with no change ($P > 0.10$) in butyrate and valerate. However, acetate: propionate was lower ($P < 0.05$) for FL goats. Blood urea nitrogen was higher ($P < 0.05$) for MB goats before feeding, one, or two hours after feeding. Goats on FL and BP system had similar ($P > 0.10$) BUN.

263. Effects of tree foliages as supplements to low quality roughages on intake, digestibility and nitrogen utilization by goats

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A meta-analysis of data obtained from previous studies was conducted to study the responses of foliage supplementation to low quality roughages on intake, digestibility and N utilization by goats. Studies were included in the database when roughages were fed as basal diets and foliages were only used as supplements. Twenty-two published studies containing 94 treatment means and 428 goats were included in the database. Data analysis was performed taking into account the random effect of the study using mixed model procedure. Basal DM intake decreased linearly with increased percentages of foliage (FP) in the diets ($49.2 - 0.314 \times \text{FP}$ g/kg BW^{0.75}; $P < 0.001$; $R^2 = 0.88$). However, total DM intake increased linearly ($48.2 + 320 \times \text{FP}$, g/kg BW^{0.75}; $P < 0.001$; $R^2 = 0.70$) with increasing FP in the diets. DM digestibility increased quadratically with increasing FP ($536 + 2.58 \times \text{FP} - 0.027 \times \text{FP}^2$, g/kg; $P < 0.001$; $R^2 = 0.38$). The maximal response of DM digestibility was 592 g/kg at 40% of foliages. Similarly, CP digestibility responded quadratically with increasing FP ($431 + 7.44 \times \text{FP} - 0.068 \times \text{FP}^2$, g/kg; $P < 0.001$; $R^2 = 0.38$) with peak digestibility of 608 g/kg at 35% foliage. However, foliage supplementation decreased NDF digestibility ($P < 0.001$; $R^2 = 0.23$). Digestible DM intake increased quadratically ($26.2 + 0.476 \times \text{FP} - 0.005 \times \text{FP}^2$, g/kg BW^{0.75}; $P < 0.001$; $R^2 = 0.55$) with FP levels in the diets peaking (35.8 g/kg BW^{0.75}) at 40% foliage. Fecal N ($P < 0.001$; $R^2 = 0.77$), urinary N ($P < 0.001$; $R^2 = 0.68$) excretion and N retention ($P < 0.001$; $R^2 = 0.45$) increased linearly with increasing foliage supplementation. Percentage of fecal N excretion of total N intake decreased quadratically ($56.9 - 0.744 \times \text{FP} + 0.007 \times \text{FP}^2$; $P < 0.001$; $R^2 = 0.26$) due to foliage supplementation with lowest fecal N excretion (39%) at 35% foliage levels. Tree foliages can be incorporated up to a level of 40%, as supplementary feeds to low quality basal forage for optimum feed utilization in goats, beyond which nutrient utilization may be adversely affected.

264. Effects of safflower seed oil and conjugated linoleic acid on milk fatty acids composition of Xinong Saanen goats

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To determine the effect of polyunsaturated fatty acid from plant oil supplementation on dairy goat milk fat composition, 8 multiparous Xinong Saanen goat (DIM 63.88±2.16) from the herd of the Saanen Goat Farm of Northwest A&F University were selected for two 4×4 Latin square experiments simultaneously. There were 4 treatments in each experiment, goats received one of 4 treatments which was supplemented with plant oil at the level of 0%, 1%, 2% or 3% (DM basis). Milk samples were collected twice a day in the morning and afternoon for two consecutive days in the end of each period, and the FA composition was assayed by GC-MS. All data was statistically analyzed by analysis of variance using the general linear models (GLM) procedure of SPSS (13.0). The 4 periods of 12 wk feeding trial showed that: in experiment 1 (Safflower oil), (1) the percentage of milk fat reduced with the increasing level of oil supplement, and show no influence on FA synthesis of C6:0, C8:0, C10:0, C12:0 and C14:0 in milk fat, but C16:0 content decreased significantly (P<0.05). (2) unsaturated FA such as C16:1, t-11 C18:1, c-9, t-11 CLA enhanced significantly (P<0.05); in experiment 2 (CLA), (1) the percentage of milk fat reduced with the increasing level of oil supplement, and show no effects on C6:0, C8:0, C10:0 and C16:0 of milk fat, C12:0 and C14:0 significantly reduced (P<0.05). (2) unsaturated FA such as C16:1, t-11 C18:1, c-9, t-11 CLA enhanced significantly (P<0.05). The contents of milk c-9, t-11 CLA, and t-11 C18:1 (TVA) of goats with 3% plant oil supplementation in experiment 1 were significantly higher than that of control group, which was 2.84 times and 3.36 times higher than that of control group respectively, two unsaturated fatty acids with 3% plant oil supplementation in experiment 2 were 2.58 times and 3.39 times higher than that of control group respectively. In conclusion, the supplementation of plant oil in groups with 3% could significantly increase the level of total linoleic acid of milk fat in both experiments.

265. Effects of high dietary soybean oil for goats in late lactation on intake, milk composition and fatty acid profile.

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Animal and vegetable fats are generally added to livestock diets to increase energy density. Unlike other ruminants, goats can tolerate more than 6% dietary fat. Feeding a diet containing soybean oil (SO), rich in polyunsaturated fatty acids (PUFA) to goats can change the fatty acid (FA) profile and composition of milk, thereby modifying its nutritional quality. PUFA such as linoleic acid are regarded as good fats since they have been shown to reduce incidences of cardiovascular illnesses in humans. Eighteen dairy goats (3 - 4 yr.; BW = 40 kg; 9 Saanen and 9 Alpine) in late lactation were used in an experiment to determine the effect of high PUFA (12% soybean oil) on feed intake, milk composition and fatty acid profile. Does were group fed once a day (2 pens per treatment) a 16% CP and 3.5 Mcal DE/kg diets containing either 6 or 12% soybean oil for 24 d. Feed intake was recorded daily during the trial and milk yield was recorded from d-10 to d-24. Milk samples were collected 3 times a week and analyzed for protein, fat, lactose, and total solids. Milk fat was extracted and analyzed for fatty acids by the fatty acid methyl ester (FAME) method using a gas chromatograph (GC) unit, fitted with a 60 m x 0.25 mm i.d. fused silica SP 2380 capillary column (Sigma-Aldrich). The data were analyzed using MIXED procedures in SAS as a completely randomized design with repeated measures. Dietary treatments did not affect ($P > 0.05$) pen feed intake, milk yield or milk composition (fat, protein, lactose and total solids). Diet containing 12% SO decreased the proportion of saturated fatty acids (SFA; C6:0, C8:0, C10:0, C12:0, C14:0, C16:0) and increased ($P < 0.01$) the proportions of monounsaturated fat (MUFA; C18:1n9; C18:1t), and the predominant PUFA, linoleic acid (C18:2n6). The results indicate that goats consuming diet with 12% soybean oil (high PUFA) in late lactation produced milk with higher proportions of PUFA and MUFA and lower proportions of SFA compared to 6% soybean oil.

266. Are cultivated forages sustainable for goat production in sub-humid and semi-arid climates?

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Year-round cultivated forage systems for goat production in sub-humid and semi-arid climates may not be sustainable. Low amounts of poorly distributed rainfall make pasture establishment and persistence a risky investment. By contrast, native rangelands rich in deep-rooted perennial browse species can outlast most droughts. Cultivated forage, however, may be useful in support of rangeland systems during seasons and years when rangeland productivity is inadequate for ideal goat nutrition. This paper reviews sub-humid U.S. systems which exemplify how cultivated forages can be used strategically in support rather than substitution of rangeland-based systems. Most of the southern Great Plains in the USA have a bimodal rainfall system with low moisture in mid winter and mid summer. Cool-season pastures can carry flocks through droughty and freezing December-February when most rangeland species are dormant. Goats grazing cool season pastures in north-central Texas averaged over 100 g average daily gain (ADG) compared to negligible gains for animals on native wooded rangeland. Compared to warm season pastures, cool season pastures are more dependable over time since rainfall in the autumn months of north-central Texas is more evenly distributed and evapo-transpiration rates lower. Cultivated warm-season forages can, however, fill the July-September dry period when low moisture limits rangeland productivity. Goats on warm season pastures specifically designed for browsers (upright forbs) had ADG of 100 g, three times greater than those on annual grass-only pastures and nearly twice as high as rangeland-fed goats. Additional cultivated forage strategies include hay, foggage (stockpiled forage), forage banks and cultivated pastures that incorporate grass/legume mixtures designed specifically for goats. Research has indicated, however, that Bermudagrass (*Cynodon* spp.) hay (12% CP), a common supplement traditionally fed to cattle and now being widely used for goats, increased ADG 43% during a dry year but had no positive effect during a year with normal rainfall. A review of the research carried out to date in Texas indicates that cultivated forages in marginal climates of the southern U.S. plains support rather than replace rangeland production.

267. Effect of four leguminous hays in goat kids diets on intake and apparent digestibility

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The aim of this work was to evaluate the effect of inclusion of four leguminous in the diet of goat kids on dry matter intake (DMI) and apparent digestibility of the nutrients. The trial was conducted at Federal Rural of Rio de Janeiro University (UFRRJ) - Brazil. Four different total mixed rations (TMR) using different leguminous hays were formulated to be isoproteic (14.0% of crude protein) and isoenergetic (66.5% of total digestible nutrients). The TMR were constituted by corn meal, soybean meal, wheat middlings, urea, mineral mixture and 25% of leguminous hay. Three tropical leguminous were used in order to replace the alfalfa (*Medicago sativa*) – a temperate leguminous – widely used in goat diets. The treatments were: treatment 1 - *Medicago sativa*; treatment 2 - *Pueraria phaseoloides* (kudzu tropical); treatment 3 - *Macrotyloma axilare*; treatment 4 - *Neonotonia wightii* (perennial soy). Eight castrated male goat kids, with mean initial weight of 18.5 kg, were maintained in metabolic cages, and randomly assigned to a replicated 4 x 4 Latin Square design. The dry matter intake (DMI) and digestibility of crude protein (CP), total carbohydrates (TC), nonfiber carbohydrates (NFC) and neutral detergent fiber (NDF) were determined. The results were compared by Newman-Keuls test ($\alpha=0.05$). The DMI values were measured daily and the values of digestibility obtained by total faeces collection. There was no difference ($P>0.05$) in the DMI, which were in average 947.0 ± 0.23 g/d or $4.3\pm 0.59\%$ of body weight. There were no differences ($P>0.05$) in apparent digestibility of DM, CP, TC and NFC, with mean values of 78.3 ± 5.7 ; 77.3 ± 6.6 ; 78.5 ± 5.7 and 86.4 ± 4.1 , respectively. There was a difference ($P<0.05$) in NDF apparent digestibility to diets with *Pueraria phaseoloides* and *Neonotonia wightii* that presented higher values of apparent digestibility of NDF ($67.9\pm 5.7\%$ and $72.13\pm 7.9\%$, respectively) when compared to *Medicago sativa* and *Macrotyloma axilare* ($64.3\pm 8.5\%$ and $64.5\pm 10.1\%$, respectively). The results indicate that the tropical leguminous studied can replace alfalfa in growing kid goats diets.

268. Replacement of corn meal for cactus pear (*Opuntia ficus indica* mill.) and its effect on milk production and feed intake by dairy goats

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This study evaluated the effect of the substitution of corn meal by cactus pear (*Opuntia ficus indica* Mill.) on milk production and feed intake of dairy goats during lactation. Ten Saanen and Parça Alpina goats were distributed into two latin squares. Treatments consisted of different substitution levels (0, 25, 50, 75 and 100%) of corn meal by cactus pear. Milk production, feed intake, dry matter intake, weight variation and water intake were evaluated. There were no differences ($P>0.05$) between genotypes or interaction between genotype and treatment for the evaluated variables. Cactus pear levels had no effect on milk production and weight variation. Dry matter intake increased linearly with increasing levels of cactus pear in the diet; mean values ranged between 1.825 and 3.239 kg/day. On the other hand, water intake was greatly reduced, linearly, due to cactus pear addition in the diet ($P<0.01$). Cactus pear can substitute corn meal in the diet of lactating goats without affecting milk production negatively, and can be an important resource to reduce water intake in dairy goats.

269. Composition, digestibility and degradability of dry-roasted mesquite pods as a feed supplement in goats.

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The effects of roasting (150°C/45 min) on composition, *in vivo* digestibility and fiber fractions degradability (NDF and ADF), of mesquite pods were tested. Eight Nubian female goats (37.6 ± 3.4 kg) rumen-fistulated, during two periods (4 goats per period) were used. Grounded mesquite pods (2mm screen), (RP) and roasted (RMP), distributed in porous bags were utilized per each treatment and period, bringing 2 bags with sample and one bag without sample to each animal throughout every degradation time (0,1,3,6,9,12,24,48 and 72 hours). Cross-over design was used. Degradation rates of fibrous fraction were calculated by the non-linear model ($\text{Deg} = a + b * (1 - e^{-c*t})$) where: (a) is the soluble fraction, (b) the potentially digestible fraction, (c) the rate of degradation over time; (a + b) represents the potential degradation, and effective degradation is considered as $(a + b * [c / c + kp])$, where kp is the rate of fractional passage (0.6 kp / h). In a second experiment, *in vivo* digestibility of fibrous fractions (NDF and ADF) were estimated, 10 male goats (32.68 ± 4.5 kg) during two periods of 22 days each were used, (15 days for diet adaptation and 7 for sampling in metabolic cages). Offered food, rejected food and feces were analyzed to determine NDF and ADF contents and to calculate intake and digestibility Coefficient (Cdig). The experimental rations were: Control (CTR) (11.74% CP, 2.1 Mcal DM), RP= 80% of Ctr +20% of RP and RMP = 80% Ctr + 20% RMP. An increase (P <0.05) in the content of CP, ADF, CP-NDF and ash was observed, as a result of roasting mesquite pods, but no changes (P > 0.05) on NDF and ADF degradation. However, degradation rates of NDF (P <0.05) were altered with a decline of the soluble fraction (a), but an increase (P <0.05) in the slow degradation fraction (b) and the fractional rate of degradation (c); resulting in an increase of effective degradation of NDF (P <0.05). Roasting increased also (P <0.05) the ADF fraction (b), resulting in a lower effective degradation (P <0.05). The inclusion of 20% of RP or RMP did not affect (P > 0.05) NDF and ADF consumption (g/d), or the Cdig and digestible NDF content in the ration as % of DM. However, the ADF consumption (g / kg /BW^{0.75}) was higher in rations with RMP. Including 20% RMP or RP in the ration improved NDF and ADF digestible content (% of the DM) when compared with the CTR ration. In conclusion, roasting of mesquite pods, can modify both, their nutrient composition, as well as the degradation kinetics of the NDF, increasing rates of fractional and effective degradation, however, the inclusion of 20% RP or RMP in the ration don't improved of the Cdig of fiber fractions, but improved NDF and ADF digestible content (%MS).

270. Use of cactus pad (*Opuntia ficus indica*) as a supplement of lactating does grassing on semiarid grassland.

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The present study was conducted in order to determine the effect of prickly pear cactus supplementation (*Opuntia ficus indica*) on milk production of goats grassing in a semiarid grassland, with a high proportion of *Atriplex canescens*, during dry season. Fourteen four years old (lactating, non-pregnant) Nubian does, were used at the San Luis Experimental Station of INIFAP, for a seven weeks experiment, beginning in May, 21 and ended in July, 15. Does were randomly assigned to one out of three treatments: 1) grassing on a native semiarid grassland with a high proportion of *Atriplex canescens*, as a unique available green forage (2 Ha) (G), and 2 and 3) similar to G group plus 1.0% (GLS) or 1.5% (GHS) of prickly pear cactus (live body weight dry matter basis). The *Atriplex* available forage, assuming a 70% intake, was 2.71 Kg/doe/day, containing 17.8±2.44% CP, 20.2±1.91% ADF and 67.1±3.65% DMD. Differences in milk production were detected due weeks ($P<0.001$), but not due to treatment or interaction ($P>0.05$). The initial milk production was 330.2±75, 292.1.2±205 and 276.5±66 ml/d for G, GLS and GHS, respectively. By the time, production tended to reduce gradually, being the final production of 82.0±66, 136.9±68 and 175.7±55 ml/d for G, GLS and GHS, respectively. However, that reduction was higher ($P<0.005$) in G does (75.0%), than in the GLS (55.4%) or GHS (36.5%), indicating that prickly pear cactus supplementation improved milk production, reducing the wide lost of milk production, originated by drought. Key words: Opuntia, Goats, milk production.

271. Whole sugar cane silages enriched with *Pleurotus sapidus* solid culture as an alternative to the feeding of goats

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The objective of the study was to evaluate whole of integral sugar cane (CAI-0) and you mix with 10 and 20 % (CAI-10 and CAI-20) respectively, of a solid culture obtained after 15 days (d) of fermentation with the mushroom *Pleurotus sapidus* (FMS-15). Nutrients contents and variables of fermentation and of 96 h *in vitro* gas production were analyzed, the experimental design was completely randomized, an analysis of variance was performed and means were compared using the Tukey test ($P \leq 0.05$). Addition of solid culture increased CP content by 1.9% which may be due to *P. sapidus* activity on the substrate, the variables fermentative him during silage showed that mixtures of CAI-20-24d had regard to other treatments a lower content of MS (3.20%), The highest value of ammonia N was for CAI-0-24d with MS 9.26% and the lowest for CAI-20-0d 3.54% MS, the highest value for lactic acid was CAI-0-24d with values of 19.44% DM, for the pH value was as high treatment CAI-0-0d with 5.36 and the lowest was for the treatment CAI-20-24d with 3.90, both suitable for the process of silage. The CP was similar for all treatments at the beginning of fermentation, day 24 was the highest value for CAI-0-24d with 13.72% DM; whereas DIVMS of the CAI-0-0d was 63.71% DM and CAI-20-24d 70.13% DM improving in this aspect 6.42 units. The study of the kinetics of gas production *in vitro* indicated that the treatment CAI-0-0d he was better ($260.63 \text{ g ml}^{-1} \text{ DM}$); treatments per day 24 with FMS-15 showed no significant differences near to $233.76 \text{ mL g}^{-1} \text{ MS}$. The highest rate of fractional gas production *in vitro* was for CAI-0-0d and FMS-15 in the first 10 hours of incubation; treatments with FMS-15 at day 24 showed a second peak of activity after 12 hours of incubation, so which leads to improved DIVMS this effect. The study offers as an alternative the use of solid crop of sugarcane with the fungus *Pleurotus sapidus*, improves the availability of compounds found in the walls of the fiber, and stabilizes production ammonia nitrogen preventing losses of nitrogen.

272. Performance of dairy goats fed whole sugarcane (*Saccharum officinarum*)

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Sugarcane (*Saccharum officinarum*) is an important cash crop in the northeast region of Brazil. The crop is mainly used for sugar and ethanol production; however, it can also be used as forage particularly during the dry season as other forages become scarce. Despite it was evaluated for dairy cows, there is little information regarding the feeding values of sugarcane to lactating goats. Five multiparous lactating Saanen goats (48 ± 6,6 kg body weight and 39 days in lactation) were used in a 5x5 Latin square experiment to determine the effects of feeding whole sugarcane (WSC) plus slow-released urea on milk yield and milk composition. Each period lasted 17 days with the first 10 days for diet adaptation followed by 7 days for data collection. Goats were housed in individual pens with wooden floor and were fed diets containing 0; 112.5; 225.0; 337.5 and 450.0 g/kg WSC and 450.0; 337.5; 225.0; 112.5 and 0 g/kg bermudagrass tifton hay (TH) and 550.0 g/kg concentrate. Diets were offered as total mixed diet twice daily in two equal meals at 8:00 and 14:00 hour for ad libitum intake. Does were hand milked twice at 8:00 and 14:00 hour. Feed offered and orts were recorded daily for individual animals. Milk samples were analyzed for fat, protein and lactose concentration by infra ready (Bentley 2000, Bentley instrument, Inc. Minnesota, USA). Does were dosed with 5 g of Cr₂O₃ twice daily as an external indigestible marker. Grabbed fecal samples were collected 3 times daily from each doe. Dry matter intake and digestibility varied from 126.1 to 81.7 g/BW^{0.75} and 68.9 to 58.9%, respectively (0 and 450.0 g WSC, respectively). Intake and total tract digestibility of dry matter, organic matter and neutral detergent fiber (NDF) decreased linearly (P<0.05) as the level of WSC in the diet increased. Milk production varied from 3.26 to 2.50 kg.day⁻¹ for 0 and 450.0 g WSC, respectively. Sugarcane inclusion linearly (P < 0.05) decreased milk, fat, protein, lactose and total solids yield, however, did not affect milk composition. It was concluded that WSC had a lower feeding values than TH for lactating goat

273. Carcass characteristics of young goats from different breed groups under two feeding systems

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The present trial was conducted at the Goat Production Center, FMVZ/Unesp-Botucatu, Sao Paulo, Brazil, with the purpose of comparing breeds, sex and feeding systems on carcass characteristics of goat kids. Seventy-eight goats from both sexes, five breeding groups and two management systems were used in this trial: 13 Alpine (7 male and 6 female), 14 Boer x Alpine F1 (7 male and 7 female), 15 ½ Anglo-Nubian x ½ Alpine (9 male and 6 female), 17 Boer x Alpine F2 (7 male and 10 female) and 19 ½ Anglo-Nubian x ¼ Alpine x ¼ Boer (9 male and 10 female). The animals were raised under feedlot conditions, weaned at 60 days of age and fed a pelleted diet containing 70% concentrate and 30% hay (S1 = 40 animals) or grazing on cultivated Tanzania grass pasture (*Panicum maximum*) (S2 = 38 animals). Animals were slaughtered after reaching 120 days of age. The effects of breed, sex and feeding system on live weight at slaughter (LWS) were significant ($P < 0.01$). Boer x Alpine (F1) presented a higher LWS ($P < 0.01$) than other breeds, male goat kids were heavier than female goat kids (23.7 vs. 20.0 kg) and animals from S1 had higher LWS in comparison to animals from S2 (26.0 vs. 17.7 kg). Hot carcass of Boer x Alpine (F1) goat kids was heavier (11.5 kg) than Boer x Alpine F2 (9.2 kg), Alpine (9.7 kg), ½ Anglo-Nubian x ¼ Alpine x ¼ Boer (10.4 kg) and ½ Anglo-Nubian x ½ Alpine (9.9 kg). Dressing percentage was affected ($P < 0.01$) by feeding system and was greater ($P < 0.01$) for S1 (47.0%) than for S2 (43.9%). The size of wholesale cuts was affected by breed. Boer x Alpine (F1) goat kids showed better performance with respect to size of leg, loin and rib cuts. In addition, the proportion of all cuts for male and goat kids raised on S1 was found to be greater ($P < 0.01$) than that of S2 and females. Findings of this study indicated that Boer x Alpine (F1) goat kids had better carcass characteristics than the other breeds.

274. Assessment of nutrition of grazing goats and sheep, tethered at pasture

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Goat and sheep production are important renewable resources in tropical areas for the production of meat and milk. Both species are commonly tethered or managed extensively, occupying little housing space and conveniently cared by unpaid family labour (Devendra, 1981). As nutrition is an important limiting factor for small ruminants in Tropics, we attempted to estimate the nutritive value of *Digitaria decumbens*, grazed by individually tethered does or ewes, based on the estimation of digestibility and faecal output. Four dry Creole does (28 ± 2.1 kg LW) and 4 dry Black-Belly ewes (45 ± 2.4 kg LW), equipped with faecal bags, were tethered in a *Digitaria decumbens* based sward at 28 days of regrowth, during two grazing cycles. Organic matter digestibility (OMD) was estimated from faecal N according to local hyperbolic equations established for bucks and rams (Boval et al, 2003). OMI was calculated from OMD and faecal output by gathering all faeces excreted during 4 days. The energy supply was calculated according to the French Unit Systems from OMD ($1.55 \cdot \text{OMD} \cdot \text{OMI}$, $R^2=0.98$; r.s.e.=0.009, Aumont et al, 1995). The characteristics of sward (height, herbage mass, morphological and chemical composition, *in situ* tiller measurements) were measured individually for each animal on their grazing area, being possible by using the tethering practice. The OMD was slightly higher for the does compared to the ewes (0.705 vs 0.687, $P<0.05$). The OMI was similar for both species (29.8 vs. 31.3 g/kg LW^{0.75}, $P>0.05$). The energy supply, estimated for the does and the ewes (0.405 and 0.578 UF/day) were consistent with theoretical energy requirements for dry does and ewes, respectively 0.396 and 0.555 UF/day. Sward characteristics were not related to OMI, but did to OMD. The most determining sward characteristics for the does OMD were the cumulated leaf length per tiller ($R^2=0.72$), and for the ewes OMD, the stem length and the NDF content together ($R^2=0.80$). Faecal nitrogen, combined with faecal bags and tethering practice provide a useful tool to study both sward and animal variables, individually and simultaneously.

275. Utilization of fresh and treated Albazia foliage N by goats

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Tree foliages can be a potential source in scarce feed resources and present subsistence level of goat farming. The presence of high level of tannins in tree foliages can bind forage protein and reduces their utilization. The study was conducted on amelioration of nutritive values of tanniniferous foliage by different chemical treatment and N utilization by goats. Fresh *Albezia procera* (*Albezia*) foliage of 2 months old and grown in dry season was treated with $\text{Ca}(\text{OH})_2$ at the rate of 2% of foliage DM, mixed with water, sprayed and left in sun for 3 days. Sixteen whether goats were divided into 4 groups and offered basal diet of grass hay and wheat bran and in addition, one of the group was offered fresh *Albezia* leaves (A), $\text{Ca}(\text{OH})_2$ treated *Albezia* leaves (B), A + polyethylene glycol (PEG) (C) and B + PEG (D) at the rate of 45, 25 and 30% of total feed DM requirement/d, respectively. During the 17 days feeding trial intake of feed, digestibility and microbial N yield were measured and statistically analyzed in randomized block design. The foliage contained 32.2g/kg DM of crude protein and was not affected by treatment and appeared to be a good source of forage protein. Contents of Total tannins (64.5mg/g DM) and Condensed tannin (9.5mg/g DM) in foliage were 2-3 times higher than that of wet season. Feeding of $\text{Ca}(\text{OH})_2$ treated foliages and by incorporating PEG in fresh or treated foliages to goats on average increased intake (5g and 0.1g OM and N/kgLW/d), digestibility (0.05 and 0.1 OM and N), N retention (1.03gN/kgNI) and microbial N yield (6.4g/d). Amelioration with PEG and $\text{Ca}(\text{OH})_2$ was found significantly reduced the contents of tannins in foliage and may have increased the digestibility, N retention and microbial N yield in goats. The higher extent of N utilization by goats could be due to reduction of tannins by oxidation and treatment with those oxidizing agents have removed or inactivated the tannins. It may be concluded that incorporation of PEG and $\text{Ca}(\text{OH})_2$ may be used for inactivation of tannins and improving protein utilization of tanniniferous foliages by goats.

276. Assessment of macro-minerals status in soil, water, feed resources and its influence on blood plasma of sheep and goats in central mix cropping zone of Punjab, Pakistan

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This study was undertaken to assess the effects of season, soil, water and feedstuffs on macro-mineral status of blood plasma of sheep and goats of central mix cropping zone of Punjab, Pakistan. Five sub-locations were selected randomly from the study area. From each sub-location, blood samples were collected from adult sheep and goats as well as from kids and lambs, both in winter and summer season. Lower sodium (Na) and potassium (K) levels were found in soil and feedstuffs of the area. However, in different sources of water, Na values were nearly within the range but K was slightly higher. This was followed by lower plasma Na concentration both in sheep (114.23 ± 10.21 mEq / L) and goat (121.78 ± 12.35 mEq / L). However, concentration of K was within the critical limit in sheep (4.05 ± 0.40 mEq/L) and goat (5.10 ± 1.24 mEq/L). Plasma Na, and K in both species showed effects of season, animal class and interaction by season and animal class ($P \leq 0.05$). Lower calcium (Ca) concentrations were found in soil, feedstuffs and water. The similar trend was observed in plasma Ca concentration of sheep (3.2 ± 0.98 mg / 100 ml) and goat (3.4 ± 1.26 mg / 100 ml) during winter. In contrast, phosphorus (P) was marginally deficient in soil, water and feedstuffs as well as in blood plasma of sheep (3.12 ± 2.25 mg/100ml) and goat (3.60 ± 2.25 mg/100ml) during winter and summer. The levels of Ca and P were marginally deficient in summer season in adult animals. Soil magnesium (Mg) values were slightly higher, whereas, water and feedstuffs were found to be deficient. Blood plasma concentration of Mg was higher many folds both in sheep (5.25 ± 1.85 mg/100ml) and goat (4.76 ± 1.23 mg/100ml). However, plasma Mg showed only interaction effect between season and animal class ($P \leq 0.05$). The data thus obtained was analyzed using one way ANOVA test and significant differences between means was tested by Duncan's multiple range test. From these blood analyses, it was concluded that the macro-mineral levels was significantly different ($P \leq 0.05$) in blood plasma of sheep and goats on this specific ranch of Punjab and needs supplementation with the implication of similar needs for other regions of Pakistan.

277. Milk production and composition of lactating goats fed with high moisture corn silage

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The present study was carried out at Goat Production Area of FMVZ/Unesp-Botucatu, Sao Paulo, Brazil. Twenty primiparous and multiparous Alpine goats (11-12 weeks in lactation) were individually housed in metallic cages and assigned according to milk production in five 4 x 4 Latin square arrangement. All experimental diets presented 65:35 concentrate to forage ratio. Treatments were considered the graded replacement levels (0, 33, 67 and 100%) of high moisture corn silage (HMCS) by corn grain (CG). For milk production measurements, milking were carried out at all periods. HMCS replacement levels did not affect dry matter, crude protein, ether extract and total digestible nutrients intakes, expressed in %PV, with the following mean values, respectively, 3.90, 0.47, 0.16 and 2.87%. Daily milk production, milk production corrected for 3 and 4% fat, fat percentage, protein, lactose and non-fat dry extract with the following mean values, 1.86, 1.69, and 1.56 kg/day; 2.96, 2.85, 4.36 and 7.99%, respectively, were not influenced by dietary HMCS levels. Treatments average value for total solids was 10.96%. Difference was observed between 0% and 100% HMCS level treatments. The other dietary levels (33 and 67%) did not show differences. Urea nitrogen values in milk were significant. 100% HMCS level had the highest value ($P<0.05$). Feed efficiency ratio did not differed among dietary treatments ($P>0.05$). Weight gain by period was not influenced by dietary treatments with mean value of 1.10 kg/period. Weight gain in different periods and body score condition were not influenced by HMCS dietary levels ($P>0.05$). High moisture corn silage can total or partially replace corn grain without affecting milk production in Alpine goats.

278. Dairy production of burkinabe Sahelian goat in intensive and semi-intensive rationing using local resources

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Thirty two female goats were randomly distributed in two groups of sixteen animals each. The first group was nourished completely in trough (intensive production system; IS), whereas the second group was fed a supplement to satisfy 50% of DM, energy and nitrogen requirements (semi-intensive system; SS). The feed mix contained cottonseed (37%), millet bran (33%), cowpea hay (12.5%) and sorghum straw (17.5%). All animals received a multinutrient block made with local resources. Animals in the SS were followed during grazing to observe fodder type selected and its quality. Milk production was estimated by milking after application of an oxytocin injection. Results show that woody leaves represented the greatest part of fodder taken by the goats (58% of selected fodder). Fodder consumed (DM basis) had 14.5% crude protein, 0.33% P; 9.9 ppm Cu; 23.9 ppm Zn and 78.3 ppm Mn. The production system had a significant effect ($P < 0.05$) on the milk production. Goats on the SS produced 1413 g/day, whereas those on the IS produced 1069 g/day. Greatest ($P < 0.05$) daily weight gains (41.3 g/d) were obtained with kids whose mothers grazed and were supplemented (SS), in comparison to those whose mothers were fed a complete diet (36.2 g/d).

279. Fermentation characteristics, aerobic stability and forage intake of *Stylosanthes guianensis* ensiled in round bales

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Ensiling characteristics, aerobic stability and forage intake were determined for *Stylosanthes guianensis* (SG) ensiled at two period lengths of fermentation (LF) in round bales (RB). Eighteen RB were sampled after seven periods of ensiling (0, 6, 10, 13, 18, 30, and 72 d) to determine pH, organic acid content (%), and NH₃-N/total-N (%). Data were analyzed by a general lineal model (SAS) using a completely randomized design with three replicates per day of fermentation. Aerobic stability was determined during 5 days in haylage from three bales opened after 30 and 72 d of fermentation. A split plot design in time was used to analyze the data where RB from each LF were considered as a plot, and the repetitive samples of days of aerobic exposure in each bale corresponding to each LF as a subplot. Voluntary DM intake of meat goats was determined by feeding haylage from each LF (30 or 72 d) in a diet containing 50% SG haylage and 50% grass hay, during 5 consecutive days. Data were analyzed using a mixed model for random and fixed effects, where LF, and day of aerobic exposure were considered as fixed effects, and bales from each LF as random effects. Changes in pH, and fermentation end products, during the fermentation process, were characteristic of tropical legumes ensiled in RB. SG haylage had a pH above 6.0, and low lactic and acetic acid content (< 1.5 and .8%, dry matter basis), respectively). The NH₃-N/total-N percentage increased (P < 0.05) gradually during the fermentation process, reaching its highest concentration at 30 d of fermentation. The LF did not affect (P > 0.05) fermentation characteristics of SG haylage, however, during aerobic exposure, SG fermented during 30 d suffered less deterioration than that fermented during 72 d as evidenced by lower (P < 0.05) pH and increase (P < 0.05) in temperature. Forage intake (FI) expressed as a percentage of BW, and SG intake expressed as percentage of the total offered forage were similar (P > 0.05).

280. Importance of lactating dairy goat's diet composition supplemented with live *Saccharomyces cerevisiae* on milk yield response

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Few references are available with respect to the impact of live yeast supplementation on dairy goat performance, or the relationship between the diet composition and yeast supplementation. Four hundred and fifty eight Saanen and Alpine early lactation goats (43 ± 10 days) from six commercial farms were paired on the basis of the stage of lactation, milk yield before the trial start and the parity, before being randomly assigned to a control (CON) or treatment (LY) group in each farm, to assess the effect of live *Saccharomyces cerevisiae* (SC) CNCM I-1077 (Levucell[®]SC) on dairy goat lactation performance. LY was fed to goats during 120 days at $4 \cdot 10^9$ cfu/day. Feed intake was monitored and diet components were analysed. Average diet composition on a DM basis was: CP (16%), NDF (44%), ADF (27%), starch (13%) and 6.12 MJ NEI. Data on milk production were analysed by ANOVA according to the mixed procedure of SPSS 14.0, using milk production values at grouping as covariate. Pearson correlation test was applied to assess the relationship between increase milk production due to the treatment and diet components. LY animals had a greater ($P < 0.01$) milk production (3.60 kg/day vs. 3.35 kg/day, SEM ± 0.06) of similar composition for the fat content (3.61%, SEM ± 0.04) and the protein content (3.10%, SEM ± 0.02). DMI was increased ($P < 0.01$) by an average of 0.1 kg for the LY treatment. The increase in milk production with LSC was highly positively correlated ($r = 0.95$) with the starch/sugar content (11.8-23.1%), whereas an inverse correlation ($r = -0.93$) was observed with NDF content (37.4-50.6%). In conclusion, the LY improved milk performance of early lactation does, without changing its composition. The positive effect of yeast supplementation appears to be positively related to the energetic density of the diet. However, further studies should be conducted to measure a yeast dose effect and consider different feeding systems.

281. Nutritive evaluation of *Morus alba*, *Ziziphus mucronata*, *Moringa oleifera*, *Leucaena leucocephala* and *Cajanus cajan* in the semi-arid areas of Zimbabwe.

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Studies were undertaken with the objective to evaluate the nutritive value of some potential browse trees and plant species found in the semi-arid areas of Zimbabwe. The following species were evaluated: *Morus alba*, *Ziziphus mucronata*, *Moringa oleifera*, *Leucaena leucocephala* and *Cajanus cajan*. *Morus alba* (MA) and *Ziziphus mucronata* (ZM) were evaluated by their chemical composition and through a feeding trial. The crude protein (CP), acid detergent fibre (ADF), neutral detergent fibre (NDF) and ash content of MA leaves of 173g/kg DM, 236 g/kg DM, 286 g/kg DM and 146 g/kg DM respectively. For *Z. mucronata*, CP, ADF, NDF and ash content of 147 g/kg DM, 222 g/kg DM, 391 g/kg DM and 84 g/kg DM respectively. Intake of browse (g/kg W^{0.75/d}) was significantly higher (P<0.001) for MA (24) than ZM(17). The total dry matter intake for both diets differed significantly (P<0.001). Hay intake on MA supplement was higher (P<0.001) than ZM diet. Digestibility of the two browse species was significantly different (P<0.001). DM, OM, ADF and NDF digestibility was higher on animals offered MA than animals offered ZM. Nitrogen intake and retention was also significantly different (P<0.001). The nutritive value of *Moringa Oleifera* (MO), *Leucaena Leucocephala* (LL) and *Cajanus Cajan* (CC) was investigated by laboratory analysis and in sacco degradability. MO had CP, ADF, NDF and ash content of 245 g/kg DM, 111 g/kg DM, 184 g/kg DM and 82 /kg DM respectively. LL had CP, ADF, NDF and ash content of 82g /kg DM, 242 g/kg DM, 446 g/kg DM and 61 g/kg DM respectively. CC had CP, ADF, NDF and ash content of at 150g/kg DM, 336 g/kg DM, 508 g/kg DM and 53 g/kg DM respectively. CP degradability of MO at 24hr incubation period was 540 g/kg DM and significantly different (P<0.05) from LL (at 485.0 g/kg DM) and CC (at 412.5 g/kg DM) the DM degradability at 24 hr incubation period of the total leaf material were also significantly different (P<0.05). MO had 642 g/kg DM, LL (at 565 g/kg DM) and CC (at 486 g/kg DM). The results of the studies indicate that such species have the potential to be used as feed supplements for small ruminants.

282. Performance of growing indigenous goats fed rations based on urban market crop wastes

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The effect of feeding diets that include market crop wastes (sweet potato vines (*Ipomoea batatas*) and scarlet eggplant (*Solanum aethiopicum*) wastes), on growth and intake was studied in a 12-weeks experiment using 32 indigenous intact growing male goats, 4 to 6 months old and averaging 14.0 kg. Four dietary treatments were used: Vines (sweet potato vines with elephant grass (*Pennisetum purpureum*)), Solanum (eggplant wastes with elephant grass), Mixed (sweet potato vines with eggplant wastes) and Control (elephant grass with *Leucaena leucocephala* leaves). Each diet was supplemented with maize bran, and calculated to be isocaloric and isonitrogenous. After the growth trial, 12 goats were randomly selected for a digestibility trial with the same diets, and 8 goats for a feed preference test, which included the market wastes and elephant grass. Mean crude protein (CP) content ranged from 75 g/kg dry matter (DM) for elephant grass to 83, 142 and 268 g/kg DM for sweet potato vines, eggplant wastes and *Leucaena* leaves, respectively. Total CP intake was highest ($P<0.05$) for the Control (48 g/day) and lowest for the Vines (23 g/day) diet, but not different between the Mixed (35 g/day) and Solanum (34 g/day) diets. The average daily gain was between 11.0 and 14.2 g/day, and was not significantly different among the diets. Diet affected ($P<0.05$) DM and CP digestibility, nitrogen (N) intake and retained N. Overall, DM and CP digestibility, respectively, were 0.56 and 0.56 for the Control, 0.62 and 0.56 for Mixed, 0.59 and 0.49 for Vine, and 0.54 and 0.45 for the Solanum diet. N excretion through faeces and urine was highest ($P<0.05$) in goats offered Vines or Solanum diets. Goats offered the Solanum diet were generally characterized by the lowest ($P<0.05$) N retention (0.025 g/day). Goats showed a lower ($P<0.05$) preference for eggplant wastes, but no difference ($P>0.5$) between sweet potato vines and elephant grass. On average, goats spent 5% of the 8 hour observation time eating eggplant wastes, 34% on sweet potato vines and 36% on elephant grass. In conclusion, growth performance and N utilization by the goats were low, and the poor intake characteristics of the market crop wastes, especially eggplant wastes, may account for these poor findings.

