

Asian Regional Conference on Goats (ARCG-2018)

Associate Editors

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सुरेश प्रभु
SURESH PRABHU



सत्यमेव जयते

वाणिज्य एवं उद्योग मंत्री
भारत सरकार, नई दिल्ली
MINISTER OF COMMERCE & INDUSTRY
GOVERNMENT OF INDIA, NEW DELHI

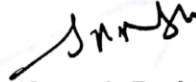


MESSAGE

I am pleased to note that the Amity University, Jaipur is organizing the Asian Regional Conference on Goats from 22nd to 26th October, 2018. This university has been contributing towards providing quality higher education.

I understand that scientists of eminence in the field will be participating in this conference.

I wish the event all success.


(Suresh Prabhu)

नरेन्द्र सिंह तोमर
NARENDRA SINGH TOMAR



ग्रामीण विकास,
पंचायती राज और खान मंत्री
भारत सरकार
कृषि भवन, नई दिल्ली
MINISTER OF RURAL DEVELOPMENT,
PANCHAYATI RAJ AND MINES
GOVERNMENT OF INDIA
KRISHI BHAWAN, NEW DELHI

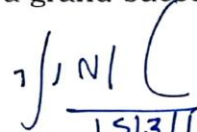


MESSAGE

I am pleased to note that Amity University Rajasthan, Jaipur is organizing the Asian Regional Conference on Goats from October 22-26, 2018. Amity University Rajasthan has been contributing towards providing quality higher education and research by providing harmonious climate where all kinds of talents meet and flourish.

I understand that scientists of eminence in the field will be participating in this conference. I wish the conference a grand academic success and hope that it will be a great platform to improve the linkage between academia, researchers, farmers, associated industries and other sectors of the society.

Wishing Asian Regional Conference to be a grand success.


(Narendera Singh Tomar)



डा. महेश शर्मा
Dr. Mahesh Sharma



सत्यमेव जयते

संस्कृति राज्य मंत्री (स्वतंत्र प्रभार)
पर्यावरण, वन एवं जलवायु परिवर्तन राज्य मंत्री
भारत सरकार, नई दिल्ली
MINISTER OF STATE (IC) FOR CULTURE
MINISTER OF STATE FOR ENVIRONMENT,
FOREST & CLIMATE CHANGE
GOVERNMENT OF INDIA, NEW DELHI

MESSAGE

17 JUL 2018

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Wishing Asian Regional Conference to be a grand success.


(Dr. Mahesh Sharma)

संस्कृति मंत्रालय : 501, 'सी' विंग, शास्त्री भवन, नई दिल्ली-110001, दूरभाष : 91-11-23386765, 23381539, फैक्स : 91-11-23385115
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Ministry of Environment, Forests & Climate Change : 5th Floor, Akash Wing, Indira Paryavaran Bhawan, Jor Bagh, New, Delhi-110003
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के. जे. अल्फोंस
K. J. ALPHONS



पर्यटन राज्य मंत्री (स्वतंत्र प्रभार)
भारत सरकार, नई दिल्ली
MINISTER OF STATE (IC) FOR TOURISM
GOVERNMENT OF INDIA, NEW DELHI

MESSAGE

I am pleased to note that Amity University Rajasthan, Jaipur is organising the Asian Regional Conference on Goats from October 22 – 26, 2018. Amity University Rajasthan under the stewardship of Dr. Ashok K. Chauhan has been immensely contributing towards providing quality higher education and research of global standards by providing harmonious climate where all kinds of talents meet and flourish.

I understand that scientists of eminence in the field will be participating in this conference. I wish the conference a grand academic success and hope that it will a great platform to improve the linkage between academia, researchers, farmers, associated industries and other sectors of the Society.

Wishing Asian Regional Conference to be a grand success.



(K.J. Alphons)
March, 2018

गजेन्द्र सिंह शेखावत
Gajendra Singh Shekhawat



कृषि एवं किसान कल्याण
राज्य मंत्री
भारत सरकार
Minister of State For Agriculture &
Farmers Welfare
Government of India

11 2 MAR 2018

Message

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Wishing Asian Regional Conference to be a grand success!

(Gajendra Singh Shekhawat)



FOUNDER PRESIDENT'S MESSAGE

It gives me immense pleasure that Amity University Rajasthan (AUR) is hosting Asian Regional Conference on Goats (ARCG 2018) in partnership with International Goat Association (IGA, USA) & in association with other renowned national institutes. I also congratulate the organizers for selecting a very pertinent theme for this conference "Current Challenges in Goat Industry and the Strategies to Combat in Asian Region".

"Research and Innovation" are not only for setting scholars' merits but also for sustained development of area around, by adopting innovative technologies and outreach of the findings to all the stake holders from government grants & policies, research laboratories to field and Goatherds. Indigenous livestock such as goats and sheep help the rain-fed farmer's family in multiple ways.

The Conference will cover the major challenges of goat health, nutrition, breeding, production in different climate system, socio-economic and marketing issues and come out with proven scientific solutions & models from eminent scientists, academicians and meat exporters of goat and sheep rearing in Asian region. I am confident that ARCG-2018 will be a mega event in thought provoking, creating the opportunities as well as determining anticipation among academia, research institutes and our much presumed goat farming.

I am sure that the conference will also provide a unique platform to all the participants to share their knowledge and experiences while deliberating on the theme of the congress and will also greatly help in drawing a road map for achieving socio-economic upliftment of the goat rearing farmers, newer technological interventions, nutritional management for rain fed and landless farmers and suggest ways and means for overcoming the challenges in achieving that goal.

I wish to express my compliments to Dr. G.K. Aseri, Director, Amity Institute of Microbial Technology (AIMT) & Dy. Pro Vice Chancellor, AUR, the dedicated faculty, brilliant students and other officials of the university who, under the visionary leadership of Dr. Aseem Chauhan, Chancellor AUR, have made untiring efforts in ensuring the success of the conference.

I extend a very warm welcome to all delegates and worthy participants and wish them a pleasant stay. I anticipate that the conference will be greatly outcome based and result orientated and contribute towards further development in the livestock management, society upliftment, prosperity and economic development of farmers.

I wish all the success for the conference to achieve its motto and objectives.

A handwritten signature in blue ink that reads "Ashok K. Chauhan". The signature is written in a cursive style with a horizontal line underneath the name.

(Dr. Ashok K. Chauhan)
Founder President

Ritnand Balved Education Foundation (RBEF)
(The Foundation of Amity Institutions and the
Sponsoring Body of Amity Universities)



AMITY UNIVERSITY

R A J A S T H A N



Dr. Aseem Chauhan
Chairperson
Amity University Rajasthan

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Tel: 011-41888000 Fax: 011-24339500

MESSAGE

It gives me immense pleasure to know that Amity University Rajasthan is organising the "Asian Regional Conference on Goats" from October 22-26, 2018. I sincerely hope that this conference would be an excellent opportunity and a forum for the young scholars and goat farmers to interact with an august gathering of eminent scientists from India and abroad belonging to diverse areas viz., goat health and welfare, feeding and nutrition management, breeding, reproductive health, and socio economic aspects.

I am hopeful that the participants, particularly the young students and rainfed and progressive goat farmers, would find the atmosphere extremely captivating and shall act as a spur in their endeavor in achieving societal sustainable developments. Overall, Asian Regional Conference on Goats-2018 will provide an harmonious atmosphere for the inter-disciplinary discourses and an opportunity to the local farmers to listen and share success stories of the model goat farming.

It is a great sense of achievement for the Amity University Rajasthan as large number of the national and international participants, keynote speakers and technical experts will be going to share their sustainable models, research findings in goat management and future possibilities of goat farming in country like India will be explored.

I am certain that the local farmers, students, faculty and all the participants will be largely benefited by the outcome of this five day Goat conference with the learned delegates sharing their innovative thoughts, vision and expertise.

I convey my heartiest congratulations to the organisers and extend my best wishes for the grand success of the seminar.

Dr. Aseem Chauhan

प्रो. (डॉ.) ए.के. श्रीवास्तव
अध्यक्ष

सन्दर्भ सं/Ref. No. PPS/CHAIRMAN/2018

दिनांक/Dated 26.07.2018

Prof. (Dr.) A.K. Srivastava
Chairman

MESSAGE



Goat is known as 'Poor man's cow' and plays multifunctional roles in the economy, livelihood and nutrition of landless, small and marginal farmers in India. For thousands of years, goats have been utilized for their milk, meat, hair, and skins all over the world. Goat rearing has become a widespread economic activity and many more farmers are engaging in this activity to support their livelihood.

Goat production has witnessed good growth over the years despite a negative campaign against it for its perceived adverse impact on vegetation, forest and grazing lands. The goat population in the country increased steadily from 47.2 million in 1951 to 140.54 million in 2007, which then declined to 135.17 million in 2012. India is the world's largest producer of goat milk, with a production of 5.75 million tons goat milk during 2016-17, accounting to 3.5% of the total milk produced in the country. During the same period, goats contributed to 14.22% of the total meat produced in the country. Despite not being as popular as cow milk, goat milk has various benefits and nutritional values that cow's milk lacks. During recent years, commercial goat production is gaining momentum owing to therapeutic properties of goat milk and as alternate milk for the persons allergic to cow milk.

In the given situation wherein climate change, decreasing soil fertility, declining natural resources and cultivable land, and massive urbanization are becoming the constraints for livestock production, goats can play a very significant role in supporting the livelihood of small and marginal farmers. With very low investments, goat rearing can be made in to a profitable venture for small and marginal farmers. However, goat production in our country is still highly unorganized and proper policy need to be put up in place for development of goat sector in the country.

I am happy to note that Amity University in collaboration with International Goat Association is organizing Asian Regional Conference on Goats at Amity University, Jaipur, Rajasthan during October 22-26, 2018. I hope that this symposium will provide a suitable platform for sharing concepts, knowledge and technologies available among researchers in India and abroad for overall benefit of goat farmers and developing the goat sector globally.

I wish the conference a grand success.

(A.K. Srivastava)



Indian Council of Agricultural Research
Krishi Bhavan, New Delhi - 110 001
Telefax (O) : 011 23386668 Email: ashokkr.icar@gov.in, ashokakt@rediffmail.com



Dr Ashok Kumar
Assistant Director General (Animal Health)

No. PA/ADG(AH)/2018

September 24, 2018

Message

I am glad to know that Amity University Rajasthan, Jaipur in collaboration with International Goat Association is organizing the 'Asian Regional Conference on Goats-2018' during October 22 – 26, 2018 at Jaipur.

Goats were among the first domesticated animals and have been an integral part of human civilization. More than 33 million Indian farmers, majority of them being small and marginal farmers, are involved in goat rearing, which provides them with nutritional security and prosperity. Further, goats serve as insurance for the poor and marginal farmers in case of crop failure thus ensuring their livelihood. Climate change, reduced land holdings, rapid industrialization and demographic changes have imposed newer challenges to the livestock sector. In this scenario, researchers and organizations working in the related field have to vouch for means to improve the sustainability of small ruminant farming. It is also important that the policies and research developments reach the end user for maximum impact.

I am sure that the deliberations during 'Asian Regional Conference on Goats-2018' and recommendations thereof will be a harbinger for betterment of the goat husbandry in the country and abroad.

I wish all success to the conference.

(Ashok Kumar)



भा.कृ.अ.प.- केन्द्रीय बकरी अनुसंधान संस्थान

मखदूम, पो० फरह - 281 122, मथुरा (उत्तर प्रदेश) भारत

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डा. मनमोहन सिंह चौहान
निदेशक

Dr. M.S. Chauhan
DIRECTOR

MESSAGE

It is a matter of immense pleasure to note that Amity University Rajasthan, Jaipur is organising an Asian Regional Conference on Goats from October 22-26, 2018 in collaboration with International Goat Association.

Goat serves as a source of livelihood and nutritional security to large section of society. In the present scenario of changing agro-climatic conditions, goat has tremendous potential to be projected as future animal for the prosperity in India. The traditional goat rearing is steadily turning as the fast growing livestock industry. Recently goat meat and milk carries premium value in the market because it carries some of the health promoting properties.

The ICAR-central institute for research on goats (CIRG) is spearheading in goat research, education and extension activities. The comprehensive initiative taken by the institute has led to notable accomplishments in goat improvement and productivity in our country.

I am confident that this international event will provide an opportunity to the scientists and entrepreneurs engaged in the goat production to interact with each other to evoke strategies for joint collaborative efforts and development activities for improving well being of the society.

I wish all success for this endeavour.