283. Mineral status of grazing goats under extensive condition in semi arid area in Brazil

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Rio Grande do Norte in Brazil is a semi arid region called Caatinga receiving an annual rainfall less than 400 mm. During the long dry season, rainfall is scarce, thus, most forage species are withered. Farmers leave their sheep and goats to graze freely on indigenous pasture in their farms. During the dry season, grazing animal's forage intake is too low to meet energy, protein and mineral requirements. The situation is worsened by presence of alkali soil in this region that might lead to mineral imbalance in the soil. The objective of this study was to determine blood mineral concentration of grazing goats in this region during dry season. The study was conducted in 4 farms of Mossoró, Rio Grande do Norte (5°2'S, 36°8'W) in January and February, 2006. Averages of 200 goats per farmer were under free range grazing conditions throughout the year without any supplementation. Animals depend on browsing on leaves, twigs and fruits of coconut trees during the dry season. A total of 40 mixed-bred goats were used. Blood sample from each animal was taken from the jugular vein. Sodium (Na), potassium (K), sulfur (S), calcium (Ca), phosphorus (P), magnesium (Mg), iron (Fe) and copper (Cu) concentrations were analyzed. With exception of Cu, mean values of blood mineral concentrations of animals in each farm were within the normal range of > 3,220 mg Na/L, < 156 mg K/L, >500 mg S/L, > 70 mg Ca/L, > 60 mg P/L, > 14 mg Mg/L, > 1.9 mg Fe/L and > 0.9 mg Cu/L recommended by Underwood and Suttle (1999) and NRC (2001). However, variations between farms ($p < 0.05$) existed for P (100-163 mg/L), Mg (21-29 mg/L) in January and Cu (0.8-1.2 mg/L) in February. Animals in 2 farms had lower concentrations of blood P and Cu than those in other 2 farms ($p < 0.05$). This study suggests that grazing goats should be supplemented with minerals that were deficient, especially Cu, particularly during the dry season.

284. Performance of $\frac{3}{4}$ Boer + $\frac{1}{4}$ Saanen and Saanen goats fed with dry yeast as protein source in rations

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Twenty-seven male kids $\frac{3}{4}$ Boer + $\frac{1}{4}$ Saanen ($n=18$) and Saanen ($n=9$) initially weighing 18.0 ± 1.6 kg fed rations containing dry yeast (DY) of sugar cane as protein source (*Saccharomyces cerevisiae*), were used to evaluate feed intake, growth performance, carcass yield (cold carcass weight/body weight) and carcass biological yield (cold carcass weight/empty body weight). Male kids were randomly distributed in factorial arrangement 2 (genetic groups) x 3 (rations), allocated to individual pen. Three groups of nine kids each were fed pelleted rations composed of soybean meal (SM), soybean meal plus dry yeast (SMDY) or dry yeast (DY) as protein source, oat hay, ground corn and mineral supplement. The diets were formulated to contain 19.1% crude protein and 2.51 Mcal of ME/kg DM. No differences were obtained among treatments in dry matter intake (0.79 kg/day). However, crude protein, ether extract, neutral detergent fiber and acid detergent fiber intakes were higher ($P<0.05$) with SM than with DY or a combination of both sources of protein. Growth performance was not influenced ($P>0.05$) by rations. However, differences were observed ($P<0.05$) between genetic groups, for the $\frac{3}{4}$ Boer + $\frac{1}{4}$ Saanen goat kids had greater total body weight gain, average daily gain (0.25 vs. 0.18 kg/day) and better feed conversion, consequently, attaining earlier the desired slaughter weight (51 vs. 63 days on feed). Greater carcass yield and carcass biological yield ($P<0.05$) were obtained for Saanen (45.97% and 53.65%) than for $\frac{3}{4}$ Boer + $\frac{1}{4}$ Saanen goat (44.77% and 52.74%). In conclusion, dry yeast is an alternative protein source that can be included in rations of goat kids in substitution of with soybean meal, obtaining similar performance and carcass yield. Boer crossbred kids reached their slaughter weight earlier than Saanen kids, thus potentially increases economic returns for goat producers.

285. Comparative evaluation of some browse foliages for small ruminants production in the subhumid zone of West Africa

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The effect of feeding foliage from *Azelia africana*, *Pterocarpus erinaceus* or *Khaya senegalensis* on growth performance and internal parasite infestation was evaluated using 32 West African Djallonké rams of about 8 months of age and with a mean initial body weight (BW) of 16.1 kg. The animals were randomly assigned to four groups of 8 animals. The experiment lasted 13 weeks. All the animals received the same amount of hay from *Andropogon gayanus* and maize bran (200 g/day each) and dried foliage *ad libitum*. The control group was fed cottonseed cake (average of 234 g/day). The data were subjected to ANOVA using the GLM procedure of Minitab. The number of coccidia oocysts was transformed ($\log_{10} x + 1$) to approximate normal distribution before analysis. There was no difference ($P = 0.36$) in growth rate between sheep offered *A. africana* (62.9 g/d) or *P. erinaceus* (58.8 g/d), although sheep offered *K. senegalensis* had a lower ($P < 0.05$) average daily gain (48 g/day). Sheep offered *P. erinaceus* and *K. senegalensis* had similar ($P > 0.05$) carcass characteristics and dressing percentage, but lower ($P < 0.05$) *fasted* BW, empty BW, carcass weight and dressing percentage than sheep offered *A. africana*. The average number of coccidia oocysts per gram of faeces of animals fed *P. erinaceus* (3478±555) and *K. senegalensis* (3339±622) was significantly lower ($P < 0.05$) than in faeces of animals fed *A. africana* (4695±644). These tree species may provide a valuable supplement for periods of feed shortage in subhumid regions

286. Effects of distillers dried grains with solubles on intake, digestibility, and passage rate in goats.

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Objectives were to evaluate effects of various dietary inclusion levels of distillers dried grains with solubles (DDGS) on dry matter intake (DMI), particulate passage rates, and apparent nutrient digestibility in meat goats. In a 4 x 4 Latin square arrangement of treatments, four mature crossbred Boer wether goats (51.39±0.89 kg BW) were fed once daily diets containing 36.7% bermudagrass hay (BGH) plus 63.3% concentrate with 0, 12.7, 25.4, and 38.1% of DDGS replacing corn and soybean meal in the concentrate portion of the diet. Concentrate mixes were made to be isonitrogenous at 16% crude protein. Each period had 2 weeks of adjustment followed by 5 days of total collection. Feed offered, refusals and fecal output were monitored. The ytterbium-marked BGH was used to determine the passage rate. With the inclusion of DDGS, ether extract contents of total diets increased from 2.39 (no DDGS) to 4.98% (38.1% DDGS). No differences were observed in DM, acid detergent fiber (ADF), neutral detergent fiber (NDF), and hemicellulose and non-fiber carbohydrate (NFC) intakes between treatments. Ether extract (EE) intake increased ($P < 0.01$) as DDGS level and percent fat levels increased in the diet. The DM digestibility tended to decrease ($P = 0.14$) with increasing levels of DDGS. Similarly, ADF digestibility decreased ($P < 0.04$) as DDGS replaced higher levels of corn and soybean meal in the diet but NDF digestibility was not different ($P = 0.16$). The EE digestibility was higher for goats consuming 25.4% DDGS (quadratic; $P = 0.04$). The passage kinetics was not affected by DDGS inclusion. Overall, up to 38% of DDGS (on dry matter basis) can be included in diets for meat goats without any compromise in nutrient intakes and digestibility.

287. Formulation and acceptability of multi-nutritional blocks made from organic residues for supplementing goat diets

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Goat production in Puerto Rico requires dietary supplementation because of the low quality of tropical forages. The increasing price of concentrated feed has focused research of other viable options for supplementation. The objective of this study was to determine the physical and chemical characteristics of multi-nutritional blocks (MNB) made from organic by-products (poultry litter, PL and coffee husk, CH) and to evaluate their acceptability by meat goats. PL: CH were mixed in 4 different combinations; 40:0 (T1), 35:5 (T2), 30:10 (T3) and 25:15 (T4). All combinations included cane molasses (40%), ground lime stone (10%) and a commercial vitamin and mineral pre-mix (10%). MNB were prepared in wooden frames (13.2cm²) and dried at 65° C/24 h. Physical property evaluated included Hydraulic Press Resistance (HPR) and chemical composition included; DM, IM, CP and NDF. Data were analyzed using the GLM procedure of SAS. MNB acceptability was tested during a 1 hour period in three trails using 8 meat goats per trial and determined by counting the number of goats approaching and consuming the MNB of each treatment every 5 minutes. As to physical properties, the T1 MNB was shown to be harder ($P<0.05$, 2119.0 lb) than those of the other combinations (1279.9, 1167.1 and 1108.2 for T2, T3 and T4, respectively). DM content for all treatments was similar ($P=0.05$), however, IM content was higher in T1 (45.48%) than T3 (41.30 %) and T4 (37.69 %), but similar to T2 (44.16 %). CP content was highest ($P<0.05$) for T1 (9.15 %), followed by T2 (8.33%), T3 (7.23 %) and T4 (6.84 %). NDF content increased with increasing levels of CH. A tendency in acceptability and intake was observed favoring T4 with an intake of 0.62g/h followed by T3 (0.37g/h), T2 (0.06g/h) and T1 (0.03g/h); however, the higher consumption of MNB with higher CH content (T3 and T4) is explained by a lower HPR. These results suggest that MNB containing PL and CH in 40:0 or 35:5 proportions could be a viable option for goat supplementation in the tropics

288. Effects of concentrate supplementation on milk yield and MUN concentration on commercial dairy goat farms.

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Concentrates fed on dairy goat farms often determine the majority of the cost of milk production yet little guidance is given to farmers in ration balancing, historically. To study the actual inputs of concentrate as they relate to milk yield, cost and protein intake from concentrates, 7 commercial dairy goat farms in Vermont, USA were used as case studies. Beginning in April 2007, measurements of monthly milk yield, milk components, MUN, and quarterly concentrate and forage intake, concentrate costs, goat body weights and scores were collected. All herds were composed of crossbreds and grade Alpines, Saanens, LaManchas, Nubians and Oberhaslis. Two farms were certified organic; 6 of the 7 herds were bred seasonally; 5 herds were reliant on fresh forage from pasture and browse areas for the majority of forage in the months of May-September. Dry hay was used to some extent on all farms that used pasture and browse as forage sources (.5-2 lbs/day A-F). Measurement and analysis of milk yield, milk components and MUN were provided by Vermont Dairy Herd Improvement Association. Feed analysis was provided by the feed companies or by the researchers. Higher daily protein intake from concentrates (242-359 vs. 159-195 gms/d) was related to the highest 2 herd average milk yields (1887-2242 lbs 305 day ME) and to the lowest 2 herd milk yields (1345-1559 lbs 305day ME). Average levels of MUN from bulk milk samples did not follow a consistent pattern with % or intake of CP in the concentrate. Increasing amounts of concentrate fed per day was not consistently proportional with increasing milk yields among herds. Cost of concentrate fed per goat per day was not consistently proportional to increasing average milk yields (lbs. 305 day ME) among herds, even taking the higher cost of organic concentrate into account. Except for the herd with the lowest milk yield average, the average herd body condition scores increased with average milk yield (lbs. 305 day ME). These results would indicate that neither concentrate cost, amount of concentrate fed, amount of protein intake, %CP in concentrate nor MUN are strong indicators of milk yield.

289. A nutrition mathematical model to account for dietary supply and requirements of energy and nutrients for domesticated small ruminants: the development and evaluation of the Small Ruminant Nutrition System

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A mechanistic model that predicts nutrient requirements and biological values of feeds for sheep (Cornell Net Carbohydrate and Protein System; **CNCPS-S**) was expanded to include goats and the name was changed to the Small Ruminant Nutrition System (**SRNS**). The SRNS uses animal and environmental factors to predict metabolizable energy (ME) and protein, and Ca and P requirements. Requirements for goats in the SRNS are predicted based on the equations developed for CNCPS-S, modified to account for specific requirements of goats, including maintenance, lactation, and pregnancy requirements, and body reserves. Feed biological values are predicted based on carbohydrate and protein fractions and their ruminal fermentation rates, forage, concentrate and liquid passage rates, and microbial growth. For sheep, the SRNS accurately predicted gains and losses of shrunk body weight (SBW) of adult sheep ($n = 15$; mean bias (MB) = 5.8 g/d and root mean square error of prediction (RMSPE) = 30 g/d; and $r^2 = 0.73$) when diets were not deficient in ruminal nitrogen. Several evaluations indicated the SRNS had MB varying from 2.4 to 18 g/d, RMSPE varying from 21.4 to 41 g/d, and r^2 varying from 0.70 to 0.84 when predicting average daily gain (ADG) of growing lambs. For goats, the evaluation for lactating does indicated that ME intake ($n = 21$; MB = 0.04 Mcal/d; RMSEP = 0.24 Mcal/d g/d; and $r^2 = 0.99$) and energy balance ($n = 21$; MB = 0.075 Mcal/d; RMSEP = 0.20 Mcal/d; and $r^2 = 0.87$) were adequate. Similarly, the SRNS accurately predicted ADG of kids ($n = 31$; MB = -6.4 g/d; RMSEP = 32.5 g/d; and $r^2 = 0.85$). In conclusion, the SRNS can accurately predict dietary organic matter digestibility, ADG of growing lambs, and changes in SBW of mature sheep and ME intake and the energy balance of lactating and non-lactating adult goats and the ADG of kids of dairy, meat, and indigenous breeds. The SRNS model is available at <http://nutritionmodels.tamu.edu>.

290. Ruminal inoculums and digestibility *in situ* of three browse foliages contain tannins

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Studies had been demonstrated that tannin can affect the nutritional value of browser species that are consumed by small ruminants. Nevertheless, few information exist referent to effect of animal specie. The objective of this study was to assessment three different ruminal inoculums (cattle(CA), adapted goat(AG) and unadapted goat(UAG)), three browse foliages (*Lysiloma acapulcensis*(LA), *Quercus laeta*(QL) y *Pithecellobium dulce*(PD)) with different condensed tannins concentration (LA 174 gKg⁻¹ of DM, QL 99 gKg⁻¹ of DM, PD 78 gkg⁻¹ of DM) and season (rain(RS) and drought(DS)) on ruminal digestibility of dry matter, crude protein and fiber fractions. Animals were equipped with ruminal canula and received forage:feed (80:20) ratio diets, AG received a high diet in tannins (71.34g kg⁻¹ of DM). Sample incubation period for digestibility was 48 h. Browse foliages; season and ruminal inoculums were arranged in a 3x2x3 factorial design. The results showed that crude protein and fiber fractions were affected (P<0.01) by inoculums and season. Digestibility of dry matter of PD was higher (P<0.01) to DS, and goats inoculums were more efficient (RS: CA:54.43^c, UAG:54.78^c, AG:51.46^d vs. DS: CA:59.69^b, UAG:66.89^a, AG:65.28^a), low values was obtained to LA in DS, however, AG was better (RS: CA:24.16^k, UAG:27.31^j, AG:28.19^j vs. DS: CA:29.67^{ij}, UAG:31.07^{ih}, AG:34.47^{gf}). Season did not affected neutral detergent fiber digestibility, but, UAG and AG degraded more efficient this fraction, PD was highest (RS: CA:30.86^{bc}, UAG:33.24^{ab}, AG:27.38^c vs. DS: CA:21.47^d, UAG:36.62^a, AG:33.62^a). Digestibility of crude protein was increased in PD (Table 1), probably to low tannins contents, because condensed tannins bound protein complexes, to made indigestible protein at ruminal level. Browse species rich in tannins could be used more efficient in goats than cattle and represents an important source protein in small ruminant, particularly in drought season.

Table 1. *In situ* digestibility in cattle and goats of crude protein mof three browse foliages during rain and drought seasons (P<0.01).

	Rain			Drought		
	CA	UAG	AG	CA	UAG	AG
LA	2.17 ^l	1.99 ^l	10.85 ^{jl}	5.90 ^{kl}	7.12 ^{kl}	15.21 ^{hi}
QL	13.14 ^{hi}	17.60 ^{hg}	22.64 ^f	21.40 ^{jf}	30.48 ^e	37.16 ^d
PD	58.46 ^{bc}	58.19 ^{bc}	56.31 ^c	62.54 ^b	73.09 ^a	73.85 ^a

291. *Sphaeralcea angustifolia* as a substitute for alfalfa for growing goats

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Sphaeralcea angustifolia (Cav.) G. Don (narrowleaf globemallow) occurs on millions of hectares of rangeland in the southwestern United States and northern Mexico, and it constitutes an important forage resource for both domestic and wild herbivores. In order to determine the nutritional properties of this roughage, forty 2-month-old crossbred (native x European dairy goats) female goats (9.4 ± 2.2 kg) were used. Goats were equally and randomly allotted to five dietary groups (two goats per pen, four replications per ration) to evaluate the effect of feeding different levels of *S. angustifolia* in a complete ration, on growth performance and diet digestibility. The rations were: a total-mixed control ration containing 0% *S. angustifolia* (T0) and four diets in which *S. angustifolia* progressively replaced alfalfa [25% (T25), 50% (T50), 75% (T75) and 100% (T100)]. Diets were based on corn grain and soybean meal. Forage made up 30% of the dietary DM in all diets. Values of nutritional parameters for *S. angustifolia* were: in vitro organic matter digestibility (OMD), $523 \text{ g} \cdot \text{kg}^{-1}$; crude protein (CP), $170 \text{ g} \cdot \text{kg}^{-1}$; metabolizable energy, $8.18 \text{ Mj} \cdot \text{kg}^{-1}$ MS. Differences ($P < 0.05$) were observed between treatments in average daily gain (ADG; range 88 to $124 \text{ g} \cdot \text{day}^{-1}$) and dry matter intake (DMI; range 3.3 to 4.0% BW). Feed conversion ratio [FCR (DMI/ADG); range 4.0 to 4.8] was similar ($P > 0.20$) among treatments. Goats fed diets with any of the *S. angustifolia* levels had similar apparent nitrogen (N) digestion (range 67.6 to 69.8%) as those fed only alfalfa, but N retention was greater ($P < 0.05$) in goats on T25 and T50 diets compared to other diets. The apparent digestibilities of DM, NDF and ADF were greater ($P < 0.05$) for T25 and T50 than other diets. Except for phosphorus, concentrations of serum metabolites and minerals studied were not affected by diet. Results indicate that *S. angustifolia* at the flowering stage was a palatable and nutritious roughage, which could fully replace alfalfa hay in diets of growing goats without negative effects on DMI, performance, nutrient digestibility or health.

292. L-Glutamine infusions and body weight, testicular weight and testosterone secretion under intermittent blood collection in buck goat during spring in northern Mexico (26° N).

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To evaluate the effect of L-glutamine on body weight (BW), testicular weight (TW) and serum testosterone (T) during March-May in northern Mexico (26° N; 104° W), Alpine goat bucks (n = 12) with 31.08 ± 1.41 kg BW) were into three i.v injection groups. **CONT**, (n=4, 31.25 ±2.87 kg) with 5 mL saline (0.9 N) solution; **GLUT1**, (n=4, 35.00 ±4.89 kg) with 7 mg kg⁻¹ BW and **GLUT2**, (n=4, 32.00 ±2.55 kg) with 14 mg kg⁻¹ BW of L-glutamine. Blood collection was three times per week. At the fourth blood collection treatments were assigned. This, split the treatments into before (PRE) and after (POST). To evaluate variables PROC MIXED and PROC GLM (SAS) were used. After each sampling (0830 h), treatments were infused. Body measurements were weekly registered. There was difference in BW (p=0.05), with a higher weight in GLUT groups than in CONT with 31.90, 34.06 and 34.58 ±0.83 kg (LSM ±SEM) for CONT, GLUT1 and GLUT2. However, TW was not different (p=0.96) with 131.87, 144.80 and 143.19 ±36.20 g for CONT, GLUT1 and GLUT2. The increase was caused by the season (March-May). Serum T concentrations was not affected (p=0.68) with 2.23, 1.71 and 1.86 ±0.43 ng mL⁻¹ (LSM ±SEM) for CONT, GLUT1 and GLUT2 and by times (p=0.22) with 1.63 ±0.47 and 2.24 ±0.15 ng mL⁻¹ for PRE and POST. Differences (p=0.0001) during the experimental period (sampling times) showed significance. They were evident at the middle (April) and at the end (May) of the experimental period. It is suggested that GLUT caused a sensibility in hipotalamic nuclei that stimulated and activated any sensor in the somatostatinergic axis reflected in the body weight development of GLUT animals. The development of TW was normal in the animals mainly caused by the transition of breeding season in May-June in this region and by the normal body development and not by GLUT. These results suggest that serum T concentrations at the middle of the experimental period were caused by GLUT and at the end, by the season of the year.

293. Nutritional analysis of *Tillandsia recurvata* in San Luis Potosi as an alternative for goat's consumption

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Tillandsia recurvata, an epiphyte plant belonging to the bromeliad family; is known to be a rustic invasive specie that is highly habitual to various southern regions of North America exposed to extreme weather conditions that are high in temperature and humidity. A unique characteristic of the *Tillandsia recurvata* is its ability to bind itself to different structures, such as fence posts, power poles, and different plant species (i.e. mesquite), Unfortunately, little information can be found on the nutritional content of this plant. In the current experiment, samples of *Tillandsia recurvata* were taken from mesquite (*Prosopis laevigata*) in the area of San Luis Potosí, Mexico; a nutritional analysis was carried out with the purpose to identify nutritional composition, as well as the possibility to evaluate their uses as forage with livestock. Results indicated that the nutritive value for *Tillandsia recurvata* was: Crude Protein (CP) (7.2%), Dry Matter (97.1%), Acid Detergent Fiber (40.6%), Neutral Detergent Fiber (71.8%), lignin (7.3%), Total Digestible Nutrients (50%), Net energy of maintenance (0.92 Mcal/kg) Net energy of gain (0.38 Mcal/Kg), Ca (1.02%), P (0.15%), Mg (0.09%), K (0.42%), Na (0.04%), Cu (11.8 ppm), Mn (41.4 ppm) and Fe (1411.8 ppm). In comparison with maize stubble (4.9% of CP), Atriplex canences (16.4% of CP), *Cenchrus ciliaris* (3.3% of CP), *Opuntia streptacantha* (3.17% of CP), *Tillandsia recurvata* could be suitable forage for small ruminants. In conclusion, *Tillandsia recurvata* despite being an epiphyte plant that causes irreversible damage to their host plants provides an alternative feed source to producers of small ruminants. Browsing animals such as goats can utilize *Tillandsia recurvata* during the dry season when more frequently used feedstuffs are more costly and not always available. Further experiments are required to better understand the physiological effects of *Tillandsia recurvata* as a complement source of nutrition.

294. Chemical composition and metabolizable energy content in native plants selected by goats from north Mexico

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Native vegetation represents an important source of nutrients for range small ruminants; however, their nutritional value is still unknown. Foliage from trees (2), shrubs (11), forbs (4), cacti (3) and pods and fruits (7), were collected to determine the content of crude protein (CP), cell wall (NDF), ligno-cellulose (ADF), lignin, hemicellulose, cellulose, crude fat (CF) and metabolizable energy (ME). The latter was estimated using the *in vitro* gas production technique in which 200 mg of each sample were incubated in calibrated glass syringes. Gas production (GP) was registered at 0, 3, 6, 9, 12 and 24h. The ME content was calculated using the following equation: $ME = 2.20 + 0.136GP_{24h} + 0.057CP + 0.0029CF^2/4.184$. Data were statistically analyzed using ANOVA for a completely randomized design. All data, within each group of plants, were significantly different among species. The CP content in trees varied from 7 to 9% (dry matter), shrubs 11-17, forbs 10-16, cacti 5-6 and fruits 4-12. Cell wall in trees varied from 64 to 65%, shrubs 26-57, forbs 42-48, cacti 38 -49 and fruits 24-55. The ADF in trees varied from 31 to 34%, shrubs 11-34, forbs 29-36, cacti 11-16 and fruits 18-43. Lignin in trees varied from 10 to 11%, shrubs 3-14, forbs 10-15, cacti 1-2 and fruits 4-10. Hemicellulose in trees varied from 30 to 33%, shrubs 9-25, forbs 10-17, cacti 22-38 and fruits 6-7. Cellulose in trees varied from 21 to 33%, shrubs 8-25, forbs 18-26, cacti 9-13 and fruits 12-32. The ME in trees varied from 1.05 to 1.13 Mcal/kg (dry matter), shrubs 0.89-2.00, forbs 1.88-2.35, cacti 1.63-1.80 and fruits 1.22-2.27. Data supported on chemical composition and ME content indicated that shrubs and forbs represent an important potential source of nutrients for grazing goats in semiarid regions, while foliage from tree species registered low energetic values. Moreover, strong correlations between ME and *in vitro* gas production might emphasize a major source of energy in shrubs, herbaceous, cacti and fruits than trees.

295. In vitro gas production parameters of native plants selected by goats in North Mexico

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The nutritional value of browse vegetation can be evaluated by the *in vitro* gas production technique because it is related to voluntary feed intake and rumen microbial protein synthesis. Thus the aim of the study was to determine the rate and extent of dry matter digestion of foliage from trees (2), shrubs (7), forbs (3), cactae (3), pods and fruits (7). *In vitro* gas production determinations were performed incubating 500 mg of samples in 100 ml calibrated glass syringes. Gas production was registered at 0, 3, 6, 9, 12, 24, 48, 72 and 96 h. Data were adjusted to the model $p = a + b(1 - e^{-ct})$ and were analyzed using ANOVA for a completely randomized design. The gas produced from the insoluble but fermentable fraction of feed (*b*), potential gas production (*a+b*) and constant rate of gas production (*c*) were different ($P < 0.05$) among plants within each group. The fraction (*b*) in trees varied from 54.6 to 74.5 (ml/500mgDM) shrubs from 45.2 to 119.1, forbs from 100.4 to 115.5, cacti from 94.9 to 111.4 and fruits from 64.1 to 108.9. Values for the constant rate of gas production (*c*) in trees varied from 1.9 to 4.4 (% h⁻¹), shrubs 1.3-9.4, forbs 7.5-8.5, cacti 4.7-10.5 and fruits 3.5-8.6. The *a+b* fraction in trees varied from 59.8 to 83.5, shrubs 54.0-118.1, forbs 103.5-122.0, cacti 118.0-123.8 and fruits 55.4-155.7. Our results indicate that higher values in the constant rate of gas production (*c*) in forbs, cacti and fruits might indicate a better nutrient availability for rumen microbiota when such species are selected by range goats.

296. *In vitro* true organic matter digestibility and *in situ* protein degradability of native species from north Mexico

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This study was conducted to evaluate rate and extent of digestion of organic matter (OM) and crude protein (CP) in foliage of trees (2), shrubs (12), forbs (4), cactae (3) and fruits (8) that are commonly selected by range goats. The ANKOM Daisy^{II} incubator was utilized to determine *in vitro* true organic matter digestibility (IVTOMD) by incubating 250 mg of samples (48h; 39°C) in filter bags using as a buffered-rumen liquor solution. The inoculum was collected from three sheep fed alfalfa hay and concentrate (75:25). The nylon bag *in situ* procedure was used to estimate the CP degradability (CPD) by placing 5 g of samples in nylon bags (5 x10 cm, 50 µ pore size) and incubated in the ventral part of the rumen of three sheep feeding the same diet. Bags were incubated at 3, 6, 12, 24 and 48 h then dried at 60° C for a period of 48 h. The CP content in residues was estimated. The IVTOMD and CPD were analyzed using ANOVA for a completely randomized design. With exception of trees, IVTOMD was significantly different among plants within each group. Mean values for trees, shrubs, forbs, cacti and fruits were 41.4, 77.9, 78.5, 88.6 and 77.1%, respectively. Contrary to tree (mean = 41.2%) and cacti (91.8%) species, the CPD in shrubs (79.1), forbs (88.4) and fruits (86.2) varied significantly among plants. Our data suggested that both IVTOMD and CPD evidence that trees were lower digested, in the rumen of sheep, than forbs, shrubs, fruits and cacti species. Thus, the latter plant groups may be potential prominent sources of nutrients for range goats.

297. Effect of the protected fat for composition and yield milk in dairy goat under tropical conditions

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In order to evaluate the consumption effect of a supplement of protected fat and the calving number several aspects were evaluated, such as milk yield, lactation days, milk characteristics and components of 31 crossbreed Canarias goat during lactation on 277 milk samples that belong to the Unidad Experimental de Producción Caprina of the Facultad de Ciencias Veterinarias of the Universidad Central de Venezuela located in Maracay. Beside, the effect on weight changes, body condition, triglycerides and blood cholesterol was evaluated. We used additive lineal statistical models with repeated measurements on time through the Proc GLM and a Tukey test from which we obtained significant differences using the SAS 6.12 (SAS, 1992) statistical software. A highly significant effect was appreciated ($P<0,01$) on the treatment and on the calving number over the total production, as well as a trend of the treatment over the lactation duration. Neither the treatment nor the calving number affected the milk physic characteristics, but the treatment do have significant effect ($P<0,01$) increasing all the milk components in a profitable way. The treatment did not have a significant effect on the weight, body condition and voluntary consumption. The calving number had a significant effect ($P<0,01$) on the milk components and body weight increasing according to up the 4th calving number. Neither the treatment nor the calving number had a significant effect on the blood cholesterol and triglycerides. There was not a significant correlation between both metabolites either, as well as with the milk production, milk components, weight or body condition.

298. Effect of age at cutting on chemical composition of *leucena Leucocephala* and *Leucaena trichode*

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Plant maturity effects on the contents of crude protein (CP), neutral (NDF) and acid detergent (ADF) fibre and acid detergent lignin (ADL) were evaluated in the species *L. leucocephala* and *L. trichode* at 40, 60, 80, 100, and 120 days of sprout age. Plants were arranged randomly in a 2x5 experimental design, with three repetitions of eight plants each. The area was located at 11°12'N and 69°37'W and classified as a tropical dry forest region, with an averaged yearly rainfall of 800 mm and a loamy texture soil with a pH of 5.8. Samples analyzed included leaves with pinna, petioles, and shafts lower than 6 mm in diameter. The statistical analysis included as variation sources the species (fixed factor), maturity as a covariate (with its linear, quadratic and cubic components) and the species x maturity interaction. Estimates of CP, NDF and ADF were higher in the specie *L. trichodes* ($P < 0.001$) with values of 25.7 vs. 24.3, 33.8 vs. 30.5 and 24.3 vs. 22.1%, while the estimates for ADL and ash were higher in *L. leucococephala* ($P < 0.001$) with values of 7.7 vs. 7.3 and 7.3 vs. 6.4 %, respectively. Maturity had limited linear, quadratic and/or cubic effects on most variables; CP decreased, whereas levels of other components increased with increasing age. Effects of age were smallest for *L. trichodes*. Therefore, differences between the two species do not seem important from a nutritional point of view. The nutrient content recorded for these species show high potential as forage sources for ruminants in tropical areas.

299. Effects of plant age on crude protein, mineral content and organic matter digestibility of *leucaena* spp, in the dry season

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In a semi-arid region of the State of Zulia, Venezuela (10°32`N and 71°42`W), with 600 mm of average annual precipitation and sandy-loam soil, having a pH 5.5 and Ca, Mg, Na and K levels of 0, 6, 0.3, 0.1 and 0.17 mg/100 g, the effect of four ages of utilization (EDU; 42, 84, 126 and 168 days) on the content of crude protein (CP), in vitro organic matter digestibility (IVOMD) and mineral concentrations in *Leucaena* in the dry season were determined. Samples of the fine fraction (pinna, petioles and stems < 5mm in diameter) were analyzed for IVOMD and levels of CP and minerals (Ca, P, Mg, K and Na). The experimental design entailed random blocks with three replications. The IVOMD and level of CP reached maximum at 42 days (63.5 and 30.7%, respectively) with significant decreases as age increased to 84 and 126 days, but without change when age increased from 126 to 168 days. Levels of Ca, Mg, K and Mn were 1.4, 0.35, 1.96, 75.9 % respectively; dry matter basis, while P and Na levels were below critical levels (0,25 y 0,08% respectively). Only Na increased (P <0.05) with the increased maturity, and the level of copper decreased.

300. Chemical composition of the forages of the rangeland for goats of the community Monte del Toro, Ejutla, Oaxaca

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The chemical composition of the species integrated to the goat's diet within the Monte del Toro, Ejutla, Oaxaca rangeland community, was evaluated from July to October 2006. The sampling sites were located based on grazing routes and a Stratified Random Sampling was established at each sampling site and four 30 m Canfield Lines version PROGAN were evaluated from a central point oriented in accordance to the cardinal points. Within four quadrants nine plots were established by quadrant of 10 x 10 m at which the samples of grasses were taken through by Quadrants cuts taken randomly. Four samples (50 g) per plant and species were obtained from bushes at each sampling site. The results showed that from July to October, the average percentage of ashes in dry matter for grasses is 14%, while for Huizache (*Acacia farnesiana*) is 8% and 9% of Toronjil (*Dalea sp.*); the crude fiber was 23.9% for grasses, 20.7% for Huizache, and 9.4% for Toronjil; in terms of crude protein grasses have 13.2%, Huizache 39.5% and Toronjil 33%; calcium content was 0.26% for grasses, 1.81% for Huizache and Toronjil showed 1.61%; the phosphorus in grasses was 0.10%, in Huizache it was 0.13% and 0.14% in Toronjil. The dilution of protein in the grass is 7.1% when the dry matter production increases from 217 to 410 kg DM ha⁻¹, while in Huizache diminished to 7.4% when production increases from 344 to 356 kg DM h⁻¹.

301. Nutritional supplementation improves the maternal selectivity in goats grazed under semi-arid conditions

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We investigated if feed supplementation with rolled corn during last 12 days of gestation in goats maintained under semi-arid conditions improves the ability of goats to accept their own kid and reject an alien kid at 3 hours postpartum (behavior called as maternal selectivity). One group of pregnant multiparous non-supplemented goats (CG; n=21) was kept under natural grazing conditions where they feed only available natural vegetation and were not supplemented. Another group of pregnant goats was maintained in similar conditions as CG plus supplemented daily with 600 g of rolled corn during 12 days before delivery (SG; n=31). Maternal selective test was performed at 3 hours postpartum during two successive 5-min presentations of the own or an alien kid of approximately the same age and similar appearance. The behaviors recorded were: acceptance behaviors (number of low-pitched bleats and suckling time) and reject behaviors (number of high-pitched bleats and aggressive behavior). Behaviors were compared using a Wilcoxon test for comparisons within of each group (own vs. alien kids). In both groups, the suckling time towards the own kid was significantly higher than towards the alien (P<0.001). While in goats from CG frequency emitted of low-pitched bleats was similar with both kids (P>0.05). In addition in goats from CG, non significant differences were found in the high-pitched bleats emission with their own or the alien kids (2.86 ± 1.19 vs. 1.81 ± 0.64 , respectively; P>0.05). In this group, similar results were found in the aggressive behavior towards the own and to the alien kids (1.14 ± 0.72 vs. 1.38 ± 0.45 , respectively; P>0.05). In contrast, mothers from SG emitted significantly more high-pitched bleats in presence of an alien kid than their own kid (9.63 ± 3.90 vs. 2.69 ± 0.87 , respectively; P<0.001). In the same way goats from this group showed significantly more aggressive behavior toward the alien kid than their own (1.69 ± 0.48 vs. 0.03 ± 0.03 , respectively; P<0.001). We concluded that in goats grazed under semi-arid conditions, supplementation with rolled corn during last 12 days of gestation allows the formation of a strong mother-young selective bond at 3 hours postpartum. We thank Fernando JA Medrano (Intervet, México) for providing us with material for protocol synchronization. S. Ramirez was supported by a CONACyT scholarship during his doctoral studies.

302. Effect of maternal undernutrition during the second half of pregnancy on body development during the first six month of age in goat kids.

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In the present study we investigated the short term effects of undernutrition during pregnancy on body development in male and female kids. Ten males and 12 female kids from underfed mothers (experimentally underfed from day 75 of pregnancy until birth, receiving 70% of their requirements, UF), and 9 males and 10 female kids from control mothers (fed with 100% of their requirements during the whole pregnancy, C) were used. Body weight (BW) was recorded at birth and at 2, 4, 6, 8, 15, 19, 23, 27 and 31 weeks of age in the females plus 35, 39 and 43 weeks in the males; body weight change (BWCH) was recorded in the same period. Goat Body Mass Index (gBMI) was registered in weeks 15, 19, 23, 27 and 31 for females plus 35, 39 y 43 for males. In male kids, diameter and testicular length were also registered at 19, 23, 27, 31, 35, 39 and 43 weeks of age. The BW in C female kids was higher than that of UF kids during the whole period; however, in weeks 3 (C: 5.2 ± 0.35 vs. UF: 4.32 ± 0.28 kg, $P=0.05$) and 23 (C: 14 ± 0.85 vs. UF: 11.7 ± 0.63 kg, $P=0.04$) of age difference was significant. In male kids non significant differences were found in BW between C and UF groups. Regarding BWCH, values for female kids were similar in both groups from birth until week 19; then, C female kids showed higher body weight gain than the UF group, however this difference was significant only between the 19 to 23 weeks of age (C: 1.04 ± 0.12 vs. UF: 0.25 ± 0.22 kg, $P>0.001$). For male kids similar results were found in BWCH from birth until week 19 in both groups. Thereafter C kids showed higher body weight gain than those UF and it was significantly different between weeks 23 and 27 (C: 1.83 ± 0.16 vs. UF: 1.5 ± 0.28 kg, $P=0.04$). However from weeks 27 to 31 UF kids showed higher body weight gain than C (UF: 1.6 ± 0.21 vs. 1.51 ± 0.31 kg, $P>0.001$). gBMI was higher in C than in UF group for female kids; however, it was significantly different in week 27 (C: 3.99 ± 0.22 vs. 3.49 ± 0.067 kg, $P=0.05$). In male kids, similar gBMI were found in both groups but in week 39 underfed kids showed higher values than control kids ($P<0.05$) Testicular length was higher in C than in UF kids; however, it was significantly different in week 27 and 43 of age ($P<0.05$). Testicular diameter did not differ between C and UF groups in the whole period of study. It is concluded that prenatal malnutrition could impair normal development of goat kids and its effect is stronger in females. Supported by PAPIIT IN217205, FIS B/3872-1 and CATEDRA IN2-07.

303. Vitality and viability of newborn goat kids from malnourished mothers are improved by maternal high energetic supplementation two weeks before parturition

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Malnutrition during pregnancy negatively affects kid's viability and goat milk production; also, malnutrition during pregnancy impairs mother and young mutual recognition. Therefore, we investigated whether vitality and viability of newborn kids from malnourished goats may be improved by a maternal high-energetic supplementation two weeks before parturition. Multiparous mixed-breed dairy goats were allocated in the next groups: 1) Control (C, n=11); 2) Malnourished during second half of pregnancy, receiving 70% of their energy and protein requirements (MN n=12); 3) Malnourished but supplemented, two weeks before parturition, with 0.6 kg of ground maize/animal (S, n=14). The following variables were recorded: 1) dystocia, 2) motor activity and head reflex response in the first hour after birth, 3) birth weight and 4) percentage of mortality during the first 45 days after birth. Proportion of dystocia was significantly higher in MN compared to S and C groups (MN: 16/29, S: 7/32 and C: 3/23 kids, $P < 0.01$); non significant differences were found between C and S groups ($P > 0.05$). After birth, kids from malnourished goats spent longer time trying to stand up than kids from Control mothers (1380.2 ± 291.2 vs 464 ± 75.9 sec., $P = 0.009$), while non significant differences were found between kids from S and MN, and those from S and C goats. Similar results were found in the kid's latency to be completely stood up (2457.4 ± 243 vs 1461.2 ± 199.4 sec., $P = 0.01$). Proportion of kids showing positive response to the head reflex test (head rising after a touch on their nose) was smaller in MN than in C and S (MN: 7/16, C: 14/20 and S 20/27, $P = 0.04$). While proportion of kids shaking their head in response to tickling inside their ear tended to be smaller in kids from MN than those from S and C mothers ($P = 0.08$). Kids from Control were heavier at birth than those from Supplemented and Malnourished mothers (Control: 3.54 ± 0.1 , Supplemented: 3.04 ± 0.9 and Malnourished: 3.02 ± 0.1 kg, $P = 0.01$). Mortality from birth until the first 45 days of life was significantly higher in kids from MN than those from Control and Supplemented mothers (MN: 40%, C: 12% and S: 18%, $P = 0.05$); non significant differences were found between Control and Supplemented. It is concluded that a high-energetic food supplementation few days before parturition improves some aspects of vitality and consequently the viability of kids from underfed mothers. Supported by PAPIIT IN217205, FIS B/3872-1 and CATEDRA IN2-07

304. Growth rate of young kids fed diets with various nutritional levels

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The objectives of this study were to compare the growth rates of young kids (4 different breeds or types) applying to 80% level and 90% level NRC of feeding standard for goats(1981). A total of 207 kids were divided into 4 groups in the experiment. Eighty seven (A1) of these kids were Tianfu goats at Sichuan Agricultural University; 40 (A2) Black goats at the Suining Breeding Farm; 40(A3) crossbreds (Tianfu X Local goat) at Yanting Breeding Farm; and 40 (A4) crossbreds (Boer X Local goat) at Luding Breeding Farm. The results showed that: the total gain (TG) and average daily gain (ADG) of the kids were higher in 90% NRC level than that in 80%; and the TG, ADG and body sizes of the kids were higher in A1, A3 and A4 group than those in A2 at similar nutritional level. The results indicated that the growth rates of the kids were influenced by factors such as breeds, sex and nutritional level. At the same nutritional level, it seems that the rate of the crossbred goats and male kids is higher than that of local goats and females; and the high-level of the nutrition level can bring into full play their productive performance for cross bred goats with Tianfu and Boer goats.

305. Goats fed with wet brewer's grain

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The aim of this work was to evaluate intake and apparent digestibility of nutrients in goats fed with diets containing different levels of wet brewers grains (WBG) for replacing the concentrate (0, 25, 50, 75 and 100%). The diet concentrated was 60% and roughage used was tifton hay. Five Boer x Saanen and five Saanen goats were randomly assigned in two 5 x 5 Latin squares. The intake of dry matter (DM), organic matter (OM), crude protein (CP), ether extract (EE), total carbohydrate (TC), total digestible nutrient (TDN) and neutral detergent fiber (NDF) had quadratic effect. The higher values of intake were observed to the levels 0 and 25% of replacing. The apparent digestibility of the dry matter (DM), organic matter (OM) and total carbohydrate (TC) had linear effect decreasing with increment of levels of WBG in the diet. The digestibility of CP had quadratic effect, with higher digestibility observed for level of replacing of 25%. The digestibility of DM, OM and TC was linear decreasing. The digestibility CP was quadratic effect, higher digestibility was for level of replacing of 25% of WBG. It was concluded that WBG can be used replacing 50% of concentrate in diets for lactating goats.

306. Soy, sunflower and palm kernel oils in dairy goat diets: performance and milk composition

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The production and composition of milk can be influenced by the use of vegetable oil sources in the diet, because it supplies 2.25 times more energy than the carbohydrate, beside it is used as substratum for the fat milk synthesis. On the other hand, they can also affect the efficiency of the ruminal fermentation. These effects can be influenced by the oil source. This experiment was assigned to evaluate the effect of the oil sources inclusion of different profiles and its blends in the diet of lactating goats on the production and composition of milk. The assay was conducted in the Embrapa Goat in Sobral, Ceará - Brazil, since October until December 2007. Eight crossbred goats (½ Saanen x ½ Nubian) with average live weight of 37.58 and 80 days in milking had been used. The animals were allocated in four treatments which consisted of inclusion 3.75% of vegetal oil or blends in the dry matter of diets as follow: treatment 1 - 3.75% of soy oil (source of fatty acid C18:2); treatment 2 – 2.81% of soy oil plus 0.94% of palm kernel oil; treatment 3 – 3.75% of sunflower (source of fatty acid C18:3) and treatment 4: 2.81% of sunflower oil and 0.94% of palm kernel oil. The palm kernel oil (source of fatty acid C12:0) was used to evaluate its role as a modifier of ruminal biohydrogenation. The composition of the total diet was 58% of fresh elephant grass (*Pennisetum purpureum*) and 42% concentrated. The experimental design was a double latin square 4 x 4 and the averages had been compared by the Tukey test (P<0.05). There were not significant effects of the treatments on the analyzed variables. The averages production was 1,150 ml; corrected production: 1,000 ml; density: 1.031; dry extract: 11.56%; mineral matter: 7.83%; crude protein: 3.58%; milk fat: 3.88%. The different vegetal oil sources and mixtures can be used in the diet of milk goats without negative effects for the production or milk composition, however is necessary the evaluation of acid aspects of composition of fatty acids as well as the sensorial evaluation of produced milk.

307. Food intake and apparent digestibility of lactating goats fed high moisture corn silage

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The present study was carried out at Goat Production Area of FMVZ/Unesp-Botucatu, Sao Paulo, Brazil. Twenty primiparous and multiparous Alpine goats (11-12 weeks in lactation) were individually housed in metallic cages and assigned according to milk production in five 4 x 4 Latin square arrangement. All experimental diets presented 65:35 concentrate to forage ratio. Treatments were considered the graded replacement levels (0, 33, 67 and 100%) of high moisture corn silage (HMCS) by corn grain (CG). Average values of dry matter intake (1.64 kg/day, 3.9 %LW or 99.35 g/MW), crude protein (0.20 kg/day) and organic matter (1.53 kg/day) were not influenced by HMCS dietary levels. However, intakes of ether extract (0.067 kg/day), neutral detergent fiber (0.82 kg/day or 49.51 g/MW), non-structural carbohydrates (0.45 kg/day), total digestible nutrients (1.20 kg/day) and lactation net energy (1.66 Mcal/day) were different ($P<0.05$) respective to the dietary treatments. Apparent digestibilities of dry matter (73.51%), organic matter (74.77%), crude protein (71.30%), ether extract (82.03%), neutral detergent fiber (65.88%), non-fiber carbohydrates (85.09%) showed differences respective to the dietary HMCS levels ($P<0.05$). It is concluded that the SGUM did not modify the MS consumption and improved the nutrients digestibilities, being able to be used in partial or total replacement to GSM in Alpine goat's diets.

308. Effect of roasted treatment in consumption of mesquite pods and content of antinutritional factors in goats

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In order to analyze the effect of dry roasted (150 °C/45min) of the mesquite pods, in the antinutritional factors activity and consumption in goats was carried out experiment. 10 Nubian male goats (32.68±4.5 kg) were used. Experimental rations containing 20% of raw mesquite pods (RAMP), or 20% of roasted mesquite pods (RMP). The rations were offered in restricted form (40g/kg BW^{0.75}/day). The experiment was conducted in 2 periods of 21 days (15 days of adaptation and 7 days of sampling in metabolic cages, with feces, food offered and rejected collecting). Food intake and *in vivo* digestibilities of dry matter (DMdig), organic matter (OMdig), crude protein (CPdig) and fiber fractions (NDFdig and ADFdig) were measured. The water-soluble protein content was determined in RAMP and RMP samples. Protease inhibitors, lectin content and total and condensed tannins were also determined. The results were analysed in a crossover design (2 treatments in 2 periods), and also a correlation analysis was performed to determine the association between consumption of antinutritional factors and DMdig, OMdig, CPdig, NDFdig and ADFdig. The results indicated that the roasting did not change ($P < 0.05$) the consumption of water soluble protein (9.9 ± 0.56mg RAMP vs. 11.01 ± 0.56 mg RMP protein / day), however, the consumption of lectin / mg protein, increased 2.3 times ($P < 0.05$) and the consumption of condensed tannins increased 9.27 times ($P < 0.05$) in relation to RMP, on the other hand, protease inhibitors activity declined by roasting of mesquite pods ($P < 0.05$). Consumption of soluble protein was correlated with DMdig ($r = 0.96$, $P < 0.001$) and OMdig ($r = 0.97$, $P < 0.01$) and with NDFdig ($r = 0.95$, $P < 0.01$). Lectine presented a positive and significant correlation with DMdig, OMdig, CPdig and NDFdig ($r = 0.78$, $r = 0.78$, $r = 0.81$, $r = 0.95$, respectively). In conclusion roasting of mesquite pods caused an increase in the lectin activity, consumption, content of condensed tannins, and reduction in the proteases inhibitory activity, and was highly correlated with the *in vivo* digestibility of DM, OM, CP and fiber fractions.

309. Changes in nutrient degradation by roasting mesquite pods (*Prosopis laevigata*) can be associated to changes in blood glucose and insulin concentration in goats

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An experiment in goats was performed to show the possible changes in blood insulin and glucose concentration after ingestion of roasted mesquite pods, since roasting modifies its degradation. Mesquite pods were roasted to 150°C/ 45min and 4 castrated female goats were used to determine in situ degradability of DM, CP, NDF and FDA. Two treatments, in a cross over design, were: Roasted Mesquite Pods (RMP) and Raw Mesquite Pods (RAMP) applied in two periods. Two bags with sample and one without sample were obtained at different times (0, 1, 3, 6, 9, 12, 24, 48 and 72 h) for each treatment and period. Degradation data was recorded for each food fraction, and in all cases this was adjusted to non-linear equations $a + b(1 - e^{-c \cdot t})$. Subsequently, for another in vivo digestibilities experiment, 10 male goats (32.8 ± 4.5 kg weight) were provided with 3 different rations: Control - without mesquite pods, RAMP ration - with 20% of Raw Mesquite pods, and RMP ration - with 20% of roasted mesquite pods. This phase consisted of 2 periods of 21 days each (15 days of adaptation and 7 of collection in metabolic cage), and blood samples were obtained the 21st day at 30, 15 and 0 min intervals before consumption; and at 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330, 360, 390, 420 and 450 min intervals after consumption. Increases or decreases of blood glucose and insulin concentration were obtained in postprandial time, and ANOVA was performed to estimate differences in glucose and insulin concentration as a result of time by effect in treatments. Degradation of each nutrient intake was estimated in gr by time and a correlation analysis was tested with blood glucose and insulin concentration data in order to estimate the association between degradability of different food fractions and the concentration or variation in concentration of glucose and insulin through time. Results indicate a blood glucose concentration of 55 mg/dl for RAMP rations, and 63 mg/dl in RMP rations. Concentration began to increase from 210 until 300 minutes, being higher in the ration with RMP (P < 0.05). Insulin concentration was similar (P > 0.05) in both, RAMP and RMP rations. Roasting of mesquite pods caused a decrease (P < 0.05) in the degradability of dry matter (DM), crude protein (CP) and fiber fractions (NDF and ADF). However, degradability of the mesquite pod CP was associated with blood glucose concentration (r = 0.8, P < 0.01). This indicates that the decrease in CP degradation as a result of roasting was the major factor related to the concentration of blood glucose and insulin (r = 0.82, P < 0.01); Also, the total CP degraded in time was associated with glucose concentration (r = -0.77, P < 0.01), and with insulin concentration (r = -0.663, P < 0.001); whereas the DM and NDF degradation were associated with glucose concentration (r = 0.620, p < 0.05; r = 0.66, P < 0.01 respectively). In conclusion, the intake of roasted mesquite pods increased the blood glucose and insulin concentration at 210 to 300 min after feeding the goats; and CP degradation showed the highest association with glucose and insulin concentration. Keywords: Glucose, Insulin, roasted mesquite pods.

310. Effect of prickly pear cladode size (*Opuntia Ficus indicus*) on *in situ* degradability and degradation kinetics of fiber fractions in goats

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In general cladode size is associated to different ripeness stages, which may vary in their dietary attributes. Therefore, in this experiment we analyzed how different cladode sizes affects nutritional contents, degradation kinetics and degradability of fiber fraction (Neutral and Acid detergent fiber) (NDF and ADF); as well as the effects of intake level on these factors. Six rumen cannulate Nubian goats (37.6±3.4 kg) were used, and their intake was restricted considering two levels: High intake (HI) (58 g of DM/kg BW^{0.75}/day) and Low intake (LI) (42g of DM/kg BW^{0.75}/day). Size of cladodes was determined by multiplying their length by width, so three categories were designed: Small cladodes (SC) (170.7 ± 48.2 cm²), Medium cladodes (MC) (548.1 ± 105.0 cm²) and Large cladodes (LC) (809.1 ± 48.2 cm²). The experiment was randomly designed with 3x2 factorial arrangements (three cladodes sizes and 2 consumption levels), with 4 animals per treatment, and degradation times were determined for 0, 1, 3, 6, 9, 12, 24, 48 and 72 hrs. Three bags tow with sample and one without sample obtained by each degradation time and animal were used. Neutral detergent fiber (NDF) and acid detergent fiber (ADF) contents observed data from both, total samples and waste from each bag were utilized to estimate ADF and NDF degradation kinetics parameters and degradability. A nonlinear equation $a + b * (1 - e^{-(c * t)})$ was used, where (a) is the soluble and rapid degradation fraction, (b) is the slow degradation fraction, (c) is the fractional degradation rate in time (t), (a+b) is potential degradation, and $(a + b [c / c + kp])$ is the effective degradation were kp is the fractional rate of passage (kp = 0.06/h). The results showed that the SC had a lower content (P <0.05) of NDF (36.8a SC vs. 44.9b MC and 43.5b LC) and ADF (11.8a SC vs. 17.8b MC and 16.0b LC). In addition, no differences were observed in NDF and ADF rumen degradability (P>0.05) by size or level intake. However, the content of (a) fraction in NDF was significantly lower (P <0.05) in the SC, followed by MC and LC (9%a, 27%b, 32%c respectively). In contrast, the (b) fraction was higher (P <0.05) in the SC, and the fractional degradation rate (c) was higher (P <0.05) in NDF of LC. The (a) fraction of ADF in SC and MC were higher (P <0.05) than LC, but the LC has a higher content (P <0.05) of (b) fraction, and fractional degradation rate were not different (P> 0.05). In conclusion, intake level in rumen cannulated goats did not affect degradation and degradability of prickly pear cladodes; however, the SC presented a lower solubility and slower degradation of the NDF, whereas effective degradability of these was lower. FDA in SC presented a higher effective degradation and a greater solubility.

311. Nutritional composition and antinutritional factors of shrubs grazed by goats in the eastern area of Puebla state, México

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The objective of this study was to evaluate nutritional composition, content of antinutritional factors and grazing frequency by goats of the main shrubs at Miravalles, Puebla State, México, from January to March, 2008. Two herds of 100 goats were directly observed during grazing (09 to 13 h and 15 to 18 h), with intervals of eight days in four areas, where average annual temperature and rainfall are 18 °C and 2120 mm. The morphological components of the consumed shrubs were registered; besides, samples were taken for their taxonomic classification and nutritional analysis: Dry matter (DM), ash, and crude protein (CP), according to AOAC (1980); acid (ADF) and neutral detergent fiber (NDF), according to Van Soest *et al.* (1991). Nitrogen-free extract (NFE), total digestible nutrients (TDN), and digestible energy (ED) were calculated (Bondi, 1988); besides, antinutritional factors (tannins, alkaloids, and saponins) were qualitatively evaluated (Larrahondo, 1985), as well as percentage frequency (House and Aguirre, 1974) = (number of samples where the species is found/total number of samples) X 100. We identified two xerophytes and seven shrubs: *Agave spp* (Maguey), *Nolina spp* (Sotole), *Barkleyanthus spp* (Azomiate), *Baccharis pteroniodes DC* (Escobillo), *Baccharis spp* (Escoba), *Prunus serotina* (Capulín), *Cupressus spp* (Sabino), and *Buddleia spp* (Tepozan). Plant components consumed by goats were flowers, young foliage and mature leaves, varying according to the species. The average contents for CP, NDF, ADF, ash and TDN were 7.2, 34.65, 35.35, 8.59 and 67.83%, and 2.9 Mcal DE. The frequency was highest (76 and 71%) for Escobillo and Sabino and lowest (1.72%) for Capulín. The saponins were high in Maguey and Capulín, and alkaloids were observed only in Sotole and Tepozan. There were no tannins in Sotole, but they were found as pyrogallol and as catechol in Capulín. The shrubs were preferred by the goats due to their best nutritional composition and low content of antinutritional factors; however, together, these factors decreased the frequency of the shrubs.

312. Effects of Rabaa (*Trianthema pentandra L.*) Ash Alkali Treatment of sesame straw on chemical composition and degradation in the rumen of Nubian goats

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Effects of Rabaa (*Trianthema pentandra L.*) ash alkali on sesame straw (*Sesamum indicum L.*) chemical composition and artificial fiber bags degradation in the rumen of three Nubian goats fed groundnut haulm were studied. The straw was treated with 0, 3, 5 and 8% Rabaa ash alkali forming diets USE, AT₁SE, AT₂SE and AT₃SE, respectively. The alkali affected the chemical composition by decreasing CF (40.01, 32.43, 34.94 and 34.92) and EE (1.40, 1.09, 0.96 and 1.08) and increased CP (4.52, 5.74, 5.80 and 4.94) and ash (7.84, 13.30, 14.67 and 19.63) for diets USE, AT₁SE, AT₂SE and AT₃SE, respectively. Increasing alkali level significantly increased ash and generally decreased CF and NFE. Increasing the alkali level had generally increased DM and OM degradation at 6, 12, 24 and 72hr. It also increased OM degradation at 6 and 72 hr. Increase the alkali level had increased DM, OM and CP degradation characteristics including the soluble fraction, the fraction degraded with time and total degradation.

313. Forage yield and quality of novel forage legumes in Zacatecas, México

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In Zacatecas, Mexico, goat production is carried out on arid and semiarid rangelands. From ending winter to early summer, there is a scarcity of forage because no precipitation occurs, and the native vegetation is dormant. To meet the forage needs of goats, producers use cultivated forages, but only oat and corn stubble are used, forage legumes are not cultivated because there is a lack of information about them. The objective of this study was to determine the performance of forage legumes not sown in Zacatecas. Six legumes were tested: *Lathyrus sativus* L., *Vicia dasycarpa* L., *Vicia narbonensis* L., *Vicia sativa* L. (Mexican ecotype), *Vicia sativa* L. (Syrian ecotype) and *Pisum sativum* L. and compared to oat (control). The experiment was conducted under rainfed conditions in summer 2007 under a randomized complete block design. The variables measured were dry matter and crude protein (CP) yields and leaves, stems and pods dry matter production. The dry matter production was significantly different ($P < 0.0001$) among species; oat had the highest dry matter yield, 5.73 ton ha^{-1} , followed by *Vicia dasycarpa* L. (3.16 ton ha^{-1}) and *Lathyrus sativus* L. (3.0 ton ha^{-1}). Regarding to the biomass distribution, legumes showed to have better characteristic as forage crops than oat because most of their biomass is made of leaves, for instance, 65% of the *Vicia sativa* L. (Mexican ecotype) and *Vicia dasycarpa* L biomass was made of leaves whereas in oat only 24% of the biomass corresponded to leaves. Legumes protein content was higher than that of oat, *Vicia dasycarpa* L. forage had 24.1% of CP whereas oat crude protein content was 9.2%. As a result, even though the yield was lower, the crude protein yield of *Vicia dasycarpa* L. was significantly higher ($P = 0.0079$) than oat, *Vicia dasycarpa* L yielded 764 kg ha^{-1} of CP and oat produced 532 kg ha^{-1} . In conclusion, although the yields of the legumes tested were lower than oat, they are viable options to produce forage because they yield more crude protein than oat and their forage quality is higher than oat and corn stubble.

314. Food intake and apparent digestibilities of lactating goats fed high moisture corn silage

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The present study was carried out at Goat Production Area of FMVZ/Unesp-Botucatu, Sao Paulo, Brazil. Twenty primiparous and multiparous Alpine goats (11-12 weeks in lactation) were individually housed in metallic cages and assigned according to milk production in five 4 x 4 Latin square arrangement. All experimental diets presented 65:35 concentrate to forage ratio. Treatments were considered the graded replacement levels (0, 33, 67 and 100%) of high moisture corn silage (HMCS) by corn grain (CG). Average values of dry matter intake (1.64 kg/day, 3.9 %LW or 99.35 g/MW), crude protein (0.20 kg/day) and organic matter (1.53 kg/day) were not influenced by HMCS dietary levels. However, intakes of ether extract (0.067 kg/day), neutral detergent fiber (0.82 kg/day or 49.51 g/MW), non-structural carbohydrates (0.45 kg/day), total digestible nutrients (1.20 kg/day) and liquid energy (1.66 Mcal/day) were different ($P<0.05$) respective to the dietary treatments. Apparent digestibilities of dry matter (73.51%), organic matter (74.77%), crude protein (71.30%), ether extract (82.03%), neutral detergent fiber (65.88%), non-fiber carbohydrates (85.09%) showed differences respective to the dietary HMCS levels ($P<0.05$). It is concluded that the SGUM did not modify the MS consumption and improved the digestibilities of the nutrients, being able to be used in partial or total substitution to the GSM in the feeding of Alpine goats

315. Crude protein and mineral concentrations in soil and forages of rangelands of the volcanic region of Nayarit, Mexico

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The tropical regions of Mexico are rich in forage resources. Forage is the main feed for small ruminants, but is deficient in many nutrients, specially protein and minerals. Under these conditions, small ruminants can not attain an acceptable level of production, even with enough forage available. Mineral and protein supplementation of small ruminants is necessary in order to improve growth and reproductive efficiency. This study was conducted with the objective of mapping the concentrations of minerals elements of soil and forages of the volcanic region of Nayarit, Mexico, during the wet season. Two hundred and one samples were obtained which included the species: *hyparrhenia ruffa*, *brachiaria brizantha*, *cynodon dactylon*, *melinis minutiflora*, *ixophorus unisetus*, *axonopus spp.*, *chloris gallana*, *adropogon gayanus*, *bouteloua hirsuta*, *digitaria spp.*, *panicum maximum*, *paspalum notatus*, *digitaria decumbens*, *panicum maximum* and *cynodon plectostachyus*. Samples were oven-dried at 50°C and ground through a 1 mm diameter screen in a Wiley mill. Soil samples collected in sites where forage samples were obtained, were dried and passed through a 2 mm stainless steel screen, for its subsequent analysis. Calcium (Ca), potassium (K) y sodium (Na) concentrations of forage samples were determined with a photoflamometer. Phosphorus (P) was analyzed with a colorimeter. Magnesium (Mg), iron (Fe), copper (Cu), manganese (Mn), and zinc (Zn) were analyzed by atomic absorption spectrophotometry. Crude protein was determined as Kjeldahl N x 6.25. Soil pH was determined utilizing a Beckman 390 pH meter. Organic matter content of soil was determined using the methods of Walkley-Black. Calcium and Mg in soil were determined using EDTA, while Na and K were determined using a photoflamometer, P by colorimetry, and Fe, Cu, Mn, Co y Zn with an atomic absorption spectrophotometer. Mean CP content of forage was 6.69%. Mineral concentrations of forage species was: Ca, 1.12%; P, 0.21%; K, 2.39%; Na, 0.36%; and Mg, 0.49%. Considering the critical level of deficiency for P of 0.25%, 34.71% of the samples were deficient. Trace mineral concentrations were: Fe (166 ppm), Cu (14 ppm), Mn (26 ppm) and Zn (43 ppm). Only Mn was lower than the critical level of deficiency (40 ppm), with 95% of the samples below this level. Mean soil pH was 5.86 and organic matter was 4.63. Mean macromineral concentrations of soils were: Ca, 265.3 ppm; P, 17.3 ppm; K, 593.4 ppm; Na, 91.7 ppm; and Mg, 97 ppm. Mean trace mineral contents of soils: Fe, 4.11 ppm; Co, 2.02 ppm; Mn, 1.30 ppm; y Zn, 0.57 ppm, whereas Co could not be detected. Protein and mineral supplementation of small ruminants may improve performance.

316. Composition, digestibility and degradability of dry-roasted mesquite pods as a feed supplement in goats.

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The effects of roasting (150°C/45 min) on composition, *in vivo* digestibility and fiber fractions degradability (NDF and ADF), of mesquite pods were tested. Eight Nubian female goats (37.6 ± 3.4 kg) rumen-fistulated, during two periods (4 goats per period) were used. Grounded mesquite pods (2mm screen), (RP) and roasted (RMP), distributed in porous bags were utilized per each treatment and period, bringing 2 bags with sample and one bag without sample to each animal throughout every degradation time (0,1,3,6,9,12,24,48 and 72 hours). Cross-over design was used. Degradation rates of fibrous fraction were calculated by the non-linear model ($\text{Deg} = a + b * (1 - e^{-c*t})$) where: (a) is the soluble fraction, (b) the potentially digestible fraction, (c) the rate of degradation over time; (a + b) represents the potential degradation, and effective degradation is considered as $(a + b * [c / c + kp])$, where kp is the rate of fractional passage (0.6 kp / h). In a second experiment, *in vivo* digestibility of fibrous fractions (NDF and ADF) were estimated, 10 male goats (32.68 ± 4.5 kg) during two periods of 22 days each were used, (15 days for diet adaptation and 7 for sampling in metabolic cages). Offered food, rejected food and feces were analyzed to determine NDF and ADF contents and to calculate intake and digestibility Coefficient (Cdig). The experimental rations were: Control (CTR) (11.74% CP, 2.1 Mcal DM), RP= 80% of Ctr +20% of RP and RMP = 80% Ctr + 20% RMP. An increase (P <0.05) in the content of CP, ADF, CP-NDF and ash was observed, as a result of roasting mesquite pods, but no changes (P > 0.05) on NDF and ADF degradation. However, degradation rates of NDF (P <0.05) were altered with a decline of the soluble fraction (a), but an increase (P <0.05) in the slow degradation fraction (b) and the fractional rate of degradation (c); resulting in an increase of effective degradation of NDF (P <0.05). Roasting increased also (P <0.05) the ADF fraction (b), resulting in a lower effective degradation (P <0.05). The inclusion of 20% of RP or RMP did not affect (P > 0.05) NDF and ADF consumption (g/d), or the Cdig and digestible NDF content in the ration as % of DM. However, the ADF consumption (g / kg /BW^{0.75}) was higher in rations with RMP. Including 20% RMP or RP in the ration improved NDF and ADF digestible content (% of the DM) when compared with the CTR ration. In conclusion, roasting of mesquite pods, can modify both, their nutrient composition, as well as the degradation kinetics of the NDF, increasing rates of fractional and effective degradation, however, the inclusion of 20% RP or RMP in the ration don't improved of the Cdig of fiber fractions, but improved NDF and ADF digestible content (%MS).

317. Influence of pregnancy and lactation on glucose metabolism of Nubian goats

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Two *in vivo* metabolic challenges were conducted to assess the changes in glucose metabolism during three intervals prepartum (-6, -4, -2 weeks) and three postpartum (+2, +4, +6 weeks) in six multiparous pregnant Nubian goats. Challenges consisted of intravenous administration of glucose (62.5 g/goat) and epinephrine (0.7 µg/kg body weight). Blood samples were collected via jugular cannula from 30 min pre-injection (basal concentrations) to four hours post-injection, and analyzed for glucose, non-esterified fatty acids (NEFA) and insulin concentrations. Goats were offered a pelleted ration based on ground corn, alfalfa hay and mineral mix (14% CP during pregnancy, 15% CP during lactation); *ad libitum* feed intakes were monitored throughout the study. Response variables for glucose challenge were glucose concentration at zero time (t_0) glucose disappearance rate ($t_{1/2}$), insulin and NEFA concentrations; for epinephrine challenge glucose, NEFA and insulin integrated responses were determined through the four hours of sampling. Data were analyzed according to a repeated-measures design blocking by goat. Dry matter intakes (1.8±0.07 kg/d) were not different throughout the study ($P>.1$). Average milk production was 649±69 g/d, and was not different among periods ($P>.1$). Basal glucose and insulin concentrations were not different ($P>.1$) between pregnancy and lactation, with means (± standard error) of 77.9±3.7mg/dl, and 0.264±.034ng/dl, respectively. Basal NEFA concentrations were greater ($P<.001$) during the weeks 2 and 4 postpartum (0.40±0.2 and 0.57±0.3 mmol/l) and lowest during prepartum periods. Responses to glucose challenge did not differ throughout periods evaluated, with a mean for t_0 of 289±17 mg/dl ($P>.1$) and for $t_{1/2}$ of 31±15 min ($P>.1$). Insulin responses were similar for all periods ($P>.1$) with an overall mean of 63.3±8.2 ngml⁻¹min. Epinephrine challenge resulted in similar changes in glucose and insulin integrated responses throughout periods evaluated ($P>.1$), with corresponding means (±SE) for glucose of 3886.5±318 mgml⁻¹min, and 21.6±7.7 ngml⁻¹min, but elicited a significant ($P<.001$) increase in plasma NEFA concentrations during weeks 2 and 4 postpartum (1.24±0.6 and 1.40±0.3 nmoll⁻¹min), but not during the prepartum periods. Responsiveness of dairy goats to metabolic challenges evaluated is markedly influenced with onset of lactation.

318. Effect of dietary energy level on growth and meat quality of Korean black goats

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This study was conducted to investigate the optimal energy level at growing Korean black goat from April 20 to November 6, 2006. Forty male Korean black goat were divided into four treatments and were fed with concentrate feed containing ME 2.4, 2.6, 2.8 and 3.0 Mcal/kg with CP 15% and rice straw. Average daily gains of were 59.8, 65.4, 73.2 and 77.2 g/day in groups fed with ME 2.4, 2.6, 2.8 and 3.0Mcal/kg diet, respectively. There was a tendency to increase ADG as the ME level of concentrate feed grew. Dressing percentage were 49.73, 48.64, 50.19 and 51.36% in each group, and were increased as the ME level grew. Meat percentages ranged between 53.1 and 55.3%, and were almost constant. Ranges of crude fat contents and water holding capacity were 3.0~3.7% and 57.9~59.0%, which were increased as the ME level grew. On the other hand, shear force were between 2.8 and 3.1kg/cm², which were decreased as the ME level grew. These results suggest that the optimal energy level at growing goat's concentrate is ME 3.0Mcal/kg.

319. Effects of concentrate supplementation levels based on barley silage on growth and meat quality of growing Korean black goats

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This trial was conducted to investigate effects of concentrates levels based on barley silage on growth and meat quality of Korean black goats. A total of 36 male goats were separated into four treatments. Treatments were consisted of control diets based on rice straw and concentrates, and three substituting levels (2.0, 1.5 and 1.0%, respectively for BS2.0, BS1.5 and BS1.0) of concentrates for barley silage. All the diet was fed to Korean black goats at 2.0% level of their body weight during the period of 14th May to 12th October, 2007. Average daily gain was significantly ($P<0.05$) higher for BS1.5 and BS2.0 treatments than for controls. Daily feed intake showed that control diets (689.3 g) were significantly ($P<0.05$) higher than BS1.0 treatment (585.5 g), but they were significantly ($P<0.05$) lower than BS2.0 treatment (734.3 g). Feed conversion ratio was the highest in controls, showing 9.46 value ($P<0.05$). Dressing and meat percentages were significantly higher for BS2.0 and BS1.5 treatments than for BS1.0 treatment ($P<0.05$). Shear force was significantly more excellent in BS2.0 in comparison with other treatments ($P<0.05$), and water-holding capacity was significantly ($P<0.05$) lower in BS1.0 than in BS1.5 and BS2.0 treatments. Sensory results (juiciness, tenderness and flavor) showed a better tendency with increasing levels of concentrates based on barley silage. In conclusion, the results indicated that optimal concentrates supplementation level based on barley silage to improve growth and meat quality of growing Korean black goats might be 1.5 to 2.0%.

320. Effects of different supplements on the milk production of Criollo goats

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The objective of this work was to evaluate the effect of supplementation with Lucerne hay in addition algarroba fruit (*Prosopis flexuosa* DC.) and commercial concentrate on milk production and milk composition of criollo goats. The experiment was carried out on Experimental land of INTA La Rioja (30° 22' S; 66° 17' W), in the Llanos de La Rioja region of Chaco Arido district. Thirty six goats kidding winter were assigned randomly to three treatments each of twelve animals. The stocking rate was of one goat /2 Ha there is according to the available of the herbaceous natural grassland. T1: grazing goat on native pastures in traditional range management with nocturnal confinement (TRM), T2: TRM + 0,400 Kg/animal/day of lucerne hay and 0,450 Kg/animal/day of algarrobo fruit; T3: TRM + 0,600 Kg/animal/day of commercial concentrate. The experiment had two periods; 14 days of adapted animals and 42 days register data. The goats were received supplement at the afternoon. The milk production in goats was measured in form singular through of the weighed double method (before and after the suckling) with a milk later manual in the event of existing milk surplus. These determinations were carried out to the morning and the afternoon, three times a week in non serial days, during the sampling period. Milk composition was measured once a week with representative sample. The body weight goat and their body condition score were registered once a week. The average daily milk production had a significant effect between treatments ($p < 0,01$) T1= 0,63 Kg/day (a); T2= 1,10 Kg/day (b) and T3= 1,12 Kg/day (b). The crude protein percentage was different between treatments T1= 2,74% (b); T2= 2,92% (b) and T3= 3,58% (a). The goat of T1 and T2 loosed body weigh while T3 it was keep. It was concluded that winter supplementation with lucerne hay in addition algarrobo fruit and commercial concentrate on goat grazing native pastures improve the milk production and composition.

321. Effects of supplementary feeding of Creole goats on milk intake and growth kids

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The objective of this work was to evaluate the effect of supplementary feeding with Lucerne hay in addition algarroba fruit (*Prosopis flexuosa*) and commercial concentrate on the growth rate, milk intake and the efficiency of conversion of Creole kids. The experiment was carried out on Experimental field of INTA La Rioja (30° 22' S; 66° 17' W), located in the Llanos de La Rioja ecological district of the Chaco Arido. Thirty six goats kidding winter and grassing on native pasture were assigned randomly to three treatments each of twelve animals. The stocking rate was of one goat /2 Ha there is according to the available of the herbaceous natural grassland. T1: grazing goat on native pastures in traditional range management with nocturnal confinement (TRM), T2: TRM + 0,400 Kg/animal/day of Lucerne hay and 0,450 Kg/animal/day of algarroba fruit; T3: TRM + 0,600 Kg/animal/day of commercial concentrate. The experiment had two periods; 15 days of adapted animals and 45 days register data. The goats were received supplement at the afternoon. Milk intake kids were determinate with double weighing method (before and after the suckling). Seventy two kids were feeding by natural lactation restricted to 2 daily eat and their average daily gain and milk conversion index were computed. These determinations were carried out to the morning and the afternoon, three times a week in non serial days, during the sampling period. The average milk intake kids had a significant effect between treatments ($p < 0,05$) T1= 0,314 Kg/day (b); T2= 0,553 Kg/day (a); T3= 0,563 kg/day (a). The daily gain kids was different between treatments ($p < 0,05$) T1= 0,034Kg/day (b); T2 = 0,063 Kg/day (a) and T3= 0,065 Kg/day (a). The efficiency of conversion was the same ($p < 0,05$), T1= 9,25(b); T2=8,75 (a) and T3= 8,62 (a) It was concluded that supplementary feeding with lucerne hay in addition algarrobo fruit and commercial concentrate on goat grazing native pastures improve the performance of kids.

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Reproduction



322. Seminal parameters and its correlation with plasma proteins in Anglo Nubian goats

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Goats living at semi-arid areas like Northeast of Brazil show periods with better and worst semen quality during the year even without day length variation. Aiming to investigate the reasons why does this happen, it was evaluate some variables from semen throughout the year. It was used five adults male goats from Anglo Nubian breed weighting 35.6 ± 6.43 kg. The animals were submitted to semi extensive system, feeding grass and receiving grass elephant (*Pennisetum purpureum*). The concentrate composed by corn and soy was offered according to body weight and the water and mineral salt *ad libitum*. The semen collection through artificial vagina happened weekly from March/2006 to April/2007. It was analysed the following semen parameters: aspect (1-6), volume (mL), motility (%), vigour (1-5), and concentration ($\times 10^9$ spzts/mL). The total proteins were analysed using the Bradford method during all the year while the protein bands identification, using pool of samples, through one-dimension electrophoresis (SDS-PAGE) and silver staining were analysed on May (rainy period) and November (dry period). It was observed significant ($P < 0,05$) variation concerning to humidity and rain precipitation between the dry and rainy periods. The semen volume, aspect and concentration showed significant difference ($P < 0,05$) between the rainy-dry transition period (June) with the dry period (July, August, September, October, November and December). Also these variables showed significant ($P < 0,05$) difference between the dry and rainy (February, March, April and May) periods. However, the semen motility and vigour didn't show significant ($P > 0,05$) difference among the periods of the year. The total protein ($\mu\text{g}/\mu\text{l}$) presented significant ($P < 0,05$) difference between the rainy-dry transition period and the rainy season; and also a significant ($P < 0,05$) variation between the dry and rainy seasons. The analysis of the one-dimension electrophoresis were analysed using the Doc-It@LS Image Acquisition Software from UVP. The results showed two bands of 79 kDa and 91 kDa on May which they are absent on November. On other hand, November showed three bands of 28kDa, 72kDa and 133kDa that aren't present on May. It was concluded that there were influence of the periods of the year on semen quality and proteins bands in Anglo Nubian goats in Northeast of Brazil.

323. Effect of nursing duration on the length of *post partum anoestrous* in North Moroccan goats

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The effect of nursing duration on the length of *post partum anoestrous* was studied on 30 adult female North Moroccan goats maintained indoors under natural day length conditions (35°N). Goats gave birth during February, March and April. At parturition, goats were divided into three groups where kids were weaned at 0 (A), 30 (B) and 90 (C) days. Female were monitored from one week after parturition until all females showed, at least, one normal *oestrous* period. During this period the *oestrous* behaviour was checked twice a day with a vasectomized buck and blood samples were collected trice a week to determine progesterone concentration. After weaning females were manually milked once a day until the end of the study. Duration of *post partum anoestrous* and anovulation period depends on kidding season. Anovulation and anoestrus periods were respectively 85 and 75 days long following late kidding (April), and 44 and 48 days long following an early kidding (February). An early kidding allows the goat a quicker come back to reproductive activity, whereas a late kidding coincides with *seasonal anoestrus*. Reproductive ability is therefore postponed to the subsequent reproductive season. Rearing type does not influence *anoestrus* duration; however suckling duration significantly lengthens the period of anovulation.