(M.S. Chauhan)





भा.कृ.अनु.प.-केन्द्रीय भेड़ एवं ऊन अनुसंधान संस्थान

अविकानगर (तह. मालपुरा, जिला-टोंक) वाया-जयपुर, राजस्थान (भारत) 304501

ICAR-CENTRAL SHEEP & WOOL RESEARCH INSTITUTE

Avikanagar (Tehsil-Malpura, Dist.-Tonk) Via-Jaipur, Rajasthan (India) 304501



डॉ. अरुण कुमार तोमर

निदेशक

Dr. Arun Kumar Tomar

Director (Act.)

Message

I am happy to know that *Asian Regional Conference on Goats (ARCG-2018)* is being organized by Amity University, Jaipur in association with International Goat Association (IGA) from 22-26 October, 2018.

Goats play a crucial role in rural economy contributing towards socio-economic upliftment of small and marginal farmers in the country. India possesses a population of 135.17 million goats ranking 2nd in the world after China. Goats in India estimated to contribute 0.94 million tonnes meat and 5.38 million tonnes milk during 2015-16. Goat farming is preferred by the farmers due to its certain advantages, mostly in terms of lower financial and labour investment, easy upkeep, availability of suitable local market, faster return etc. over other livestock. The ever-increasing human population, rapid urbanization and increasing purchasing capacity of individuals are boosting the demand for meat, milk and other animal produces in the country. After poultry, goat is considered to be the most important source for fulfilling the demand for meat. Seeing its huge demand and profitability, there is an increasing interest for commercial goat farming among the educated youth, retired persons and other professionals in the country.

I sincerely hope that this Conference will provide a unique platform for interaction among national and international participants/experts from different backgrounds like scientists, researchers, students, goat farmers, entrepreneurs, decision makers, NGOs and other stake holders to share their experiences, discuss the relevant issues and suggest ways to augment goat production and utilization, thus, ensuring higher return to the goat farmers.

I am sure that this Conference will adopt recommendations providing suitable directions to deal with the emerging challenges in goat farming to boost the livestock sub-sector.

I wish the Conference a grand success.

(Arun Kumar)



भा.कृ.अनु.प. - केन्द्रीय कृषिरत महिला संस्थान, भुवनेश्वर
ICAR - CENTRAL INSTITUTE FOR WOMEN IN AGRICULTURE
(भारतीय कृषि अनुसंधान परिषद ((Indian Council of Agricultural Research)



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Phone : 0674-2386220, Fax : 0674-2386242, e-mail : director.ciwa@icar.gov.in, Web : http://www.icar-ciwa.org.in

Message



It is heartening to know that Asian Regional conference on goats is being organized by Amity University, Jaipur in collaboration with International goat association during October 22-26, 2018.

Goats play a vital socio-economic role in Asian agriculture, particularly for resource-poor people. Asia is home to about 60 percent of the total world goat population and India is the second largest producer of the goats. Goat farming is the domain of women and play an important role in employment generation, improving household nutrition and livelihood security of 80 percent of small and marginal farm women. Goat production system in India has been slowly moving from extensive to intensive system of management for commercial production and entrepreneurship development by farm women. However, inadequate availability and poor quality of feed and fodder, high incidence of diseases and inadequate knowledge on appropriate management of livestock are identified as the major problems.

Rural farm women involved in goat farming are often constrained by limited access and control to resource inputs and services, markets, formal knowledge and social networks, decision making power *etc.* These gender based resource constraints affect women's ability to access and use improved technologies of goat farming or engage in resource intensive enterprises which adversely affect the productivity of their animals. Therefore, many cost effective and eco friendly technologies have been developed in recent times to boost in productivity and food security. The need of the day is to validate and disseminate these technologies to farmers at their door step so that they are encouraged to adopt them.

On the occasion of this significant scientific endeavour, I extend my sincere greetings and congratulate to the organizers, learned participants. I am sure that the deliberations in the conference would suggest ways to help increasing the productivity of goats in a sustainable manner and can enhance household income of rural women involved in goat farming improving their socio economic status, self sufficiency, decision making ability and welfare of the rural farm women which will ultimately address the flagship programme of doubling the farmer's income in India.

I wish the conference a grand success.

सन्तोष श्रीवास्तव

(S.K. Srivastava)

डॉ० राजेन्द्र प्रसाद केन्द्रीय कृषि विश्वविद्यालय

पूसा (समस्तीपुर) - 848 125, बिहार

Dr. Rajendra Prasad Central Agricultural University

Pusa (Samastipur) – 848 125, Bihar

डॉ० रमेश चन्द्र श्रीवास्तव
कुलपति

Dr. R. C. Srivastava

M.Tech., Ph.D. (IIT, Kgp)
FNAAS, FIASWC, FISAE, FIE, FCHAI

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No. / Dr.RPCAU (VC)

Date : 12/10/18

MESSAGE

I am indeed very happy to note that the Amity University is organising the “Asian Regional Conference on Goat (ARCG-2018) at Amity University, Jaipur, Rajasthan, 22rd – 26 Oct., 2018”. Conference of such nature provide a great opportunity to Research scientists not only to update knowledge and keep abreast with latest developmental scenario in the respective research fields, but also an occasion for the resource persons / delegates / observers to exchange ideas and interact with each other. I take this opportunity to extend warm greetings to the resource persons and delegates registered for the conference.

Goat has a special place in economy of marginal & submarginal farmers and landless people. Goat has also been playing a significant role in rain-fed farming system. I am glad that Amity University realized the need of organising an International conference on a topic which is at the core of disadvantaged people of rural India and included all the respective topics on goat research and development, thereby making conference open for all research fellows, scientists and field staff to share their achievements and views for the benefit of people of India. Marketing of goat is in the hand of unorganized sector and middleman oriented. So, there is urgent need to develop strategy in respect of breed conservation, management, health care, credit, insurance and marketing system of goat in India.

I hope that new ideas and strategies will emerge from this conference which will be documented in the proceedings and outcomes. The challenges now for all of us is to embrace the new ideas and approaches, so that the way we support people with intellectual disability in the country, and indeed exceeds, best practices. I wish the conference a grand success.

R.C. Srivastava

(R.C.SRIVASTAVA)



Kamdhenu University

Our Motto : Welfare of all living beings

(Established by Government of Gujarat vide Gujarat Act No. 9 of 2009)

Dr. P. H. Vataliya
Vice-Chancellor (I/c)

Message

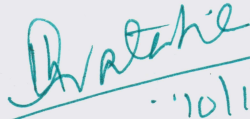
Goats play a vital role in socio-economic development in India and are also important for ensuring the livelihood of livestock owners. Goat is the second most important livestock enterprise next to bovines in almost all countries and they have been an integral component of the farming system. Goats have multidimensional utility and serve as primary source of livelihood for marginal or landless villagers of India. It has distinct social, economical, managerial and biological advantages over other livestock species which justifies the phrase "Poor man's cow" for goats. Goat Rearing has been found equally rewarding under both intensive and semi-intensive systems of management. Commercialization of goat keeping would help in increasing the productivity and bridge the demand supply gap.

Asian continent richly contributes to the global goat scenario in the form of population 597 million (59.38%) heads, milk production 1.0 million tons (58.35%); meat production 3.7million tons (70.71%) and raw skin production 0.96 million tons (47.19%) (Faostat, 2013). Asia is constantly the larger producer of goat milk (58%) followed by Africa. India leads for goat milk production in Asian Region with world's second largest goat population of 162 million. There is rising trend globally but especially in the developing countries in goat milk, meat and skin production over the last two decades.

All this indicates increased role of goats in food production, particularly in Asia. In countries like India, goats are uniformly distributed in different ago-climatic regions and have been evolved mainly through natural selection, geographical isolation and adapted to diverse agro-climatic conditions to meet out area specific requirements. It is important to reconsider the current status of goat husbandry sector in Asia.

Therefore, it is a remarkable step taken by the Amity University, Jaipur to organize the Asian Regional Conference on Goats (ARCG)-2018 in association with International Goat Association (IGA). I congratulate the organizers for their efforts towards organizing a meaningful conference dedicated towards this important domestic species with a vision to develop measures to ameliorate goat husbandry by drawing out conclusions through this very scientific congregation of intellectuals.

I hope the scientific deliberations will surely benefit all the stakeholders.


- 10/10/18
(P. H. Vataliya)



पशुधनं नित्यं सर्वलोकोपकारकम्।

RAJASTHAN UNIVERSITY OF

VETERINARY AND ANIMAL SCIENCES, BIKANER

Prof. (Dr.) Vishnu Sharma
Vice-Chancellor



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No. F. 1/PS/VC/RAJUVAS/2018/ 1307

Dated: 09.10.2018

MESSAGE

I am delighted to know that the Amity University Rajasthan, Jaipur is organizing "Asian Regional Conference on Goats (ARCG- 2018) during Oct. 22-26, 2018.

I believe that theme and objectives of the proposed conference is extremely relevant keeping in view the vibrant role of goat production in uplifting of rural economy and significant contribution in country GDP. This conference will provide the common platform for the veterinary scientist, researchers, extension professionals, field workers, young mind, livestock entrepreneurs and other stakeholders from across the length and breadth of the country and abroad to share their rich expertise with each other. It would also provide a platform to identify research gap so as to focus future research strategies.

I convey my best wishes to the organizer and participants and hope for all success of conference.

पशुधनं नित्यं सर्वलोकोपकारकम्।


(Prof. Vishnu Sharma)
Vice- Chancellor



बिहार पशु विज्ञान विश्वविद्यालय

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डॉ० रामेश्वर सिंह

कुलपति

Dr. Rameshwar Singh

Vice-Chancellor

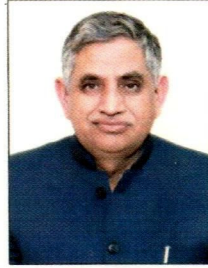


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vicechancellorbasu@gmail.com



MESSAGE

It gives me immense pleasure to learn that Amity University, Jaipur is organizing Asian Regional Conference on Goats during 22-26 October 2018.

Goat plays a significant role in providing supplementary income and livelihood to millions of rural poor in India. Goat products are in big demand and command a premium position in the western countries. However, importance of goat is somehow underestimated in our country and it has not been given the desired attention. Scientific practices of goat farming can further help in improving the production, productivity and profit of all stakeholders involved in the goat value chain.

I am confident that the deliberations in the conference will deal with important issues of goat husbandry, post harvest technology and market interventions. I convey my best wishes for successful organization of the conference.

(Rameshwar Singh)



बिरसा कृषि विश्वविद्यालय

BIRSA AGRICULTURAL UNIVERSITY

काँके, राँची - 834006, झारखण्ड, भारत

Kanke, Ranchi - 834006, Jharkhand (India)

डॉ. परविन्दर कौशल
Dr. Parvinder Kaushal
कुलपति
Vice-Chancellor

Ref. No.: 86/c
Date : 25.9.2018

Message

I am happy to learn that Amity University Rajasthan, Jaipur is organizing “Asian Regional Conference on Goat” (ARCG-2018) during October 22-26, 2018.

The goat is perhaps the earliest ruminant to be domesticated. Goat provides subsistence to a large percentage of small holders and landless poor farmers and marketable commodities such as meat, Milk, skin, fiber and manure, raising goat is an income generation activity that has enormous potential to increase income and improve nutrition for resource-poor household especially in remote tribal and ecologically vulnerable areas.

India has the second largest goat population. Building a vibrant goat sector in India is critical for reducing poverty and meeting the sustainable goals and India’s own rural development goal of doubling farmers income by 2022.

On this remarkable occasion, it will be the opportunity for the delegates from all across the country and abroad to share research based educational information on goat production, management, Herd health and marketing. It will help in formulating strategies for sustainable goat production in India and other developing countries.

I convey my best wishes for the success of the conference.

(Parvinder Kaushal)
Vice-Chancellor



भाकृ.अनुप. – राष्ट्रीय मिथुन अनुसंधान केन्द्र
ICAR - NATIONAL RESEARCH CENTRE ON MITHUN

मेड्जीफेमा, दीमापुर – 797 106 (नागालैंड) भारत
Medziphema, Dimapur - 797 106 (Nagaland) India
(An ISO 9001 : 2015 Certified Quality Management System)



डॉ. अभिजित मित्र/Dr. Abhijit Mitra
निदेशक/Director

Message

It gives me a great pleasure to learn that Amity University, Rajasthan, Jaipur is organizing “**Asian Regional Conference on Goats (ARCG-2018)**” on 22-26 October 2018.

Goat plays an important role in providing livelihood to the resource-poor farmers. Father of Nation, Mahatma Gandhi described goat as “Poor Man’s Cow”. Goat farming has the tremendous scope to be transformed as an Industry. It is the high time that all the Stakeholders, including Researchers, Policy Makers, and Farmers, put up a joint mission to exploit the inbuilt potential of the species.