324. Secondary sex ratio and selective prenatal investment in domestic goats

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Until now many different and mutually competing hypotheses were proposed to explain great variation in secondary sex ratio. One of the most accepted one, Trivers-Willard's hypothesis (TWH), presumes that in sexually dimorphic species with polygynic mating system females should tend to adaptively manipulate offspring sex ratio according to their relative fitness. A domestic goat (*Capra hircus*) represents ideal model for testing this hypotheses since it satisfies all of TWH presumptions and in the same time isn't under pressures of natural selection for enough longtime. We analyzed data of sex ratio in 31 616 litters, totally containing 61 687 kids born in 1992 – 2004 on farms all over Czech Republic. The average sex ratio was 0,56 in favour of males which is significantly different from equable ratio 1:1 ($p < 0.01$) and this bias is more expressed in bigger litters ($p < 0.01$). Anyway, except births of quadruplets that are very rare, overall representation of sexes in each other category of births accurately corresponds with binomic distribution, therefore we could not validate TWH. When using Generalized Linear Models (GLZ) we didn't find significant effect of a breed, a season of parturition and even composition of milk on offspring sex ratio. It seems that only age of pregnant female has crucial influence on the sex of her goatlings ($F_{(7, 31249)} = 4.60$; $p < 0.01$). Mothers also invest more in their male offspring compared to female offspring (birth weigh of male 4.51 ± 0.10 kg vs. birth weigh of female 3.77 ± 0.13 kg; $F_{(1, 140)} = 19.36$; $p < 0.01$), which is in contrast to Fisher's hypotheses of balanced parental investment. The selectivity of parental investment is most expressed in litters of male-female twins where male is 0.67 kg heavier than his twin sister ($Z = 2.65$; $p < 0.01$).

325. Productive and reproductive results of German Fawn Goats in Serbia

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In former Yugoslavia, of which Serbia was a part, goat keeping was forbidden. It was regulated by the law which was in effect from the early 1950`s to mid-1980`s of the 20th century. As a result, in Serbia in the 1970`s there were several small populations of the Balkan goat breed. In that period the law was still in effect, but it was not strictly observed, and goat breeding started to develop. There were several imports of Saanen and Alpine goats for the crossing with Balkan goats and for the improving of its milk production. For the past ten years breeders from the lowland part of Serbia (the region of intensive agriculture production) have started to be interested in intensive goat milk production. They built modern goat farms and dairy houses, and they imported flocks of Alpine and German Fawn goats. In this paper we would like to present the average values of productive and reproductive results obtained during five years in one flock of German Fawn goats consisting of 150 does. The period of lactation was 260 days on average. It was the shortest in the first lactation (467 days) and increased to the fifth lactation (284 days). The average yield of milk was 675.3 l, and also increased from the first lactation (566.3 l) to the fifth (892.5 l), while the percentages of milk fat and milk protein were 3.13 and 3.07 respectively and they were not changed with the order of lactation. The average number of born kids per doe was 1.95. The lowest number of newborn kids was per doe kidding for the first time (1.72) and increased to the fifth kidding (2.51). It was the same with birth weight of kids. Average value was 3.37 kg and changed from the first (3.16 kg) to the fifth kidding (3.61 kg). Since these are the first results of the production of German Fawn goats in Serbia, and since this was the beginning of goat milk data recording, we can conclude that the researched flock of goats could be a good genetic base for further selection.

326. Progesterone levels in goats after synchronization: does the social dominance matter?

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Progesterone is essential for maintaining pregnancy in goats and embryonic loss might be a consequence of its reduction in serum near the implantation time. Some evidences exist about social dominance affecting progesterone levels in several species, where dominant females get pregnant earlier. With the objective of determine whether progesterone levels differ in goats of different social status, a behavioral study was conducted during 10 days in a herd of 57 females and an individual index of success (IS) was calculated according to the result of agonistic interactions. Goats were classified as high- (IS: 1-0.67) medium- (IS: 0.66-0.34) and low-dominance (IS: 0.33-0.0). Ovulation was synchronized using two injections of prostaglandin 11 days apart, and progesterone levels were determined daily during 20 more days. The second injection of prostaglandin was the day zero of the experiment. Data was analyzed using repeated measures anova and Pearson correlation. The progesterone levels tended ($p=0.08$) to be affected by social status of goats during the sampling, and in days 12, 13, 14, 15 and 16 they were higher in goats of high dominance ($p<0.05$). The progesterone levels were significantly correlated with the IS in days 14 and 15 ($r=0.26$, $p<0.05$). Results suggest an effect of the social status of goats on the progesterone production from the corpus luteum and other possible sources.

327. Effect of melatonin during the seasonal anoestrous on the reactivation of the sexual activity and semen production at the normal breeding season on Mediterranean bucks

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One experiment was conducted to determine if the onset of the reproductive activity and semen production could be modified by a previous treatment with exogenous melatonin, used to enhance reproductive activity during the seasonal anoestrous in Mediterranean bucks. Two balanced groups of bucks were used. The 18th march 2005, one group (M) received 3 s.c. implants of melatonin (N=7) and other group (N=4) was used like control (C). From June to September, body weight and testosterone was measured weekly and testicular weight every 15 days. The reproductive activity of each buck was assessed using characteristics of the testosterone profile. During the first 8 days of each month, volume of ejaculate and sperm concentration was assessed. Each of these 8-d periods was divided into 3-d periods of daily sperm collection separated by 2 d of rest. The semen was collected using an artificial vagina. The effect of treatment and month was studied on each variable. An interaction, month-treatment was observed on ejaculate volume, July was the month with higher volume (0.62 ± 0.058 ml vs. 1.07 ± 0.15 ml for M and C group respectively, $P < 0.05$). Sperm concentration was influenced by treatment ($6.13 \times 10^9 \pm 2.49 \times 10^8$ vs. $4.26 \times 10^9 \pm 3.12 \times 10^8$ sperm/ml, for M and C, respectively, $P < 0.05$). The onset of the reproductive activity, after the study of the testosterone concentrations was similar for both groups (31st August ± 7.89 days and 4th September ± 25.66 days for M and C group, respectively). Results demonstrate that melatonin treatment during the seasonal anoestrous does not influence the onset of the normal breeding season or ejaculate volume but it seems that could increases the sperm concentration at the normal breeding season in Mediterranean goat males.

328. Plasmatic concentrations of progesterone and estradiol around parturition in Majorera goats

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Plasmatic concentrations of progesterone and estrogens (estradiol 17- β) were analyzed around parturition in Majorera goats. Blood samples of pregnant goats (n=35) were collected at days 140 and 145 of gestation. In addition, on day 145 of pregnancy, 20 goats (group L) were induced to parturition with 7.5 mg of luproliol and 15 goats (group S) were injected IM with saline solution. Thereafter, blood samples were collected every 12 h from the induction day till kidding, and then every 24 h for the first week after kidding. In group L, the range of time to parturition was of 25-41 hours (33.3 \pm 0.9, mean \pm sem). Plasma concentrations of progesterone and estradiol 17- β were determined with radioimmunoassay, using a commercial kit (Coat-to-Count). Before the induction, pregnant goats showed similar plasmatic concentrations of estradiol 17- β (mean values ranging between 40.1 and 62.0 pg/mL) and progesterone (10 and 11.2 ng/mL, days 140 and 145 of gestation). However, in group L, 36 hours before parturition it was detected a significant increase (91.5 \pm 2.9 pg/mL, p<0.05) in the plasma levels of estradiol, reaching the higher value at 12 hours before parturition (around 180 pg/mL); in control group, the plasmatic levels of estradiol 17- β remained low till 48 hours before parturition, then, showed a progressive increase, showing a mean value of 211.2 pg/mL at 12 hours before kidding. With regard to progesterone, by 12 hours post-injection, it was detected a significant reduction (4.9 ng/mL, p < 0.01) in the plasmatic concentrations of progesterone in the induced group, and the fall became more evident 24 h after the treatment, with mean levels lower than 2 ng/ml in all induced goats. The control group showed high concentrations of progesterone (>8.5 ng/ml) till day 147 of pregnancy and then exhibited a progressive decrease until parturition. After parturition, no significant differences in plasmatic progesterone and estradiol were observed between induced and control goats. The luproliol induced a slightly faster decrease of the plasmatic levels of progesterone than observed in the control group; on the other hand, the estradiol-17 profile was very similar in both groups.

329. Estral and ovarian responses in dairy goat following superovulatory treatment soon after ovulation

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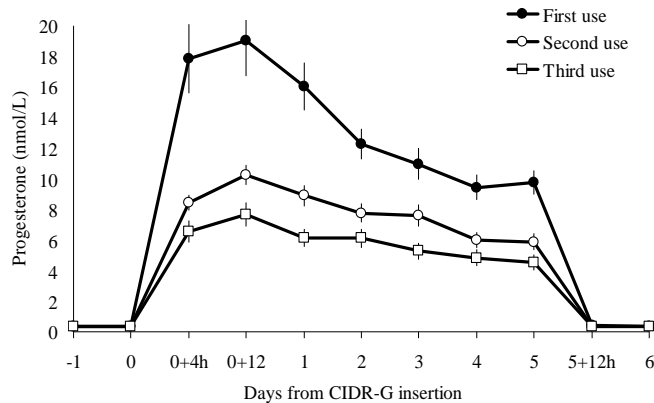
The study was carried out with the aim to evaluate the effect of superovulatory treatment with p-FSH in absence of a large dominant follicle (i.e. soon after ovulation) on estral and ovarian responses in dairy goats. Thirty – two donor dairy goats were subdivided into two homogeneous treatment groups (N=16). In Group A) estrus and ovulation were synchronized with FGA-impregnated intravaginal sponges (40 mg) for 5 days + PG analogue (cloprostenol, 100 µg) at the time of FGA insertion + GnRH (Fertagyl, 100 µg) 36 hours after sponge removal. The administration regimen of p-FSH (total dose: 250 IU, Pluset) started at 80 h after sponge withdrawal and consisted of six decreasing doses given every 12 h and. Together with 5th and 6th p-FSH doses, PG (cloprostenol, 125 µg respectively) was given to ensure luteolysis. In Group B) (control) estrus was synchronized with FGA (9 days) and PG at 7th d p-FSH (total dose 250 IU) was administered in 6 decreasing doses over 3 days, from -48 h pessary removal, every 12 h. Ovarian changes were monitored in 4 goats for each treatment group by transrectal ultrasonography every 12 h, starting -48 h sponge removal until 72 h after the end of superovulatory treatment. The goats were monitored for estrus. At day 7 after the end of the superovulatory treatment ovulation response (n. corpora lutea) was evaluated by laparoscopy. The incidence of estrus tended to be higher in control group B) (91.7 vs 58.3%; P>0.05). Group A) showed an earlier and synchronized occurrence of estrus (27.4 ± 9.1 vs 39.3 ± 17.9 h; P<0.05), a higher number of medium and large follicles (4 to ≥ 5 mm) recruited by p-FSH treatment (12.2 vs 7.5; P<0.05) and a tendency to a higher ovulation rate (13.8 vs 11.4; P>0.05). The results demonstrated that superovulatory treatment starting soon after ovulation, i.e. in absence of dominant follicle, tended to improve superovulatory response in dairy goats.

330. Reutilization of cidr-g using the short-term protocol in goats: i. Serum progesterone concentrations with devices of first, second or third use

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The Short-term Protocol is a new treatment to synchronize ovulation for Timed Artificial Insemination in sheep and goats (Menchaca et al., 2007; Anim. Rep. Sci. 102:76-87). Because the Short-term Protocol shortens the period of progesterone treatment from 11-14 to 5 days, the reutilization of intravaginal devices has been postulated (i.e. to diminish the costs of reproductive programs). The objective of this experiment was to establish the serum progesterone concentrations induced by CIDR-G of first, second or third use associated with the Short-term Protocol in goats. Thirty anestrus Alpine goats received a Short-term Protocol during the non-



breeding season (December, Montevideo, Uruguay, 35°S) using an intravaginal device (CIDR-G, 0.3 g progesterone, InterAg, Hamilton, NZ) during 5 days associated with a dose of PGF2 α (10 mg dinoprost, Lutalyse, Pfizer, NY, USA) and eCG (300 IU, Novormon, Syntex, Buenos Aires, Argentina) at the moment of device insertion and withdrawal, respectively. Three experimental groups were designed using CIDR-G of first use (n=10), second use (previously used for 5 days, n=10) and third use (previously used twice for 5 days

each time, n=10). Serum progesterone concentrations were determined from jugular venipuncture sampled from Day -1 to Day 6 (Day 0: day of CIDR-G insertion). A direct solid phase ¹²⁵I RIA (Coat-a-Count, DPC, Los Angeles, CA, USA) for progesterone determinations was used. Statistical analysis was performed using ANOVA for repeated measure.

Figure 1. Mean (\pm SEM) serum progesterone concentrations induced with a CIDR-G of first, second and third use in anestrus goats. Significant differences were found from Day 0+4 to Day 1 between CIDR-G of first use versus second and third use ($P < 0.05$). Serum progesterone concentrations were higher for the new devices during the first day of treatment. However, with the re-used devices constants levels of progesterone higher than 1.0 ng/mL (3.3 nmol/L) were maintained during the whole treatment.

331. Nutritional supplementation improves ovulation rate in goats submitted to the male effect under extensive conditions

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We investigated if nutritional supplementation improves ovulation rate in female goats submitted to the male effect under natural grazing conditions. Multiparous anovulatory does were divided in two groups (n = 27 each). One group received no feed supplementation, while the other one was supplemented daily with a mixture of 260 g of rolled corn, 110 g of soya and 900 g of alfalfa hay per animal, for 7 days from the day of introduction of sexually active males (two by group). Ovulation rates were compared using the Mann-Whitney U test. The ovulation rate, assessed by the number of corpora lutea by transrectal ultrasonography, was higher in supplemented (2 ± 0.1) than in non-supplemented does (1.6 ± 0.1 , $P < 0.05$), between days 6 and 14 after buck introduction. Over the 5 days after male introduction the ovulation rate did not differ between supplemented (1.2 ± 0.1) and non-supplemented does (1.2 ± 0.1 , $P > 0.05$). We concluded that seven days of supplementation starting at male introduction increases ovulation rate at the second male-induced ovulation of female goats exposed to the male effect under natural grazing conditions. G. Fitz-Rodríguez was supported by a CONACyT scholarship during his doctoral formation.

332. The nutritional status affects Lh secretion during the transition to the breeding season in Creole goats

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The objective was to determine the effect of body energy stores, evaluated by a body mass index (BMI), and food intake, on LH secretion during the transition to the breeding season. Twelve adult, ovariectomized, estradiol-treated (s.c. implant) Creole goats isolated from bucks were used. Animals were fed to induce two different BMI conditions: high (HBMI; n=6), and low (LBMI; n=6). Each BMI group was divided in two sub-groups (n=3 each), which were either fed restricted (FR) or non-fed restricted (NFR). The restriction consisted in alternated periods of 100% and 60% of the basal ration for 11 and 10 d, respectively, during three consecutive cycles (63 d). Serial blood samplings were conducted on Day 10 of each restriction period or on the corresponding date in NFR animals (August 24th, September 14th, and October 5th), to determine mean and basal LH concentrations and pulse frequency. Data were analyzed by ANOVA for a split-plot design. Mean LH was affected by BMI ($P<0.01$; 2.10 vs. 0.87 ng/ml \pm 0.1 for HBMI vs. LBMI), feed restriction ($P<0.06$; 1.89 vs. 1.08 ng/ml \pm 0.1 for NFR vs. FR), and sampling period ($P<0.01$; 1.01b, 1.58a and 1.87a ng/ml \pm 0.26 for periods 1, 2 and 3, respectively). Basal LH was affected by feed restriction ($P<0.05$; 1.18 vs. 0.55 ng/ml \pm 0.1 for NFR vs. FR), sampling period ($P<0.01$; 0.57b, 0.98a and 1.04a ng/ml \pm 0.06 for periods 1, 2 and 3, respectively), and BMI by period interaction ($P<0.01$; 0.67, 1.39 and 1.41 vs. 0.47, 0.57 and 0.68 ng/ml \pm 0.11 for periods 1, 2 and 3, within each: HBMI and LBMI, respectively). Pulse frequency was affected by BMI ($P<0.01$; 3.22 vs. 0.88 pulses/6 h \pm 0.21 for HBMI vs. LBMI), and feed restriction ($P<0.01$; 2.83 vs. 1.27 pulses/6 h \pm 0.21 for NFR vs. FR). In conclusion, during the transition to the breeding season, LH secretion can be modulated independently by the body energy stores and feed intake.

333. Development of a goat granulosa cell culture system: cell proliferation and estradiol production

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The objectives were to develop a serum-free goat granulosa cell culture system, and evaluate the effects of FSH, IGF-I and insulin on estradiol (E₂) production and proliferation of granulosa cells, from medium size follicles (2 to 4 mm). Ovaries were collected between November and February from adult, Creole goats. Cells were cultured in 96-well plates for 6 d, in McCoy's medium supplemented with 20 mM HEPES, penicillin (100 UI/ml), streptomycin (0.1 mg/ml), amphotericin (5 µg/ml), 3 mM L-glutamine, 0.1% BSA, testosterone (100 ng/ml), transferrin (2.5 µg/ml) and sodium selenite (4 ng/ml). Initially, different concentrations of FSH (0, 0.1, 1, 10 and 100 ng/ml), and seeding densities (2, 4, 6 and 8 x10⁴ viable cells/well) were evaluated. In the subsequent experiments 6x10⁴ cells/well and 10 ng FSH/ml were used to evaluate the effects of the IGF-I analog, LR3-IGF-I (0, 0.1, 1, 10 and 100 ng/ml), and insulin (0, 1, 10, 100, 1,000 and 10,000 ng/ml) on E₂ production and cell proliferation. Estradiol concentrations dropped drastically after 24 h of culture in all the experiments. The effect of FSH by density interaction tended to be significant (P=0.08) for E₂ but not for cell number (P=0.63). FSH (1 to 100 ng/ml) increased cell proliferation compared with control (24,239±3945 vs. 8,994±1464 cells/well; P<0.01), with no effect on E₂, while greater cell densities increased E₂ (P<0.01). Medium doses of insulin (10 and 100 ng/ml) decreased cell number, while higher doses (1,000 ng/ml) increased E₂ at 24 h of culture (302±54 vs. 172±30 pg/ml; P<0.01), and allowed for E₂ production persistence in the subsequent days, compared with control. The addition of LR3-IGF-I (1 to 100 ng/ml) favored cell proliferation, compared with control (162,079 vs. 38,989 cells/well; P<0.001), with no effect on E₂ (P=0.27); moreover, together with high doses of insulin (100 to 10,000 ng/ml), favored cell proliferation (16,006±1,765 vs. 7,470±824 cells/well; P<0.01) and E₂ (157±55 vs. 11±4 pg/ml; P<0.01) compared with control. In conclusion, FSH and IGF-I increased cell proliferation capacity, while insulin, alone or together with IGF-I, favored E₂ production at 24 h of culture, and production persistence in the subsequent days. (Project supported by INIFAP: 6236073P and CONACYT: C01-121).

334. Studies on reproductive performance of goats under intensive systems

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The reproduction records and qualitative traits of about 1000 goats bred in scale pens were analyzed. The results indicated that goats fed in confinement exhibited estrus all year around, but was concentrated in Spring and Autumn, with highest in Autumn. The pregnancy rate of artificial insemination (diluted semen in common temperature) was similar to that of natural breeding ($P > 0.05$). The gestation periods of does producing single kid are significant longer than that of twins ($P < 0.01$) and triplets and higher ($p < 0.05$). The average birth weight of single kid are significant higher than that of the twins and triplets ($P < 0.01$); and the birth weight of male twins are higher than that of triplets ($P < 0.05$). In single and twins, the weight of males was significant greater than that of females ($P < 0.01$), but in triplets, there was no difference between males and females. The litter size of does with beard was 8.3% higher than those without beard. The hornless does had a 5.7% higher litter size than those with horns. The litter size of does with wattles was 1.1% higher than those without wattles. Birth weight was negatively correlated to litter size ($r = -0.388$).

335. Seasonal variation of ovulatory activity in Nubian and Alpine does under tropical photoperiod (22° N)

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The present study was conducted in order to determine the seasonal variation of the ovulatory activity in Nubian and Alpine does maintained under natural tropical photoperiod (22° N). Eight non-lactating, non-pregnant does (4 years old) of each breed were housed at the San Luis Potosi Autonomy University (22° 14' N, 100° 53' W) during a 12 months experimental period, beginning in April. Does had access to visual, olfactory and audible signals of Alpine bucks. Nutrition was controlled in order to maintain live body weight in a constant level. Blood samples were collected twice a week by jugular venipuncture during the entire experimental period and serum progesterone concentrations were determined (RIA; sensitivity 0.03 ng ml⁻¹; intra and interassay coefficients of variation of 4.5 and 8.5%). During the course of the 12 months experimental period, a clear seasonal pattern of sexual activity became apparent in both breeds. The ovulatory period began and ended at similar (P>0.05) dates (Oct, 1 and Sep, 27, and Jan, 30 and Feb 6 for beginning and ending in Nubian and Alpine does, respectively). In a similar way, the ovulatory period ended at a similar (P>0.05) date. Consequently, both breeds showed an ovulatory period of similar length (121.1±18 and 131.8±15 days for Nubian and Alpine; P>0.05). In both breeds, the percentage of does ovulating increased gradually from September to October, and all does remained ovulating until January, when the percentage of does ovulating gradually decreased. From Feb, 20 to the end of the experimental period (April 4), all does remained without ovulatory activity. We concluded that Nubian and Alpine does maintained under tropical photoperiod, show a short reproductive season, beginning in September and ending in February.

336. Breeding soundness evaluations of young Boer bucks

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The Boer goat breed, native of South Africa, was recently introduced in Brazil, through frozen semen imports and afterwards both through live specimens and frozen embryo imports. The fact that they are good providers of meat is responsible for a considerable increase in the interest of the Brazilian breeders for them in the last few years. The current work aims at establishing a pattern of breeding soundness parameters of the Boer breed raised in Brazil, in order to provide veterinarians with reliable data. In May and June 2007 (breeding season in Brazil), two animal exhibitions took place in São Paulo, during which breeding soundness evaluations were carried out. Young Boer bucks with no offspring were submitted to external examination of the reproductive organs: the testes, the epididymides, the scrotum, the neck of the scrotum, the penis, the prepuce and scrotal circumference. The semen was collected using an artificial vagina and help of a female teaser. Then it was evaluated according to: volume, color, smell, pH, mass movement and consistency of ejaculate, wave motion characteristics, vigor, progressive individual motility, concentration and morphology of spermatozoa. The values of the main breeding soundness parameters are shown in Table 1 and are similar to those obtained by Fuck (2006) in his evaluation of Boer and Anglonubian animals raised in the State of Paraná, Brazil.

Table 1. Main Breeding Soundness Parameters of Boer Bucks, São Paulo, Brazil, 2007.

Animal	Age (years)	Scrotal Circumference (cm)	Volume (ml)	Wave Motion (0-5)	Vigor (0-5)	Progr. Ind. Mot. (%)	Concentration (sperm/ml)	Abnormal morphology (%) totals
1	1,8	33	0,7	4	4	80	3,2 x 10 ⁹	10
2	1,7	32	0,5	5	5	90	2,0 x 10 ⁹	1
3	1,6	29	1,5	5	4	90	3,2 x 10 ⁹	4
4	1,4	28	1,5	4	3	50	1,37 x 10 ⁹	3
5	2	30	1	3	3	50	3,35 x 10 ⁹	9
6	2	27	1	4	4	80	3,5 x 10 ⁹	9
Average/ sd	1,75 ±0,23	29,83±2,32	1,03±0,41	4,17±0,75	3,83±0,75	73,33±18,62	2,77±0,87	6,00±3,79

In conclusion, the Boer Bucks evaluated present breeding soundness parameters in accordance with the pattern of the species, showing perfect adaptation to the Brazilian environmental conditions.

337. Effect of breed and sex on growth characteristics of goat kids

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The present study was carried out at Goat Production Area of FMVZ/Unesp-Botucatu, Sao Paulo, Brazil. This study was carried out to compare breed and sex on growth characteristics of goat kids. Thirty-nine goats from both sexes and five breed groups were used in this trial: 6 Alpine (3 male and 3 female), 7 Boer x Alpine F1 (3 male and 4 female), 8 $\frac{1}{2}$ Anglo-Nubian x $\frac{1}{2}$ Alpine (5 male and 3 female), 9 Boer x Alpine F2 (4 male and 5 female) and 9 $\frac{1}{2}$ Anglo-Nubian x $\frac{1}{4}$ Alpine x $\frac{1}{4}$ Boer (5 male and 4 female). The animals were raised on feedlot system, weaned at 60 days of age and fed a pelleted diet containing 70% concentrate and 30% hay. Diet was formulated according to NRC (1981) for an estimated weight gain of 150 g/day. Feed intake was measured daily and body weight (BW) gain at 2-week intervals. Animals were slaughtered when reach 120 days of age. Analyses of variance were performed on all the variables measured using the general linear models procedure of SAS (1990). Birth weight was affected by breed and it was higher for Boer x Alpine (F1) goat kids in comparison to other groups (4.2 vs. 4.0, 3.8, 3.7 and 3.3 kg for Alpine (A), $\frac{1}{2}$ Anglo-Nubian x $\frac{1}{2}$ Alpine (AA), Boer x Alpine (F2) and Anglo-Nubian x $\frac{1}{4}$ Alpine x $\frac{1}{4}$ Boer (T), respectively). Dry matter intake (DMI) was higher for Boer x Alpine (F1) goat kids (1.0 vs. 0.9, 0.8, 0.7 and 0.9 kg/day for Alpine (A), $\frac{1}{2}$ Anglo-Nubian x $\frac{1}{2}$ Alpine (AA), Boer x Alpine (F2) and Anglo-Nubian x $\frac{1}{4}$ Alpine x $\frac{1}{4}$ Boer (T), respectively). Breed group did not affect average daily gain (ADG) and feed conversion ratio. Average daily gain and feed conversion was affected by sex. Males had higher ADG in comparison to females (196 vs. 164 g/day). Females had better feed conversion rate in comparison to males (186 vs. 224 g BW gain: kg DMI).

338. Electrophoresis profile in plasma semen from Anglo Nubian goats according to freezing ability in northeast of Brazil

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Aiming to investigate the proteins profile from animals that shows semen freezing ability it was used two adult Anglo-nubian goats weighting approximately 45,0 kg, living in the semi arid area of the Northeast of Brazil. These animals showed along its life historic of semen freezing (Animal X) with high percentage (90%) of approved doses and no freezing capacity at all (Animal Y), data observed at Laboratory of Andrology and Artificial Insemination belonging to Embrapa Goats located at Sobral city, State of Ceará, Brazil. The semen collection happened during two weeks at two days intervals through artificial vagina. A pool from all collections from each animal was used to analyze the total proteins and to run the 1D electrophoresis SDS-PAGE. The gel electrophoresis data were analyzed by Life Science Software Doc-It®LS UVP. The results showed nine bands of protein identified on the gel belonging to animal X and five on gel from animal Y. In the animal X it was observed a band of high molecular weight 112,3 kDa and others of 61,3; 43,3 and 30,9 kDa. The animal Y shows a band of 55 kDa and other of 20,6 kDa. Both animals showed in common bands of 67,0; 23,0; 22,0 and 20,6 kDa. The attention is focusing on the presence of high molecular weight band only in animal X and the presence of a protein band of 55 kDa only in animal Y. It is known through literature that spermadesins have molecular weight from 12 - 16 kDa, these bands not found in this study. Concerning to BSPs proteins that shows molecular weight around 28 to 30 kDa, it were found correlated bands (29,1 and 30,9 kDa) in animal X. These proteins are correlated to acrossomic reaction. In buffalo bulls, the literature found a protein band of 55 kDa correlated with sperm viability of fresh semen. We can conclude from these results that the proteins are involved on semen freezing ability in goats, but further studies are necessary to identified makers to select reproducers to be donor of semen.

339. The onset of the reproductive activity at the normal breeding season is not modified by a previous treatment with exogenous melatonin in Mediterranean goat females.

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The objective of this work was to determine if the treatment with exogenous melatonin used at the spring equinox to induce reproductive activity during the seasonal anoestrous, have an effect on the onset of the reactivation of the reproductive activity at the normal breeding season in Mediterranean goat females. Twenty-nine adult and empty does were used and distributed into two groups (Group M: N=14 treated with melatonin, and Group C: N=15, control group). These groups were balanced according to their live weight (LW) and body condition score (BCS) at the onset of the experiment. The 18th March, group M received 1 s.c. implant of melatonin that induced a period of reproductive activity during the seasonal anoestrous (Gatica et al., 2006, Rep. Dom. Anim. 41:103-125). From June to September LW and BCS were measured weekly. Oestrous activity was tested daily using entire aproned males. Ovulation rate was evaluated by laparoscopy 7 days after positive identification of oestrous. Plasma samples were obtained weekly for progesterone assay. No differences between groups in the onset of the normal breeding season according to the reactivation of the ovulatory activity (5 September \pm 4.81 days vs 22 August \pm 5.62 days for M and C group respectively) or on the onset of the oestrous activity (28 August \pm 5.76 days vs 25 August \pm 5.96 days for M and C group respectively) were observed. Similarly, treatment with exogenous melatonin during the seasonal anoestrous did not influence the ovulation rate at the onset of the normal breeding season (1.56 ± 0.176 and 1.55 ± 0.20 corpora lutea for M and C group, respectively). We can conclude that treatment with exogenous melatonin, that was effective to induce an intensive reproductive activity during the seasonal anoestrous, does not influence the date of normal reactivation of the reproductive activity in Mediterranean goat females.

340. Effects of prostaglandin administration 10 days apart on estrus, ovulation and pregnancy in nulliparous dairy goats

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The objective of this study was to check the effects of prostaglandin administration (d-cloprostenol, PGF2-alfa) on estrus, ovulation and fertility in nulliparous Alpine (n=10) and Saanen (n=9) goats. Animals received two doses of 22.5 µg of PGF2-alfa 10 days apart. After 1st and 2nd PGF2-alfa dose, estrus was monitored at 12 and 4 hr interval, respectively, with buck teaser. After the onset of the second estrus (after 2nd PGF2-alfa), females were scanned transrectally (5 MHz probe) at each 4 hr until at least 8 hr after ovulation detection. Goats were artificially inseminated with frozen-thawed semen (100 millions spermatozoa per 0.25 ml straw) after first detection of ovulation. Pregnancy was checked by transrectal ultra-sound (5 MHz probe) on days 20, 25, 30, 35 and 90 after 2nd PGF2-alfa. All parameters studied did not differ between breeds (P>0.05). Overall percentages of animals in estrus after 1st and 2nd PGF2-alfa were 73.7% (14/19) and 89.5% (17/19). The average interval (mean ± SD) from 1st to 2nd PGF2-alfa administration were 44.5 ± 15.9 h and 49.9 ± 11.9 h (P>0.05), respectively. Estrous duration did not differ (P>0.05) between breeds but in general it was smaller (P<0.05) after 2nd PGF2-alfa (31.7 ± 11.1 h) than the 1st PGF2-alfa (16.2 ± 10.8 h). Ovulation occurred in average 17.6 ± 10.7 h after estrous onset. Positive correlation (r=0.57, P<0.02) was detected between time of ovulation and estrous duration. Pregnancy rate at 25 days after 2nd PGF2-alfa was 66.7% (6/9) and 50.0% (4/8) in Alpine and Saanen goats, respectively. Embryo loss, 50% (3/6) in Alpine and 75% (3/4) in Saanen goats, occurred before 35 days after 2nd PGF2-alfa in both breeds. It could be a reflex of inadequate time of insemination and/or excessive stress from transrectal ultra-sound exams during crucial time of embryonic implantation. Estrus can be efficiently synchronized in nulliparous Alpine and Saanen goats with prostaglandin administered 10 days apart. The knowledge of the time of ovulation relative to onset of estrus may help the development of artificial insemination protocols based in estrous detection and timed artificial insemination. Key words: estrous synchronization, prostaglandin, ovulation, pregnancy.

341. Artificial insemination in the Majorera goat: fertility rate with semen frozen by an ultrafreezer of – 152 °C

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This experimental work tried to assess the fertilizing rate of caprine semen frozen and stored by the use of an ultrafreezer of - 152 °C. Semen of six bucks was collected, pooled and processed to reach a final concentration of 600×10^6 spermatozoa/ml (glycerol 4% and 12% egg yolk); diluted semen was packaged in 0.5 ml straws containing 200×10^6 motile spermatozoa each. Thereafter, semen straws were placed in the cooler (4 °C) for 4 hours and then two freezing techniques were tested: (I) straws were placed on a rack at 4 cm above liquid nitrogen for 15 min and, finally, were plunged in the liquid nitrogen (group NL); (II) straws were moved directly from the cooler (4 °C) to the ultrafreezer at – 152 °C and then were frozen and stored in the ultra-low freezer at – 152 °C (Group ULF). In addition, two periods of artificial insemination were defined after 1 and 6 months after cryopreservation. Majorera goats were synchronized by intravaginal sponges of flurogestone acetate for 11 days, and the administration of eCG (200 IU) and PGF-2alfa analogue (7.5 mg, luprostiol) injected IM at 48 hours before sponge withdrawal. Artificial insemination was carried out at 18 and 30 hours after the onset of estrus; goats were inseminated with semen frozen-thawed in liquid nitrogen (Group NL, n=35) or with semen frozen-thawed in the ultrafreezer (Group ULF, n=36). Before insemination, the straws were tested to determine the seminal quality: sperm parameters (progressive motility, live spermatozoa percentage, abnormal spermatozoa percentage) were not significantly different between both protocols. Pregnancy rate was performed on days 35 and 42 after insemination by transabdominal ultrasound scanning, using a real-time B-mode scanner equipped with a 5.0 MHz linear-array transducer (Aloka SSD-500). Fertility rate was not significantly different between NL group and ULF group (42.8% vs 38.9% and 40% vs 36.1; after 1 and 6 months of cryopreservation, respectively). Our study confirmed that caprine semen, frozen and stored by an ultrafreezer of – 152 °C, remains fertile after freezing, showing results very close to that obtained after insemination with semen frozen with liquid nitrogen.

342. Effect of the freezing protocol (nitrogen liquid and ultrafreezer of – 152 °C) over the semen frozen-thawed of Majorera bucks

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This aim of the present study was to define the effectiveness of the ultrafreezer to freeze and store caprine semen. Semen of seven bucks (3-4 years old) was collected, pooled and diluted to reach a final concentration of 400×10^6 spermatozoa/ml (glycerol 4% and 12% egg yolk); and finally was packaged in 0.5 ml straws containing around 60-70% of motile spermatozoa each. After equilibration (4° C for 4 hours), two freezing protocols were evaluated: (Group NL) straws were frozen in liquid nitrogen; (Group ULF) straws were frozen and stored in the ultra-low freezer at – 152 °C. Sperm motility (CASA system), the percentage of live spermatozoa, the acrosome membrane integrity and the percentage of abnormal sperm cells were evaluated at 1 and 6 months after freezing. No significant differences were observed between both protocols in the sperm progressive motility, with mean values of 44.2% and 40.4% (NL and ULF, respectively; 1 month after cryopreservation) and 38.7 and 36.8 (NL and ULF, respectively; 6 months after cryopreservation). Mean values of live spermatozoa ranged between 48 and 56%; no significant differences were observed when comparing the freezing protocols throughout the experimental period. In addition, the percentage of abnormal spermatozoa was lower than 10% in both freezing techniques (NL: 4.4 and 3.8%, 1 and 6 months, respectively; ULF: 6.7 and 4.5%, 1 and 6 months, respectively). Finally, the mean percentage of the acrosome membrane-intact spermatozoa ranged between 78.6 and 75.5%, showing no differences between freezing protocols. Therefore, after 6 months of cryopreservation, all the seminal parameters tested not showed significant differences between both freezing protocols. *In vitro* results suggested that the use of ultra-freezers at -152 °C for freezing and for storage caprine semen is a potential alternative to liquid nitrogen.

343. Male-to-male variation in fresh and frozen-thawed semen quality in Majorera breed bucks

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This experiment tried to determine the different features of fresh semen and to evaluate the male-to-male variation in frozen semen in bucks of the Majorera breed. Semen samples (five ejaculates) were obtained of six bucks (3-4 years old) and evaluated immediately (volume, sperm concentration, sperm motility, the percentages of live and abnormal sperm cells, acrosome status). After evaluation, the ejaculates of each buck were processed individually to result in a final concentration of 400×10^6 spermatozoa/mL, glycerol at 4% and 12% egg yolk; after equilibration (4 °C), semen straws (0.5 mL) were frozen in liquid nitrogen. Finally, semen samples (20 straws/male) were tested at 30 days after cryopreservation. In fresh, sperm parameters were as following (mean \pm sem): volume, 1.6 ± 0.2 ml; sperm concentration, $4.6 \pm 0.3 \times 10^9$ sp/mL; sperm motility, 80.8 ± 1.2 %; live sperm percentage, 84.1 ± 1.0 %; abnormal spermatozoa percentage, 4.3 ± 0.5 and acrosome membrane integrity, $89.1\% \pm 1.6$. There were significant differences ($p < 0.01$) in the sperm concentration among the bucks, however, microscopic sperm features were very similar and no significant differences were detected. After cryopreservation, the results of sperm motility (range of medias: 25-44.8%) and live sperm cells (mean range: 30.2-57.1%) were significantly different ($p < 0.01$) among males; similar results were observed in the percentage of abnormal cells (range of means: 3.2-8.5%, $p < 0.05$) and the acrosome membrane integrity (range of means: 67%-80.3%, $p < 0.05$). In our study, the microscopic characteristics in fresh semen were practically similar in all males; however, after the semen processing and freezing, it was observed significant variations in the seminal quality of individual donors, especially in the sperm motility and sperm viability, suggesting that there are an important male-to-male variation in the sperm capability to overcome cryopreservation.

344. Oestrus synchronization in Majorera goats with two different protocols of fluorogestone acetate (20 mg versus 45 mg)

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This study was carried out to check the synchronization efficiency of two different treatments with fluorogestone acetate. During the breeding season, adult goats of Majorera breed were synchronized by two different protocols: (Group F₄₅): insertion (n=31) of progestagen impregnated vaginal sponges with 45 mg Fluorogestone acetate for 11 days and the IM administration of a PGF2alfa analogue (7.5 mg luprostiol) and eCG (200 UI), 2 days before the sponge withdrawal; (Group F₂₀): insertion (n=41) of progestagen impregnated vaginal sponges with 20 mg Fluorogestone acetate, for 11 days and the IM administration of 7.5 mg of luprostiol and eCG (200 UI), 2 days before the sponge withdrawal. Oestrus detection was carried out with entire bucks three times at day (08:00, 14:00, 20:00), starting 20 h after the sponge removal. The percentage of goats showing oestrus was similar between both experimental groups: 93.5% (29/31) and 95.1% (39/41) for groups F₄₅ and F₂₀, respectively. In addition, the interval from the sponge withdrawal to the beginning of the oestrus did not show significant differences between treatments; in group F₄₅, the interval was (mean ± sem) 33.7 ± 2.9 hours (range: 24-72), starting the oestrus in the 65.6% (19/29) of the females between 24 and 36 hours after the sponge withdrawal. On the other hand, in group F₂₀, the 58.9% of the goats started to show oestrus between 24 and 36 hours, and the interval from the sponge withdrawal to the beginning of heat signs was (mean ± sem) 35.3 ± 1.7 h (range: 20-60). With regard to the estrous length, it was not detected significant differences between treatments: 34.2 ± 2.3 h (range: 12-48) and 31.5 ± 2.2 h (range: 24-63), for groups F₄₅ and F₂₀, respectively. In addition, oestrus length distribution was practically similar in both groups: the percentages of goats showed an oestrus duration between 24 and 40 hours were of 57.7% and 58.9% for groups F₄₅ and F₂₀, respectively. Although, it was a preliminary study and fertility was not tested, it seems that the protocol including 20 mg of fluorogestone acetate sponges is suitable to induce and synchronize oestrus in goats.

345. Induction of parturition in pregnant goats using different prostaglandin analogues

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This study was carried out to assess the use of the prostaglandin analogues luprostiol and cloprostenol to induce parturition in goats. Majorera goats were induced to parturition on day 145 of pregnancy with two different protocols: group CI (n = 24) was injected intramuscularly (IM) with 75 µg of cloprostenol; group L (n=24) was injected IM with 3.75 mg of luprostiol; in addition, group S (n=20, control) was injected IM with 1 ml of saline solution. Twenty hours after the treatments, goats were observed to record the following parameters: time to parturition, dystocia incidence, placental delivery and kid and maternal survival. The interval from injection to parturition (mean ± SEM) was not significantly different among the experimental groups: 35.3 ± 1.6 h and 34.8 ± 1.4 h (groups CI and L50, respectively); in addition, no significant differences were observed between nuliparous and pluriparous goats. In the control group, time to parturition was 104.1 ± 11.1 h (range: 34–168 h) and the parturition took place later in singleton than in multiple bearing goats (118.2 vs 80.0 h, respectively). All the induced goats expelled the foetal membranes within the first 3 h after the induction; however, in the control group, the incidence of placental retention was 10% (2/20). Dystocia incidence was very close between the induced and the control goats (20.8%, 25.0% and 20%, for groups CI, L and S, respectively) however, it was observed a higher incidence (p < 0.05) of dystocia in nulliparous (26.7%, 8/30) than in pluriparous goats (15.8%, 6/38). Neonatal mortality was lower than 10% in the induced groups (3.9% and 5.8%, for groups CI and L, respectively), while in the control group the incidence of kid mortality was around 14% (6/41). Finally, it was observed a case of maternal mortality in control group (5%; 1/20), whereas there was no mortality in induced goats (0%; 0/48). The luprostiol showed high effectiveness to induce the parturition in goats, within a narrow range (30–40 h) in most of the induced females (79.2%, 19/14).

346. Evaluation rates of ovulation and pregnancy in Toggenburg goats after hormonal treatment with synthetic progesterone 12, 9 and 6 days

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The aim of the study was to evaluate the rates of ovulation and pregnancy, after the use of controlled internal drug release device impregnated with progesterone (CIDR[®] - Pfizer) 12, 9 and 6 days, in anoestrus season. Animals (N=51) were used, distributed homogeneously into 2 groups (G1 = 30 animals and G2 = 21 animals). Each group had 3 treatments, treatment 1 (T1) remained 12 days with CIDR[®], weight 45.71 ± 0.64kg and 3.42 ± 0.11 for body condition score; treatment 2 (T2) 9 days with CIDR[®], weight 45, 76 ± 0.98kg and 3.59 ± 0.17 for body condition score and treatment 3 (T3) 6 days with CIDR[®], weight 47.66 ± 1.66kg and body condition score 3.52 ± 0.32. With permanence of CIDR[®] 12, with 9 and 6 days respectively. The goats received dose of 1 ml of prostaglandin subvulvar (Lutalyse[®] - Pfizer) on the insertion of the device in 200 IU of eCG (Novormon[®] - Schering-Plough) 24 hours before the removal of CIDR[®]. In both groups after the removal of the progesterone, was carried out monitoring of the animals by transrectal ultrasonography 8 to 8 hours until the confirmation of ovulation. The method of mating was covered by natural insemination in G1 and artificial insemination with fixed time (AIFT) in G2, 50 hours after the removal of the CIDR[®]. The period that includes the start of estrus to ovulation was in G1 23.3 ± 4.08 hours and 15.47 ± 4.08 hours to G2. The percentage of animals that had ovulation was 100% in G1 and G2, 85% (6 / 7), 71% (5 / 7) and 71% (5 / 7) for T1, T2 and T3, respectively, But there was no significant difference (p ≤ 0.05) between treatments (Fisher test), however the ovulation between groups differed by Chi-square test. The pregnancies of G1 had 60% (6 / 10), 70% (7 / 10) and 40% (4 / 10) for T1, T2 and T3, respectively in G2, 50% (3 / 3), 80 % (1 / 5) and 60% (3 / 5) for T1, T2 and T3, respectively, with no statistical difference between treatments by Fisher test and between groups (chi-square test). The induction and synchrony of estrus in goats with CIDR[®] in the period of anoestrus season, independent of the time of exposure to P₄ result in good fertility, both in natural and in AIFT.

347. Steroid hormone profiles during various reproductive phases in female dwarf goat (*capra hircus*) using radioimmunoassay

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A study was performed to determine the progesterone and estradiol profiles during estrous cycle, gestation and parturition in Dwarf goat (*Capra hircus*) using Radioimmunoassay (RIA). Eight female goats of almost similar age and weight were selected from a lot maintained at NIAB farm under normal grazing conditions. Blood sampling was carried out daily during estrous cycle and on alternate days during gestation till parturition. Serum was analyzed by RIA. Observations regarding estrous cycle, gestation length, litter size and birth weight of kids were recorded. With the initiation of cyclicity, estradiol attained peak levels (7.7 ± 1.7 pg/ml) at estrus phase and dropped down to the lower levels within 3 to 4 days post-estrus. Concomitantly, progesterone started to increase from the mean basal value of 0.1 ± 0.03 ng/ml on day-0 to 3.0 ± 0.9 ng/ml on day-6 of estrous cycle and reached the peak value of 7.7 ± 0.6 ng/ml on day-12. From day-15 a decline was observed in progesterone values till the end of the cycle. A 2nd estradiol peak was observed on day-18. The mean estrous cycle length was found to be 18.2 ± 2.1 days. During gestation higher progesterone levels were maintained in the range of 4.3–11.0 ng/ml. Estradiol remained at lower concentrations for 30-50 days of gestation, then gradually increased and reached to 270 ± 13.0 pg/ml a few days before parturition. It dropped again to basal values within 1-2 days of postpartum. The mean gestation length in Dwarf goat was found to be 144.8 ± 3.9 days.

348. Effect of trehalose supplementation on sperm *In vitro* quality and fertility after artificial insemination in goats

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In France, goat artificial insemination (AI) with frozen semen is preferred to that realised with fresh semen. Routinely, 35 to 40% of the ejaculates produced for AI are discarded because of poor *in vitro* characteristics and survival post-thaw. Improvement of sperm survival to cryopreservation is therefore a priority. Trehalose has been previously used as cryoprotecting agent (CPA) for the semen of numerous species such as bull, ram, dog, stallion and mouse. In ram, the addition of 100mM trehalose in the standard milk – glycerol diluent allowed an improvement of the percentage of motile sperm, acrosome integrity and fertility after AI as compared to that obtained with the base medium. After preliminary trehalose toxicity tests, buck semen was cryopreserved using different concentrations of glycerol (0 to 7%) and trehalose (0 to 400mM) in the milk based medium. The optimal combination considering sperm quality (7% glycerol and 100mM of trehalose) was then used for further tests. 13 bucks were collected biweekly, each ejaculate was divided in 2 fractions then diluted and frozen either in the base milk – glycerol medium (control) or in the base medium supplemented with 100mM trehalose (T group). Survival rate (SYBr14-IP), percentage of motile sperm (microscope) and percentage of progressive and rapid sperm by computer-assisted sperm analysis (CASA) were assessed after thawing. AI (n=357) were realised two consecutive years in 14 farms with a minimum of 20 goats inseminated at a time (10 in the control group + 10 in the T group) using the semen previously frozen. The results of the first year showed that the percentage of motile spermatozoa was significantly improved in the T group as observed both with microscope and CASA. Survival rate was also increased with trehalose (40,5% vs 24,8% for control group). Fertility after AI was clearly altered in the T group. The second years, the results observed *in vitro* were less spectacular, none of the above mentioned parameters differed between groups, and neither did fertility.

		Microscopic observations			Computer-assisted sperm analysis				Fertility after AI			
		% sperm	motile	motility (1-5)	% sperm	motile	% progressive sperm	% sperm rapid				
year 1	control	29.6 ^a	+/- 14.6	3.3 ^a	+/- 0.7	31.8 ^a	+/- 15.3	8.7 ^a	+/- 5.3	16.6 ^a	+/- 7.8	52% ^b (n=60)
	T	46.3 ^b	+/- 15.6	3.4 ^a	+/- 0.6	47.3 ^b	+/- 14.2	18.8 ^b	+/- 8.8	30.8 ^b	+/- 10.9	37% ^a (n=65)
year 2	control	55.5 ^a	+/- 15.1	3.1 ^a	+/- 0.4	48.7 ^a	+/- 13.7	27.0 ^a	+/- 10.3	39.9 ^a	+/- 12.2	43% ^a (n=115)
	T	51.7 ^a	+/- 11.1	3.2 ^a	+/- 0.4	46.2 ^a	+/- 17.4	26.3 ^a	+/- 14.7	38.1 ^a	+/- 16.6	45% ^a (n=117)

Means +/- SD. a vs. b: P<0,05 (T test or Chi²)

Males used were different from one year to the other (year 1 : males were 4-6 years old and routinely collected for AI semen production ; year 2 : 3-year-old males collected less regularly). There might have been an interaction between treatment and male characteristics. Differences in fertility results could also be attributed to a very high farm effect. Although fertility was not improved, a supplementation of 100mM trehalose in the conservation medium significantly improved sperm survival and quality after cryoconservation hereby increasing the AI doses production yield.

349. Conservation of naturalized goats in the semiarid Brazilian environment: reproductive flocks behaviour in the rural Inhamuns, Ceará, Brazil.

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There exist in the Brazilian semi-arid environment an important association between the peasant agriculture and local genetic resources. In this area the agricultural systems face different difficulties, through time the goats have been adapted to the local environment which is strongly associated with the livelihoods life of local people. As a contribution for the conservation studies of local breeds of Brazilian semiarid environment this work analyzed the reproductive goat flock behavior to the naturalized breed Canindé in the micro-region of Inhamuns, Ceará, Brasil. The information of reproductive indicators was gathered using surveys *in situ* during 2 seasons, the drought season (August-December 2006) and rain time (January-September 2007). The reproductive parameters of mature female and their breeds were obtained from 99 female goats located in 91 familiar agricultural production units from 6 rural communities. The information was analyzed using descriptive statistics (frequency distribution, central tendency measurements and scatter). 90.6% of the fertility was found it in one community which is considered acceptable while in the rest of the sample were obtained minor values. The general averages fluctuate in 64.3%. Low was the prolificacy average of animals (1.6%) in all communities. Two villages concentrated the twin births (68.7 y 66.7 %) which contrasted with the rest of rural communities (average of 44.9%), while the other two presented a high average of simple births (72.3% y 63.2 %). High average of index birth rate (0.96 %) was found it, in contrast with two communities were the values was low (0.79 y 0.70 %). Just in one village presented high miscarriage rate and low fertility rate. The wean rate was high in all the communities (average of 96.5%) with a low breed mortality (2.9%) except in one village were the death were high (16.8%); the mortality of mature goat does was low (5.2%).

350. Fertility of dairy goats, in seasonal anestrous, after a short-term progestagen treatment associated with eCG or estradiol benzoate

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This experiment evaluated the fertility rate at parturition of Saanen goats in seasonal anestrous, artificially inseminated after estrous synchronization with a short-term progestagen treatment, combined with equine chorionic gonadotrophin (eCG) or estradiol benzoate (EB) injection. Non-lactating Saanen goats (n=30) in seasonal anestrous were distributed in two treatments (eCG and EB). On the day zero (D₀), goats in both treatments received ½ of a Norgestomet implant (1.5 mg), placed under the skin of the dorsal surface of the ear, which were maintained for a five days period. Goats in the eCG treatment (n=15) received an 250 IU injection at the moment of implant removal (D₅), while the animals in the EB treatment (n=15) received an 0.5 mg injection 24 hours after implant removal (D₆). The estrous behavior was evaluated at 4 hours intervals, from 12 until 96 hours after implant removal (IR). Goats showing estrous signs were artificially inseminated twice with fresh semen, diluted in coconut water extender, at 12 and 24 hours after estrous onset (EO). Ovulation was estimated based on serum progesterone on day 5 after estrous. Student t-test and Chi-square test of the software SAEG 8.0 were used for statistical analysis. Estrous induction was similar between treatments (80.0% vs. 93.3%, in eCG and EB, respectively). The time to estrous after implant removal (IR-EO) was shorter with eCG treatment (P<0.05) (24.3 ± 1.7 h vs 31.4 ± 1.2 h), however the interval between the first and the last goat that showed estrous was 16 hours in both treatments (16-32 h and 20-36 h, in eCG and EB, respectively). Estrous duration was shorter using eCG than EB (P=0.008) (37.3 ± 2.2 and 50.3 ± 2.4 h). Considering the goats that showed estrous and were inseminated, the percentage ovulating and giving birth to live kids did not differ (P> 0.05) between eCG and EB treatment (83.3% vs. 92.9% and 58.3% vs. 28.6%). In conclusion, a short-term progestagen treatment associated with eCG or EB is highly effective for estrous induction of dairy goats in seasonal anestrous, but fertility rate at parturition need to be improved.

351. Reutilization of cidr-g using the short-term protocol in goats: II. Follicular dynamics and moment of ovulation

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The objective was to establish the follicular development and the ovulatory response induced by CIDR-G of first, second or third use associated with Short-term Protocol. Thirty anestrus Alpine goats (December, Uruguay, 35°S) received a Short-term Protocol using a CIDR-G (0.3 g progesterone, InterAg, Hamilton, NZ) during 5 days associated with PGF2 α (10 mg dinoprost, Lutalyse, Pfizer, NY, USA) and eCG (300 IU, Novormon, Syntex, Buenos Aires, Argentina) at device insertion and withdrawal, respectively. The CIDR-G was of first use (n=10), second use (previously used during 5 days, n=10) and third use (previously used during 5 days each time, n=10). Day 0 was defined as the day of CIDR-G insertion. Follicular development was determined once a day (from Day -3 until Day 5) and twice a day until ovulation by transrectal ultrasonography (7.5 MHz, Aloka, Japan). Estrous behavior was checked every 8 hours for 96 hours after device withdrawal. Statistical analysis was performed using ANOVA.

Table 1. Ovarian response (mean \pm SD) induced by CIDR-G of first, second or third use associated with Short-term protocol (5 days).

	First use (n=10)	Second use (n=10)	Third use (n=10)	P
Goats with estrus and ovulation	10 / 10	10/10	10/10	ns
Onset of estrus ¹ (h)	27.6 \pm 5.1	25.8 \pm 2.9	30.6 \pm 10.0	ns
Moment of ovulation ¹ (h)	64.8 \pm 6.2	61.8 \pm 4.0	66.0 \pm 10.3	ns
Ovulation rate	2.1 \pm 0.7	2.1 \pm 0.9	2.5 \pm 1.0	ns
Goats with ovulation from a new follicular wave (%)	10/10 (100%)	8 / 10 (80%)	8 / 10 (80%)	ns
Day of emergence of the ovulatory follicle ²	1.9 \pm 1.1	1.0 \pm 1.3	1.9 \pm 1.9	ns
Lifespan of ovulatory follicle (days)	5.6 \pm 1.2	6.1 \pm 1.4	5.4 \pm 1.9	ns

¹hours from CIDR-G withdrawal, ²days from CIDR-G insertion

In spite of the differences obtained in progesterone profiles (abstract I), follicular dynamics were not different between groups. The data are demonstrating that the reutilization of CIDR-G is effective for synchronizing estrus and ovulation in goats. Pregnancy rate following Short-term Protocol with devices of second or third use is being evaluated nowadays in our Lab.

352. Successive use of the follicular aspiration by laparoscopy and effects about oocytes viability and fertility in goat females with or without hormonal ovarian stimulation

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The influence of successive follicular aspiration by laparoscopy associated or not with hormonal stimulation for oocytes recoveries and evaluation of their quality and fertility of donors was performed. Twenty crossbred goat females aging between 18 and 48 months were divided randomly into two groups with 10 animals each, as: Group 1 - Does stimulated with a unique hormonal stimulation of 80mg of FSH-p and 300IU of eCG, 36 hours before surgery and Group 2 - Does not stimulated (control). Each female was submitted for 6-weekly sessions of harvesting. Water and food deprivation was conducted for 24 and 36 hours, respectively. The technique consisted of two incisions with introduction of the endoscopy and atraumatic clamp. After visualization of the ovaries, follicles on its surface were punched with an aid of aspiration needle connected to a vacuum system. Recovered oocytes were classified in accordance with their quality, as: I - excellent; II - good; III - regular and IV - bad or degenerate. Grades I to III were defined as viable and submitted to *in vitro* maturation, fixed and stained. Finishing surgery procedures, all females were mated with fertile males. The data were submitted for analysis of variance (ANOVA) by SAS[®] statistical program. Tukey test ($P < 0.05$) was performed to compare means. The assessment of fertility was performed by Chi-square test. The proposed procedure does not interfered in the oocytes quality seen that a majority was classified as viable (G1 – 82.55 ± 10.30 and G2 – 72.13 ± 10.25). A maturation rate was not damaged (G1 – 68.33 ± 6.17 and G2 – 74.37 ± 7.72). There was a decrease in the number of recovered oocytes by female donor, from the first to the sixth surgery in both groups (reduction of 78 to 36 in G1 and 62 to 38 in G2) however, no difference between groups ($P > 0.05$) was observed. After ultrasound examination at 45 days post-mating, 52.63% of females were pregnant. In conclusion, the follicular aspiration by laparoscopy used weekly in successive times is safe, efficient and low cost, and in these conditions, use of hormones is not necessary. Financial support: FAPESP

353. Development a programme for improving the Payoya goat breed

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The goat breed Payoya, is a native breed of Spain, with aptitude dairy and meat. This race is classified as endangered breed, with a census of about 9,000 players spread over three provinces in the region of Andalusia. This race is breeding production extensive. One of the characteristics that define the goat industry in Spain is the great diversity of production systems (extensive, semi-extensive, intensive), which is conditioned by the heavy reliance traditional goat regard to the medium in which he operates productive. In addition we have one of the least developed livestock sectors, with holdings in disadvantaged areas, sparsely and who are often led by a poorly qualified staff. In turn, their organization often limited, with a deficit in trade and services. But to appreciate the importance of the goat industry is not enough to use as its contribution to census and productions, without taking into account the work of improving the environment and the fixing of the rural population, these being the main values that this provides livestock to society. Currently, this association is composed of 57 members, taking control of 40 farms. In these farms have been collected data from official milk (quantity of milk, and analysis of fat, protein and dry extract) (a total of 20,000 controls) and has launched a programme of assisted reproduction with artificial insemination (1.600 ia in 4 years). After 4 years of work, we have obtained the valuation data genetics stallions 4, and 5 that are still in testing. And also is developing the genetic improvement programme in this race.

354. Response of meat does under two nutritional levels to the male effect during the transitional period

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The experiment was conducted at Texas A&M University Kingsville with 32 mature crossbreed does from February to August in order to determine if over nutrition induced reproduction in anestrus does and if does with different Body Condition Score (BCS) and Body Weight (BW) response to the male effect during the transitional period. Does with low BCS (1.6 ± 0.04 , scale 1 to 5) were randomly assigned to either receive 100% (T-100) or 150% (T-150) of NRC requirements for maintenance. In order to determine the reproductive and nutritional status of the does during treatments, weekly blood samples were collected and analyzed for progesterone (P_4) and metabolic hormones: Non Esterified Fatty Acids (NEFA), Triglycerides (Tg), Triiodothyronine (T_3), and Thyroxine (T_4). Initial and final mean BW (kg) differed ($P < 0.001$) between T-100 (52.3 ± 1.4 and 56.27 ± 1.36) and T-150 (60.9 ± 2.4 and 74.87 ± 2.81). Final mean BCS differed ($P < 0.001$) between T-100 (1.9 ± 1) and T-150 (4.4 ± 2). Serum concentration of T_3 , T_4 , NEFA and Tg were similar throughout the study ($P > 0.1$). On August 16, 16 does (8 from each diet treatment) were randomly selected and provided exposure to two males (T-Male); the remaining does ($n=16$) served as control (T-WOM). By d 10, 62.5% (5/8) of the does from T-Male-100 and T-Male-150, 12.5% (1/8) of the does from T-WOM-100 and 25% (2/8) of the does from T-WOM-150 had evidence of ovulatory activity. A greater ($P < 0.05$) percentage of T-Male does (100%, 16/16) had elevated P_4 by d 12 as compared to T-WOM does (18.75%, 3/16). We concluded that an increase in the dietary intake of 150% of the does' requirements for a long term during the anestrus season did not result in an early beginning of the breeding season. Neither BCS nor BW affected the response of the meat doe to the male stimuli.

355. Effect of Melengestrol Acetate (MGA) in meat does with two different Body Condition Scores (BCS) during anestrus season

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The current experiment was conducted at Texas A&M University Kingsville (27° N). The potential induction of estrus and ovulation during the non-breeding season was investigated in sixteen mature (T-MGA), non pregnant, crossbreed does, the rest of the does served as control (n=16, T-NMGA). The objective was to evaluate the efficiency of Melengestrol Acetate (MGA) in the induction of estrus in does with two different Body Condition Scores (BCS). Does were allocated by BCS into one of four groups of eight does each assigned to receive or no MGA (.25 MGA mg/hd/d). Hence, four groups of eight does resulted (BCS-2-MGA, BCS-2-NMGA, BCS-4-MGA and BCS-4-NMGA). Does were penned in order to received a diet to maintain their BCS and ensure the MGA intake for a period of 14 d. In order to determine the reproductive and nutritional status of the does prior the MGA treatment, weekly blood samples were collected and analyzed for progesterone (P₄) and metabolic hormones: Non Esterified Fatty Acids (NEFA), Triglycerides (Tg), Triiodothyronine (T₃), and Thyroxine (T₄). Following MGA feeding, bi-weekly blood samples were collected for 2-wk in order to determine if initiation of ovarian activity had occurred. RIA technique was used to determine serum concentration of P₄, T₃, and T₄, and Spectrophotometric technique for NEFA and Tg. Serum concentration of NEFA, Tg, T₃ and T₄ were similar throughout the sampling period (P > 0.1). All does were anestrus (P₄ < 0.5 ng/mL) prior to progestogen treatment (MGA). All does stayed anestrus (P₄ ≤ 1.0 ng/mL) during 14-d following MGA. These results demonstrated that anestrus does were not induced to ovulate by feeding MGA alone (P > 0.1). We concluded that MGA by itself is not a viable tool to induce estrus in anestrus does.

356. Expression of reproductive seasonality in Creole bucks under different nutritional conditions

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Effect of plane of nutrition (PN) and short term increases in energy consumption (EC), on reproductive seasonality in creole bucks was evaluated. Fourteen 15-18 months old bucks were assigned on March 13 to different PN, established by offering dissimilar amounts of same diet; Low PN (LPN, DMI=2.0 % BW) and Medium PN (MPN, DMI=3.2 % BW). Subgroups of EC were created by maintaining diet/ration (MEC) or offering 19% plus ME for 7 d every 21 d (IEC). Body weight (BW), scrotal circumference (SC) and odor (OD; scale 0-3, 3=active male) were registered weekly until October 11. Changes in SC (CSC) with respect to day 0 and interval to odor 3 for two consecutive measurements (IO3) were estimated. Blood samples were collected twice a week, analyzed for testosterone (T) and 15 d T means obtained (MT). Data were analyzed by ANDEVA for repeated measures or completely randomized design. BW was influenced by PN, Week and PNxWeek (P<.05). BW was relatively stable in LPN and lower than in MPN. MPN also presented a small gradual increase in BW from week 7 to 19. CSC was affected by Week and ECxWeek (P<.05). IEC presented greater CSC than MEC throughout the study (+2.8 vs. +1.6 cm), almost maintained maximal size until week 22, and presented a small decline thereafter (+1.3 cm on week 30). MEC presented a continued decline in SC from 13th week to the end of the study (-0.5 cm in CSC on week 30). IO3 was 61 days shorter in MPN vs. LPN (P<.05), with 8/8 animals and 3/6 animals presenting 3 odor score at week 30 (MPN vs. LPN). MT was influenced by Time and PNxTime (P<.05). MT was similar in PN groups until mid June (<250 ng/dl). Thereafter MPN presented a sharp increase up to 663 ng/dl on September 6 (mean of 397.3 ng/dl from July to October) while LPN had a smaller (up to 270.4 ng/ml) and latter (late August) increase in MT. Short term nutritional signals associated with temporal increases in EC influenced testicular growth and medium term nutritional signals associated with PN influenced testicular endocrine function.

357. Estrus synchronization in goats treated with sponges impregnated with different doses of medroxyprogesterone acetate (map)

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Short treatments have been routinely used in goats showing an acceptable estrus response. In sheep, previous studies suggest that the amount of MAP effectively utilized in an estrus synchronization treatment is lower than the dose conventionally used in sponges, in long protocols. Based on this information, the aim of the present study was to evaluate the effects of short treatment with intravaginal sponges impregnated with different doses of MAP upon estrus incidence and interval to estrus onset. Eighty two crossbred goats females were divided randomly into three groups. The goats were treated with intravaginal sponges impregnated with different doses of MAP (group I: n=30, 30; II: n=30, 40 and III: n=22, 60 mg). After 5 days, sponges were removed and it was administered 300 UI of eCG and 37.5µg of d-cloprostenol. Estrus detection was accomplished using teaser every 6h up to 60h after the sponges' withdrawal. The data were analyzed by ANOVA using the GLM procedure of SAS, means were compared using chi square test (P<0.05). The mean time interval from the end of treatment to the onset estrus was compared by the Tukey test (P<0.05). There were no significant differences between treatments for estrus incidence (GI: 80%; GII: 90% and GIII: 95.45%). In the same way, the means for the interval to estrus onset after synchronization treatment did not differ significantly among groups (GI: 42.25 ± 11.72; GII: 4622 ± 9.17 and GIII: 44 ± 12.20). However a great distribution frequency along the period of observations was shown in the three groups (18 to 54 for the GIII, and 24 to 54 for the GI and GII). It was still observed larger incidence to the 54 h (30, 43.3 and 50% at GI, GII and GIII, respectively). These results suggest that the estrus can be effectively synchronized using sponges with lower doses of MAP in short protocols. Therefore, studies should be intensified to promote larger concentration at estrus onset, important in fixed time artificial insemination programs.

358. Induction of parturition in Anglo-nubian goats with Cloprostenol: effects dose/ways of application

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The artificial induction of parturition in dairy goats is justified as an interesting auxiliary tool in the control of disease transmission through colostrum, as in the case of Caprine Arthritis-encephalitis and Mycoplasmosis, also making possible the interruption of delay pregnancy or associated pathological disorders. This allows the rationalization of the time and labor spent in the observation of parturition, with better obstetric and neonatal attendance. This objective of this study was to evaluate the efficacy of Sodic Cloprostenol (Ciosin, Schering-Plough Coopers, Brazil) in the induction and synchronization of the parturition in 30 Anglo-nubian goats allotted in four treatments: T1 (N=08): 0.4 ml: 0.106 mg, intramuscularly (IM); T2 (n=08): 0.2 ml: 0.053 mg, IM; T3 (n=7) 0.4 ml: 0.106 mg, through intravulvar (IV) and T4 (n=7): 0.2 ml: 0.053 mg, IV, applied to the 145th days of pregnancy at the 7:00 am. The data was analyzed using a completely random design, with a 2x2 factorial arrangement of treatments (two doses and two application methods). There was no significant differences ($P>0.05$) among the treatments with respect to the application of Cloprostenol and parturition (T1=31.57±4.16^a; T2=30.06±1.39^a; T3=30.11±2.46^a; T4=33.13±2.27^a hours). The occurrence of the parturition was of 8.32 hours for T1; 2.38 hours for T2; 5.53 hours for T3 and 4.54 hours for T4. All the parturitions occurred between 10:30 and 17:45, only two animals came to partum out of this interval: 19:10 (T4) and 23:40 (T1). All the treatments were efficient in inducing the parturition in the treated animals, being the dose in the concentration 0.053mg IM, the most suitable, due to smallest concentration in the dose of the Cloprostenol, application simplicity and larger synchronized parturitions.

359. Use of melengestrol acetate (MGA) in controlling goat reproduction: its combination with gonadotrophin and prostaglandins

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With the aim of evaluating the estrus and ovulatory response to the use of MGA with and without gonadotrophin and in short treatments (6 days) combined with prostaglandins, two experiments were done in milk goats during their breeding season (September-October). In experiment 1, group MGA₉ (n=15) received 0.22mg of MGA orally during 9 days, group MGA₉eCG (n=15) received the same treatment plus 150UI of gonadotrophin (eCG) at the end of treatment, control group (C, n=12) did not receive treatment. In experiment 2, MGA was administered during 6 days plus an injection of 10mg of prostaglandin at the end (dinoprost trometamine, MGA₆Pg, n=15), control group (C, n=12) did not receive treatment. Estrus behavior and ovulation (progesterone levels) were detected during the complete study. Data was analyzed using anova and Fisher tests. In experiment 1, estrus response was higher in MGA groups (MGA₉, MGA₉eCG, 93%) than in C goats (41%, p<0.05); interval to estrus was not different (113.3±24.6, 178.7±46.4 and 80.2±14.2, respectively, h±se, p>0.05). Ovulatory response was similar between groups (66, 66 and 91% respectively, p>0.05); MGA groups ovulated earlier (2.3±0.2, 2.4±0.2) than C goats (3.4±0.2, days±se, p<0.05). In experiment 2, estrus (93% vs. 83%) and ovulatory response (86% vs. 91%) were similar between MGA₆Pg and C respectively (p>0.05). Interval to estrus tended (p=0.052) to be shorter in MGA (74.2±10.8) than in C goats (108.7±12.8, h±se). The interval to ovulation was shorter (p<0.05) in MGA (2.6±0.3) than in C goats (4.4±0.3, days±se). It is concluded that, in milk goats during their breeding season, 1) MGA alone by 9 days increases the estrus behavior and accelerates the occurrence of ovulation the same as when eCG is used; 2) the use of MGA during 6 days combined with a prostaglandin injection is able to accelerate the estrus behavior and the ovulation. Results are discussed in terms of reducing costs for strategies that allow controlling reproduction in goats, without affecting efficiency.

360. Reproductive parameters and perinatal mortality of crossbred goats under range conditions in northern Mexico

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A trial was carried out in northern Mexico (25°05'-26°54' N 101°40'-104°45' W; 270 mm annual precipitation) in four commercial goat herds (range 48-82 adult criollo x dairy goats) kept under extensive conditions (n=263), from August 30, 2004 to February 28, 2005. Goats were allowed to graze/browse in a restricted herding system (8 hours grazing), starting at 1100 h and were confined in the afternoon, without extra feed supplementation). The objective of this study was to characterize the reproductive parameters in these goat herds and mortality rate of newly-born kid goats in this arid ecosystem, and to determine the causes of death. The newly-born kids were grouped according to their death's age (G) expressed in days: G1 (0-4), G2 (5-9), G3 (10-14), G4 (15-19), G5 (20-24) and G6 (25-29). In the four goat herds combined, pregnancy rate, prolificacy, mortality rate and occurrence of abortions was 78.75%, 1.72%, 9.2% and 7.6%, respectively. Does bearing singles, twins, triplets or quadruples were 39, 53, 7 and 0.6%. Autopsy was practiced on 32 cadavers and 17 aborted fetuses. The main causes of death were respiratory and digestive disorders. The highest ($P \leq 0.05$) kids mortality occurred at 0-4 days of age (23 cases, 72%), compared with mortality of other age groups. According to sex of kid, mortality was equally distributed between males and females. The highest mortality of kids ($p \leq 0.05$) occurred during the coldest months (December, with 11 cases and January with 14). Low environmental temperatures were associated with high mortality rates ($R = -0.9$). Respiratory diseases were the main causes of mortality in kid during the first 4 days of age, pneumonia being the most important cause of death. It was concluded that grazing crossbred goat under this hot arid ecosystem and poor management present low mortality and high reproductive efficiency, which can be exploited for efficient goat milk and meat production in this xeric environment.

361. Use of the male effect in a flock of creole goats from Tamaulipas, Mexico, under grazing conditions

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Goats from the North of Mexico show an anestrus period from March to August. The sudden introduction of a male to a group of females during that period, but isolated of any previous contact with him, advances and synchronizes the reproductive season. The objective of this work was to assess the male effect on estrus display and subsequent delivery of a creole goat flock from Bustamante, Tamaulipas (Mexico; 23°N). Forty multiparous, non pregnant goats and two adults bucks, equipped with a marker harness, were used to detect estrus. Females from the control group (n=20) stayed the whole experimental period with one male; females from the experimental group (n=20) were exposed to the other male for 30 days, this male was previously isolated from the flock for one month; both groups were separated 1.5 km distance. Goats were kept under diurnal grazing and night confinement throughout the experimental period: from May 15 to June 14. Detection of estrus was carried out twice a day, in the morning and at night, in the confinement farmyard; subsequent parturition from both groups were registered. Data was analyzed by a proportion comparison for independent groups using the Fisher exact test. In the control group, 20% of the females (4/20) showed estrus behavior during the experimental period; in the experimental group, 100% of the females (20/20) subjected to the “male effect” displayed estrus throughout that period (P<0.001), and 85% of them were detected by the male in one week period (June 8 to 15). Latency, period from the male introduction to the flock until the first goat was estrus-detected, was 96 hours. Regarding fertility (females that gave birth/females exposed to the male), values were 15 and 85% for control and experimental groups, respectively (P<0.001). In conclusion, the “male effect” is an easy and cheap technique that may be incorporated to reproductive goat management provided male separation from the flock is possible.

362. Production of teaser female goat by short-term protocol of exogenous androgen administration

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The objective of this study was to report the possibility of inducing male behavior in the female goat by short-term protocol of exogenous androgen administration. A mature pluriparous Toggenburg goat that didn't become pregnant for two consecutive seasons was selected. The goat received 10 subcutaneous doses of 5 mg testosterone propionate (Androgenol[®], Hertape – Calier do Brazil, Juatuba – MG, Brazil). The first 4 doses were administered at 4 days interval (days 0 to 12) and the other 6 doses weekly (Days 19 to 54). The efficiency of the teaser female was compared with to mature bucks during de induced estrus in anestrus Toggenburg goats. Three protocols were use to induce estrus. In all animals goats received 10 mg dinoprost (Lutalyse[®], Pfizer Saúde Animal, São Paulo, Brasil) at latero-vulvar via at implant insertion and 200 IU eCG (Novormon 5000[®], Shering – Plough do Brazil) i.m. 24 h before implant removal. Time o permanence of intravaginal device (0.33 mg progesterone; CIDR[®], Pfizer Saúde Animal, São Paulo, Brazil) were six (T1, n=14), nine (T2, n=14) and twelve days (T3, n=14). Females were induced to be artificially inseminated with frozen-thawed semen 53 h after devise removal in two 21 animal groups at 14 days interval. The first dose of testosterone was administered the same day of devise insertion in T3 goats during first group of estrous induction. The female teaser goat presented typical male behavior including flemen, vocalization and mounting. Estrus was monitored twice daily (07:00 a.m. and 17:00 p.m.). Percentage of animal in estrus did not differ ($P>0.05$) for treatments in group 1 (T1=100% (7/7), T2= 71,4% (5/7), T3= 71,4% (5/7)) and 2 (T1= 100% (7/7), T2= 85,7% (6/7), T3= 71,4% (5/7)). Pregnancy rate did not differ ($P>0.05$) for treatments in group 1 (T1=50%, T2=80%, T3=80%) and 2 (T1=75%, T2=60%, T3=30%). Percentage of females in estrus detected by bucks (83,3% (35/42)) did not differ to teaser female (90,4%(38/42)). Nine days after the end of androgenization, teaser females showed estrus and were mated and became pregnant. The protocol of androgenization was efficient to induce buck behavior in the female goat and can be promptly used

363. Estrus synchronization with medroxyprogesterone acetate impregnated sponges in goats (*Capra Hircus*)

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A study was carried out to synchronize estrus in goats by self-made progesterone sponges and to determine the time of onset and duration of estrus along with subsequent fertility rate. Polyurethane sponges were prepared with medroxyprogesterone acetate (MAP: 60mg) and inserted intravaginally in a lot of 8 female postpartum goats (Beetal x Dwarf). Two goats were kept as control. Sponges were removed on 17th day. Estrus was checked in all goats at 8 h interval. A buck was introduced in the herd for breeding after one day of removal of sponges. Estrus was further confirmed by determining serum estradiol levels using Radioimmunoassay (RIA). All the experimental goats exhibited estrus within 2-4 days of removal of sponges, whereas 1 control animal also showed estrus. The time from sponge withdrawal to the onset of estrus was 65.4 ± 24.0 h and duration of estrus was observed as 29.8 ± 6.7 h in experimental group. The control animal showed estrus after 22.0 h of sponge removal and estrus duration of 36 h. Estradiol concentrations were found in the range of 2.2-15.0 pg/ml during estrus. Animals were observed for reversal towards estrus after 21 days. Only one animal exhibited 2nd estrus. The gestation period of 150.4 ± 3.4 days and a litter size of 1.3 ± 0.5 was observed with a fertility rate of 87.5% in the experimental lot. The control does produced a male kid after 153.0 days of gestation.

364. Assessment of the spermatic membrane integrity with the use of fluorescent probes in goats of Boer and Alpina breeds after collection and thawing.

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The aim was to evaluate the spermatic membrane integrity after thawing. The semen was collected from bucks, Boer and Alpina breeds, in all 135 ejaculates, submitted to freezing using egg yolk-TRIS extenders. Submitted to the plasma membrane integrity of spermatozoa test with fluorescent probe with semen after collected and thawing. The semen (10 µL) was diluted in 1 mL of homogenized saline stock solution, added of 40 µL of stained solution, maintained in a water-bath at 37°C by 10 minutes. Aliquots of 10 µL of the stained suspension were deposited in a slide covered with a coverslip and evaluated under an epifluorescent microscope (x 1000). For visualization of the stained suspension, were used in an alternate way, fluorescein and rodhamine filter, to the carboxifluorescein diacetate and propidium iodide stains, respectively. Two hundred cells were counted by lamina of each ejaculate, following the classification proposed by HARRISON and VICKERS (1990). The means (%) and the standard deviation (±) from the intact or normal spermatic cells were observed: 97.80±2.71 e 20.33±15.03 (Boer goat); 94.61±6.27 and 30.01±17.57 (Alpina goat); partially damaged: 1.56±14.92 and 77.47±5.69 (Boer goat); 4.61±15.73 and 66.52±43.77 (Alpina goat); and damaged: 0.64±0.88 and 2.20±3.86 (Boer goat); 0.78±1.74 and 3.47±4.24 (Alpina goat) after collecting and after thawing, respectively. There were significant differences between the samples after collection and after thawing to both breed. The mean percentages of the intact cells or normal cells after thawing were small, however the fertility rate might be compensated by the high concentration of viable spermatozoa in 300x10⁶ favorable to the fertilization.