I congratulate the organizers for organizing the event and providing a platform to deliberate the issues related to Goat farming.

My best wishes for the successful organization of ARCG-2018.


(Abhijit Mitra)





Phone 91-294-2471101 (O), 2470682 (F), 09414158224 and 09414170239 (M)
Email : vc_mpuat@yahoo.co.in OR vc@mpuat.ac.in

Maharana Pratap University of Agriculture and Technology
University Campus, Udaipur – 313 001 (Rajasthan), INDIA

प्रो. उमा शंकर शर्मा
कुलपति
Prof. U.S. Sharma
Vice-Chancellor

महाराणा प्रताप कृषि एवं प्रौद्योगिकी विश्वविद्यालय
विश्वविद्यालय परिसर, उदयपुर - 313 001 (राजस्थान), भारत



No. PS/VC/MPUAT/2018/734
14th September, 2018

MESSAGE

It gives me immense pleasure to learn that AMITY University, Jaipur in collaboration with International Goat Association is hosting "Asian Regional Conference on Goat (ARCG-2018) on Oct. 22, 2018 at Amity University Rajasthan, Jaipur.

Goat husbandry is a very important component of socio-economic status, particularly for resource - poor people in Asia. Unfortunately the importance of this species is underestimated and its extent of contribution to the livelihood of the poor is not properly understood. Looking towards the importance of Goats and considering an important source of livelihood in coming years, it is most relevant to host an international meet on the theme "Current Challenges in Goat Industry and Strategies to Combat in Asian Region". It will provide a platform to the scientists to generate the novel strategies through discussions in various technical sessions, to help in promoting Goat Husbandry and Research. I wish that deliberations in various technical sessions will be most meaningful.

I congratulate the organizers to organize this important event and send my best wishes for all round success of the conference.

(Uma Shanker Sharma)



AMITY UNIVERSITY

UTTAR PRADESH

DR. W. SELVAMURTHY, Ph.D., D.Sc.

FAMS, FABMS, FIMSA, FIANS, FIAY

President

Amity Science, Technology and Innovation Foundation (ASTIF),
Director General, Amity Directorate of Science & Innovation,
Chancellor, Amity University, Chhattisgarh and
Chair Professor for Life Sciences

(Former Distinguished Scientist and Chief Controller R&D(LS), DRDO)

Tel: 91(0)120 4392045 / 91-9871372441 / 91-9818801028

Fax: 91(0)120 4392114, E-mail: wselvamurthy@amity.edu



Message

I am delighted that Amity University, Rajasthan is hosting Asian Regional Conference on Goats (ARCG 2018) in partnership with International Goat Association (IGA, USA), which provides a platform to encourage scientific spirit and demonstrate the scientific approach to make livestock management as an income generation source to landless and small farmers in Asian region.

I am pleased that conference organizing team is able to manage and coordinate all the major leading institutes/Industries of veterinary importance viz. Central Institute for Research on Goats (CIRG), Central Sheep & Wool Research Institute (CSWRI), Central Arid Zone Research Institute (CAZRI), Post Graduate Institute of Veterinary Education & Research (PGIVER), College of Veterinary Science & Animal Husbandry (SDAU-Dantiwada), Nimbkar Agricultural Research Institute and Genomix CARL Pvt. Ltd. etc). Modern world has ushered into an era where scientific knowledge and innovations can no longer be restrained into narrow confines or can be owned by a specific group of people. In present scenario, success of a national mission hinge on the role and participation of all the stakeholders by the same token. I am confident that Asian Regional Conference on Goats with a focused theme “Current Challenges in Goat Industry and the Strategies to Combat in Asian Region” will bring all the stakeholder at a common platform to explore the possibilities and cooperation. Nutritional and feedings system, breeding of superior breeds, reproductive health and effect of climate changes on goat farming will be the future areas of research.

The conference will provide the common platform to research institute and academia for interaction research with industry and industry will serve to tackle and innovate the solutions to the present challenges of goat farming. It seems that ambition and determination of our nation to double the income of the farmers by 2022 will have its way through livestock management extensively for small and rain fed farmers.

I congratulate Prof. G K Aseri, Organizing Committee Chairman and Dr. Jagdip Singh Sohal, Secretary ARCG 2018 for their continuous and tiring efforts for organizing such a vibrant conference.

I hope that the technologies, innovations, papers, and the posters shared in the conference will bring revolutionary advancement in the livestock in whole Asian region.

Dr. W. Selvamurthy



AMITY UNIVERSITY

RAJASTHAN



Prof. Arun Patil
President/Vice Chancellor
Amity University Rajasthan

Kant Kalwar, NH-11C,
Jaipur (Rajasthan) 303002
Tel. : 01426-405678
Fax : 01426-405679

It is a matter of immense pleasure that Amity University Rajasthan, Jaipur is organizing the Asian Regional Conference on Goats-2018. The conference aims to provide a platform to enlarge/wider the dialogue on the methodology of livestock management in India, Asian region and internationally.

Goat farming has phenomenal scope in rural development in Asia. In the last few decades, commercial goat farming has emerged as one of the notable factors in agricultural growth in India. This field of study is specially valuable as it can influence export of products, capital storage, house-hold income, employment and nutrition. With the alignment of innovative technologies, local knowledge and commercial intervention, goat farming can serve as a model for doubling the income of rural farmers not only in India but also other Asian countries.

I appreciate and welcome the galaxy of renowned speakers, scientists, technocrats, researchers and farmers, who are present here to invigorate the discourse on goat health, nutrition, breeding and other relevant biproducts. I strongly believe that the assemblage of national and international experts will stimulate further dialogues on the theme by means of their ideas, opinions and questions. During the conference the participants will also witness many exhibitions set up by various stakeholders; governments, NGOs, public partnership industries and distinguished cooperative societies.

In recognition of the endeavours of the organizing committee, I would like to take this opportunity to express my heartfelt gratitude to Dr. Ashok K. Chauhan, Founder President, Amity Education Group and Dr. Aseem Chauhan, Chancellor, Amity University Rajasthan, for inculcating industry-linked research and innovation culture in the university with a vision to serve the nation and society.

I also extend my compliments to Prof. G K Aseri, Chairperson, Organizing Committee and Dr. Jagdip Singh Sohal, Organizing Secretary. In conclusion, I would like to express my best wishes for the grand succes of the conference.

With Regards,

Prof. Arun Patil



AMITY UNIVERSITY

RAJASTHAN

Kant Kalwar, NH-11C,
Jaipur (Rajasthan) 303002
Tel. : 01426-405678
Fax : 01426-405679



I am delighted to learn that Amity University Rajasthan is hosting the Asian Regional Conference on Goats (ARCG 2018) in partnership with various reputed national and international organizations from 22 - 26 October 2018. At the outset, I would like to congratulate the International Advisory Board who have guided Dr. Jagdip Singh Sohal, Organizing Secretary and his team to identify eminent speakers for different panels of the event.

The conference with its overarching theme on challenges in Goat husbandry and strategies to overcome them in Asia will definitely be path breaking and set benchmarks for others to organize similar focussed events in future. Livestock management is an emerging and key focus area in Asian countries, as it addresses the salient objective of socio-economic development of our farmers who rely solely on traditional and rain fed agricultural practices for income generation.

With swift and growing advances in goat animal husbandry as a commercial scale business, society in its entirety is looking towards this Conference with great expectations. Goat rearing has immense potential to develop as a small business model for income regular generation for landless and rain fed farmers. Developing countries of Asia have huge potential in goat rearing with a fruitful association of government bodies, industry and Academic institutions.

I would like to also express my earnest thanks to Prof. Arun Patil, Vice Chancellor, AUR for providing support to organize this conference as per the needs of society. My warm greetings and best wishes to all organising team members and participants for fruitful and successful conduct of the Asian Regional Conference on Goats.

**Pro Vice-Chancellor,
Amity University Rajasthan**



Mission of the International Goat Association: to promote goat research and development for the benefit of humankind, to alleviate poverty, to promote prosperity and to improve the quality of life.

14 October 2018

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Congratulations to Amity University of Jaipur, India, and the successful organization of the Asian Regional Conference on Goats 2018! Thank you for this opportunity for researchers, producers and development workers to gather together to share information, strategies and ideas to use the unique productive capacities of the goat. In Asia, the goat is ubiquitous and has been valued for its hardiness and small size, requiring relatively little food to survive and reproduce. In the past 20 years, demand for milk, meat and fiber from goats has skyrocketed, along with the need for supportive scientific investigations, extension of best practices, and sound policies to protect vulnerable farmers, the land and natural resources, and the welfare of the animals themselves.

Through IGA's international network and the ARCG Technical Committee, we have brought together the best of the national and international experts in all aspects of goat production, processing and marketing, and using goats as an entry point for sustainable and equitable development, and environmental protection.

IGA and the International Scientific Committee wish to thank the local organizers, and our gracious hosts at Amity University who first proposed this idea and brought it to fruition. We are excited at the enthusiastic response of our colleagues, and the exciting opportunity to exchange ideas and experiences, and begin new friendships and collaborations.

IGA is pleased to announce that the Asian Regional Conference on Goats will be continued next year in Nepal, in October 2019, building on the success of the Jaipur meeting. We look forward to continuing our collective efforts to bring attention and professionalism to the world of the goat.

With warm wishes,

Beth A. Miller, DVM
President
International Goat Association



In collaboration with



Message



On behalf of the organizing committee, I am delighted to welcome all the delegates and participants to Amity University Rajasthan for the Asian Regional Conference on Goats (ARCG-2018). The conference will be held from 22nd till 26th October 2018 at the beautiful and lush green campus of Amity University Rajasthan situated in the foot hills of Aravalli range.

I am delighted that a huge number of national and international scientist, subject experts, scholars, progressive farmers will share their ideas and experiences with the participants. We hope you will take this opportunity to plan and attend the conference to share, celebrate and together create a new bonding and cooperations for the goat farming in Asian region. The organising committee is gratified to have a line-up of highly renowned speakers and industry experts consists of professionals who agreed to shed light on research and issues that shape our goat industry. Various programmes consisting of keynote, plenary, sponsored session have been assembled. Moreover, the opportunity to visit ICAR-CSWRI during the conference will be the icing on cake for all the participants to bystander the model sheep and goat farming in India. Additionally, there will also be opportunities for students, researchers and practitioners to share their research and contribution towards the success of our professions through oral and poster presentations.

We hope this conference will offer participants a platform to exchange ideas, discover novel opportunities, reacquaint with colleagues, meet new friends and broaden their knowledge.

I would like to express my immense indebtedness to our beloved Dr. Ashok K. Chauhan, Founder President, Amity Education Group and Dr. Aseem Chauhan, Chancellor, Amity University Rajasthan for developing research culture and industry integration in its programmes, this conference is also a small stride to contribute in goat industry. It gives me immense pleasure, to express my sincere thanks to the Prof. Arun Patil, Vice Chancellor, AUR for their continuous support, affection and guidance to make this event more successful and vibrant.

I am also thankful to Prof. K. Balkrishnan, Pro-Vice Chancellor, AUR for their contribution in making industry bridge, which will be essential for this event. It gives me immense pleasure to congratulate Dr. Jagdip Singh Sohal, Organizing Secretary-ARCG and his local team for their continuous efforts to make the event a grand success which is one of its kind first conference of the Asian region.

The local organizing committee members from Amity University Rajasthan are looking forward to welcoming you at the conference.



Prof. G K Aseri
Dy. Pro. Vice Chancellor
Director - AIMT
Chairman, Organizing Committee, ARCG 2018



In collaboration with



ASIAN REGIONAL CONFERENCE ON GOATS (ARCG – 2018)
OCTOBER 22-26, 2018 | at Amity University Rajasthan, Jaipur

Message



I on behalf of organizing committee welcome you all to Asian Regional Conference on Goats to be held from 22 October-26 October 2018 at Amity University Rajasthan in association with International Goat Association (USA). A sea change has taken place in the last decades in goat farming and developments in veterinary allied disciplines. The laboratory research and model systems developed by the scientific experts is only worthwhile when it is translated to the upliftment of local farmers and society, the academic institutions, scientific laboratories and public partnership industries, all play a crucial role.

With the theme “Current Challenges in Goat Industry and the Strategies to Combat in Asian Region” we move forward and determined to disseminate the vision of newer technologies and innovations in goat farming in Asian regions. Amity University of Rajasthan is a research driven institution and committed to explore new avenues as a responsibility to up surge societal goals. With the development of new innovations in goat health & nutrition, reproductive technologies and socio-economic advancement, we play a crucial role in clearing the grey shades and heading towards better, brighter and brilliant future by redefining the discipline.