365. Effect of continual presence of the male on seasonal variation of reproductive activity in crossbred Nubian goats under tropical photoperiod

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The present study was conducted in order to determine the effect of continual presence of male on reproductive seasonality in Crossbred Nubian does maintained under natural tropical photoperiod (22° N). Nutritional was controlled in order to maintain live body weight in a constant level. Sixteen non-lactating, non-pregnant does (4 years old), were housed at the San Luis Experimental Station of INIFAP, or at San Luis Potosi Autonomy University (22° 14' N, 100° 53' W) throughout an 11 months experimental period, beginning in January. Does were randomly assigned to one out of two treatments: (ID) totally isolated of males (n=8), and (MD) in contact with males (does had access to visual, olfactory and audible signals of bucks). Blood samples were collected twice a week by jugular venipuncture during the entire experimental period and serum progesterone concentrations were determined (RIA; sensitivity, 0.03 ng ml⁻¹; intra and interassay coefficients of variation of 4.5 and 8.5%). During the course of the 11 months experimental period, a clear seasonal pattern of sexual activity was observed. The effect of male presence on ovulatory activity became apparent at the end of the reproductive season. The percentage of does ovulating decreased gradually from February to March, and became zero ended 54.2 d earlier in ID than in MD (P<0.001). Both groups of does remained without ovulatory activity until July. The percentage of does ovulating gradually increased between August and September, starting in similar dates in both groups (Sept, 26 and Sept, 25, respectively; P>0.05). Ovulating activity remained elevated (100% of does ovulating) in both group until December, when the experimental period concluded. The anovulatory period was 55.9 d shorter in MD (P<0.01). We concluded that the continual presence of male affected the length of the anovulatory period in Crossbred Nubian does kept under tropical photoperiod.

366. Boer goat multiplier herd at Pagoh, Malaysia

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Among the many factors identified as constraints that hinder the development of the goat industry, two of the most pertinent are the lack of quantity as well as quality of available breeding stock and the high dependence on importation of animal feeds. Today MARDI has developed package technology that includes breeding aspect, nutrition, health and management system to produce top quality Boer breed in a commercial scale. To speed up the multiplication of Boer goat and solve the shortage of quality Boer breed available in the country, MARDI has carried out Boer multiplier herd project at Pagoh, Johore. The model that was developed, utilized initial breeding stock of 10 pure MARDI Boer bucks with 500 crossbred Boer does raised on 50 acres of improved pasture. After 18 months of study, the performance data showed that the goats adapted very well under semi intensive system. The data showed that the male and female Boer goats reached early puberty at 6 months and 10 months respectively. The live weight at birth is high (3.0 to 4.5 kg), high average daily gain (250 gm/day), high kidding rate percentage (90%) with percentage kid mortality of less than 5% and high milk yield (1.5-2.5 liter/day). Based on the preliminary data of the projected cash flow analysis would give an encouraging Internal Rate of Return (IRR) of about 50%. The projected cash flow analysis also gave a high Net Present Value (NPV at 10%) of over RM 6.4 million with the expected pay back period of within 3.6 years. The benefit cost ratio of over 2.99 also showed that the venture is profitable.

367. Effect of level of eCG on the ovulation induction of does in poor body condition, in rangelands of Northeast México.

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The objective of this study was the induction of ovulation of 43 crossbred does (Saanen x Toggenburg x French Alpine x Nubian) during the anestrus season of the year (April and May), with a poor to regular body condition (1.5–2.0), and different dosages of eCG, to determine estrous presentation and pregnancy rate. Does received under rangeland conditions, 300 g per d of an energy-protein supplement containing ground sorghum and corn grains, and cottonseed meal. A free choice mineral supplement was available. A vaginal sponge impregnated with 45 mg of fluorogestone acetate was placed in all does, during 11 d. Two days before withdrawing the sponges, does were randomly assigned to 3 groups, a control group (n = 14) receiving an IM injection of a physiological solution, a second group (n = 15) receiving 300 IU eCG IM, and a third group (n = 14) treated with 600 IU eCG IM. The results of estrous presentations were 28.6 (n = 4), 60.0 (n = 9) and 57.1% (n = 8) for control, 300 and 600 IU treatments, respectively. Although a difference (P < 0.05) was obtained between the control group and the eCG treatments, no difference (P > 0.05) was observed between the 300 and 600 IU treatments. Pregnancy rate was different (P < 0.05) among treatments, with 14.3 (n = 2), 66.7 (n = 10) and 42.8% (n = 6), for control, 300 and 600 UI, respectively. Only one animal of the 600 UI group aborted. These results suggested that 300 IU of eCG was enough to induce estrous and maximize pregnancy rate, even though body condition was poor. More research is needed to establish hormonal treatment programs which could improve the reproductive performance of does under range conditions.

368. Effect of different levels of FSH on the response to ovulation and quality of embryo transfer in goats, during the breeding season.

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The main objective of this study was to determine the effect of the application of FSH on interval removal sponges-estrus (IRE), number of corpórea lutea, recovered embryos and embryo transfer in goats. Twenty one goats were used (Alpine and Saanen), which were synchronized with intravaginal sponges (60 mg of Medroxiprogesterone Acetate) during 12 days. The treatments consisted in the application of Follicule Stimulating Hormone (FSH) (Folltropin) from the 9th day of the insertion of the sponge; 12.5 mg of Dinosprot Trometamin were also applied to each of the goats. The treatments were T1: 75 mg of FSH, T2: 145 mg of FSH and T3: 215 mg of FSH. The total dose for each treatment was divided into seven applications with an interval of 12 hours in equal doses and decreasing. Seven days after natural service, collection of embryos was performed through laparotomy. Data was analyzed by the Chi-Square Method and results were as follows: T3 had a better response ($P < 0.05$) in relation to the number of embryos collected (9.6) and transferable (6.9) compared to T1 (1.4) and T2 (1.3). A greater number of follicles resulted in T1 (3) ($P < 0.05$) when compared to T2 (0.8) and T3 (0.7). The number of corporea lutea, was higher for T3 with 13.7, followed by T2 with 5.3 and T1 with 3.9 ($P < 0.05$). There were no differences in relation to the IRE even though goats presented estrus 25.1 hours after the sponge was retired, in average. In conclusion, the response to the application of more than 200 mg of FSH will result in an acceptable number of embryos according to other reported studies.

369. Effects of mineral supply on testosterone levels and semen characteristics in Criollo kids

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The experiment was done in order to evaluate the effect of minerals on semen quality in young kids, in the Facultad de Estudios Superiores de Cuautitlán, from march to august with geographic located at 19°14' NL and 99°14' WL a 2250 meters above sea level, and wet-temperate climate with summer rain fall and average temperature of 15° C. Six Criollo kids breed with 7/8 Nubian, seven months old born in autumn, were randomly divided into two treatments: 1) Treated kids; 2) Control kids. The treated group was offered a diet of fresh Lucerne ad libitum and 400 g of broken corn with minerals 20 kg per ton, the control group was offered with the same feed but without minerals. Kids were weighted once a week, after separation of penis from prepuce semen was obtained once a week by electro-ejaculation. Previous to feeding, four samples of each kid were obtained, after treatment 8 samples of each kid were evaluated. Seminal volume was measured in a graduated tube, forward motility was estimated after dilution 1:100 in sodium citrate 98 mM, examined at 100X in a optic microscope, the result was expressed as percentage, sperm concentration was calculated using a Neubauer chamber at 1:100 dilution. Semen morphology was estimated in a slide stained with Bengal-pink-Wells Awa in sodium citrate, primary and secondary abnormalities were determinate. Each kid was evaluated weekly for Serum testosterone by radioimmunoassay with intra-assay mistake under 10%. Statistical evaluation was done by analysis of variance using the kids as block and kids weight as covariable as in the following mathematical model $Y_{ijk} = \mu + T_i + M_j + S_k + \beta (P_n - P_{\bar{n}}) + E_{ijkl}$. Sperm motility and morphology, were not affected by mineral treatment, but sperm concentration was better ($P < 0.05$). Fuentes *et al*, 1999, working with selenium and vitamin "E" does not find changes in the quality semen in adult rams, although Udala *et al.*, 1995 found motility, volume and concentration significant changes after selenium and vitamin "A" treatment in bulls. Another important mineral for reproduction is zinc, the absence or reduced intake produce poor testicular development and less sperm production (Martin and White, 1992). The flock of this paper presented a selenium deficiency as one of the principal problems in kid death, the supplementation of selenium, prevent death and increase the sperm quality. The testosterone levels showed a significant difference between treatments ($P < 0.05$). The zinc deficiency may affect the reproduction (Favier, 1992; Neve, 1992), report that zinc affects the gonads with less response to gonadotrophins and poor testosterone synthesis and action. Then the administration of minerals daily during 60 days was effective to improve the sperm concentration in young male goats.

370. Estrus response following male introduction or eCG injection into progesterone-treated dairy goats

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The objective of the present study was to evaluate the estrus response of progesterone-treated goats after male introduction or eCG injection. During the months of March-April, a total of 37 multiparous does were treated with intravaginal CIDR device during 14 days and allocated into one of the next treatments: eCG (n=13), 200IU of eCG were injected at removal of the device (time 0); male introduction (M, n=13), a male was introduced at the time of removing the CIDR, and Control (CON, n=11), goats that received no further treatment. Estrus was detected 2 times a day in all goats after 24h after CIDR removal and during 4 days. Number of goats in estrus and interval to estrus were determined. Data was analyzed using Anova and the Fisher exact test. The percentage of goats in estrus was higher in groups eCG (100%) and M (92%) than in CON does (36%; $p < 0.05$). There was no statistical difference between eCG and M groups in the number of goats showing estrus ($p > 0.05$). The interval to the estrus response was similar between groups eCG (39.3 ± 3.4) and M (47 ± 3.4 , $h \pm se$; $p < 0.05$). The interval to estrus was larger in the CON group (80.3 ± 6.2 ; $p < 0.05$). It is concluded that in progesterone-treated goats, the male introduction induces a similar estrus response and in a similar interval as when eCG is injected.

371. Serum levels of progesterone, estrogens and their fecal metabolites along the estrous cycle in goats (*Capra hircus*, Linnaeus, 1758).

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Saanen e Toggenburg dairy goats (n=10) kept in a private flock in São Paulo State, Brazil, had their serum levels of progesterone and estradiol compared to fecal concentrations of the respective metabolites, through an interval corresponding to 3 estrous cycles. Hormone serum levels and their metabolites fecal concentrations were examined through radioimmunoassay. Hormonal profile was checked with behavioral manifestations of estrous searching for a better knowledge of the cycle of these breeds in Brazilian environment, leading to a more efficient reproductive management. Comparative results were analyzed according to non-parametric methods. Spearman correlation test was performed using a commercial template (GraphPad™). Correlations between serum and fecal levels were calculated, suggesting that the model of fecal hormone measurements could be valuable in *cervidae*. It was found an extremely significant correlation between progesterone serum concentration and progestin fecal concentration, with $r=0,83$ and $p<0,0001$. Between estradiol serum concentrations and its fecal metabolites' concentrations no significant correlation was found, with $r=-0,16$ and $p<0,3916$. Based on results observation and statistical analysis, we can assume that, in the circumstances of this trial, progestin fecal concentrations show a variation profile similar to that one of serum progesterone, through estrous cycle of goats; however, this fact could not be observed for estradiol metabolites, compared to serum estradiol concentrations.

372. Estrus response following royal jelly or eCG treatment into progesterone-treated goats

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It has been shown that royal jelly from honeybees has estrogenic effects and can be used to improve estrus response in progesterone-treated ewes. The objective of this study was to compare the effects of royal jelly (RJ) and eCG treatments on estrus behavior of progesterone-treated goats. During the months of March-April, forty-one goats were administered with CIDR devices for 12 days and randomly allocated to three groups (eCG, RJ, CIDR) of 10, 11 and 10 goats each respectively. A fourth group of 10 goats without any treatment was considered as control (CON). Goats in eCG group received 200 IU of the gonadotrophin at the time of CIDR removal (time 0). Goats in RJ group were treated daily with an i. m. injection of 1g of RJ during the 12-day-period of CIDR treatment. No further treatment was given to goats in groups CIDR and CON. Estrus was detected 4 times a day in all goats after 12 h of CIDR removal and during 5 more days. Anova and the Fisher exact test were used to analyze data. Expression of estrus was 80% in eCG, 81.8% in RJ and 80% in CIDR group ($p>0.05$). No goats in CON group showed estrus behavior. Interval to onset of estrus was shorter in eCG-treated goats (28.5 ± 2.4) than in RJ (49.3 ± 2.3) and CIDR groups (43.8 ± 2.4 , $hs\pm se$; $p<0.05$). Results demonstrate that treatments of RJ or eCG in conjunction with CIDR were as effective to induce estrus as the intravaginal device alone. Differences might be in pregnancy and kidding rates but more research is needed to confirm that.

373. Influence of size of the uterus on pregnancy rate and prolificacy in dairy does

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The objective of the present study was to determine the effect of the size of the uterus on pregnancy rate and litter size. One-year old does of Alpine (n=35), Saanen (n=12), and Toggenburg (n=3) breeds were inseminated by laparoscopy and at this time the size of the uterus was recorded as small, medium and large. There was no significant effect ($P>0.05$) of the size of the uterus on pregnancy rate, as has been reported in previous studies in dairy does and sows. However, the size of the uterus significantly ($P<0.05$) affected prolificacy, which increases as the size of the uterus increases. Does with the small size of uterus had the lowest mean litter size (1.0), whereas does having a medium and large size of uterus had mean litter size of 2.3 and 3.2, respectively, which is in agreement to the reports in rabbits and sows. In these species it has been observed an influence of the uterine space available per fetus on the litter size. In conclusion, the size of the uterus in dairy does affects litter size.

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374. Effect of maternal selenium on the fetal fluids and tissues selenium concentration in goat

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The aim of this study is studying the effect of maternal liver and plasma selenium levels on selenium concentrations in the fetal fluids including allantoic and amniotic fluid and fetal tissues including liver, kidney and thyroid gland. Biological samples (slaughterhouse material) were collected from 36 goats and classified according to gestational stage into either early or late gestation. Samples consisted of allantoic fluid, amniotic fluid, fetal liver, fetal kidney, fetal thyroid glands, maternal plasma and liver in order to determine Se concentrations throughout gestation. Selenium concentrations in allantoic fluid, fetal liver and kidney increased significantly ($p < 0.01$) in late gestation, when compared to that of early gestation, whereas Se concentrations in amniotic fluid, maternal plasma and liver decreased significantly ($p < 0.01$). Significant ($p < 0.01$) positive relationships were demonstrated between the age of the fetus and selenium concentrations in allantoic fluid ($r = 0.75$), fetal liver ($r = 0.59$) and kidney ($r = 0.81$). Significant ($p < 0.05$) positive relationships were also found between selenium concentrations in allantoic fluid and fetal liver ($r = 0.37$). Maternal plasma and liver Se concentrations also correlated positively ($r = 0.57$, $p < 0.05$). However, significant ($p < 0.05$) negative relationships were found between selenium concentrations between fetal liver and maternal liver selenium ($r = -0.50$). There were also significant ($p < 0.01$) negative relationships ($r = -0.43$) between selenium concentrations in fetal liver and amniotic fluid. Selenium concentration in the fetal liver was significantly ($p < 0.01$) higher than that of the kidney and thyroid. No fetal thyroid morphological alterations were demonstrated. In conclusion, strong fetal-maternal relationships in selenium concentrations were evident throughout the gestational period. Dams seem to have sacrificed their selenium levels in order to maintain the fetus. Selenium concentrations in amniotic and allantoic fluids may be used as an indicator of the selenium status of the fetus throughout the gestational period. Fetal liver appeared to act as the main storage organ for selenium.

375. Effectiveness of sericea lespedeza leaf meal to reduce worm burden in goats

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Infection with gastrointestinal nematodes (GIN) is the primary constraint to profitable goat production in the United States, and GIN resistance to anthelmintic drugs is reaching epidemic proportions. An alternative non-chemical treatment option is feeding dried forms of the high-tannin forage sericea lespedeza [SL, *Lespedeza cuneata* (Dum.-Cours. G. Don)], which has shown effectiveness against *Haemonchus contortus*, a blood-feeding GIN, when fed at 25-75% of the diet. While this effect has been observed with sheep and goats fed dried, ground whole-plant SL, feeding SL leaf meal may enhance the plant's anthelmintic properties. A feeding trial was completed with 20 Spanish/Kiko cross 2-yr-old bucks given a trickle infection of 500 *H. contortus* larvae 3 times per week for 14 weeks in pens. After 8 weeks of receiving larvae to increase fecal egg counts (FEC), goats were stratified by FEC, randomly assigned to pens and treatments, and then fed 2 treatment diets of 25% hay and 75% concentrate (n = 10, two pens per treatment, 5 goats/pen) for an additional 6 weeks. The hay portion of each diet consisted of ground SL leaf meal or SL whole plant meal, and the diets were balanced to provide 14% crude protein. Fecal and blood samples were collected weekly during the trial for FEC and packed cell volume (PCV) determination, respectively, and the goats were slaughtered and adult GIN recovered from the abomasum and small intestines for counting and identification to species at the end of the trial. During the trial period, FEC went down and PCV increased in both groups, indicating anthelmintic activity of dried SL forage. However, goats fed the SL leaf ration had lower ($P<0.05$) FEC than animals given the total plant SL ration after 3 weeks, with the differences maintained till the end of the trial. Feeding SL leaf meal increased the anti-parasitic efficacy of SL hay and may increase the use of this plant as a natural alternative to chemical anthelmintics.

376. Effect of vaccination of goats with H-11/H-gal-GP antigens from intestinal membrane cells of *Haemonchus contortus*.

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Vaccination of sheep with H-11/H-gal-GP antigens has been effective in reducing *Haemonchus contortus* infection in sheep. This study tested these antigens in goats. Antigens were purified from the intestinal membrane cells of adult worms and combined with Quil A (adjuvant). Twenty-two crossbred goats were dewormed to remove existing infections and randomly assigned to 2 concrete floor pens (n=11 each). The vaccinate group received the antigens 35, 21 and 7 d prior to Day 0 and the control group received just Quil A. On Day 0, all animals were experimentally infected with 5000 *H. contortus* L3. Infection was monitored by fecal egg count (FEC) and blood PCV over a 70 d period. Immune response to the antigens was monitored by serum IgG levels. Overall mean FEC and PCV were significantly ($P<0.05$) lower and higher, respectively, in the vaccinated group compared to the control group from Day 21 post infection to the end of the study. The IgG levels peaked 21 d after the first vaccination and remained high throughout the remaining booster series, but began to wane after infection. However, the IgG levels remained significantly ($P<0.05$) higher throughout the entire study. A third booster vaccination, given on Day 49, caused a sharp increase in IgG levels and a 96% reduction in FEC. Due to impending clinical haemonchosis, the three animals in each group with the highest FEC were necropsied on Day 56, The remaining animals were necropsied on Day 70. On the 2 necropsy days, respectively, there were 20% ($P>0.05$) and 96% ($P<0.05$) fewer *H. contortus* adults recovered from the vaccinated group. Results of this study indicated that H11/H-gal-GP vaccination prior to infection reduced FEC, but had limited effect on worm burden; and, subsequent to a booster vaccination during the established infection, worms were essentially eliminated. H11/H-gal-GP antigens show promise for controlling pasture contamination and *H. contortus* infection in goats.

377. Sero-epidemiological survey on Peste des Petits Ruminants, Contagious Caprine Pleuropneumonia, Caprine Arthritis/Encephalitis, Q fever, Paratuberculosis and Brucellosis in goats in Lebanon.

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The goat population in Lebanon is estimated around 500,000 animals and is grossly divided in extensive flocks located in mountains and Bekaa plain and semi-intensive ones in coastal areas. Some small projects aiming at the improvement of the goat milk production have been recently launched. Information on main infectious diseases is scarce and focused on Peste des Petits Ruminants (PPR) and brucellosis (BRU). Our objective was to perform a sero-epidemiological survey including the 2 above mentioned as well as 4 other major infectious diseases of goats: Contagious Caprine Pleuropneumonia (CCPP), Caprine Arthritis/Encephalitis (CAE), Q fever (QF) and Paratuberculosis (PTB). 885 individual blood samples originating from 47 flocks representing 4 different regions (North, Mount Lebanon, Bekaa, South) were collected between July and September 2005 and a farm questionnaire describing husbandry system and health problems in the flock was filled out. Determination of individual seropositivity was made with commercial (hPPR, CAE, QF, PTB) or homemade (nPPR, CCPP) ELISAs. Classical RBPT and CFT were used for BRU. The individual and flock prevalences were respectively: 48.6 and 89.4% for PPR, 6.9 and 38.3% for CCPP, 12.7 and 46.8% for CAE, 16.9 and 87.2% for QF, 4.9 and 53.2% for PTB, 11.4 and 44.7% for BRU. Higher prevalences were seen in Mount Lebanon for PPR, CCPP, CAE and BRU and in Bekaa for PPR, CAE and PTB. PPR and BRU prevalences were higher in extensive flocks whereas higher CCPP, CAE and PTB prevalences were seen in semi-intensive ones. Goats raised with sheep in mixed flocks exhibited higher prevalences for all the diseases except BRU. These preliminary results strongly suggest that goat brucellosis is of concern in Lebanon both for public and animal health. The importance of the other diseases has to be evaluated through their impact on flock productivity.

378. Coccidia and gastrointestinal nematode infections in semi- intensively managed Jakhrana goats of semi-Arid India

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Coccidia and gastrointestinal nematode infections were monitored in 122 Jakhrana goats maintained in semi intensive management system. The prevalence and intensity of infection were determined in Kids age (0-3M, >3-6M, >6-12M and >1 year), sex and season wise. Of the randomly collected and examined faecal samples age wise prevalence of coccidial oocysts was 0, 92.31, 75.51 and 40.86 percent in 0-3M, >3-6M, >6-12M and >1 year age respectively. Sex wise prevalence of coccidial oocysts was 45.20 and 49.86 percent in female and male respectively. Seasonal prevalence of oocysts was 46.00% in summer, 54.55% in Rain and 37.00% in winter. Encountered, collected and cultured coccidia oocysts were identified as *Eimeria christenseni*, *E. jochejevi*, *E. ninakohiyakaemovae*, and *E. arloingi*. Gastrointestinal nematode egg prevalence was 33.33, 0.0, 57.14 and 41.00 percent in 0-3M, >3-6M, >6-12M and >1 year age respectively. Identified nematode species were *Haemonchus contortus*, *Oesophagostomum* spp. *Strongyloides* spp. and *Trichuris* spp. Seasonal prevalence of nematode infection was 28.74% in summer, 67.27 in rain and 13.98 in winter. Overall prevalence of concurrent infections was found to be 21.25 percent while age wise prevalence was 0.0, 0.0, 49.0 and 19.0 in 0-3M, >3-6M, >6-12M and >1 year age respectively. For intensity of infections, the data on faecal egg/oocysts count (FEC/FOC) were normalized and analyzed through least squares analysis after log transformation ($\text{Log}_e \text{FEC/FOC} + 100$). LFEC so obtained were further presented in Geometric mean as GFEC. The mean GFOC (oocysts/g) in coccidial infection were 22.73 in 0-3M, 1690.10 in 3-6M, 187.95 in >6-12M and 190.03 in >1year age. The group >3-6M was most affected. Similarly, GFEC (eggs/g) of gastrointestinal nematode eggs observed were 144.69 in 0-3M, 0.0 in >3-6M, 92.48 in >6-12M and 144.69 in >1year age. The most severely affected age group was >1 year. Effect of age, seasons of collection and collection year on nematode infection were significant ($P>0.01$). In coccidia infection, the effect of age was found to significant ($P>0.01$) but the effect of sex of the animal on intensity of either kind of infection was non- significant.

379. Benefits of urea-molasses block supplementation and symptomatic and tactical anthelmintic treatments of communally grazed indigenous goats raised by small-scale farmers in South Africa

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This study was carried out with the cooperation of farmers owning communally grazed indigenous goats in southwestern KwaZulu-Natal Province, South Africa, where farmers had identified poor reproductive performance in their herds as one of their major problems. The aim was to quantify the effects of 3 interventions and the interaction between these interventions on goat productivity and gastrointestinal nematode infection. The interventions were: urea-molasses block supplementation during the dry winter seasons of 2004 and 2005, tactical anthelmintic treatment with ivermectin (400 µg/kg) during the wet summer period (on 3 January 2005) and symptomatic treatment with ivermectin (400 µg/kg) of all goats judged anaemic throughout the entire study period. The FAMACHA[®] system was used as a gauge of anaemia. It was noted that goats considered anaemic tended to remain so throughout the study period. The tactical anthelmintic treatment was effective as it markedly reduced ($P = 0.066$) the summer peak in faecal egg counts and is therefore recommended. By contrast, while the urea-molasses block supplementation appeared to reduce the faecal egg counts immediately following the 2004 supplementation ($P < 0.05$), this did not hold true in 2005. Interestingly, in the tactically treated anaemic goats, the improvement in the number of kids suckled per doe year-on-year tended to be greater than in the non-anaemic goats. It is considered that the routine symptomatic treatment of anaemic goats may have been a key factor. More detailed investigations into the routine symptomatic treatment of anaemic goats are therefore recommended.

380. Use of CATT/*T. evansi* and LATEX/*T. evansi* for *Trypanosoma evansi* diagnosis in infected goats

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Trypanosoma evansi is the most widely distributed of the pathogenic animal trypanosomes, affecting domesticated livestock worldwide. Goats could play an important role in the dissemination of the disease in tropical and subtropical areas. However, diagnostic methods for *T. evansi* infection are not validated in goats, and the effectivity of diagnostic methods to detect parasite and antibodies induced by infection is unknown. Five goats were inoculated intravenously with, at least, 1×10^5 *T. evansi*. The animals were kept for 12 months, and were checked monthly for the presence of the parasite and specific antibodies. Four non inoculated goats served as control. Antibody detection tests used in this study were CATT/*T. evansi* and LATEX/*T. evansi*. Comparatively, blood was also examined multiple hematocrit centrifugation technique (Woo, 1969). Serologically, all animals became positive in CATT/*T. evansi* and LATEX/*T. evansi* within one month post-inoculation and remained all positive in the CATT/*T. evansi* with a minimum end-titer of 1/4. In LATEX/*T. evansi*, 52 of the 60 examinations were positive with a cut-off set at 1/2. All diagnostic methods performed in control animals resulted negative. Thus, parasitological and serological methods used in this study would be adequate to detect *T. evansi* infection in goats.

381. Genetic evaluation of resistance to strongyles in Creoles kids is affected by protein supplementation

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The aim of the present study was to test a standardised evaluation design of genetic resistance in Creole goats considering indoors experimental infection and protein supplementation. Three trials were involved with a total of 154 female kids chosen from 3 successive cohorts of the Creole flock of INRA-Gardel in 2007. After weaning, kids were allocated in 4 groups according to the amount of concentrate offered: G0 (without concentrate), G100 (22g crude protein d⁻¹), G200 (44g crude protein d⁻¹), G300 (66g crude protein d⁻¹). Kids from G0 to G300 were infected with a single dose of 10,000 *H. contortus* third stage larvae at Day 0 (D0). Each infected group was constituted by one half resistant and the other half by susceptible genetic indexed kids. The average breeding values on egg excretion at 11 months of age were distant from 0.70 to 0.61 genetic standard deviation depending on group. A control group (without concentrate and not infected) was made of medium indexed kids. Groups were balanced according to live weight. Faecal egg counts (FEC), packed cell volume (PCV), blood eosinophilia (EOSI) were weekly recorded until D42 after infection. Kinetics of each variable was modeled using mixed procedure of SAS software. The 10,000 L3 dose received by the kids induced a severe infection: 8000 eggs per gram at FEC peak, the PCV lower than 15% and mortality rate. However kids managed to cope with it when supplemented. The advantage of supplementation was already obvious at 22g crude protein d⁻¹. Interestingly, supplemented animals (G300, G200, and G100) tend to show a higher level of EOSI than the control groups (G0 and TEM). Resistant and susceptible kids had significantly different FEC variation within groups. Susceptible kids had 1.6 higher egg output than resistant kids in G0. This difference was not found in supplemented groups. These results suggest that, when proposing a genetic evaluation design for resistance to strongyles in Creole goats, animals should not be protein supplemented, otherwise actual level of individual resistance could be confused.

382. Caprine arthritis encephalitis seroprevalence in dairy goat intensive systems of the Mexican high plateau

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Caprine Arthritis-Encephalitis (CAE) has a complex epidemiological and pathological dynamic. As first fundamental step in its control inside the Mexican country, it is important to do an epidemiological study, at least in the region of the Mexican High Plateau which is a representative zone of dairy goat intensive systems, and where a great contribution of genetic material from zones that can be affected by CAE exists. The aim of this study was to estimate the seroprevalence of CAE in dairy goat intensive systems located in the Mexican High Plateau. Sera samples (1211) were obtained from goats, 4-months-old or older, of different breeds and both sexes, which were analyzed using a standardized commercial system of competitive-inhibition enzyme linked immunosorbent assay (cELISA) for the detection of antibodies. These results revealed a general seroprevalence of 39.55%. Except one, all the positive goats were native and descended from, or had contact with, imported animals. Statistical analysis showed that significant evidence exists to indicate that seroprevalence is affected by sex ($P < 0.01$), breed ($P < 0.0001$) and age of the animal ($P < 0.01$). Results indicate the need to use and observe the correct application of management practices that should help in the prevention and control programs of CAE, as well as legalize those to monitor and to assure their application in caprine production systems in the country, specially in those goats dedicated to dairy production and / or with introduction of genetic material imported from other countries that could be affected by CAE.

383. Study the impact of mortality rates in Saanen and Nubian herds

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Among the factors that interfere in the performance of dairy goat herds the carelessness with the sanitary management has serious implications in the system productivity. In this study was evaluated the influence of different mortality rates in the dynamic of Saanen and Nubian herds. Through a simulation model in development by the *Brazilian Agricultural Research Corporations (Embrapa-Goats)* was used averages values found in the dairy goat system at the same institution. Both breeds were kept in a semi-intensive system with two milkings per day. Tree simulations were performed to evaluate the impact of mortality in a herd with 50% of retention rate. The first scenario considered a mortality of 2.3% for adults, 12.5% for kids less than two months and 2% for young does. The second scenario was assumed a 20% increase in the previews rates changing them to 2.9%, 15% and 2.4% respectively, for adults, kids under two months and young does. In third scenario was used a mortality rate of 5%, 20% and 4%, respectively, for adults, kids under two months and young does hypothetical caused by some mistake in the sanitary management. All simulations were performed seeking to a equilibrium herd of 65 animals. The time to reach this equilibrium was respectively, 4.6, 4.8, 5.3 years for the three scenarios analyzed. The difference between the first and second scenarios was around 70 days which decrease in 1% the total number of animals at the end of 10 years. When comparing the first scenario with the third the difference to reach the equilibrium was 252 days which decrease in 4.1% the total number of animals. The results showed that the major mortality rates in the youngest categories compromise the time to stabilize the herd once the number of youngest to replace the herd decreases. Among the major diseases that could cause variation in mortality rates are navel infection, respiratory diseases, diarrhea and mastitis. Therefore, the misperception in the sanitary management determine losses in the number of animals to replace the herd, compromising the herd stabilization and besides reduce animals sales causing directly losses in the farmer income.

384. An increasing level of maize supplementation provides better control of gastrointestinal nematodes in browsing Criollo goats

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The objective was to explore the effect of different levels of maize (M) supplementation on the resilience and resistance of browsing kids against gastrointestinal nematodes (GIN). 42 five months-old Criollo kids (c. 15 kg BW) were allocated into five groups: infected, not supplemented (I-NS) (n=10), infected and supplemented (I-S) with 108 g/d M (I-S108), I-S at 1% (I-S1%) and 1.5% BW (I-S1.5%) and a non infected group (moxidectin 0.2 mg/kg BW s.c. every 28 d) supplemented at 1.5% BW (NI-S1.5%) (in all four group n=8). Animals were weighed every 7 days to adjust supplementation levels. Blood and faecal samples were collected every 14 days to determine PCV, Hb and eggs per gram (EPG) of faeces. At the end of the trial (day 112), four kids from each group were slaughtered to determine the adult worm burdens, female worm lengths and number of eggs *in utero*. Groups I-S108, I-S1% and I-S1.5% had higher weight gain, PCV and Hb than I-NS group (P<0.05). Resilience was improved in all the supplemented groups compared to the I-NS group (P<0.05). Growth rate of the I-S1.5% reached that of the NI-S1.5% (P>0.05). Furthermore, the I-S1.5% group had 55% lower EPG than I-NS group (P<0.05). The I-S1.5% group showed a tendency to reduce its worm burdens compared to I-NS but was only significant for *Trichostrongylus colubriformis* (P<0.05). An increasing quantity of M supplement, relative to animal's BW, was more effective than a fixed quantity for improving resilience and resistance of browsing kids against GIN infections.

385. Occurrence of mastitis infections in goat milk and their relation to Other milk parameters

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We have investigated mastitis pathogens occurrence in goat milk (n=60). Next to this indicator we have determined other milk parameters which can be affected by mastitis occurrence: somatic cell count (SCC), lactose (L), titration acidity (TA), milk freezing point (MFP), casein content (CAS), electrical conductivity (EC), Na concentration (Na) and fat (F). For microbiological analyses the samples were cultivated on Blood agar, Edward's and Endo agar at 36°C for 24 h. For identification of pathogens biochemical tests, namely STAPHYtest, ENTEROtest, STREPTOtest, and identification program TNW pro 6.5 were used. Description statistics and one-way ANOVA from GLM statistic procedures (SPSS v15) and non-parametric statistic tests (Kolmogorov-Smirnov and Mann-Whitney U tests) were used for data analysis. In total 40 species of pathogens were isolated and identified subsequently. From our results is evident that *Enterococcus faecalis* was the most frequent species (n=14), then *Staphylococcus aureus* (n=10), *Lactococcus garvieae* (n=9), *Staphylococcus lentus* (n=1), *Streptococcus uberis* (n=1) and *Streptococcus* spp. (n=5). Geometric means SCC was $3.7 \cdot 10^6 \text{ ml}^{-1}$, thereof 2 animals have had $\text{SCC} \leq 1.10^6$, 8 animals $\text{SCC} > 1.10^6$ till $\leq 2.10^6$, 28 animals from 2.10^6 till $\leq 5.10^6$ and 22 have had $\text{SCC} > 5.10^6 \text{ ml}^{-1}$. The arithmetical means of other parameters were: L=4.43 (monohydrate, g 100g⁻¹, %), TA=7.65 (mlx25 mmol l⁻¹ NaOH), MFP=-0.5544 (°C), CAS=2.41 (Nx6.38, g 100g⁻¹, %), EC=5.67 (mS cm⁻¹), Na=438.6 (mg kg⁻¹) and F=4.61 (g 100g⁻¹, %). According to statistical ANOVA results we have found out that the occurrence of mastitis pathogens was statistically significant only in milk freezing point (p≤0.01). For the other observed parameters there were not statistically significant results. The similar results (in MFP) were obtained by non-parametric tests (Kolmogorov-Smirnov-p≤0.025 and Mann-Whitney U tests-p≤0.01). In addition there was found out statistically significant difference (p≤0.05) in CAS by using both of non-parametric statistic tests. (Supported by projects MSM 2678846201 and MSMT LA 331)

386. The effect of health state of goat udder on raw milk composition and properties

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Goat milk is not so traditional in the CR. Goat population went through changes in last time. The curd recovery and milk quality depend on udder health state. It is important to improve these knowledge. 60 goat (White short-haired) bulk milk samples (4 animals in sample) were investigated in 1st 2 thirds of lactation, winter and summer season. Herd was kept at altitude 572 m with total precipitation 1 200 mm and mean air temperature 3.7 °C. Somatic cell count (SCC) was 3646 as geometric mean and 4267±2279 ths ml⁻¹. Significant relationships between log SCC and other milk indicators (MIs) were investigated between log SCC and: fat (0.34); lactose (-0.46); solid non fat (0.25); urea concentration (0.34); rennet coagulation time (0.40); curds quality (-0.26); whey volume (-0.53); specific weight (-0.36); fat/crude protein ratio (0.33); Na (0.50); Zn (0.25). Higher SCCs were linked with higher F, SNF and U contents. 11.7 % of log SCC variations were explained by U variations. It is caused by higher permeability of mammary gland secretion epitel for blood components during mastitis. L was reduced by higher log SCC in cows (-0.43; P<0.001) and sheep (-0.58; P<0.001). 21.1 % of variations in L was caused by variations in log SCC in goats. Cheeseability was negatively influenced by worse udder health. With higher log SCC the RCT was prolonged, whey volume (WV) was reduced (27.6 % of variations in WV was explainable by log SCC variations). There were 26 insignificant relationships of log SCC to other MIs. Higher number (70.3 %) than in cows and sheep (32.4 %). It is possible to improve the rules for better monitoring and prevention of milk secretion disorders and protein recovery in goats according to results and relevant relationship interpretations. *Supported by projects MSM 2678846201 and LA 331 (INGO), both MSMT.*

387. Relationship between mastitis occurrence and other milk parameters in goat milk

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We have investigated mastitis pathogens occurrence in goat milk (n=60). Next to this indicator we have determined other milk parameters which can be affected by mastitis occurrence: somatic cell count (SCC), lactose (L), titration acidity (TA), milk freezing point (MFP), casein content (CAS), electrical conductivity (EC), Na concentration (Na) and fat (F). For microbiological analyses the samples were cultivated on Blood agar, Edward's and Endo agar at 36°C for 24 h. For identification of pathogens biochemical tests, namely STAPHYtest, ENTEROtest, STREPTOtest, and identification program TNW pro 6.5 were used. Description statistics and one-way ANOVA from GLM statistic procedures (SPSS v15) and non-parametric statistic tests (Kolmogorov-Smirnov and Mann-Whitney U tests) were used for data analysis. In total 40 species of pathogens were isolated and identified subsequently. From our results is evident that *Enterococcus faecalis* was the most frequent species (n=14), then *Staphylococcus aureus* (n=10), *Lactococcus garvieae* (n=9), *Staphylococcus lentus* (n=1), *Streptococcus uberis* (n=1) and *Streptococcus* spp. (n=5). Geometric means SCC was $3.7 \cdot 10^6 \text{ ml}^{-1}$, thereof 2 animals have had $\text{SCC} \leq 1.10^6$, 8 animals $\text{SCC} > 1.10^6$ till $\leq 2.10^6$, 28 animals from 2.10^6 till $\leq 5.10^6$ and 22 have had $\text{SCC} > 5.10^6 \text{ ml}^{-1}$. The arithmetical means of other parameters were: L=4.43 (monohydrate, g 100g⁻¹, %), TA=7.65 (mlx25 mmol l⁻¹ NaOH), MFP=-0.5544 (°C), CAS=2.41 (Nx6.38, g 100g⁻¹, %), EC=5.67 (mS cm⁻¹), Na=438.6 (mg kg⁻¹) and F=4.61 (g 100g⁻¹, %). According to statistical ANOVA results we have found out that the occurrence of mastitis pathogens was statistically significant only in milk freezing point (p≤0.01). For the other observed parameters there were not statistically significant results. The similar results (in MFP) were obtained by non-parametric tests (Kolmogorov-Smirnov-p≤0.025 and Mann-Whitney U tests-p≤0.01). In addition there was found out statistically significant difference (p≤0.05) in CAS by using both of non-parametric statistic tests. (Supported by projects MSM 2678846201 and MSMT LA 331)

388. Occurrence of methicilin resistant *Staphylococcus aureus* in goat's milk

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S. aureus is an important etiological agent in raw milk not only because of possible enterotoxin production, but in recent time also due to occurrence of resistance to antimicrobials including methicillin (MRSA). Samples were collected from two goat herds both of white short-haired breed; 1. n = 60 and 2. n = 110. From both herds 272 samples were obtained. Samples originated in milk (156 samples), environment (22) and feed (3). Some samples were collected using cotton swabs from goat's anterior nares (24), oral cavity (3), conjunctiva (3), udder surface (8) and anal orifice (21). Staff (32 - oral and nasal cavities, abdomen) was sampled, too. For microbiological analyses the samples were cultivated on Blood agar, Baird-Parker agar and MRSAselect agar. For identification of *Staphylococcus aureus* we used PCR for detection of SA442 fragment. Totally 49 isolates of *S. aureus* were obtained. Isolates were examined for antimicrobial resistance by disk diffusion method. The antibiotics tested were as follows: oxacillin - OX (disk amount-1 µg), tetracycline - TET (30 µg), erythromycin - E (15 µg), chloramphenicol - C (30 µg), co-trimoxazol - SXT (25 µg), amoxicillin/clavulanic acid - AMC (20/10 µg), clindamycin - DA (2 µg), gentamicin - CN (10 µg), ciprofloxacin - CIP (15 µg), vancomycin - VA (30 µg), teicoplanin - TEC (30 µg), rifampin - RD (5 µg), cefoxitin -FOX (30 µg) and cefotaxim - CTX (30 µg). For confirmation of oxacillin (methicillin) resistant isolates PCR for detection of *mecA* gene was used. Six MRSA isolates of *S. aureus* were found. Four isolates originated in goat's milk (SA1-SA4) and 2 came from the staff (SA5 and SA6). In all these isolates resistance to other antimicrobials has been recorded simultaneously (table 1). All these isolates originated in one farm and carried the *mecA* gene.

Table 1: MRSA isolates and their resistance to antimicrobial agents

	OX	TE	E	C	SXT	AMC	DA	CN	CIP	VA	TEC	FOX	RD	CTX
SA1	R ^a	R	R	S	R	R	S	R	S	S	S	R	R	R
SA2	R	R	R	S	R	R	S	R	S	S	S	R	R	R
SA3	R	R	R	S	R	R	S	R	S	S	S	R	R	R
SA4	R	R	S	S	R	R	S	R	I	S	S	R	R	R
SA5	R	R	S	S	R	R	S	S	S	S	S	R	R	R
SA6	R	R	I	S	R	R	S	S	S	S	S	R	R	R

R.... resistant, S.... sensitive, I....intermedium

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389. Pre-mating evaluation of bucks: reproductive and health parameters found in extensive goat systems of La Pampa province, Argentina

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In order to know health status and morphological characteristics related to fertility, we evaluated during 2007 144 male breeding goats (128 Creoles, 14 Anglo Nubian x Creole, 1 Creole x Saanen, and 1 Crossbred Boer x Saanen) belonging to 69 flocks located in the west region of La Pampa province, Argentina. We performed a clinical exam by visual inspection and palpation of external genital organs, and also blood analysis for brucellosis and arthritis-encefalitis (CAE). Additionally, presence or absence of wattles and horns, scrotal sac morphology, and testicular diameter were evaluated. In 21 animals (14.6%) we found the following health problems or abnormalities: testicular hipoplasia (1.4%), unilateral criptorchidism (0.7%), bilateral orchitis(0.7%), testicular abscess (0.7%), chronic epididymitis (7%), fractured forearm (0.7%), severe hoof deformation (2.1%), gynecomastia (0.7%), ectima contagious injuries (2.8%), and ganglionar swelling (4.2%). Nine percent of the animals showed excessive teeth wear. One animal (0.7%) tested positive for CAE, and all animals tested negative for brucellosis. With regard to the presence or absence of fertility-related characters, 6.9% of the males had no horns, 13.2% had wattles, and 38.9% had several degrees of scrotal sac division (13.9% with totally splitted testicular sacs). Testicular diameter was 25.10 ± 1.1 cm for 1 year-old animals; 26.31 ± 2.16 cm for 15 to 18 months-old animals, 27.55 ± 3.04 cm for 2 years-old bucks; 31.5 ± 2.5 cm for 3 years-old, and 30.97 ± 2.44 cm for animals over 4 years old. A clinical and morphological pre-mating evaluation of bucks is a useful tool to detect and culling animals that might adversely affect flock fertility, prevent disease spread, and select males with desired traits.

390. Alternative strategies to prevent and control endoparasite diseases in goat farming

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In goat farming systems endoparasites have become a major threat (Coles, 2005). Infestation with gastro-intestinal nematodes in goat farming cause server economic losses and endanger animal welfare. Infections with gastro-intestinal nematodes can have a detrimental effect on animal health (Lüscher et al., 2005), leading to clinical and sub-clinical diseases, that may result in financial loss and overall decreased productivity (Rahmann et al., 2002). Current goat production relies on the application of chemical anthelmintics. The compulsory and often excessive use of chemotherapeutics (Hein and Harrison, 2005), often in combination with poor management practises (Wolstenholme et al., 2004), has resulted in endoparasite nematodes starting to develop resistance to treatment drugs. At present, resistant strains of endoparasites can be found all over the world, with some strains being resistant to most active agents. The development of organic farming systems, the increased public awareness for drug residues in agricultural products and the development of resistant strains of parasites have enforced the search for sustainable alternatives. The world wide conducted research has revealed the major potential to be within the field of non-chemical options. Biological control, effective pasture management, selective breeding, enhanced nutrition and the administration of bioactive forages were discussed and found to hold numerous options. The aim of this review is to summarise the current scientific knowledge of alternative strategies to prevent and control endoparasitic diseases in goat farming systems. The presentation will be divided into a part of non-chemotherapeutical control strategies and alternative anthelmintic treatments. The investigation of non-chemical control strategies comprises aspects of grazing/pasture management, breeding and feeding strategies to reduce endoparasite infection (Koopmann et al. 2007; Rahmann & Seip 2007a). The investigation of alternative anthelmintic treatments reviewed phytotherapy, homeopathy and copper-oxide wire particles (Rahmann & Seip 2007b). Phytotherapy will be examined at in detail because it holds future potential, indicating a strong need for scientific verification of the potential of many plants. In conclusion this presentation will shows possibilities and limitations in the area of alternative anthelmintic treatments as well as in non-chemical control options and outlines future research fields.

391. Prevalence of juvenile Capri-Paratuberculosis in postnatal kids belonging to farm and farmer's herds using culture and indigenous ELISA kit and geno-typing of Mycobacterium avium subspecies paratuberculosis by I1311 PCR-REA.

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To investigate prevalence of Juvenile Capri paratuberculosis in postnatal kids 71 fecal and serum samples (30 from government organized herd, 15 from private organized herd and 26 from farmers) were screened using fecal culture and indigenous ELISA kit. ELISA results were transferred to S/P ratio and the animals were categorized as negative, suspected, low positive, positive and strong positive. Cumulatively, 69.0 and 47.8% kids were positive by ELISA and fecal culture, respectively. The 73.3, 80.0 and 57.6% kids were positive in ELISA kit from government farm, private farm and farmer's herds, respectively (Type II sero-reactors). However, 40.0, 66.6 and 46.1% kids were positive in fecal culture from government farm, private farm and farmer's herds, respectively. MAP isolates were primarily characterized on the basis of morphology and mycobactin J dependency and finally using IS900 specific primers. MAP strains isolated from kids were genotyped as 'Bison type' using IS1311 PCR-REA. Study revealed high prevalence of MAP infection ('Bison type') in young kids belonging to farm and farmer's herds in North India. Potential of indigenous ELISA kit for the diagnosis of CJD has been discussed

392. Patho-biology of spontaneous and experimental paratuberculosis (*Mycobacterium avium* subspecies paratuberculosis 'Bison type' S-5 strain) in goats with reference to early lesions

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The study aimed to diagnose early cases of paratuberculosis by demonstration of AFB in faecal and tissue samples, isolation of the organisms from faecal and tissue samples in HEY Medium using decontaminant HPC, ELISA test and pathomorphological lesions in experimentally produced Paratuberculosis using S-5 strain. Faecal sample from 142 goats from various organized herds of North India were subjected to smear (using centrifugation and decontamination method) and cultural examinations. Isolation of the mycobacteria was performed in all faecal samples and 74 tissue samples inoculating on HEY medium with or without Mycobactin-J after decontamination with 0.9% HPC. Experimental study was conducted on 13 goats (10 infected and 3 controls) where pathogenicity of S-5 strain of mycobacterium avium paratuberculosis was tested positively by gross and histo-pathological lesions (using routine H& E and ZN as special stain) and plate-ELISA test. Pathogenicity of the S-5 strain of *Mycobacterium avium* paratuberculosis was proved and characteristics gross and microscopic lesions were observed on 90 DPI and onwards. Lesions showing infiltration of macrophages with AFB without granuloma formation simulating lepromatous form of human leprosy and typical granuloma as in tuberculoid form were found. Positive humoral immune response by using plate ELISA was observed on 90 DPI onwards showing antibody titer above the cut off value. There was an apparent linear correlation between the antibody level and days post infection. The performance of the different diagnostics test like examination of faecal smear by direct microscopy, faecal culture, scraping smear examination of organism from tissue pathomorphology and plate ELISA test had a linear relationship among them.

393. Genotyping of Indian *Mycobacterium avium* subspecies *paratuberculosis* isolates recovered from different host species and sources

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Present study was undertaken to understand molecular diversity of *Mycobacterium avium* subspecies *paratuberculosis* (MAP) isolates recovered in different regions of North India. Genotyping of 117 MAP isolates recovered (during 1998-2007) from animals, commercial milk and human beings in different regions of North India was carried out using IS1311 PCR-REA. Primary MAP colonies were characterized on the basis of slow growth, mycobactin J dependency and IS900 PCR. 'Bison type' was predominant genotype (83.7%) observed for MAP isolates recovered from northern regions of country followed by 'Cattle type' genotype (16.2%). 'Bison type' genotype was the only genotype recovered from goats, sheep, buffaloes and blue bulls. For cattle, humans and bovine milk samples both genotypes (Bison and Cattle type) were observed, however relative prevalence of both isolates was different in different regions. 'Bison type' was major genotype recovered in CIRG, Makhdoom, Akos, Ajmer and Mathura. 'Cattle type' was major genotype recovered in Delhi and Agra. Present study did not report the presence of 'Sheep type' genotype in the screened regions of North India.

394. The effects of litter size and time allowed for suckling on their dams on goat kids passive immune status.

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Majorera goat kids (n=200) were used in the present study to evaluate the effects of litter size and time allowed for suckling on their dams (TASD) on serum immunoglobulin G (IgG) concentration. Kids were assigned to one of three experimental groups; litter size was equally distributed in each group. In the first group, the kids (n=67) stayed with their dams for 24 h; in the second group, the kids (n=66) stayed with their dams for 48 h; and in the third group, the kids (n=67) stayed with the dams for 120 hours. Five blood samples were obtained every 24 h for 5 d, and IgG was measured in serum using radial immunodifusion. In litter sizes of one and two, the IgG blood serum was significantly higher than those of 3 kids per partum, and was lower in kids with a birth weight of less than 2,755 g. The TASD did not affect serum IgG levels of kids. If neonatal goats are allowed to suckle colostrum for 24 h from their dams, this seems to be sufficient to ingest enough IgG with colostrum to achieve an adequate serum IgG concentration and passive immune protection.

395. Effect of pasteurization, electric pulse and high pressure treatments on colostrum IgG concentration.

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Two experiments were performed in order to study the effect of different higienization methods on colostrum IgG concentration. In the first one, caprine colostrums (6 batches) were subjected to heat (56°C for 60 min and 63°C for 30 min) and high pressure (400 and 500 MPa for 10 min at 20°C) treatments and analyses of IgG denaturation was performed using radial immunodiffusion. All treatments assayed produced a reduction in colostrum IgG concentration (27.53, 23.58, 23.33, 22.09, and 17.06 mg/ml for raw, heat-treated at 56°C for 60 min or 63°C for 30 min, and pressure-treated at 400 and 500 MPa, respectively), but differences were only observed between raw colostrums and those pressure treated at 500 MPa. In the second one, caprine colostrums serum (10 batches) were subjected to heat (56°C for 60 min and 63°C for 30 min) and electric pulses (100, 300 and 1000 µS) treatments and analyses of IgG denaturation was performed using ELISA. All treatments assayed produced a reduction in colostrum IgG concentration (38.95, 34.30, 22.21, 9.97, 7.89 and 6.18 mg/ml for raw, heat-treated at 56°C for 60 min or 63°C for 30 min, and electric pulse treated at 100, 300 and 1000 µS, respectively), but differences were only observed between raw or heated treatment and those electric pulse treated.

396. Effects of protein supplementation on *Haemonchus contortus* infection in goats

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Protein supplementation may enhance host immunity to parasites. However, the mechanisms by which supplemented protein augments immunity are not clear. The study reported here determined effects of varied protein intake on immune responses in goats infected with *Haemonchus contortus*. Thirty-six Boer x Spanish goats (3 yr, 46 ± 5.9 kg BW) were dewormed and allocated to six groups of six animals each, housed in group-pens, and fed individually with a Calan gate feeding system. The treatment arrangement was a 2 x 3 factorial. Goats were fed hay-based iso-caloric (ME = 8.0 MJ/kg DM) diets containing 0, 5%, or 10% fish meal (FM). The dietary CP was 6.6%, 9.5%, or 12.4%, respectively. Thirty days after being fed the diets, goats allocated to infected groups were administered with 10,000 *H. contortus* infective larvae per animal, and all animals remained on the experimental diets for 4 additional weeks. We found that worm eggs appeared in feces from the goats fed diets with 0 or 5% FM in week 3 but were not detectable in goats fed the 10% FM diet until week 4 post-infection. The infection of *H. contortus* induced increases ($P < 0.01$) in blood eosinophil and tissue mast cells. The numbers of mast cells in spleen and mesenteric lymph nodes from the infected goats were lower ($P < 0.05$) in animals fed the 10% FM diet. The number of eosinophils was not affected ($P > 0.05$) by protein supplementation. Serum concentration of IgA increased ($P < 0.01$) after infection but was not affected by dietary protein. Serum IgG in infected goats increased ($P < 0.05$) with dietary protein 7 days post infection but declined thereafter. Worm burden was not affected by dietary protein. The results suggest that protein supplementation in goats transiently inhibits worm fecundity through enhanced IgG expression.

397. Incidence of goat mastitis in the North-Western region of Morocco (Chefchaouen)

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This study was aimed to monitor the prevalence of clinical and subclinical mastitis and their etiology in dairy goat herds of Chefchaouen area, given the sanitary and economical impacts of the disease. This study was undertaken during the period of high lactation: February 15 to May 15 and involved clinical examination of the udder (with the estimation of the retromammary lymphatic nodes' volume), Californian Mastitis Test (CMT) and bacteriology performed in six farms on a total of 151 lactating goats every other week. Milk samples were taken aseptically from udder halves with a positive CMT (score 3 or 4) for bacteriological analysis. Statistical analysis was performed using logistic regression method with 5% as the level of significance. The main results showed a high prevalence of subclinical mastitis in these farms: 18.7% of the udder halves. The isolated bacteria (with their relative frequencies) were Coagulase Negative Staphylococci (54.3%), Corynebacterium (2.8%), Staphylococcus aureus (2.4%), Nocardia asteroides (2.2%), Arcanobacterium (1.8%), Bacillus (0.9%) and Micrococcus (0.6%). CMT score (2.8) was significantly higher ($p < 0.001$) beyond the fifth lactation and lower (1.9) in goats with well conformed udders ($p < 0.01$). In addition, exotic goats were more ($p < 0.001$) sensitive to the infections than local animals (CMT = 3.2). Finally, significant CMT score differences do exist among farms, due to housing and milking hygiene, as well as husbandry technical level. Given the importance of these risk factors, we strongly recommend the monitoring of the disease using CMT at a regular basis in order to enhance subclinical mastitis detection and management.

398. Efficacy and pharmacokinetics of eprinomectin in dairy goats: comparison of pour-on and subcutaneous routes.

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Eprinomectin is a member of the avermectin class of anthelmintics licensed for use in lactating cows as a pour-on formulation. There is evidence that eprinomectin is used off license in dairy goats in France. Previous works have indicated sub-optimal parameters both for activity and pharmacokinetics in goat with the standard dosage (0.5 mg/kg). Our objective was to compare the efficacy and the pharmacokinetic profile (plasma and milk) of eprinomectin when given by pour-on or subcutaneous route. 29 lactating Saanen goats naturally infected with gastrointestinal (GIS) and pulmonary (PS) strongyles were allocated into 3 groups: group 1 (n=7) was a control group; in group 2 (n=10), goats were treated topically by eprinomectin at 0.5 mg/kg; in group 3 (n=12), goats were treated subcutaneously by eprinomectin at 0.2 mg/kg. Efficacy was assessed by coproscopical examinations: weekly for 1 month and fortnightly for the 2 following months. Blood and milk samples were collected at predetermined times over a period of 20 days and plasmas analysed by using an HPLC method with fluorescence detection. Faecal egg or larval count reductions were higher and persisted longer in goats treated subcutaneously: >96% for 6 weeks (compared to >85% for 2 weeks for pour-on) with GIS and >95% for 4 weeks (compared to >95% for 2 weeks with pour-on) with PS. The area under the plasma concentration versus time of eprinomectin was significantly higher after subcutaneous administration. The disposition of the drug in the milk paralleled the one in the plasma with milk-to-plasma ratio comparable for both administration routes (0.4-0.5). In all cases, the drug concentration in milk was below 30 ng/ml, the maximum accepted level in bovine. Given the high efficacy of injectable administration and the low residue level in milk, our results urge on the development of subcutaneous formulation of eprinomectin in dairy goats.

399. Browsing moderately high condensed tannin forages and effects on fecal egg counts in meat goats

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This study compared the use of forages containing moderately high levels of condensed tannins in a browsing system with meat goats and the effect on fecal egg counts of internal parasites. Thirty does were treated with an effective anthelmintic, randomly divided into three groups, and turned into paddocks on June 20, 2007 with access to fresh water, mineral and portable housing. Supplemental feed was not provided. Group 1 (control) grazed a cool season mix of Tall Fescue and clover typically found in Ohio. Group 2 grazed warm season Eastern Gamagrass and Switchgrass paddocks. Group 3 grazed paddocks established in lespedeza containing a high level of condensed tannin. FAMACHA tests were conducted weekly. Fecal samples were taken and evaluated monthly. Six of the ten goats in Group 3 showed zero eggs per gram of fecal material (EPG) by the end of August. Within another 30 days, the egg counts of every goat browsing lespedeza indicated zero EPG. These goats maintained excellent body condition throughout the summer. Goats in Group 2 had EPG lower than the control. EPG for this group declined 89% from an average of 51.0 to 6.1 EPG, respectively. Lower EPG may be attributed to elevated browsing height of eighteen inches which reduced the opportunity to ingest parasite larvae lower in the forage canopy. At the end of the study, Group 1 still had 216 EPG which may be due to lower grazing height causing higher ingestion rate. This study indicated goats browsing forages containing condensed tannins had reduced EPG. Individual goats had varying susceptibility to parasites. FAMACHA is a useful tool for a general evaluation but should be paired with fecal egg counts to identify goats with high parasite load. Condensed tannin forages and browsing management have the potential of reducing or eliminating the use of anthelmintics providing direct economic savings to the meat goat producer. Results from this study have indications of reduced mortality rates attributed to high parasite load as well as reduced feed and labor costs. As a legume, lespedeza can reduce nitrogen inputs in a holistic and sustainable grazing system.

400. Use of dehydrated neem (*Azadirachta indica* A. Juss) leaves to control coccidiosis in young goats

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A field study was conducted at North Carolina State University to examine the potential of dehydrated neem (*Azadirachta indica* A. Juss) tree leaves to decrease the number of coccidia oocysts in feces of young goat kids. Neem leaves were harvested from the plant nursery of the University of Zulia, Maracaibo, Venezuela. Leaves were dried in a forced air oven at 48 C for 72 h, ground, and stored in vacuum-packed plastic bags until their use. Thirty-six female and castrated male kids (87.5% Landrace x Boer to 100% Boer) averaging 50 to 75 days of age and 15.6 kg body weight were used. The experimental design was a split plot with treatments as main plots and sampling dates as sub-plots. Kids were suckling during the first three of the four-week trial while grazed on *Festuca arundinacea*, *Dactylis glomerata* and *Trifolium repens* pastures. On day 0 and weekly thereafter, kids were drenched with either no neem leaves (CTL), 7.5 mL/kg BW of an aqueous extract of dehydrated neem leaves (114 mg/L) soaked in water for 12 hours (NAE) and strained to eliminate solids, or a bolus consisting of 3 g dehydrated neem leaves, 5-8 mL water, 10 g cornmeal and 5 mL molasses (NB). Feces were taken from the rectum of each kid immediately before the weekly drenching. Oocysts were counted using a modified McMaster procedure and a solution of sodium nitrate and distilled water for fecal flotation. Number of oocysts were log transformed ($\log_{10} + 1$) for statistical analyses using PROC GLM of SAS with initial oocyst counts used as a covariate. No adverse reactions were observed in kids drenched with neem. Differences in oocyst counts were found between sampling dates ($P < 0.01$) and treatments ($P < 0.053$). Mean separation procedures detected differences between CTL and NAE ($P < 0.02$). Nevertheless, under the conditions of this study, results were not conclusive. Fresh neem leaf and seed extracts will be used in future experiments to ascertain their effects on coccidia oocysts and gastrointestinal nematodes, as the active compounds found in neem leaves may have been partially destroyed during the drying process.

401. *Haemonchus contortus* infection affects feed intake and diet digestibility in Creole goats

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A study was conducted to evaluate effects of infection with *Haemonchus contortus* infective larvae (L₃; HC) on feed intake, digestibility, faecal egg count (FEC), circulating eosinophils (EOS) and pack cell volume (PCV) in Creole goats. The experiment was developed during six weeks although measurements of intake and digestibility corresponded to 0, 2 and 4 weeks post-infection (WPI) with a single dose of 10,000 L₃. Twenty-two parasite-free kids (23.4 ± 0.65 kg BW) were housed and fed once a day (0730 h) in individual boxes. Total faeces collection (with faecal trays placed behind) and *ad libitum* forage supply method was used. Dry matter intake (DMI) was daily calculated. Pooled samples from a 75 d-old *Dichantium* spp. hay, a supplemental concentrate (100g d⁻¹) and faeces were collected for chemical analyses. Total-tract DM (DMD), OM (OMD), CP (CPD), NDF (NDFD) and ADF (ADFD) digestibilities were determined. Faecal samples were weekly collected for FEC and were analyzed with a modified McMaster method. Blood samples were collected once a week by jugular venipuncture to measure circulating EOS and PCV. Data were analyzed with PROC GLM of SAS (v. 8.1) considering WPI and animal as fixed and random effects, respectively. Digestibility of CP was not different and was dramatically low (47.1±1.1%), probably because kids were draining nitrogen (N) through faeces (larvae, endogenous N) which abnormally could increase N concentration therefore affecting CP digestibilities values. DMI (537, 639, 599 g d⁻¹), DMD (62.8, 60.4, 62.5%), OMD (64.5, 62.2, 64.0%), NDFD (59.7, 56.2, 62.0%) and ADFD (60.5, 53.0, 59.8%) showed significant differences ($P<0.05$) among the 0, 2 and 4 WPI, respectively. The DMI was higher and digestibilities lower at the second WPI when animals showed the highest level of EOS (84.10⁶ vs. 46.10⁶ and 60.10⁶ cells/ mL of blood, for 2 vs. 0 and 4 WPI, respectively) and were linearly decreasing PCV. These data suggest that the impact of parasitism occur between the second and the third WPI, period during which the immune response is more pronounced probably due to parasite maturation. Further researches are needed to monitor longer term effects on animals that could immune themselves.

402. Changes in parasitic infestation of goats in Poland in a period 2002 – 2007

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Two parasitic examinations of goats in Poland were conducted in 2002 and 2007. Feces samples were collected from representative group of goats in each flock and then screened in search for eggs, oocysts or larvae of internal parasites as well as goats themselves were examined for presence of external parasites. All parasites were divided into five groups: lungworms, gastrointestinal worms, coccidia (*Eimeria spp*), flukes (*Fasciola hepatica*) and others. To estimate severity of infestation five brackets were created depending on number of eggs/larvae/oocysts found in one drop of feces suspension: single (1-4 eggs/larvae/oocysts found), sparse (5-10), fairly numerous (11-20), numerous (21-30) and highly numerous (over 30). The only lungworm that occurred in samples was *Muellerius capillaris*. In 2002 only 21% of examined herds was free from it while as many as 43,8% in 2007. Meanwhile, there was no flock where lungworms were highly numerous or fairly numerous in 2007, compared with 1,5 and 8% respectively five years earlier. The percentage of flocks in which larvae were numerous decreased from 9,5 to 4,1%. Only percentage of herds with single and sparse lungworms remained quite equal (45 and 37,5%, 14 and 14,5% respectively). Opposite tendency was noticeable in relation to gastrointestinal worms as well as coccidia. There was only 8,3% of flocks where no gastrointestinal worms were detected in 2007, in comparison with 23,5% in 2002. Moreover the number of herds with highly numerous and numerous gastrointestinal worms increased four-fold (from 0 to 4,1% and from 4,7 to 16,7% respectively), while number of those with fairly numerous dropped seven-fold (from 15,6 to 2,1%). Other brackets (single and sparse eggs hardly changed). *Trichostrongylidae* invariably dominated in group of gastrointestinal worms with only one egg of *Nematodirus sp.* detected in 2007. The aforementioned tendency was even stronger in case of coccidia, where no free flock was found in 2007, while as many as 46,8% herds was unaffected five years earlier. In 2007 the most numerous bracket was that including single oocysts (89,6%), which consisted of only half of it in 2002 (46,8%). Remaining brackets did not markedly alter. In both field trials no presence of *Fasciola hepatica* was detected. While in 2002 the group of other parasites remained empty, in 2007 one egg of tapeworm - *Moniezia sp.* – was found and the presence of *Demodex sp.* was detected twice. Interestingly in all these cases parasites were highly numerous or numerous. Two consequent field trials allowed to state three conclusions. First, that parasites are abundant in population of goats in Poland. Second, that lungworms are less common while occurrence of gastrointestinal parasites (helminths as well as coccidia) increases. And last but not least that *Fasciola hepatica* does not occur in population of goats in Poland.

403. Relationship between CAE virus infection of goat and their milk yield and somatic cell count in milk

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Relation between caprine arthritis encephalitis virus (CAEV) infection and milk yield (MY) and somatic cell count (SCC) in milk of 178 dairy Polish White and Coloured Improved goats during a 12 years period in one herd has been studied. The animals were between first and 6th lactations and were maintained in the same conditions (loose barn, unthreatened, free access to water) and fed according to the INRA guidelines. They were milked mechanically twice a day. Milk samples were taken from each goat once a month, in the course of routine control milking and the data about MY and the SCC were collected. The SCC values were transformed to the natural logarithm scale. To determinate the serological status of goats, blood samples have been taken once a year. The samples have been tested with ELISA for a presence of antibodies against CAEV. A total number of 1928 and 1114 records were collected of seronegative and seropositive goats, respectively. In order to determine the relation between the infection and the investigated traits the multi-trait repeatability test-day animal model was used with REML method. The differences between infected and healthy animals were checked using the t-Student test. The model included the serological status of animals at the moment of sampling, birth year, year-season of kidding and parity as fixed effects and the animal additive genetic and permanent environmental effect of goats as well as dates of the tests as random effects. Legendre polynomials nested in parity were applied. The MY of seropositive animals was significantly higher ($p < 0,01$) then those of seronegative (1,88 vs. 1,77 l/day). There were no significant differences between SCC between groups. The study has been conducted in a long period on a considerably big number of animals, kept in the same conditions. The results showed that the CAEV infection does not have any impact on SCC. The considerably higher MY observed in seropositive goats compared to seronegative once indicated that high performing animals are more susceptible to the CAEV infection.

404. Course of Morel's disease in goat herds

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Morel's disease is caused by *Staphylococcus aureus* subsp. *anaerobius*. In Poland the disease has been diagnosed for the first time in 1996 in two goat herds. Both herds have been located in western part of the country. Herd A consisted of 45 animals, herd B consisted of 163. There was a history of purchasing 20 goats by a herd B from herd A. All animals showing the clinical symptoms of disease were between 8 months to 7 years old. 26 samples for microbiological examination have been taken from the abscesses. From 25 of them the *Staphylococcus aureus* subsp. *anaerobius* has been isolated in a pure culture. To study the course of the disease animals have been clinically examined every 3 months. The number, size and location of superficial abscesses have been registered. The number of abscesses present on one goat varied from 1 to as many as 7. The diameter varied from 1 cm up to 30 cm. Main location of abscesses was in subcutaneous tissue close to prescapular lymph nodes (45 %) and subiliac lymph nodes (37 %), followed by localization near submandibular (6 %), parotid (3%), mammary (0.8 %) and poplitei (0.4 %) lymph nodes, in base of tail (2.5 %), neck (1 %), sternum (0.4 %), cheek (1 %), chest (0.8 %) and ear region (0.4 %). On the beginning of the observation period lesions were present in 85% animal in herd A and respectively 55% in herd B. The number of clinically ill animals gradually decreased during research time in both herds and reached the same number of 20 % in 15 month of observation. There were almost no difference in number of clinically ill animals in group of young goats (up to 12 months) compared to older ones in both herds. The Morel's disease is rare in goats in Poland. The disease spreads easily within a herd by direct contact of ill and healthy animals. It can be transferred between herds by a movement of infected animals. The majority (83%) of abscesses have been observed on the trunk of ill goats while only 17% in a head region. The intensity of clinical symptoms significantly decreased during 15 month of observation in both herds which could suggest that disease might be self-limiting in a long time period.

405. Faecal egg output in Jakhrana goats naturally infected by *Haemonchus contortus*: physiological states and seasons effect

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Gastrointestinal nematodes constitute one of the most important health constraints to goat production in India. *Haemonchus contortus* is one of the major causes leading to production losses, increased cost of management and treatment, and even mortality in severe cases. Faecal samples of 282, does of Jakhrana, Indian breed of goats maintained at the Central Institute for Research on Goats, Makhdoom, Mathura, India, were screened to assess the susceptibility to naturally acquired gastro-intestinal (GI) nematode parasite (predominantly *Haemonchus contortus*) in different physiological states namely dry, lactating and pregnant stages of does and to study the haematological changes of animals during the course of infection. The faecal egg count (FEC) was measured using the modified Mc Master technique and packed cell volume (PCV) and haemoglobin (Hb) was estimated by auto-haematology analyzer. All the raw data of faecal egg count were transformed by \log_e (FEC+100) before analysis. The data were analyzed using a mixed model least-squares analysis for fitting constants including the effects of sampling years, physiological stages of does and season of sampling. All the fixed effects (viz., year of sampling, sampling season and physiological status of does) showed significant ($P < 0.01$) variations in LFEC of does. The highest faecal egg count was observed in rainy season followed by summer and winter season. The dry animals had significantly higher faecal egg count as compared to lactating does, whereas no significant ($P > 0.05$) variations in LFEC existed between dry and pregnant animals. The investigation also showed that season of sampling had significant ($P < 0.01$) influence on Hb content and PCV of animals during the study period. However, the physiological states of does had no significant ($P > 0.05$) effect on Hb and PCV of does. Results were interpreted in terms of genetic resistance of breed against *Haemonchus infection*.

406. Small-scale goat farming systems in the Ciénega region of Mexico: constraints and prospects for brucellosis control

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Diseases transmitted from goats to humans, such as brucellosis are major constraints in development of goat farming. In the Ciénega region of Mexico poor people practice small-scale goat farming and brucellosis is endemic. Our objectives were to characterize small-scale goat farming systems and to analyze constraints and prospects for brucellosis control. Four villages of the Ciénega region were included in the study. Multiple methods were used, such as semi-structured interviews among stakeholders, participatory workshops and two surveys, one among 43 goat farmers and one among goat farmers' neighbors. Quantitative data were summarized using descriptive statistics. Qualitative data were coded by topics for analysis. Small-scale goat farms produce milk for sale. Farming systems are relatively low external input systems. Most farmers (68%) kept goats in extensive grazing systems. During the rainy season, goats graze native vegetation in communal land, and during the dry season, crop residues in crop land. Goats are supplemented maize and sorghum during dry season. Average flock size was 60 (SD 62) adult goats. Average farm size was 5 ha (SD 6.3). For 60% of the farm households, goat farming was a main source of income. In only 36% of the farm households, goat milk was consumed. Often milk was not consumed because farmers perceived the risk of brucellosis infection. The private milk processor does not encourage brucellosis control, because milk is used to produce candies. Farmers see milk price as a main constraint to goat farming. Although 56% of the farm households have had at least one case of human brucellosis, controlling brucellosis was not a priority for 77% of the farmers interviewed. Farmers' knowledge about brucellosis in goats proved limited. Vaccine application for brucellosis control is 15 times more expensive than for pneumonia control in goats. While conducting the study a case of corruption by local agricultural officers hindered continuity of a brucellosis control program on goat farms. Brucellosis control might be feasible and attractive for farmers in a scenario where milk market and governmental support is more favorable. Results show that brucellosis control requires a good understanding of the farming system in the socio-economic context.

407. Gastro-intestinal strongyle faecal egg count and worm burden in goats

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Goat production in the world is negatively affected by several factors, including infectious and parasitic diseases. Among the latter, gastro-intestinal (GI) strongyle infection (caused by different genera of nematodes, e.g. *Teladorsagia*, *Haemonchus*, *Trichostrongylus* and *Oesophagostomum*, some of them zoonotic) remains one of the main constraints to goat production both in temperate and tropical countries. Even if several indicators of GI strongyle infections have been proposed, Faecal egg count (FEC) techniques remain the most common approach for the estimation of their prevalence and intensity. However, FEC may be subjected to a within-individual variation due to factors like weather, season, random day-to-day variation, phase of the parasitic infection and hour of sampling. A study on GI strongyle FEC in dairy goats was conducted to evaluate the effect of sampling hour on the GI strongyle egg excretion and the relationship between FEC and worm burden. The study was performed on a total of 63 female Siriana goats, 1.5 years old, at their second pasturing season, naturally infected by *Teladorsagia circumcincta*, *Haemonchus contortus*, *Trichostrongylus colubriformis* and *Oesophagostomum venulosum*. The effect of the sampling hour on egg excretion by GI strongyles was studied each 3 weeks for 21 weeks, utilizing 3 individually caged female Siriana goats. Faecal samples were collected from each cage every 2 h, and were analyzed by the FLOTAC technique. The results of the General Linear model did not revealed any significant effect of the hour ($P = 0.449$) on FEC. The same 3 goats used for the experiment 1 were then slaughtered and the relationship between worm burden (at species level) and EPG was evaluated using Pearson correlation. Positive relationship between EPG and worm counts ($P = 0.000$) was found, in particular regarding *H. contortus*. The good relationship between FEC and worm burden justifies the fact that FEC techniques are widely used to measure the prevalence and intensity of GI strongyle infections for epidemiological surveys, to quantify the efficacy of chemotherapies, and to detect anthelmintic resistance.

408. Can *aeromonas hydrophila* be pathogenic for goats?

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A restitution breeding of Carpathian goats was started in one of Polish farms at the end of 2007. There were 44 animals; 19 goats, 5 bucks bought from different small farms and 20 kids that were born. Goats were kept in very good conditions and fed the same fodder (hay, grain, green forage) as cows and horses present on the farm. The feeding rations included very high level of proteins but this mistake has been corrected. Since April till November 15 goats and 9 kids showed symptoms of disease which lead to losses of 12 goats and 9 kids. In 3 cases animals showed depression followed by sudden death. There were no significant lesions found in those animals. In other cases depression, loss of appetite, flatulence, diarrhea, mild fever, sometimes oedema of eyelid and mandible region was observed. Those animals were treated with antibiotics but only 3 goats have recovered. The course of disease lasted from 1 day to 3 weeks. Autopsy showed subcutaneous oedema on the head, a clear liquid in peritoneal cavity with heavy gelatinous oedema of internal organs and enlargement of gall bladder. In histopathological examination inflammatory and degenerative changes were found in livers, kidneys, hearts and lungs. Performed diagnostic tests allowed to exclude infection of *E. coli*, *Salmonella spp.*, *Clostridium spp.*, bluetongue virus and parasitic invasion as a reason of losses. The ragwort poisoning (*Senecio jacobaea*) has been also excluded. Microbiological investigations showed presence of *Staphylococcus intermedius*, *Streptococcus bovis*, *Acinetobacter Iwoffii* in some cases but *Aeromonas hydrophila* was isolated from all animals. These results show that infection of *Aeromonas hydrophila* could not be excluded as a cause of clinical disease in goats.

409. Validation of a rapid urinary iodide test in the goat: a preliminary study

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A rapid urinary iodide test (Merck, Germany) was assessed in goats to validate its effectiveness in field conditions. The test provides a semiquantitative assessment of the iodine intake and could be valuable for animal population. Two hundred and forty six dairy goats were randomized selected for this study. According to iodide content in urine, results were classified in three groups (<10 µg/dL, 10-30 µg/dL, >30 µg/dL). These findings were in agreement with spectrophotometrical determinations and with serum iodine values. Sensibility and specificity were 89% and 78% respectively. Data on reproducibility and interfering substances were also valuable. Given the technical simplicity, cost-effectiveness and its stability in heat environmental conditions, the rapid urinary iodide test should be considered as a valuable method for epidemiological surveys in field conditions or in development countries.

410. Risk factors associated to *Chlamydophila abortus* in goats under intensive milk production in Mexico

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Con el objetivo de conocer la prevalencia y los factores de riesgo asociados a *Chlamydophila (Cp) abortus* en caprinos lecheros con producción intensiva de México, se realizó un muestreo aleatorio simple de 246 cabras hembras de raza saanen en 9 rebaños y a través de un kit diagnóstico de ELISA recombinante se determinó la seropositividad. Se estudiaron los factores de riesgo considerando las variables: edad de la cabra, número de vientres, origen de reemplazos, intercambio de semental, distancia entre granjas, densidad animal, material de corrales y pisos y coexistencia de ovinos. La seroprevalencia fue de 4.87% cabras seropositivas a *Cp. abortus*, que pertenecen a 6 rebaños. En los rebaños que intercambian semental es 4.83 veces más probable encontrar cabras seropositivas, que en los que no intercambian semental ($P < 0.05$). Es 4.50 veces más probable hallar cabras seropositivas en los rebaños que introducen hembras de reemplazos de otros rebaños, que los que reemplazan con sus propias crías ($P < 0.05$). Las cabras de mayor edad, 85 meses promedio, tienen 0.10 más probabilidad de estar infectadas con *Cp. abortus* que las de menor edad, 30 meses promedio, ($P < 0.001$). El número de vientres, la densidad animal, la distancia entre granjas, la coexistencia de ovinos y el material construcción de pisos y de corrales no influye en la tasa de cabras seropositivas ($P > 0.05$). Los factores de riesgo asociados a la infección por *Cp. abortus* en estos rebaños caprinos son: el intercambio de sementales entre granjas y la introducción de hembras de reemplazos provenientes de otros rebaños. La mayor tasa de seroprevalencia en cabras con mayor edad sugiere que la infección clamidial en el rebaño caprino está establecida desde hace tiempo. La seroprevalencia de *Cp. abortus* no está relacionada con el número de vientres en los rebaños, la distancia entre granjas, densidad animal, material de corrales y pisos, ni coexistencia de ovinos.