It is heartening to know the great interest of scientists from all over the globe in ARCG 2018. I am confident that participants attending the conference not only

for interaction but with the intent of building a long lasting collaboration with Indian and global laboratories.

I would like to extend my sincere thanks and gratitude to Dr. Ashok K. Chauhan, Founder President, Amity Education Group, for his visionary guidance, Dr. Aseem Chauhan, Chancellor for his continous motivation and determination to serve the society with innovations and technologies. I would like to also extend my sincere thanks to Prof. Arun patil, Vice Chancellor, AUR, Prof. K. Balakrishna, Pro-Vice Chancellor, AUR and Prof. G K Aseri, Chairman Organizing committee for this constant guidance and support to organize the conference. I would also like to appreciate my able colleagues Dr. Deepansh Sharma, Dr. Neeraj Khare, Dr. Parul Yadav, Dr. Neelam Jain and Dr. Manali Datta, Joint Secretaries-ARCG 2018 for their untiring efforts and contributuins to make this even succesful.

I would also like to congratulate various organizing committes & sponsors who has given whole heartly support to make event a grand succes.

Let us together welcome and infuse new enthusiasm in young participants and scientists to make goat farming & research a relevant, dynamic, contemporary, and most sought after discipline.



Dr. Jagdip Singh Sohal
Asst. Prof. - AIMT
Coordinator - ACMDR
Organizing Secretary, ARCG-2018



Asian Regional Conference on Goats - ARCG 2018 Day wise Program (Day 1st - October 22, 2018)

Time	Activity																										
09.00-10.00 AM	Registration																										
10.00-11.30 AM	Inauguration																										
11.30-12.00 PM	Networking Tea																										
12.00-1.30 PM	<p style="text-align: center;">Session I (Goat Health Management & Welfare)</p> <p><u>Key note Address</u></p> <ul style="list-style-type: none"> • Dr Ashok Kumar, Additional Director General (Animal Health), Indian Council of Medical Research <p><u>Expert Talk</u></p> <ul style="list-style-type: none"> • Dr. S. V. Singh, Head, Department of Biotechnology, GLA University, Mathura, Uttar Pradesh, India • Dr Y. P. S. Malik, Principal Scientist, Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh, India 																										
1.30- 2.30 PM	Lunch																										
2.30-3.30 PM	<p><u>Expert Talk</u></p> <ul style="list-style-type: none"> • Dr. Paula Menzies University of Guelph, Ontario Veterinary College, Guelph, Ontario N1G 2W1, Canada • Dr. Nazan Koluman, Univ. of Cukurova, Faculty of Agriculture, 01330 Adana -Turkey 																										
3.30- 5.00 PM	<p style="text-align: center;">Paper Presentation Session I (Goat Health Management & Welfare)</p> <p><u>Session Chair</u> Dr S. V. Singh Professor & Head, Department of Microbiology & Biotechnology, GLA University, UP, India</p> <p><u>Session Co-Chair</u> Dr. Paula Menzies Professor, Department of Population Medicine, University of Guelph, Ontario Veterinary College, Canada</p> <p><u>Session Co-Chair</u> Dr Amit Kumar Balyan Associate Professor, College of Biotechnology, Sardar Vallabh Bhai Patel University of Agriculture and Technology, UP, India</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Participant Affiliation</th> <th style="text-align: center;">Title</th> </tr> </thead> <tbody> <tr> <td>Md. Mazhar Ayaz, Bahauddin Zakariya University, Pakistan</td> <td>Anthelmintic Activity of Withania Coagulans and Its Derivatives in Sheep and Goat</td> </tr> <tr> <td>Kirit B. Patel, Dantiwada Agricultural University, Gujarat, India</td> <td>A Correlation Between Seroclinico Epidemiology and Various Stimulating Parameters for Goat Brucellosis</td> </tr> <tr> <td>M. L. Meena, ICAR-CAZRI, Krishi Vigyan Kendra, Rajasthan, India</td> <td>Documentation of Ethno-veterinary Medicines for Goat Followed by Raikas' Folks in Arid Zone of Rajasthan, India</td> </tr> <tr> <td>Bhupamani Das, Dantiwada Agricultural University, Gujarat, India</td> <td>Molecular characterization and Protein profiling of Haemonchus contortus (Nematoda: Trichostrongylidae) in goats of South Gujarat</td> </tr> <tr> <td>R.G. 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8.00-11.00 PM	Gala Dinner & Entertainment																										



Asian Regional Conference on Goats - ARCG 2018 Day wise Program (Day 2nd - October 23, 2018)

Time	Activity														
09.00-11.00 AM	<p style="text-align: center;">Session II (Nutrition Management and Alternative Feeding Systems)</p> <p><u>Key note Address</u></p> <ul style="list-style-type: none"> • Dr R. K. Dhuria Dean College of Veterinary & Animal Science, Navania, Vallabh Nagar, Udaipur, Rajasthan, India <p><u>Expert Talk</u></p> <ul style="list-style-type: none"> • Dr A. Sahu Principal Scientist & Head, Animal Nutrition Division, Central Sheep & Wool Research Institute, Avikanagar, Rajasthan, India • Dr Narayan Dutta Principal Scientist, ICAR-Indian Veterinary Research Institute, Izatnagar, UP, India • Dr. Yingjie Zhang Dean and Professor, College of Animal Science and Technology, Agricultural University of Hebei, Baoding 071000, China 														
11.00-11.30 AM	<p style="text-align: center;">Session III (Breeding & Genetics)</p> <p><u>Key note Address</u></p> <ul style="list-style-type: none"> • Dr Abhijit Mitra Director, NRC on Mithun, Nagaland India <p><u>Expert Talk</u></p> <ul style="list-style-type: none"> • Dr R. Thirupathy Venkatachalapathy, Associate Professor, Centre for Advance Studies in Animal Breeding & Genetics, College of Veterinary & Animal Sciences, Mannuthy, Thrissur, Kerala, India 														
11.30-12.00 PM	Networking Tea														
12.00-1.30 PM	<p style="text-align: center;">Session III (Breeding & Genetics)</p> <p><u>Expert Talk</u></p> <ul style="list-style-type: none"> • Dr. Juan Capote Instituto Canario de Investigaciones Agrarias (ICIA), I.C. .I.A., Apto. De correos 60, La Laguna 38200 Tenerife, Spain • Dr Sándor Kukovics, Research Institute for Animal Breeding and Nutrition, Gesztenyes U 2-4, 2053 Herceghalom, Hungary 														
1.30-2.30 PM	Lunch														
2.30-4.30 PM	<p style="text-align: center;">Paper Presentation Session I - Goat Health Management & Welfare</p> <p><u>Session Chair</u></p> <ul style="list-style-type: none"> • Dr S. V. Singh Professor & Head, Department of Microbiology & Biotechnology, GLA University, UP, India <p><u>Session Co-Chair</u></p> <ul style="list-style-type: none"> • Dr. Paula Menzies Professor, Department of Population Medicine, University of Guelph, Ontario Veterinary College, Canada • Dr Amit Kumar Balyan Associate Professor, College of Biotechnology, Sardar Vallabh Bhai Patel University of Agriculture and Technology, UP, India <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 50%;">Participant Affiliation</th> <th style="width: 50%;">Title</th> </tr> </thead> <tbody> <tr> <td>S. K. Sharma, Post Graduate Institute of Veterinary Education and Research, Rajasthan, India</td> <td>Prevalence and incidence of clinical condition in goats in an around Jaipur</td> </tr> <tr> <td>D. Yadav, Post Graduate Institute of Veterinary Education and Research, Rajasthan, India</td> <td>Dystocia due to Single Fetus and its Successful Per-Vaginal Delivery in Non-Descript Goat: A Case Report</td> </tr> <tr> <td>G. G. Sonawane, Central Sheep and Wool Research Institute, Rajasthan, India</td> <td>Antimicrobial resistance of certain bacterial species obtained from lambs naturally died due to septicemia and pneumonia</td> </tr> <tr> <td>N. K. Jeph, Post Graduate Institute of Veterinary Education and Research, Rajasthan, India</td> <td>Antibiotic Efficacy Evaluation against Bacterial Pathogens obtained from Mastitic Milk of Goats</td> </tr> <tr> <td>S. R. Sharma, ICAR-North Temperate Regional, HP, India</td> <td>Contagious Ovine Digital Dermatitis (CODD) in an Organized Sheep Farm under Temperate Climate</td> </tr> <tr> <td>Alka Galav, College of Veterinary and Animal Sciences,</td> <td>Genetic analysis of PPRV strains recently circulating in Rajasthan, India</td> </tr> </tbody> </table>	Participant Affiliation	Title	S. K. Sharma , Post Graduate Institute of Veterinary Education and Research, Rajasthan, India	Prevalence and incidence of clinical condition in goats in an around Jaipur	D. Yadav , Post Graduate Institute of Veterinary Education and Research, Rajasthan, India	Dystocia due to Single Fetus and its Successful Per-Vaginal Delivery in Non-Descript Goat: A Case Report	G. G. Sonawane , Central Sheep and Wool Research Institute, Rajasthan, India	Antimicrobial resistance of certain bacterial species obtained from lambs naturally died due to septicemia and pneumonia	N. K. Jeph , Post Graduate Institute of Veterinary Education and Research, Rajasthan, India	Antibiotic Efficacy Evaluation against Bacterial Pathogens obtained from Mastitic Milk of Goats	S. R. Sharma , ICAR-North Temperate Regional, HP, India	Contagious Ovine Digital Dermatitis (CODD) in an Organized Sheep Farm under Temperate Climate	Alka Galav , College of Veterinary and Animal Sciences,	Genetic analysis of PPRV strains recently circulating in Rajasthan, India
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Rajasthan, India	
K. Syamala , College of Veterinary and Animal Sciences, KVASU, Kerala, India	Comprehensive Survey on Worm Management Practices Adopted by Goat Farmers in Kerala
Seuli Saha Roy , College of Veterinary Sciences and Animal Husbandry, Tripura, India	Bacteriological Quality of Raw Chevon of Black Bengal Goat Retailed in Different Markets in Tripura
S. V. Singh , GLA University, UP, India	Bio-load and bio-type profile of Mycobacterium avium subspecies paratuberculosis in raw milk samples of goats endemically infected with Johne's disease
Neelam Jain , Amity University Rajasthan, Rajasthan, India	Bacteriophages as Novel Arsenal to Combat Escherichia coli Infections in Goat
Amit Kumar , College of Veterinary Sciences DUVASU, UP, India	Assessment of erythrocytic oxidative stress induced by combined nanoparticle based polymer gel mastitis vaccine in lactating female inbred albino mice
Anil Dixit , Department of Animal Husbandry Govt. of Uttar Pradesh, UP	Transmission of PPR in Goat in UP"
Paper Presentation	
Session II - Nutrition Management & Alternate Feeding Systems	
<u>Session Chair</u>	
<ul style="list-style-type: none"> Dr T. K. Dutta Principal Scientist & Head, ERS-National Dairy Research Institute, Kalyani, West Bengal, India 	
<u>Session Co-Chair</u>	
<ul style="list-style-type: none"> Dr. Jean-Marie Luginbuhl Professor, North Carolina State University Raleigh, Box 7620, NC 27695-7620, USA 	
Participant Affiliation	Title
Mohammad Moniruzzaman , Agricultural University, Bangladesh	Effects of feeding rice gruel based milk replacer on growth and rumen development in kids
Yingjie Zhang , Hebei Agricultural University, China	Effects of different energy and protein levels on growth performance and nutrients apparent digestibility in lambs of Yanshan cashmere goat
Dr P. Mor , National Dairy Research Institute, Haryana, India	Effect of concentrate replacement with AFEX pellets on rumen fermentation, blood profile and acetamide in rumen of crossbred goats
Dr P. C. Regar , Krishi Vigyan Kendra, Rajasthan India	Feeding management practices of goats followed by tribal farmers in Rajasthan
Rachel Jemimah, E , Tamil Nadu Veterinary and Animal Sciences University, Chennai, India	Effect of Replacement of Concentrate Mixture with Hydroponic Maize Fodder on the Growth Performance of Tellicherry Buck Kids
Arun Kumar De , Central Island Agricultural research Institute, Andaman and Nicobar, India	Mineral imbalance induces cellular stress and interferes with immune gene regulation in goat: A field level case study
A. Chatterjee , ICAR-National Dairy Research Institute, West Bengal, India	Effect of Supplementing Dried Meal of two Aquatic Macrophytes on Growth Rate and Blood Parameters of Black Bengal Goats
Sun Haizhou , Inner Mongolia Academy of Agricultural and Animal Husbandry Sciences, China	Advances in Nutrition on Chinese Cashmere Goat: A review
Ashok Santra , National Dairy Research Institute, West Bengal, India	Mitigation of ruminal methane production using plant secondary metabolites for improving animal productivity
Yoshiaki Hayashi , Meijo University, Japan	Effects of spineless cactus silage feeding on manure compost production in goats
B. Sahoo , ICAR-Central Institute for Women in Agriculture, Bhubaneswar, India	Effect of oil cake and mineral mixture supplementation on growth performance of goat in Tribal Odisha
Kalyan De , ICAR-Central Sheep and Wool Research Institute, Rajasthan, India	Development and evaluation of efficiency of lamb incubator and herbal antioxidant (Moringa flower) pellets as a means to protect lambs from cold stress
Rachel Jemimah, E , Tamil Nadu Veterinary and Animal Sciences University, Chennai, India	Effect of Feeding Hydroponic Maize Fodder on the Reproductive Performance of Tellicherry Doe Kids
Sheela Choudhary , Post-Graduate Institute of Veterinary Education and Research, Rajasthan, India	Impact of feeding area specific mineral mixture on goat productivity and socio economic status of goat farmers
Nirmala Saini , ICAR-Central Sheep and Wool Research Institute, Rajasthan, India	Effect of different energy sources and estrous synchronization protocol on fertility of Magra sheep reared in arid region of Rajasthan
O. H. Chaturvedi , Central Sheep and Wool Research Institute, Himachal Pradesh, India	Effect of milk replacer feeding on growth performance of lambs during pre-weaning phase
Paper Presentation	
Session III - Breeding & Genetics	
<u>Session Chair</u>	
<ul style="list-style-type: none"> Dr M. K. Singh Principal Scientist (Breeding & Genetics), Central Institute for Research on Goats, Mathura, UP, India 	
<u>Session Co-Chair</u>	
<ul style="list-style-type: none"> Dr. Juan Capote I.C., I.A., Apto. De correos 60, La Laguna 38200 Tenerife Spain Dr S. S. Misra Senior Scientist (Breeding & Genetics), Central Sheep & Wool Research Institute, Avikanagar, Tonk, India 	
Participant Affiliation	Title
D. K. Deokar , ICAR-Central Institute for Research on Goats, Mathura, India	Selection Indices for Improvement in Sangamneri Goats under Field Condition
M. K. Singh , ICAR-National Dairy Research Institute,	Factors affecting body weight in Barbari goats at different ages in Nucleus

	West Bengal, India	Flock
	Ajoy Mandal , Nepal Agriculture Research Council, Nepal	Genetic diversity and population structure in Muzaffarnagari sheep of India assessed through pedigree analysis
	Gorkhali Neena Amatya , Agriculture and Forestry University, Nepal	Origin and genetic diversity of Nepalese indigenous goats (<i>Capra hircus</i>)
	Nirajan Bhattarai , Heifer International Nepal, Kathmandu, Nepal	Effect of non-genetic factors on body morphometry of Khari goat kids (<i>Capra hircus</i> L.) in Nawalparasi, Nepal
	Keshav P. Sah , Sher-e-Kashmir University of Agricultural Sciences & Technology, J&K India	Community Led Goat Genetic Improvement Program in Nepal
	Safeer Alam , ICAR-Central Sheep and Wool Research Institute, Rajasthan India	Status and Scope of Goat Breeding in Kashmir & Laddakh Region of Jammu & Kashmir
	G. R. Gowane , ICAR-Central Sheep and Wool Research Institute, Rajasthan India	The breeding structure of the Indian sheep resources: Impact of effective population size on the genetic architecture of the population
	S. S. Misra , ICAR-Central Sheep and Wool Research Institute, Rajasthan India	Genetic trend of growth traits in a closed flock of Sirohi goat maintained under semi-arid condition
	I. S. Chauhan , Department of Animal Genetics and Breeding, HP, India	Survival analysis of Sirohi goat kids by frailty survival model
	Krishanender Dinesh , Department of Animal Genetics and Breeding, HP, India	Analysis of Genetic diversity in Chegu goat population of Himachal Pradesh using Microsatellite markers
	Varun Sankhyan , ICAR-Central Sheep and Wool Research Institute, Rajasthan, India	Genotyping of MHC class II DRB3 gene using PCR-RFLP and DNA sequencing in small ruminant breeds of Western Himalayan state of Himachal Pradesh, India
	Rajiv Kumar , ICAR- National Bureau of Animal Genetic Resources, Haryana India	Keratin gene expression differences in wool follicles and sequence diversity of high glycine-tyrosine keratin-associated proteins (KAPs) in Magra sheep of India
	N. K. Verma , ICAR- Central Sheep & Wool Research Institute, Rajasthan, India	Indian Indigenous Caprine genetic diversity and its population status
	Sudarshan Mahala , ICAR-Central Institute for Research on Goats, UP, India	Selection Criteria for Avikalin Sheep
4.30-6.00 PM	Networking Tea & Poster presentation (Session I, II & III)	
7.30-9.00 PM	International Goat Association Board Meeting	



Asian Regional Conference on Goats - ARCG 2018 Day wise Program (Day 3rd - October 24, 2018)

Time	Activity																
09.00-11.30 AM	Session IV (Production Systems and Climate Change in Asia)																
	<u>Key note Speaker</u> <ul style="list-style-type: none"> • Dr Sanjita Sharma Dean, Post Graduate Institute of Veterinary Education & Research, Jaipur, Rajasthan, India 																
	<u>Expert Talk</u> <ul style="list-style-type: none"> • Dr A. K. Patel Principal Scientist, Central Arid Zone Research Institute, Jodhpur, Rajasthan, India • Dr D.V. Singh, Head Livestock Production Management, College of Veterinary and Animal Sciences, GBPUAT, Pantnagar, Uttarakhand, India • Dr N. Ramachandranm Central Institute for Research on Goats, Mathura, UP, India • Dr Yoko Tsukahara, American Institute for Goat Research, Langston University, PO Box 730, Langston, Oklahoma 73050, USA, 																
11.30-12.00 PM	Networking Tea																
	Session V (Innovations in Reproductive Technology)																
12.00-1.30 PM	<u>Key note Speaker</u> <ul style="list-style-type: none"> • Dr M. S. Chauhan Director, Central Institute for Research on Goats, Mathura, UP, India 																
	<u>Expert Talk</u> <ul style="list-style-type: none"> • Dr S. D. Kharche Principal Scientist, Animal Reproduction Division, Central Institute for Research on Goats, Mathura, UP, India • Dr H. S. Birade Professor & Dean, Post Graduate Institute of Veterinary and Animal Sciences Krishinagar, Akola, Maharashtra, India • Dr Satish Kumar Principal Scientist, Animal Biotechnology NDRI, Karnal, Haryana, India 																
1.30-2.30 PM	Lunch																
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	<u>Session Chair</u> Dr M. K. Singh Principal Scientist (Breeding & Genetics), Central Institute for Research on Goats, Mathura, UP, India																
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	Paper Presentation Session IV - Production Systems and Climate Change in Asia																

Session Chair

Dr Sohan Vir Singh

Principal Scientist, Physiology & Climate Change, National Dairy Research Institute, Karnal, India

Session Co-Chair

Dr. Nazan Koluman

Faculty of Agriculture, Dept. of Animal Science, University of Cukurova, Adana -Turkey

Dr J. Muralidharan, Professor

Department of Livestock Production & Management, Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu, India

Dr Gulab Chandra,

College of Veterinary and Animal Sciences, SVPUAT, Meerut, UP, India

Participant Affiliation	Title
Anshita Sharma , Post Graduate Institute of Veterinary Education and Research, Rajasthan	Impact of the Climate Change on Livestock
N. Ramachandran ICAR-Central Institute for Research on Goats, Uttar Pradesh, India	Effect of plastic slatted flooring on growth performance of kids and lambs maintained under stallfed semiarid conditions of India
S. D. Mandakmale , Mahatma Phule Krishi Vidyapeeth, Maharashtra, India	Effect of Temperature and Temperature Humidity Index on Growth Performance of Sangamneri Goat
B. Rai , ICAR-Central Institute for Research on Goats, UP, India	Effect of alternative bedding materials during winters on growth performance of Barbari kids
Saket Bhusan , ICAR-Central Institute for Research on Goats, UP, India	Growth of kids under semi-intensive management system of Jakhrana flock
D.S. Chauhan Vasantrao Naik Marathwada Krishi Vidyapeeth, Maharashtra, India	Ethology of Black Bengal goats and Garole sheep under semi-intensive system of management
P. P. Rohila , Central Arid Zone Research Institute, Rajasthan, India	Production System of Marwari Goat in Indian Arid Zone
P. Perumal , ICAR-Central Island Agricultural Research Institute, Andaman and Nicobar ,India	Walking and summer stress on physiological, heamatological and antioxidant profiles in Andaman local goat under island tropical ecosystem
P. Perumal , ICAR-Central Island Agricultural Research Institute, Andaman and Nicobar India	Endocrinological profiles of Andaman local goat under island tropical ecosystem
Arpita Mohapatra ,ICAR-Central Sheep and Wool Research Institute, Rajasthan, India	Effect of solar radiation exposure on physiological response and blood biochemical of Malpura sheep under semi-arid region
Madhu Mohini ,National Dairy Research Institute,Haryana, India	Contribution of Small Ruminants to Global warming through emission of GHGs

Paper Presentation

Session V - Innovations in Reproductive Technology

Session Chair

Dr S. D. Kharche

Principal Scientist (Animal Reproduction), Central Institute for Research on Goats, Mathura, UP, India

Session Co-Chair

Dr C. H. Pawshe

Post Graduate Institute of Veterinary and Animal Sciences, Akola, India

Dr Krishnappa Balaganur

Scientist, Central Sheep & Wool Research Institute, Avikanagar, Tonk, India

Dr M. K. Singh

Scientist, National Dairy Research Institute, Karnal, India

Participant Affiliation	Title
Amit Sharma ,CSKHPKV-Himachal Pradesh, INDIA	Effect of day length on follicular characteristics of Gaddi goats
Krishnappa Balaganur , CSWRI, Rajasthan, India	Successful induction of oestrus, ovulation and pregnancy with Avikesil-S-PMSG protocol in anoestrus Sirohi goats
Xuejiao Yin , Hebei Agricultural University, Baoding, China	Effect of different PMSG does on reproductive performance in Yanshan cashmere goats
Ravi Ranjan , Central Institute for Research on Goats, UP, India	Effect of beta defensin-1 on conception rate using artificial insemination in Barbari goat
Chetna Gangwar , PRSM Division, CIRG, UP,India	Effect of monosaccharides supplementation on sperm characteristics of Barbari buck semen during long term preservation
Feng Wang , Nanjing Agricultural University, Nanjing, China	Role of Vitamin D and its receptor in proliferation and steroidogenesis of goat luteinized granulosa cells
S. P. Singh , ICAR-Central Institute for Research on Goats,U.P., India	Production of anti-progesterone antisera using glutaraldehyde-fixed and progesterone sensitized chicken erythrocytes
Feng Wang , Nanjing Agricultural University, Nanjing, China	Highly methylated Xist in SCNT embryos was retained in female deceased cloned goats
Juhi Pathak , ICAR-CIRG, UP, INDIA	Effect of Culture Media on Developmental Potency of Caprine Chimeric Embryos
Feng Wang Nanjing Agricultural University, Nanjing, China	Long noncoding RNAs changes during oocyte maturation in goat
M. Karunakaran , ICAR- National Dairy Research Institute, Eastern Regional Station, Kalyani, West Bengal, India	Heparin binding proteins and their correlation with in vitro sperm characters of Black Bengal buck semen
N. M. Markandeya , College of Veterinary and Animal Sciences, Maharashtra, India	Fecundity improvement trials in estrus synchronized Osmanabadi Goats
S. K. Gangwar , Animal Production Research Institute (APRI),Bihar, India	Conception Rate Of Black Bengal Goat Using Frozen Semen Of Boer In Bihar