411. Pharmacokinetics of injecting Florfenico1 in contagious caprine pleuropneumonia goats and therapy scheme

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Twelve healthy goats were divided into two groups: Group A as healthy control, Group B as contagious caprine pleuropneumonia (CCPP) model. All goats were injected with a single dose of Florfenico1 (FFC) at 20mg/kgBW intramuscularly. Plasma concentrations of FFC and minimal inhibitory concentration (MIC) of FFC on mycoplasma of CCPP were determined. Pharmacokinetics parameters were calculated by the 3P97 computer program. The results indicated that pharmacokinetics characteristics of FFC in both groups were similar. There was no significantly influence of pharmacokinetics characteristics of intramuscular injecting FFC on contagious caprine pleuropneumonia (as a respiratory tract disease) in goats. The characteristics of endosomatic pharmacokinetics of intramuscular injecting FFC in these goats demonstrated fast absorption, broad distribution, high effective concentration and slow elimination. Main parameters of the pharmacokinetics were $T_{1/2Ka}$ 0.41±0.25 his, $T_{1/2ke}$ 7.41±3.66 h, T_{peak} 1.57±0.57 h, C_{max} 4.64±2.15 mg.l⁻¹, AUC 54.38±20.65 mg.h.l⁻¹. The MIC was 0.18 ± 0.07 µg.ml⁻¹. A clinical therapy scheme of FFC for goats infected CCPP were as follow: administration cycle (τ): 24.21 h, first dose (X_0): 21.20mg.kg⁻¹, maintaining dose (X): 20mg.kg⁻¹, times of administration (n): 2.38 when the f_{ss} (n) reach 99.9%.

412. Prevention of the goat mastitis during milking

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Mastitis is one of the biggest problems that face the producer of goat dairy cattle, since the economic losses for decrease in milk production, waste of not suitable milk for human consumption, increased in the involuntary waste or the death of the animals, extra expenses for the treatment (medicines, payments medical veterinary services, labour) overcome \$2'000,000 US Dollars. On the other hand, the waste of some animals can cause a delay in the genetic advance of the herd. The first challenge to overcome is to find a way of preventing an epizootic that provoke between 70-80 % of the times for any "bacterial zoo" integrated by *Streptococcus*, *Escherichia*, *Pseudomona*, *Candida*, *Brucella*, *Nocardia*, *Klebsiella*, for mentioning some bacterial classes. In a minor degree for other diverse causes. The central objective of this study was to evaluate the efficacy of germicide against the presence of bacterial mastitis in the milking machine during the milking. In the experiment three bactericidal disinfectants were used: Commercial Shampoo, muriatic acid and an oxidizer chlorine- concentive. The study used 32 goats of the race Nubia of different ages and weight; the animals were confined and under semi-controlled conditions; the experiment lasted two months with samplings every 10 days in every treatment; treatments were deferred in the epoch of the year. The oxidizer chlorine-concentive turned out to be better to prevent the mastitis since there was significant ($p < 0.05$) reduction in the appearance of contagious bacteria in comparing with the other reagents; nevertheless, there increased of the number of bacterial not pathogenic stocks of 'environmental' type. This product did not irritate the breasts and also it was more effective to reduce the bacterial stocks in the milk with regard to other used products.

413. Somatic cell count in goat milk through diagnostic tests: California test, Wisconsin, direct microscopy and Delaval cell counter.

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The somatic cell count (SCC) in goat milk is accepted as an indicator of health status in mammary gland. Some procedures used to conduct the SCC are Microscopy count of somatic cells (MCSC) and the DeLaval cell counter (DCC). There are other methods based on the identification of DNA of somatic cells, these are; the California mastitis test (CMT) and Wisconsin mastitis test (WMT). The purpose of this study assess the relationship between the results of the tests mentioned above with respect to MCSC in milk samples from mammary glands of goats, considering the bacteriologic culture of the milk samples. Sixty goats from different stages of lactation and parity, mechanically milked, were sampled. Linear regression models and logistic regression models were used to explain the effect of CMT, WMT DCC on the variation in MCSC, bacteriological culture and specific milk cell types. DCC explained significantly ($P < 0.01$) the MCSC ($r^2=0.95$), followed by CMT ($P 0.0168$, $r^2=0.81$). The *Staphylococcus spp* were presented in 92% of cases positive bacteriological culture. DCC and CMT were reliable predictors of MCSC in milk from goats. The microorganism found in most cases of subclinical mastitis was *Staphylococcus spp*.

414. Genetic and environmental influences on fecal worm egg counts following natural infection in Barbari goats

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An investigation was made in 741 Barbari goats, maintained at the Central Institute for Research on Goats, Makhdoom, Farah, Mathura, India for a period of 5 years (1999 through 2003) to study the effect of genetic and environmental factors on faecal egg count (FEC) following natural infection due to *Haemonchus contortus* and inheritance pattern of faecal egg count in this breed. The FEC was conducted twice from each animal at each sampling and the mean FEC was used for data analysis. The FEC was measured using the modified McMaster method. All the raw data of faecal egg count were transformed by $\log_e (FEC+100)$. All statistical tests for FEC were applied to the transformed data. The data were analyzed using a mixed model least-squares analysis for fitting constants including the effects of year of sampling, sex of animal, month of sampling and age groups of animals. The heritability of faecal egg count was estimated by paternal half-sib method. The overall least-squares means for log-transformed faecal egg count (LFEC) and geometric mean of FEC (GFEC, epg) of animals in the flock were 5.31 ± 0.13 102.35 unit eggs/gram, respectively during the study period. The random effect of sire significantly contributed ($P < 0.01$) variation in log-transformed FEC (LFEC) of animals. The year of sampling had significant ($P < 0.01$) effect on LFEC of animals. There were no significant variations ($P > 0.05$) in LFEC between two sexes. Significant variations ($P < 0.01$) in FEC existed among sampling months in this study. The effects of the age of animals on LFEC were also found significant ($P < 0.01$) in this breed. The parasitic load in the animals was increased with age in our study. The moderate heritability (0.32 ± 0.11) estimates for faecal egg count in this breed suggests the existence of some scope for improving this trait by selection.

415. Control of gastrointestinal parasitism in grazing goats by using medicated block

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A study was undertaken to observe the efficacy of medicated feed blocks on the control of gastrointestinal parasitism in grazing goats. Medicated blocks were prepared by adding anthelmintics Levamisol HCl @ 7.5 g/ kg at NIAB. The feeding trials were conducted on goats (Beetal X Dwarf) to compare the effectiveness of anthelmintic as oral drench or through medicated feed blocks. Fifteen goats were selected from the herds kept at NIAB Farm on the basis of having medium helminthes infestation. Animals were divided into 3 equal groups of 5 animals each. Group one, no anthelmintic (kept as control lot); group two, oral drench of 10 ml (1.5 % w/v) Levamisole HCl (recommended dose); Group three, medicated-UMMB containing 7.5g /kg Levamisole HCl. All the animals were left for free grazing on seasonal fodders or grasses plus free access to UMMB licking (200-250 g/d). Fresh faeces samples of all animals were collected weekly for identification of parasite species and determination of eggs per gram (EPG). Medicated-UMMB supplementation decreased the percentage of parasite infection 86 %, 96 % and 97 %, after 7 days, 14 days and 21 days post-treatment respectively. While in case of anthelmintic drench the percent reduction was 97%, 97% and 100% after 7 days, 14 days and 21 days post-treatment. There was no significant difference between medicated blocks or oral drench. Medicated blocks were equally effective as the drenching of Levamisol. It was concluded that the medicated blocks might replace the anthelmintics.

416. Serological evaluation of commercial vaccines against enterotoxemia in goats¹

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Enterotoxemia in sheep and in goats is caused by the effects of the epsilon toxin of *Clostridium perfringens* type D, being considered the main infectious cause of mortality in those animal species. The main prophylactic measures include adequate nutritional management and vaccination of all animals using vaccines of high immunogenic power. Six commercial vaccines containing in its formulation the epsilon toxoid of *C. perfringens* type D were serologically evaluated. Eighty four female goat kids, whose mothers had no previous vaccination history against clostridiosis were used. They were divided into six groups of 14 animals each. The animals of the control group didn't receive any vaccine dose and the animals from the groups 1 to 5 received two vaccine doses. The first vaccine dose was applied at 45 days of life (day zero) and the second dose at 75 days (30 days after the first dose). Blood samples were collected from the goat kids at the days zero, 30, 60, 90, 120 and 150 after the beginning of the experiment, in order to evaluate the immunologic response. The Indirect ELISA technique was used for the quantification of the antibodies against epsilon toxin in the samples of blood serum of the animals. In day zero, no animal presented titre considered protector. The largest number of animals considered protected was found at day 60, in response to the two initial doses of the vaccine (days 0 and 30, first and second doses, respectively). Only five animals which received the vaccine 1 and one animal which received the vaccine 3 stayed with titres of antibodies considered up to 150 days after the first vaccine dose. Based on the results, it was concluded that the evaluated vaccines showed small amount of epsilon toxoid in the commercial formulations, a crucial fact for the low efficiency of the vaccines. For commercial reasons, the vaccines against the clostridiosis present versatile formulations, with several toxoid types, used for various animal species, which certainly contributed to reduce their effectiveness in preventing the illnesses caused by the clostridia or their toxins.

417. Healthier goats. a project for eradicating contagious diseases in Norwegian goats

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“Healthier goats” is a project with the purpose of eradicating CAE, CLA and Johne’s disease in the Norwegian goat population. The project started in 2001. By February 2008, 270 farmers have applied to join the project. The project is intended to last until 2010. The goal is to include all the Norwegian goat flocks; 475 flocks of milking goats and about 1000 other flocks. For eradication of the different pathogens, the technique of “snatching” kids has to be used. The kids are taken away from the mother and the “infected” barn as quickly as possible after birth. The kids are housed in a clean barn, given cow colostrum and raised separated from older animals. The old goats are kept until the lactating period is finished and are then slaughtered. Thereafter, the barn and the near surroundings are cleaned and disinfected. The kids will start to produce milk at the same time of the year as usual for the farm. There is an extensive testing. Some flocks have all the three diseases, while others only have CAE or CLA. The first test for detection of CAE-antibodies is done before the kids are 5 weeks old. The next test is within a year. Bulk milk testing is then done twice a year. An ELISA-test is applied for both blood and milk. CLA is tested by an ELISA, but the detection relies mainly upon clinical examination in the initial phase of the infection. Johne’s disease is tested by interferongamma-test, ELISA, culturing of faeces and by pathological examination. The test results after eradication show very good results, when the recommended procedures are followed. So far, less than 2% CAE-positive animals have been detected. One case of Johne’s disease has occurred where the procedures were not followed during eradication. CLA have been confirmed in 4 flocks, and represent a major challenge because of its very contagious nature. The production results are very good. There is so far calculated an average increase in milk yield of more than 20% in the eradicated flocks. An increase in animal welfare is often evident but not easy to measure.

418. *In vitro* research on anthelmintic properties of lectins and tropical plants against gastrointestinal parasites of small ruminants

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Resistance of gastrointestinal parasites (GIP) to chemical compounds in synthetic drugs used traditionally for their control is an increasing worldwide problem. In addition, public concern of environmental pollution and chemical residues in human food have provided the impetus for the study of natural alternatives, such as the use of plant secondary metabolites (PSM) and PSM-rich plants with anthelmintic potential for livestock. Lectins are PSM that are known to have potential to control sedentary and migratory endoparasitic nematodes in plants but have not been studied until now for their anthelmintic potential on GIP of small ruminants. The aim of this study was to evaluate the possible effect of lectins and some tropical plants on the first stage larvae (L₁) of common GIP, through the use of larval feeding inhibition assays. After screening 13 different lectins, the three most potent ones were chosen, namely, Phytohaemagglutinin (PHAE3L), Concanavalin A (Con A) and Wheat Germ Agglutinin (WGA), and tested at concentrations of 0.5-500 µg/ml in triplicate and compared against a distilled water control. The selection of tropical plants was based on the fact that these are already used by Venezuelan and tropical farmers for their livestock, based on their nutritious characteristics. The plants species tested were *Gliricidia sepium* (GLI), *Leucaena leucocephala* (LEU), *Morus alba* (MOR), *Azadirachta indica* (NEE) and *Trichanthera gigantea* (NAC), using the same bioassay, and concentrations that ranged from 0.2 to 10 mg/ml (because of its potent effect GLI was re-tested in concentrations that ranged from 0.005 to 10 mg/ml). The concentration of the lectins and plant extracts against percentage of fed larvae were plotted, and the confidence interval at percentile 50 (IC₅₀) for each extract calculated. A clear dose response was found for the three lectins, although PHAE3L was significantly more effective than the others. The plant extracts from GLI and LEU strongly inhibited larval feeding, whereas MOR, NEE and NAC had no effect. Further bioassays and *in vivo* studies may help to elucidate the mechanisms and practical implications of this novel finding.

419. Frequency of endoparasites in goats of ten municipalities in the state of Nuevo Leon, Mexico

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With the aim of establishing the most common endoparasites of goats in the state of Nuevo Leon, a total of 589 fecal samples were taken of ten different municipalities and analyzed by coproparasitoscopic examinations. Samples obtained through convenience sampling, came from animals between 6 and 48 months of age obtained randomly from each herd studied during the period from February 2006 to December 2007. Results, using the technique of concentration with flotation in solution of Sheather and the morphological identification of the forms of dispersion determined that total sample of 488 (83.27%) were positive for Strongylida, 84 (14.33%) to *Strongyloides spp.*, 13 (2.21%) to *Trichuris spp.*, 73 (12.45%) to *Moniezia spp.*, 75.42% in the 442 were positive forms of dispersion on the Coccidia order. The coproculture were consistent with the Strongylida order showed that *Haemonchus contortus* (85.33%) was the endoparasite, higher of this group, followed by *Trichostrongylus spp.* (17.10%), *Cooperia spp.* (5.24%) and *Teladorsagia spp.* (3.09%). We concluded that all herds tested were positive for both Strongylida and Coccidia.

420. Two year field evaluation of a selective anthelmintic treatment scheme for goats in tropical Mexico.

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Goat production systems rely on repeated anthelmintic (AH) treatments for the control of gastrointestinal nematodes (GIN). Extensive use of AH can produce resistant strains of GIN. Selective treatment, only those really affected by GIN, may help to reduce the number of animals treated per year and maintain a “refugia” of susceptible worms to delay resistance. This trial tested a methodology of selective treatment using two levels of nematode eggs per gram of faeces (500 vs. 750 EPG). A goat herd of 170 adult goats was monitored on two consecutive years (2005 and 2006). Every month all the goats were checked for FAMACHA® and body condition score (BCS). Combinations of scores of those tools were used to select which animals were faecal sampled every month. Threshold for anthelmintic treatment was 500 EPG on year 2005 and 750 EPG on year 2006. Data from both years were compared using 2x2 tables and the odds ratios were determined using Epiinfo 6.0. A total of 2263 and 2009 events were recorded during the years 2005 and 2006 respectively. During 2005, 13% of the events were treated and during 2006 only 8 % of the events required treatment. Thus, animals were treated more times when 500 EPG was used as threshold compared to 750 EPG (288 vs 169 respectively, OR = 1.59, 95%CI = 1.29-1.95, P<0.001). This resulted from more animals with FAMACHA® 2 and 3 treated when 500 EPG was used as threshold (OR = 2.11 and 2.78 respectively; P<0.004). On year 2005 60 animals, of the 170 in the herd, were not treated during the whole year and this number increased to 90 on year 2006. No animal died due to GIN infection during the two years of the study. No indication of reduced productivity of dams was recorded between years. However, when 750 EPG was used as threshold for treatment there was a greater risk of recording animals on FAMACHA® 5 (16 vs. 29; OR = 2.06, 95%CI = 1.07 – 3.97, P<0.01). Selective treatment was feasible but work burden was considerable. Ability of workers increased with time as well as the animal’s adaptation to management.

421. Scanning electron microscopy of the changes induced to *Haemonchus contortus* after contact with extracts of two tanniferous plants: Tzalam, (*Lysiloma latisiliquum*) and sainfoin (*Onobrychis viciifolia*).

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Gastrointestinal nematodes (GIN) represent a major pathological threat for goat production worldwide. The constant and widespread development of resistance to chemical anthelmintics in worm populations imposes to seek for alternative solutions. Both in temperate and tropical areas, several positive results against GINs have been associated with the consumption of tannin-rich (TR) plants. However, the mode of action of tannins remains largely unknown. A better understanding of the mechanisms is required to permit a pertinent use of these bioactive plants for the control of GI parasitism. Therefore, the objective of this study was to examine the changes provoked on adult nematodes after *in vitro* contact with extracts of TR plants. The nematode model used was *Haemonchus contortus*. Extracts of two TR plants were used: a tropical plant (Tzalam (*Lysiloma latisiliquum*) and a temperate one (sainfoin, *Onobrychis viciifolia*). Adult worms were collected from two artificially infected goats and were maintained *in vitro*. One batch of worms composed a control group which was maintained in PBS, one group of *Haemonchus contortus* was kept in contact with sainfoin extracts (concentration = 1200 µg/ml) and a third group was kept in contact with Tzalam extract at the same concentration. After 24 hours of exposure, the worms were fixed and prepared for observation by Scanning Electron Microscopy. The main changes observed concerned the cuticle, the buccal capsule and the vulva of the female worms. With both TR extracts, a thickening of both the longitudinal and transversal cuticular ridges was observed by patches which might reduce the motility of the worms and the exchanges with the surrounding environment. Moreover, aggregates of extracts were found around the buccal capsule and the female vulva which might affect the access to nutrition and the egg excretion. These observations can explain some of the main results (e.g. significant decreases in egg excretion and total egg output) normally associated with the consumption of TR plants by infected goats.

422. The consumption of Tzalam, (*Lysiloma latisiliquum*), a tropical tanniniferous plant is associated with a reduced larval establishment of parasitic nematodes in goats.

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Gastrointestinal nematode infections remain a major pathological threat for goat production in tropical countries. Because of the constant development of anthelmintic resistance in worm populations, the use of tannin-rich (TR) plants represents one alternative solution to the exclusive reliance on chemical anthelmintics. The distribution of such tannin-rich (TR) forages has been associated with an improvement of host resilience and/or resistance against nematodes in sheep and goats in temperate conditions. However, in tropical countries, studies remain scarce which have considered the possible use of TR browsing plants for their anthelmintic properties. Here, we focus on Tzalam, (*Lysiloma latisiliquum*), a TR plant from Yucatan (Mexico) which is palatable for goats. The objectives of the current study were i) to examine the effects of Tzalam on the establishment of nematode third-stage larvae (L3), and ii) to define the role of tannins in these effects. Three groups of 6 naive goats were fed either a) Tzalam, b) Tzalam+PEG, or c) *Brosimum alicastrum*, a plant with very low level of tannins. After 7 days of diet adaptation, each goat was infected with 3000 third stage larvae (L3) of *Haemonchus contortus* and 3000 L3 of *Trichostrongylus colubriformis*. The goats were killed 5 days after infection for worm counts. Despite significant differences in total tannin and total polyphenol contents, no difference in plant consumption was found between the groups for the 12 experimental days. For both *H. contortus* and *T. colubriformis*, the consumption of Tzalam was associated with a reduced larval establishment ($P < 0.001$), as assessed by the Mann Whitney test. When PEG was added to the Tzalam diet, these differences disappeared, suggesting a major role for tannins in those anthelmintic effects. Since no difference in appetency was measured, the potential use of Tzalam as bio-active plant could be proposed in tropical farm conditions to favour the control of parasitic nematodes. These results are discussed in relation with recent basic data on the possible direct mechanisms of tannins on L3.

423. Chitotriosidase activity in goat and kid's blood and colostrum

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Chitotriosidase (ChT) activity has not been investigated in ruminants, and therefore we studied this activity in blood and colostrum of 15 pregnant goats and 30 goat kids. Blood samples were taken from pregnant goats at 3, 2 and 1 d prepartum, at partum, and at 1, 2, 3 and 4 d postpartum. Colostrum samples were obtained by machine milking at partum, and 1, 2, 3, and 4 d postpartum. Goat kid blood was collected at birth and every 7 d thereafter until goats kids were 56 d old. ChT activity ranged from 2464 to 3568 nmol/mL/h in goat blood serum, and no statistical differences were detected through time. However, activity tended to decrease from 3 d prepartum to 2 d postpartum. Colostrum ChT activity was 3834 nmol/mL/h and 421 nmol/mL/h on the d of delivery and 4 d postpartum, respectively. Colostrum ChT activity was significantly higher at partum than at any other time. ChT activity in colostrum was significantly greater at 1 d postpartum than at 2, 3 and 4 d postpartum. ChT activity did not differ in colostrum collected on d 2, 3, and 4 postpartum. ChT activity in goat kid blood serum ranged from 2521 to 9987 nmol/mL/h at birth and 49 d of life, respectively. ChT activity in the blood serum increased with age: at birth, activity was significantly less than at 28, 35, 42, 49 and 56 d postpartum. The maximum ChT activity in blood serum was observed at 49 d postpartum.

424. The Effects of Diet (goat milk vs. milk replacer) and age on serum complement system activity in goat kids

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Twenty new born male kids were allotted into two groups to evaluate the effects of diet and age on complement system activity in serum. After the colostrum feeding period, the control group (C) received commercial milk replacer, and the GM group was fed with goat milk. The kids were fed colostrum for 2 days and then milk replacer or goat milk from days 3 to 60. Blood samples were taken at 1, 10, 20, 30, 40, 50 and 60 d of age. Complement system activity was higher ($P < 0.05$) in the GM group every time samples were taken. The control kids did not present complement activity at any time.

425. Technology application to improve productivity and sustainability in traditional goat production units in Venezuela

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The Project objective is to develop and apply integrated biotechnologies in goat and sheep production in order to increase productivity and sustainability of traditionally raised goat and sheep herds. Project initiated in February 2005 with selection of communities in Torres municipality of Lara State, Venezuela. In selected communities restricted participative diagnostics were carried out to study goat and sheep raising situation and to agree in actions to be taken. As a result 2 work zones were defined: Villa Araure-Los Aranguez axis and San José de Los Ranchos community (5 hamlets), were 2 sanitary routes with 24 production units were implemented for monitoring and productive follow-up of herds. As a result 3 *Leptospira* Serovars were detected in Villa Araure-Los Aranguez axis (*L. pomona*, *L. canicola* y *L. hebdomadis*) for the first time in goat herds of Venezuela. No animal reactants to *Brucella* were detected. Most important sanitary cases affecting production were: Diarrheas (21.9%), Miasis (10.6%), Abscesses (10.6%), Mastitis (8.5%), Floopy Kid Syndrome, (6.8%), General Weakness (6.5%), Pododermatitis (5.8%), Poliartthritis (4.4%), Queratoconjuntivitis (3.7%), Respiratory problems (3.4%) and others (17.8%). As a result of producers training (17 workshops and curses) and changes in herd management introduced a significant ($P < 0.01$) increase in kidding weight was observed in Villa Araure-Los Aranguez from 2.948 to 3.212 kg and in San Jose de Los Ranchos from 2.545 to 2.668 kg in year 2006 when compared to 2005. A reduction of 79.6% in pathologies observed was achieved from 2005 to 2006. As other result 7 forage production units were established with introduced species like *Leucocephala*, *Cynodon Cynodon Pleichtostachius* y *Opuntia Ficus Indica*. Semen Freezing and insemination program was initiated in more than 125 animals. A web page was also designed (www.bioteccaprina.inia.gob.ve) to promote diffusion of results, didactic material and other important information. In the VillaAraure-Los Aranguez axis a Semiindustrial milk plant and meat plant are being installed to improve processing and marketing of products in order to increase income obtained by producers.

426. Varimax rotated factor analysis of the conformation traits of Uda sheep

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A study was conducted to determine the interdependence among conformation traits of 459 Uda rams using factor analysis. The body measurements were withers height, body length, heart girth, rump height, rump width, rump length, face length, foreleg length, tail length and shoulder width. The animals were grouped into milk teeth, 2-tooth, 4-tooth, 6-tooth, 8-tooth and worn teeth ages respectively. Age group of animals was a significant ($p < 0.05$) source of variation for the studied traits. The various constituent parts of the body developed at varying rates. Tail length was the fastest growing trait. Face length, foreleg length, withers height, rump height and body length appeared to have reached their genetic potential in a similar fashion. Maturity of rump width, rump length and shoulder width followed the same pattern. The phenotypic correlations, adjusted for age effect, ranged from 0.36 to 0.90. From the factor analysis with varimax rotation of the correlated traits, three principal components were extracted, which accounted for 85.7% of the total variance. The first principal component alone explained 73.2% of the variation, and tended to describe general size. The second and third principal components tended to differentiate between tail length and meat traits (rump width, rump length and shoulder width). The three extracted principal components could be considered in selection programmes to obtain animals with better conformation using fewer measurements.

427. Innocuous practices for the elaboration of traditional goat cheese at Miravalles, Oriental Puebla

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The production of traditional goat fresh cheese was defined in the state of Puebla, Mexico in 2008. It is home made at the microregion of Oriental, Puebla. It is a rounded cheese of 0.2kg made of crude milk. The elaboration process of this cheese is similar in all production-family systems. The results show small variants in the procedure, such as how hygiene is applied during the milking process, in the amount of salt applied in the final product and particularly in the coagulation time. Some families increase the temperature to 35°C before or after the coagulation time, this process affects the cheese texture. The present work was done with the participation of the regional organization called “Impulsores Caprinos de Oriente, S. P. R. de R. I.” and with goat growing families from Miravalles Community at Oriental, Puebla. The goat production is the most important activity in the rural sector at this municipality. The aim of this study was to transfer simple innocuous procedures for the elaboration of cheese in a traditional way. Workshops involving goat producers were conducted in order to evaluate the local knowledge. They were interviewed as key informants. A questionnaire in a Likert scale form was carried out to define the preferences in the cheese production. There were proposed improvements in the milking, in the udder cleaning with a wet material by water and iodine. Several factors were included: filtered milk to separate strange bodies, personal hygiene and the equipment used in the milking and the cheese pressing process. Particular attention in the pasteurization was made. This activity is one of the weakest in terms of health and safety as it can potentially present pathogen microorganisms that can lead to serious illnesses such as *Brucella*. This is a serious problem as it affects goat cheese consumption due to uncertainty within the customer. It can be observed that 50% of trained families adopted the pasteurization process in their elaboration of craft cheese. Regarding udder cleaning and cheese pressing 65% utilized heavy objects such as bricks wrapped with plastic bags.

428. Acceptability of goat cheese with jalapeño chili (*Capsicum annuum* var. jalapeño) by two different cultures

Dora A. Avalos-de la Cruz, Joël Hardy, Muriel Jacquot, Carlos G. García-García, Juan A. Pérez-Sato, Victorino Morales-Ramos, J. Cruz García-Albarado y Carlos Narciso-Gaytan.

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A method of acceptability scaling was utilised to determine the preferred levels of capsaicinoids (CPS) in goat cheese with chilli, in two groups, French descendants and Mexicans newly arrived in France. Preference for the taste and colour of the cheeses were evaluated. Eleven cheese samples with four concentrations of CPS were rated for their degree of liking (0, 0.5, 1.0 and 1.5 mg of CPS /100 g curd milk). Results showed that the French group preferred lightly spiced cheese (0.5 mg) comparable to the white cheese (without CPS) and white (with CPS) and red (with red hot pepper) coloured cheese. Mexicans have a varying preference: some preferred highly and others more lightly spiced cheese. This large range of preference can also be noted for the colour. However, highly spiced white cheese (1.5 mg of CPS) was disliked. This study showed that consumers are ready to eat cheese spiced with chilli, independent of cultural traditions.



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429. Vitamin E and selenium use for the treatment of heat stress in dairy goats

Armendáriz Velázquez J; Armendáriz Martínez J; Apodaca Sarabia C; Ayala Oseguera J and Rangel Santos R.

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In arid and semiarid zone of Mexico, during the critical temperature time, dairy goats submit a series of problems associated to negative effect of heat stress. The most important are reduction of milk production and reproductive problems how embryonic reabsorption, abortion and infertility. Associated to the heat stress the animals present the oxidative stress whit increment of free radicals that restrict the optimal functioning of organism, affected in greater or slightest degree all the animal physiologic process. The effects more important in the animal are low dry matter intake and somatic cell increase. Treated to find a strategy to diminish the negative effect of heat stress and oxidative, make use of 18 saanen goats, 9 treated whit one milliliter of vitamin E-selenium (MuSe) in fourteen days interval and the other 9 as control group. Record of ambient temperature and relative humidity in intervals of one hour and the rectal temperature during the hours of highest and lowest temperature were taken. The result of rectal temperature sign decrease in the animals treated versus control group (38.9 vs. 39.04 0C). It is concluded that vitamin E-selenium (MuSe) application reduce the rectal temperature, as well as the body temperature; therefore the heat stress in the animal decreases and the productive performance improves regardless animals without this vitaminic supplementation.



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Abstracts Appendage

Management and Production Systems

Modeling the Impact of Breeding Seasons in the Dynamics of Dairy Goat Herds. Production and Economical Evaluations

Physiology and Behaviour.

Vitamin E and Selenium use for the treatment of heat stress in dairy goats

Animal Health.

Designing a National Study for the US Goat Industry



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Modeling the Impact of Breeding Seasons in the Dynamics of Dairy Goat Herds. Production and Economical Evaluations

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The reduction of goat milk production and the competitiveness of other more profitable activities have increased the adoption of measurements to enhance goat milk and meat around the world. It has been proposed that by increasing the number of reproduction seasons would increase income over costs. The objectives of this study were to evaluate the impact of 1 or 2 annual reproductive cycles on production and economical health of dairy goats and to identify differences of production costs and revenues associated with changes in the herd dynamics as predicted by a mathematical model. A previously developed goat model using the System Dynamics approach to study long-term changes in the dynamics of the herd was used in these simulations. The model simulations used feeds, labor, and fixed costs as inputs and the outputs were revenues from milk production sales and sales of animals from all categories of the herd. The simulation time unit was "month" and a long-term horizon of 10 years was considered for these simulations. The model was set up to simulate a free-stall facility of a herd in equilibrium with 100 does in lactation. All parameters considered in this model assumed average values reported in production systems in the Southeast region of Brazil. Our simulations indicated that improvements of 10% in the fertility rate would increase the number animals in the herd up to 185% and 35% for one and two breeding season, respectively. Establishing a milk price as US\$0.68 the break even for one and two breeding seasons was respectively US\$0.62, and US\$0.50, giving the systems with two breeding a capacity to support reductions on milk price up to 26% against 9% with one breeding season. The comparison of models with 1 or 2 breeding seasons indicated that the 2 breeding seasons scenario was considerably more profitable and had a higher turnover than the model with 1 breeding season. Our findings indicated the use of a second (artificial) breeding season might be an important management strategy in providing flexibility and increasing income in dairy goat production systems.

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Vitamin E and Selenium use for the treatment of heat stress in dairy goats

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SUMMARY

In arid and semiarid zone of Mexico, during the critical temperature time, dairy goats submit a series of problems associated to negative effect of heat stress. The most important are reduction of milk production and reproductive problems how embryonic reabsorption, abortion and infertility. Associated to the heat stress the animals present the oxidative stress whit increment of free radicals that restrict the optimal functioning of organism, affected in greater or slightest degree all the animal physiologic process. The effects more important in the animal are low dry matter intake and somatic cell increase. Treated to find a strategy to diminish the negative effect of heat stress and oxidative, make use of 18 saanen goats, 9 treated whit one milliliter of vitamin E-selenium (MuSe) in fourteen days interval and the other 9 as control group. Record of ambient temperature and relative humidity to intervals of one hour and the rectal temperature during the hours of greater and slightest temperature. The result of rectal temperature sign decrease in the animals treated versus control group (38.9 vs. 39.04 °C). It is concluded that vitamin E-selenium (MuSe) application reduce the rectal temperature, as well as the body one; therefore the heat stress in the animal decreases and the productive performance improves regardless animals without this vitaminic supplementation.





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Title: Designing a National Study for the US Goat Industry

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Abstract

The goat industry was only animal industry in the United States to grow in both numbers of operations and numbers of animals between the census years 1997 and 2002. This trend is expected to continue when the 2007 census numbers are reported. Even with this population growth, the US imported an average of 10,296 metric tons of goat meat per year during the years 2005-2007. The combination of a growing industry with many new producers, general lack of knowledge about the goat industry in the US, and the potential to further contribute to the study of goat diseases guided the decision to conduct a national goat study in 2009.

In preparation for this study, producers and small ruminant veterinarians were surveyed to determine the most important issues for goat producers. This needs assessment was conducted by mail-in responses and via the web on Survey Monkey during the period between October 15th 2007 and March 15th 2008. There were 1264 total respondents with 89.6% being producers while the rest of the respondents were made up of veterinarians, nutritionists, university extension agents, federal and state veterinarians, and other allied industries. Of the producers, 39% were dairy producers and another 39% were meat producers, in addition, 10% reported being both meat and dairy producers. The average size of dairy producer operations was 75 goats (2 – 1500) while the average size of meat producer operations was 123 goats (1 – 3000).

Overall, internal and external parasites and caseous lymphadenitis were the largest issues for all respondents to the needs assessment. This was followed by caseous lymphadenitis, nutritional issues, mastitis, respiratory disease and Johne's. Dairy producers were more concerned with caprine arthritis encephalitis, mastitis, and Johne's while meat producers were more concerned about respiratory disease, nutritional issues and lameness.





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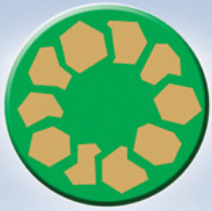


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NATIONAL COTTONSEED PRODUCTS ASSOCIATION

La NCPA (National Cottonseed Products Association) es una organización de compañías e individuos comprometidos en el proceso de la semilla de algodón y en la comercialización de productos de semilla de algodón. Estos incluyen molineros de aceite de algodón, dealers y brokers.

La harina de semilla de algodón o harinolina, así como la cascarilla de algodón son muy apreciadas por ganaderos mexicanos y de todo el mundo debido a su gran calidad como fuente proteica y de forraje para los rumiantes. Los productos de semilla de algodón proveen fibra, grasa y proteína en un solo paquete y, por tanto, tienen el potencial para disminuir costos de manejo y evitar tener varios productos a la vez ideales para ranchos de agostadero, ganado de engorda, bovino de leche, cabras y plantas de alimentos balanceados de bovinos por sus cualidades favorables de palatabilidad, energía, fibra y aporte de minerales.

La semilla de algodón y harinolina son excelentes alimentos comúnmente utilizados en rumiantes..



Harinolina

En una reciente prueba de campo (7 semanas) utilizando 90 cabras cruzadas de la raza Saanen y otras lecheras, 45 con concentrado (500 grs. /animal al 20% de harinolina) y alfalfa (500 grs. /por animal) comparados con 45 sin estos suplementos, se encontró resultados favorables en un 70% mayor producción de leche a la utilización del concentrado con harinolina. Estas estuvieron en semi-estabulación y semi-pastoreo, bajo condiciones de agostadero en la región sur de Coahuila.



HARINOLINA O HARINA DE SEMILLA DE ALGODÓN

La harina de semilla de algodón (HSA) o harinolina ha sido empleada exitosamente por más de 100 años en la producción de carne de res en áreas de Estados Unidos donde la producción y el proceso del algodón son dominantes. El contenido nutricional de las harinas de semilla de algodón varía dependiendo del proceso empleado para extraer el aceite. En comparación con aquéllas producidas hace 25 a 30 años, las harinas de semilla de algodón producidas actualmente son más altas en proteína cruda, magnesio, potasio y sulfuro, y más bajas en fibra cruda, cobre y manganeso. En términos generales, el mayor efecto del proceso de extracción en la harina de semilla de algodón es en el contenido de grasa. Como regla, las harinas de semilla de algodón extraídas mecánicamente tienden a tener un contenido más elevado de aceite residual, que las harinas de semilla de algodón prepresadas por solventes o las harinas de semilla de algodón mediante solventes. La HSA se emplea principalmente como una fuente de proteína para una variedad de operaciones de producción de carne de res que incluye suplementos para becerros en el predestete y vacas. El análisis nutricional de la HSA dependerá del proceso empleado para extraer el aceite de semillas de algodón. La HSA estándar tiene 41% de proteína cruda tal como es dado. La harinolina es alta en proteína con buena fibra y fósforo.

[View presentation movie Clip](#)



Sustainable Goat Production:
Challenges and Opportunities
of Small and Large Enterprises



Introduction

The Executive Committee of the 9th International Conference on Goats, is eager to welcome to Queretaro, all foreign and Mexican delegates participating in this magnum event. The city of Queretaro was selected because of its strategic proximity to Mexico City and for its central location in the country, where goat production is important. Its importance is also related to its tradition in goat milk and meat production, processing and consumption.

Today, 4 years after our last IGA international meeting held in Pretoria, South Africa, we are prepared to have an intense and fruitful event. So today we will begin the activities of the 9th International Conference on Goats, with the central theme:

“Sustainable goat production: challenges and opportunities of small and large enterprises”.

The importance of the central theme takes into consideration the modernization of the goat sector, under a sustainability scheme, in which scientists, producer associations and government and non-governmental entities have been interacting with the result of improved goat production and social development. An increased demand for quality goat products such as meat, milk, fiber and processed food products world wide, have resulted from the development of new market opportunities and niches.

Recent findings in different areas of research and development will contribute to a successful improvement of goat production. Government and non-government entities, participating in the conference, are an essential component in the development of this sector in Mexico, by helping goat associations in the delivery of technical support and accessible loans.

In order to achieve the success and high scientific standard expected for this conference, we will have 4 days of intensive activities with the participation of 6 plenary speakers covering topics which include:

- Sustainable Goat Production
- Food Safety, Production and Product Quality Assurance
- Future of Organic Goat Production
- Recent Advancement in Biotechnology in Goats
- Branding and Marketing of Goat Products; and
- Goat Production and Environment Conservation.

Also, twenty section invited speakers will present diverse topics within 10 areas of knowledge. These sessions are:

- Physiology and Behavior
- Reproduction, Biotechnology and Genetics
- Nutrition and Feeding
- Animal Health
- Management and Production Systems
- Environment and Sustainability
- Marketing, Economics and Food Safety of Goat Products
- Technology Transfer and Producer Organization; and
- Social Development and Contribution of Women to Goat Production





9th International Conference on Goats **Sustainable Goat Production: Challenges and Opportunities** **of Small and Large Enterprises**

National and International researchers participating in the organization and scientific committees have been grouped according to their area of expertise, considering their academic background and current research activities. Researchers, professors, students, goat consultants and producers will be participate in the individual sessions, presenting their research findings and production experiences as oral or poster presentations. During the conference, participants will be able to attend exhibitions where producers and commercial sponsors from several regions of Mexico will present their dairy and meat goats, goat food products, among other commercial items.

The main goal of the 9th International Conference is to disseminate the knowledge of science and cutting edge technology, for the benefit of sustainable goat production. For this purpose, we are gathering to share experiences and to study ways of improving goat production around the world. The outcome of such exchange will surely impact this sector for the benefit of Mexico and humankind.



XXIII Reunión Nacional sobre Caprinocultura



9th International Conference on Goats

Sustainable Goat Production: Challenges and Opportunities of Small and Large Enterprises



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