	M. R. Raut , BAIF-Development and Research Foundation, Maharashtra, India	Seminal attributes and cryopreservation semen of different goat breeds in India
	M. K. Singh , Embryo Biotechnology Lab, Animal Biotechnology Centre, ICAR- National Dairy Research Institute, Haryana, India	Differential Expression of Imprinting Related Genes in Goat (Capra hircus) Chimeric Embryos
	Dhruba Malakar , Animal Biotechnology Centre, National Dairy Research Institute, Haryana India	Stem cells: A promising field of reproductive biotechnology and regenerative medicine
4.30-5.30 PM	Networking Tea & Poster presentation (Session IV & V)	
	Paper Presentation	
	Session V - Innovations in Reproductive Technology	
	Participant Affiliation	Title
5.30- 6.30 PM	S. V. Bahire , ICAR-Central Sheep and Wool Research Institute, Rajasthan, India	In vivo isolation, culture and characterization of granulosa cells from Booroola carrier and non carrier ewes
	Ranjna S Cheema , Guru Angad Dev Veterinary and Animal Sciences University, Punjab, India	Comparative Analysis of Semen Attributes of Beetal Goat Bucks reared in Sub-tropical conditions
	Ashok Kumar , Arid Region Campus, Central Sheep & Wool Research Institute, Bikaner, India	Semen quality evaluation and artificial insemination with liquid semen in sheep of arid region of Rajasthan
	Dilip Kumar Swain , U.P. Pandit Deendayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go Anusandhan Sansthan, UP, India	Functional insights into endocannabinoid signalling in goat spermatozoa
	Mayur Pawshe , Mannuthy Kerala Veterinary and Animal Sciences University Kerala, India	Evaluation of Artificial Insemination Performance in Malabari Goats Based on the Site and Dose of Deposition with Cryopreserved Semen
	Dhruba Malakar , National Dairy Research Institute Haryana, India	CRISPR/Cas9 mediated human erythropoietin gene knockin into mammary epithelial cells of goat



Asian Regional Conference on Goats - ARCG 2018 Day wise Program (Day 4th - October 25, 2018)

Time	Activity
08.00-01.00 PM	Institutional Visit to Central Sheep & Wool Research Institute (CSWRI), Awikanagar (Package of Breakfast & Lunch will be served in the bus + Tea will be arranged at CSWRI)
01.00- 2.00 PM	Lunch
	Session VI (Socio-Economic, Marketing and Financial Issues in Asia)
2.00-3.30 PM	<u>Key note Address</u> <ul style="list-style-type: none">• Dr V. Rajkumar Sr. Scientist, Central Institute for Research on Goats, Mathura, UP, India <u>Expert Talk</u> <ul style="list-style-type: none">• Dr A. K. Das Sr. Scientist, Indian Veterinary Research Institute, Kolkata, West Bengal, India• Dr Anurag Pandey PGIVER, Jaipur, Rajasthan, India
3.30- 4.00 PM	Networking Tea



Regional Conference on Goats - ARCG 2018 Day wise Program (Day^{5th} – October 26, 2018)

Time	Activity														
9.00-10.30 AM	<p align="center">Session VII (Socio-Economic, Marketing and Financial Issues)</p> <p><u>Key note Address</u></p> <ul style="list-style-type: none"> Dr P. S. Birthal ICAR National Professor, National Institute of Agricultural Economics and Policy Research, Pusa, New Delhi <p><u>Expert Talk</u></p> <ul style="list-style-type: none"> Dr A. K. Shinde ICAR-Cental Sheep & Wool Research Institute, Avikanagar, Rajasthan, India Dr A. K. Dixit Sr. Scientist, ICAR-Central Institute for Research on Goats, Mathura, UP, India 														
	<p align="center">Paper Presentation Session VI - Goat Products</p> <p><u>Session Chair</u></p> <ul style="list-style-type: none"> Dr. P. K. Mandal Professor- Livestock Products Technology, Rajiv Gandhi Institute of Veterinary Education and Research, Pondicherry, India <p><u>Session Co-Chair</u></p> <ul style="list-style-type: none"> Dr Girish Patil Principal Scientist, National Research Center on Meat, Hyderabad, India Dr Sunil Kumar Professor & Head, Department of Livestock Products Technology, Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu, India <table border="1"> <thead> <tr> <th>Participant affiliation</th> <th>Title</th> </tr> </thead> <tbody> <tr> <td>Sachin Kumar, National Dairy Research Institute, Karnal, India</td> <td>Influence of Bacopa monnieri extract on milk fatty acid profile, rumen biohydrogenating bacteria and lipogenic gene expression in goats</td> </tr> <tr> <td>Sándor Kukovics, Hungarian Sheep and Goat Dairying Public Utility Association, Hungary</td> <td>Relationships among milk production level and the quality of goat dairy products</td> </tr> <tr> <td>Heena Sharma, ICAR-National Dairy Research Institute, Karnal, India</td> <td>Technological Interventions for the Development of Value Added Fermented Goat Milk Products</td> </tr> <tr> <td>Ravindra Kumar, ICAR-Central Institute for Research on Goats, UP, India</td> <td>Effect of zinc nano particles on milk yield, milk composition and somatic cell count in early lactating barbari does</td> </tr> <tr> <td>V. V. Deshmukh, College of Veterinary & Animal Sciences, MAFSU, Parbhani, Maharashtra</td> <td>Microbial Quality Assessment of Effect of Various Wrapping Materials on Goat Carcasses</td> </tr> <tr> <td>Arun K. Das, Eastern Regional Station, ICAR-Indian Veterinary Research Institute, Kolkata, India</td> <td>Quinoa seed as antioxidant dietary fibre on quality improvement of meat nuggets</td> </tr> </tbody> </table>	Participant affiliation	Title	Sachin Kumar , National Dairy Research Institute, Karnal, India	Influence of Bacopa monnieri extract on milk fatty acid profile, rumen biohydrogenating bacteria and lipogenic gene expression in goats	Sándor Kukovics , Hungarian Sheep and Goat Dairying Public Utility Association, Hungary	Relationships among milk production level and the quality of goat dairy products	Heena Sharma , ICAR-National Dairy Research Institute, Karnal, India	Technological Interventions for the Development of Value Added Fermented Goat Milk Products	Ravindra Kumar , ICAR-Central Institute for Research on Goats, UP, India	Effect of zinc nano particles on milk yield, milk composition and somatic cell count in early lactating barbari does	V. V. Deshmukh , College of Veterinary & Animal Sciences, MAFSU, Parbhani, Maharashtra	Microbial Quality Assessment of Effect of Various Wrapping Materials on Goat Carcasses	Arun K. Das , Eastern Regional Station, ICAR-Indian Veterinary Research Institute, Kolkata, India	Quinoa seed as antioxidant dietary fibre on quality improvement of meat nuggets
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Heena Sharma , ICAR-National Dairy Research Institute, Karnal, India	Technological Interventions for the Development of Value Added Fermented Goat Milk Products														
Ravindra Kumar , ICAR-Central Institute for Research on Goats, UP, India	Effect of zinc nano particles on milk yield, milk composition and somatic cell count in early lactating barbari does														
V. V. Deshmukh , College of Veterinary & Animal Sciences, MAFSU, Parbhani, Maharashtra	Microbial Quality Assessment of Effect of Various Wrapping Materials on Goat Carcasses														
Arun K. Das , Eastern Regional Station, ICAR-Indian Veterinary Research Institute, Kolkata, India	Quinoa seed as antioxidant dietary fibre on quality improvement of meat nuggets														
10.30-11.30 AM	<p align="center">Paper Presentation Session VII - Socio-Economic, Marketing and Financial Issues in Asia</p> <p><u>Session Chair</u></p> <ul style="list-style-type: none"> Dr Safeer Alam Director Extension, Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar, India <p><u>Session Co-Chair</u></p> <ul style="list-style-type: none"> Dr Tilahun Sahlu Director (Research & Extension), American Institute for Goat Research, USA Dr Chetna Gangwar, Senior Scientist, Central Institute for Research on Goats, Makhdoom, PO- Farah, Mathura, UP, India <table border="1"> <thead> <tr> <th>Participant affiliation</th> <th>Title</th> </tr> </thead> <tbody> <tr> <td>Muhammad R. Ja'afar-Furo, Adamawa State University, Nigeria</td> <td>Economics of sheep and goats marketing in mubi zone, adamawa state, nigeria</td> </tr> <tr> <td>M. L. Meena, ICAR-CAZR, Krishi Vigyan Kendra, Rajasthan India</td> <td>Economic Analysis of Traditional Goat Rearing by Raikas' Folks of Pali District in Western Rajasthan, India</td> </tr> <tr> <td>B. S. Reddy, College of Agriculture, Kalaburagi, UAS, Raichur, Karnataka, India</td> <td>Small Ruminant Farming in Karnataka: A Pathway of Sustainable livelihood security and enhancing farmer's income</td> </tr> <tr> <td>M V Dhupal, lala Lajpat Rai University of Veterinary and Animal Sciences, Haryana, India</td> <td>Osmanabadi goat rearing for rural women empowerment in Parbhani district of Maharashtra</td> </tr> <tr> <td>Rupesh Rai, Goat village- Nag Tibba, Uttarakhand, India</td> <td>Goat Farming and Eco-tourism: A Case Study in Uttarakhand</td> </tr> <tr> <td>Keshav P. Sah, Heifer International Nepal, Kathmandu, Nepal</td> <td>Contribution of Nepalese Smallholder farmers in achieving self-sufficiency in goat meat</td> </tr> </tbody> </table>	Participant affiliation	Title	Muhammad R. Ja'afar-Furo , Adamawa State University, Nigeria	Economics of sheep and goats marketing in mubi zone, adamawa state, nigeria	M. L. Meena , ICAR-CAZR, Krishi Vigyan Kendra, Rajasthan India	Economic Analysis of Traditional Goat Rearing by Raikas' Folks of Pali District in Western Rajasthan, India	B. S. Reddy , College of Agriculture, Kalaburagi, UAS, Raichur, Karnataka, India	Small Ruminant Farming in Karnataka: A Pathway of Sustainable livelihood security and enhancing farmer's income	M V Dhupal , lala Lajpat Rai University of Veterinary and Animal Sciences, Haryana, India	Osmanabadi goat rearing for rural women empowerment in Parbhani district of Maharashtra	Rupesh Rai , Goat village- Nag Tibba, Uttarakhand, India	Goat Farming and Eco-tourism: A Case Study in Uttarakhand	Keshav P. Sah , Heifer International Nepal, Kathmandu, Nepal	Contribution of Nepalese Smallholder farmers in achieving self-sufficiency in goat meat
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	M. L. Meena , ICAR-CAZR, Krishi Vigyan Kendra, Rajasthan India	Economic Analysis of Traditional Goat Rearing by Raikas' Folks of Pali District in Western Rajasthan, India													
	B. S. Reddy , College of Agriculture, Kalaburagi, UAS, Raichur, Karnataka, India	Small Ruminant Farming in Karnataka: A Pathway of Sustainable livelihood security and enhancing farmer's income													
	M V Dhupal , lala Lajpat Rai University of Veterinary and Animal Sciences, Haryana, India	Osmanabadi goat rearing for rural women empowerment in Parbhani district of Maharashtra													
	Rupesh Rai , Goat village- Nag Tibba, Uttarakhand, India	Goat Farming and Eco-tourism: A Case Study in Uttarakhand													
	Keshav P. Sah , Heifer International Nepal, Kathmandu, Nepal	Contribution of Nepalese Smallholder farmers in achieving self-sufficiency in goat meat													

	Narendra Singh , Navsari Agricultural University, Gujarat, India	Contribution of goat rearing for sustainable farm income: A case study of South Gujarat region
	Prithviraj Chavan , Sumbran Udyog, Maharashtra, India	Sumbran Goat Farm: The Beginning of Success
11.30-12.00 AM	Networking tea	
12.00-1.00 PM	Paper presentation Session VI - Goat Products	
	<u>Session Chair</u> Dr. P. K. Mandal Professor- Livestock Products Technology, Rajiv Gandhi Institute of Veterinary Education and Research, Pondicherry, India	
	<u>Session Co-Chair</u> Dr Girish Patil Principal Scientist, National Research Center on Meat, Hyderabad, India	
	Dr Sunil Kumar Professor & Head, Department of Livestock Products Technology, Sher-e-Kashmir University of Agricultural Sciences and Technology Jammu, India	
	Participant affiliation	Title
	Arun K. Verma , ICAR-Central Institute for Research on Goats, UP, India	Effect of Breeds and Milking Time on Quality of Goat Milk during Winter Season
	Dr. Somesh Joshi , College of Veterinary and Animal sciences GBPUAT, Uttarakhand, India	Effect of Incorporation of Chevon (goat meat) Blend Containing Varying Levels of Wheat Bran On Quality Attributes of Chevon Patties
	R. Pourouchottamane , ICAR - Central Institute for Research on Goats, U.P., India	Small Scale Meat Products Processing Plant: A Start-up Entrepreneurship Model
	I.Prince Devadason , Indian Veterinary Research Institute, UP, India	Efficacy of plastic films as tray over wrap for fresh chevon under refrigerated storage (4± 1°C)
	Paper presentation Session VII - Socio-Economic, Marketing and Financial Issues in Asia	
	<u>Session Chair</u> Dr Safeer Alam Director Extension, Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar, India	
	<u>Session Co-Chair</u> Dr Tilahun Sahl Director (Research & Extension), American Institute for Goat Research, USA	
	Dr Chetna Gangwar , Senior Scientist, Central Institute for Research on Goats, Makhdoom, PO- Farah, Mathura, UP, India	
	Participant affiliation	Title
	Aishwarya Dudi , ICAR-CAZRI, Krishi Vigyan Kendra, Rajasthan, India	Gender Division of Labour and Decision Making in Goat Farming in Pali District of Rajasthan, India
	S. Sapkota , National Animal Science Research Institute (NASRI), Kathmandu, Nepal	Financial analysis of the Boer pure and crossbred kids reared under different production system at Western hills of Nepal
	Simran Godara , Lala Lajpat Rai University of Veterinary and Animal Sciences, Haryana, India	Knowledge and adoption of goat rearing farmers
Rajesh Kumar , Lala Lajpat Rai University of Veterinary and Animal Sciences, Haryana, India	Marketing practices followed by goat farmers	
Rajesh Kumar , Lala Lajpat Rai University of Veterinary and Animal Sciences, Haryana, India	Importance of goat farming in rural economy	
Shaila Vinayak Narawade , Aai Goat Farm, Maharashtra, India	Rearing Goats for Milk - A Livestock business in Draught Prone Area	
Chetna Gangwar , Central Institute for Research on Goats, Uttar Pradesh, India	Women are key player in goat farming in rural areas of Mathura	
Gunaseelan , ICAR-Indian Veterinary Research Institute, U.P., India	Adoption Level of Improved Goat Farming Technologies by Commercial Goat Farmers in Tamil Nadu, India	
1.00- 1.30 PM	Session VI Poster Presentation	Session VII Poster Presentation
1.30- 2.30 PM	Lunch	
2.30- 3.00 PM	Brain Storming Session	
3.00- 4.00 PM	Valedictory Session	
6.30-8.00 PM	Cultural Evening	
8.00-10.00 PM	Conference Dinner	

Breeding & Genetics

List of Paper Presentation

Abstract ID	Author	Affiliation	Title	Presentation
BG01	D. K. Deokar	Department of Animal Husbandry and Dairy Science, Mahatma Phule Krishi Vidyapeeth, Rahuri 413 722, Dist. Ahmednagar (Maharashtra), India	Selection Indices for Improvement in Sangamneri Goats under Field Condition	Paper
BG03	M. K. Singh	ICAR-Central Institute for Research on Goats, Makhdoom, Farah, Mathura 281122, India	Factors affecting body weight in Barbari goats at different ages in Nucleus Flock	Paper
BG07	Ajoy Mandal	ICAR-National Dairy Research Institute, Eastern regional Station, Kalyani, West Bengal, India	Genetic diversity and population structure in Muzaffarnagari sheep of India assessed through pedigree analysis	Paper
BG08	Gorkhali Neena Amatya	Animal Breeding Division, Nepal Agriculture Research Council, POB 1950, Kathmandu, Nepal	Origin and genetic diversity of Nepalese indigenous goats (<i>Capra hircus</i>)	Paper
BG09	Nirajan Bhattarai	Agriculture and Forestry University, Rampur, Chitwan, Nepal	Effect of non-genetic factors on body morphometry of Khari goat kids (<i>Capra hircus</i> L.) in Nawalparasi, Nepal	Paper
BG10	Keshav P. Sah	Heifer International Nepal, GPO Box. No. 6043, Kathmandu, Nepal	Community Led Goat Genetic Improvement Program in Nepal	Paper
BG11	Safeer Alam	Sher-e-Kashmir University of Agricultural Sciences & Technology, Shalimar, Srinagar, J&K – 190025	Status and Scope of Goat Breeding in Kashmir & Laddakh Region of Jammu & Kashmir	Paper
BG16	G. R. Gowane	ICAR-Central Sheep and Wool Research Institute Avikanagar 304501, Malpura (Tonk) – Rajasthan	The breeding structure of the Indian sheep resources: Impact of effective population size on the genetic architecture of the population	Paper

Asian Regional Conference on Goats (ARCG-2018)

BG17	S. S. Misra	ICAR-Central Sheep and Wool Research Institute Avikanagar 304501, Malpura (Tonk) – Rajasthan	Genetic trend of growth traits in a closed flock of Sirohi goat maintained under semi-arid condition	Paper
BG18	I. S. Chauhan	ICAR-Central Sheep and Wool Research Institute Avikanagar 304501, Malpura (Tonk) – Rajasthan	Survival analysis of Sirohi goat kids by frailty survival model	Paper
BG20	Krishanender Dinesh	Department of Animal Genetics and Breeding, COVAS, CSKHPKV Palampur (HP)-176062	Analysis of Genetic diversity in Chegu goat population of Himachal Pradesh using Microsatellite markers	Paper
BG21	Varun Sankhyan	Department of Animal Genetics and Breeding, COVAS, CSKHPKV Palampur (HP)-176062	Genotyping of MHC class II DRB3 gene using PCR-RFLP and DNA sequencing in small ruminant breeds of Western Himalayan state of Himachal Pradesh, India	Paper
BG22	Rajiv Kumar	ICAR-Central Sheep and Wool Research Institute, Avikanagar, Rajasthan, India 304501	Keratin gene expression differences in wool follicles and sequence diversity of high glycine-tyrosine keratin-associated proteins (KAPs) in Magra sheep of India	Paper
BG23	N. K. Verma	ICAR- National Bureau of Animal Genetic Resources, Karnal – 132001	Indian Indigenous Caprine genetic diversity and its population status	Paper
BG25	Sudarshan Mahala	ICAR- Central Sheep & Wool Research Institute, Avikanagar, Rajasthan, 304501, India	Selection Criteria for Avikalin Sheep	Paper
BG29	P. K. Mallick	ICAR- Central Sheep & Wool Research Institute, Avikanagar, Rajasthan, 304501, India	Average daily gain and Kleiber Ratio in Bharat Merino Sheep	Paper
BG30	R. Thirupathy Venkatachalapathy	Centre for Advanced Studies in Animal Genetics and Breeding, Kerala Veterinary and Animal Sciences University, Mannuthy, Thrissur, Kerala-680651, India	Genetic variability and expression profile of <i>ghrelin gene</i> in native goats of Kerala	Paper

Asian Regional Conference on Goats (ARCG-2018)

BG32	R. C. Sharma	ICAR- Central Sheep and Wool Research Institute, Avikanagar-304501, Rajasthan, India	Prolificacy and body weights of prolific Avishaan sheep in semi-arid region of Rajasthan	Paper
BG34	M K Singh	ICAR-Central Institute for Research on Goats	Genomic Selection: Potent tool for goat breed improvement	Paper
BG35	Gitam Singh	Krishi Vigyan Kendra, Banasthali Vidyapith, Newai, Tonk, Rajasthan – 304022	Influence of breeds on goat milk composition under field and farm rearing conditions	Paper
BG36	Pramod Singh	Livestock Research Station, Kerala Veterinary and Animal Sciences University, Thiruvazhamkunnu, Palakkad, Kerala, India. Pin Code 678601	Economic traits in Attappady Black goats of Kerala, India	Paper
BG37	Silpa M.V	Molecular Characterization and Detection of Two Novel SNPs of Caprine Sirtuin3 (SIRT3) Gene in Malabari and Attappady Black Goats	Department of Animal Breeding Genetics and Biostatistics COVAS, Mannuthy, P.O., Thrissur-680651, Kerala, India	Paper

Poster Presentation

Abstract ID	Author	Affiliation	Title	Presentation
BG02	S. D. Mandakmale	AICRP on Sangamneri Goat, Mahatma Phule Krishi Vidyapeeth, Rahuri-413722, Dist. - Ahmednagar (MS)	Genetic and non-genetic factors affecting the economic traits of Sangamneri Goats under field conditions	Poster
BG04	D. R. Birari	AICRP on Sangamneri Goat, Mahatma Phule Krishi Vidyapeeth, Rahuri-413722, Dist. - Ahmednagar (MS)	Genetic Analysis of Growth Traits for Sangamneri Goats under Field Conditions	Poster

Asian Regional Conference on Goats (ARCG-2018)

BG05	Kiran Kumari Bhat	Post Graduate Institute of Veterinary Education and Research, Jaipur	Selection of goat for disease resistance	Poster
BG06	S. D. Mandakmale	AICRP on Sangamneri Goat, Mahatma Phule Krishi Vidyapeeth, Rahuri-413722, Dist. - Ahmednagar (MS)	Reproduction and Production Performance of Sangamneri Goats under Field Conditions	Poster
BG12	Jai Sunder	Animal Science Division, ICAR-Central Island Agricultural Research Institute, Port Blair, Andaman and Nicobar Islands-744101	Genetic diversity of Indigenous goats of Andaman and Nicobar islands based on the mitochondrial DNA sequence variation	Poster
BG13	Anoop	Centre for Agricultural Bioinformatics, Indian Agricultural Statistics Research Institute, New Delhi, 110012	Identification, characterization and functional annotation of SNPs from pashmina goat transcriptome	Poster
BG14	J. Muralidharan	Mecheri Sheep Research Station, Pottaneri, Tamil Nadu, India	Comparison of body weight of graded and inter se mated Boer kids	Poster
BG15	P.C Regar	Livestock Production and Management Section, National Dairy Research Institute, Karnal-132001	Breeding management practices of goats followed by tribal farmers in Rajasthan	Poster
BG19	S. K. Gangwar	Animal Production Research Institute (APRI), Dr. R.P.C.A.U., Pusa, Samastipur, Bihar	Comparative growth performance of cross (Black Bengal X Boer) kids with Black Bengal in Bihar	Poster
BG24	Govind Kumar Verma	Deendayal Research Institute, Krishi Vigyan Kendra, Ganiwan, Chitrakoot-210206 (U.P)	Reproductive and productive performance of Crossbreeds (Bundelkhandi Buck X Local Female) and Local goats in Chitrakoot district of the Bundelkhand region of Uttar Pradesh	Poster
BG26	Samita Saini	Post Graduate Institute of Veterinary Education and Research, Jaipur	Assessment of Reproductive Traits in Sirohi Goats for Non-Genetic Factors	Poster
BG27	Samita Saini	Post Graduate Institute of Veterinary Education and Research, Jaipur	Evaluation of Selective value for Non Genetic factors in Sirohi Goats	Poster

Asian Regional Conference on Goats (ARCG-2018)

BG28	Charlotte Coretta Rodricks	Department of Animal Breeding Genetics and Biostatistics, College of Veterinary and Animal Sciences, Kerala Veterinary and Animal Sciences University, Mannuthy, Thrissur, Kerala, India-680651	Identification of Single Nucleotide Polymorphisms in intron 4 of the <i>ghrelin</i> gene	Poster
BG31	R. Thirupathy Venkatachalapathy	Centre for Advanced Studies in Animal Genetics and Breeding, Kerala Veterinary and Animal Sciences University, Mannuthy, Thrissur, Kerala- 680651, India	Production and Genetic Parameters of Malabari breed of goat in the home tract of Kerala, India	Poster
BG33	D. Chakarborty	Div.-AGB, FVSc&AH, SKUAST- Jammu, R.S.Pura, Jammu-181102	Bhakarwali Goat- A unique goat of Jammu & Kashmir	Poster

Nutrition Management and Alternative Feeding Systems

Paper Presentation

Abstract ID	Author	Affiliation	Title	Presentation
NM1	Mohammad Moniruzzaman	Department of Animal Science, Bangladesh Agricultural University, Mymensingh- 2202, Bangladesh	Effects of feeding rice gruel based milk replacer on growth and rumen development in kids	Paper
NM2	Yingjie Zhang	College of Animal Science and Technology, Hebei Agricultural University, Baoding 071000, China	Effects of different energy and protein levels on growth performance and nutrients apparent digestibility in lambs of Yanshan cashmere goat	Paper
NM3	Dr P. Mor	National Dairy Research Institute, Karnal-132001, Haryana, India	Effect of concentrate replacement with AFEX pellets on rumen fermentation, blood profile and acetamide in rumen of crossbred goats	Paper
NM6	Dr P. C. Regar	Krishi Vigyan Kendra, MPUAT, Dungarpur (Rajasthan)	Feeding management practices of goats followed by tribal farmers in Rajasthan	Paper
NM7	Rachel Jemimah, E	Livestock farm Complex, Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu 600 051, India	Effect of Replacement of Concentrate Mixture with Hydroponic Maize Fodder on the Growth Performance of Tellicherry Buck Kids	Paper
NM8	Arun Kumar De	Central Island Agricultural research Institute, Port Blair, Andaman and Nicobar Islands, 744101, India	Mineral imbalance induces cellular stress and interferes with immune gene regulation in goat: A field level case study	Paper

Asian Regional Conference on Goats (ARCG-2018)

NM9	A. Chatterjee	ICAR-National Dairy Research Institute, Eastern Regional Station, Kalyani 741235, West Bengal, India	Effect of Supplementing Dried Meal of two Aquatic Macrophytes on Growth Rate and Blood Parameters of Black Bengal Goats	Paper
NM10	Sun Haizhou	Institute of Animal Nutrition and Feed Research, Inner Mongolia Academy of Agricultural and Animal Husbandry Sciences, Hohhot, 010031, China	Advances in Nutrition on Chinese Cashmere Goat: A review	Paper
NM13	Ashok Santra	National Dairy Research Institute, Eastern Regional Station, Kalyani, West Bengal – 741 235	Mitigation of ruminal methane production using plant secondary metabolites for improving animal productivity	Paper
NM14	Yoshiaki Hayashi	Livestock Production, Experimental Farm, Faculty of Agriculture, Meijo University, 4311-2, Hishigaike Takaki-cho, Kasugai 486-0804, Japan	Effects of spineless cactus silage feeding on manure compost production in goats	Paper
NM15	B. Sahoo	ICAR-Central Institute for Women in Agriculture, Bhubaneswar-751003	Effect of oil cake and mineral mixture supplementation on growth performance of goat in Tribal Odisha	Paper
NM16	Kalyan De	Animal Nutrition Division, ICAR-Central Sheep and Wool Research Institute, Avikanagar, the Rajasthan, India	Development and evaluation of efficiency of lamb incubator and herbal antioxidant (Moringa flower) pellets as a means to protect lambs from cold stress	Paper
NM18	Rachel Jemimah, E	Livestock farm Complex, Tamil Nadu Veterinary and Animal Sciences University, Chennai, Tamil Nadu 600 051, India	Effect of Feeding Hydroponic Maize Fodder on the Reproductive Performance of Tellicherry Doe Kids	Paper
NM19	Sheela Choudhary	Post-Graduate Institute of Veterinary Education and Research, NH-11, Agra Road	Impact of feeding area specific mineral mixture on goat	Paper

Asian Regional Conference on Goats (ARCG-2018)

		Jamdoli, Jaipur-302031	productivity and socio economic status of goat farmers	
NM21	Nirmala Saini	Animal Nutrition Division, ICAR-Central Sheep and Wool Research Institute, Avikanagar, the Rajasthan, India	Effect of different energy sources and estrous synchronization protocol on fertility of Magra sheep reared in arid region of Rajasthan	Paper
NM22	O. H. Chaturvedi	North Temperate Regional Station, ICAR-Central Sheep and Wool Research Institute, Garsa, Kullu (Himachal Pradesh)-175141	Effect of milk replacer feeding on growth performance of lambs during pre-weaning phase	Paper

Poster Presentation

Abstract ID	Author	Affiliation	Title	Presentation
NM4	Dr Tae-II Kim	Dairy Science Division National Institute of Animal Science Rural Development Administration, Cheonan-si, Chungcheongnam-do 31000, Korea (ROK)	Effect of feed selenium-lysine supplementation on milk compositions in Saanen dairy goats	Poster
NM5	Dharmendra Chharang	Post Graduate Institute of Veterinary Education and Research, Jaipur	Effect of Replacement of Barley and Cotton Seed Cake by Mesquite (Prosopis Juliflora) Pods and Matira (Citrullus Lanatus) Seed Cake in Complete Ration on Rumens Metabolites of Goats	Poster
NM11	D. Satapathy	ICAR-National Dairy Research Institute (ERS), Kalyani-741235, West Bengal, India	Assessment of Status of Arsenic in Goats, Soil, Water, Feeds and Fodder of Gaighata Block, West Bengal	Poster

Asian Regional Conference on Goats (ARCG-2018)

NM12	Mahendra Kumar Meena	Department of Animal Nutrition, College of Veterinary and Animal Science, Navania, Vallabhnagar, Udaipur-313601	Importance of Garlic in Ruminants Feeding	Poster
NM17	Sheela Choudhary	Post-Graduate Institute of Veterinary Education and Research, NH-11, Agra Road Jamdoli, Jaipur-302031	Assessment of mineral status of goat under rural conditions of Bassi block of Jaipur district of Rajasthan	Poster
NM20	Amit Kumar Lavania	Department of Animal Nutrition , Post Graduate Institute Of Veterinary Education and Research, RAJUVAS, Jaipur	Importance of Top Feeds in Goat Feeding	Poster
NM23	Vinod Bhatishwar	Department of Animal Husbandry & Dairying, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi-221005, Uttar Pradesh, India	Effect of Different Levels of Concentrate Mixture Feeding on Milk Composition in Sirohi Goats	Poster

Innovations in Reproductive Technologies

Paper Presentation

Abstract ID	Author	Affiliation	Title	Presentation
IRT01	Amit Sharma	Department of Veterinary Gynecology and Obstetrics, CSKHPKV-Palampur, Himachal Pradesh, INDIA- 176062	Effect of day length on follicular characteristics of Gaddi goats	Paper
IRT02	Krishnappa Balaganur	Division of Animal Physiology and Biochemistry, CSWRI Avikanagar (Post), Malpura (Tehsil), Tonk- Dist, Rajasthan- 304 501	Successful induction of oestrus, ovulation and pregnancy with Avikesil-S-PMSG protocol in anoestrus Sirohi goats	Paper
IRT03	Xuejiao Yin	College of Animal Science and Technology, Hebei Agricultural University, Baoding, China	Effect of different PMSG doses on reproductive performance in Yanshan cashmere goats	Paper
IRT04	Ravi Ranjan	Central Institute for Research on Goats, Makhdoom, PO- Farah, Distt. Mathura (UP)- 281 122	Effect of beta defensin-1 on conception rate using artificial insemination in Barbari goat	Paper
IRT06	Chetna Gangwar	PRSM Division, CIRG, Mathura Uttar Pradesh, India 281122	Effect of monosaccharides supplementation on sperm characteristics of Barbari buck semen during long term preservation	Paper
IRT09	Feng Wang	Jiangsu Livestock Embryo Engineering Laboratory, Nanjing Agricultural University, Nanjing 210095, P.R. China	Role of Vitamin D and its receptor in proliferation and steroidogenesis of goat luteinized granulosa cells	Paper
IRT11	S. P. Singh	ICAR-Central Institute for Research on Goats, Makhdoom, Farah, Mathura, U.P., India	Production of anti-progesterone antisera using glutaraldehyde-fixed and progesterone sensitized chicken erythrocytes	Paper

Asian Regional Conference on Goats (ARCG-2018)

IRT12	Feng Wang	Jiangsu Livestock Embryo Engineering Laboratory, College of Animal Science and Technology, Nanjing Agricultural University, Nanjing, 210095, China	Highly methylated Xist in SCNT embryos was retained in female deceased cloned goats	Paper
IRT14	Juhi Pathak	ICAR-CIRG, Makhdoom P.O. Farah-28112, Mathura (UP) INDIA	Effect of Culture Media on Developmental Potency of Caprine Chimeric Embryos	Paper
IRT16	Feng Wang	Jiangsu Livestock Embryo Engineering Laboratory, College of Animal Science and Technology, Nanjing Agricultural University, Nanjing, 210095, China	Long noncoding RNAs changes during oocyte maturation in goat	Paper
IRT17	M. Karunakaran	ICAR- National Dairy Research Institute, Eastern Regional Station, Kalyani, West Bengal- 741 235	Heparin binding proteins and their correlation with in vitro sperm characters of Black Bengal buck semen	Paper
IRT18	N. M. Markandeya	Department of Animal Reproduction, Gynecology and Obstetrics, College of Veterinary and Animal Sciences, Parbhani, 431402	Fecundity improvement trials in estrus synchronized Osmanabadi Goats	Paper
IRT21	S. K. Gangwar	Animal Production Research Institute (APRI), Dr. R.P.C.A.U., Pusa, Samastipur, Bihar, India	Conception rate of black bengal goat using frozen semen of boer in bihar	Paper
IRT22	M. R. Raut	BAIF-Development and Research Foundation, CRS, Uruli Kanchan-412202, Maharashtra	Seminal attributes and cryopreservation semen of different goat breeds in India	Paper
IRT24	M. K. Singh	Embryo Biotechnology Lab, Animal Biotechnology Centre, ICAR- National Dairy Research Institute, Karnal-132001, Haryana, India	Differential Expression of Imprinting Related Genes in Goat (<i>Capra hircus</i>) Chimeric Embryos	Paper
IRT25	Dhruba Malakar	Animal Biotechnology Centre, National Dairy Research Institute, Karnal-132001, India	Stem cells: A promising field of reproductive biotechnology and regenerative medicine	Paper

Asian Regional Conference on Goats (ARCG-2018)

IRT26	S. V. Bahire	ICAR-Central Sheep and Wool Research Institute, Avikanagar-304501, Rajasthan, India	In vivo isolation, culture and characterization of granulosa cells from Booroola carrier and non carrier ewes	Paper
IRT28	Ranjna S Cheema	Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab-141004	Comparative Analysis of Semen Attributes of Beetal Goat Bucks reared in Sub-tropical conditions	Paper
IRT29	Ashok Kumar	Arid Region Campus, Central Sheep & Wool Research Institute, Bikaner	Semen quality evaluation and artificial insemination with liquid semen in sheep of arid region of Rajasthan	Paper
IRT30	Dilip Kumar Swain	College of Veterinary Science & Animal Husbandry, U.P. Pandit Deendayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go Anusandhan Sansthan, Mathura - 281001, Uttar Pradesh, India	Functional insights into endocannabinoid signalling in goat spermatozoa	Paper
IRT35	Mayur Pawshe	Evaluation of Artificial Insemination Performance in Malabari Goats Based on the Site and Dose of Deposition with Cryopreserved Semen	College of Veterinary and Animal Sciences, Mannuthy Kerala Veterinary and Animal Sciences University Pookode (Kerala)	Paper
IRT36	Dhruba Malakar	CRISPR/Cas9 mediated human erythropoietin gene knockin into mammary epithelial cells of goat	Animal Biotechnology Centre National Dairy Research Institute Karnal-132001, India	Paper
IRT38	Indu Shekhawat	"Studies on differential regulation of lysophospholipids receptors in endometrium during ovulation of sheep breeds	Department of Biotechnology School of Life Sciences Central University of Rajasthan Bandar Sindri, Kishangarh, Rajasthan 305 817 India	Paper

Asian Regional Conference on Goats (ARCG-2018)

Poster Presentation

Abstract ID	Author	Affiliation	Title	Presentation
IRT05	Dr. Tae Kim	National Institute of Animal Science, Rural Development Administration, Cheonan-si, Chungcheongnam-do 31000, Korea (KOR)	Development of artificial insemination technique of goat for non-experts	Poster
IRT07	Sonia Saraswat	APR Division, ICAR-Central Institute for Research on goats, Makhdoom, Farah, Mathura-281122, UP, India	Transcriptional gene response and its modulation with respect to fertility in Jamunapari buck semen	Poster
IRT08	Deeksha Gupta	APR Division, ICAR-Central Institute for Research on goats, Makhdoom, Farah, Mathura-281122, UP, India	Spermatogonial stem cells technology: an attractive option for conservation of endangered species	poster
IRT10	Nandini Sharma	ICAR-Central Institute for Research on Goats, Makhdoom, Farah, Mathura, U.P., India	Production of anti-progesterone antisera using glutaraldehyde-fixed and progesterone sensitized chicken erythrocytes	poster
IRT13	Manisha Pathak	ICAR-CIRG, Makhdoom P.O. Farah-28112, Mathura (UP) INDIA	Morpho-Biometric Evaluations and Isolation of Spermatogonial Stem cells from Pre pubertal and Post pubertal Goat (<i>Capra hircus</i>) testes	Poster
IRT15	AKS Sikarwar	ICAR-CIRG, Makhdoom P.O. Farah-28112, Mathura (UP) INDIA	Effect of Cryopreservation on Bone marrow derived Caprine Mesenchymal Stem cells	Poster
IRT19	Manna Baruti	College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati-22	Effect of Soybean lecithin based extender and Ovixcell on quality of frozen semen in Beetal, Sirohi and Assam hill goat	poster

Asian Regional Conference on Goats (ARCG-2018)

IRT20	A K S Sikarwar	ICAR-CIRG, Makhdoom P.O. Farah-28112, Mathura (UP) INDIA	Effect of freezing on seminal plasma of Sirohi buck semen through SDS profiling	poster
IRT23	Dushyant Yadav	Division of Animal Reproduction, Indian Veterinary Research Institute, Izatnagar, Bareilly. UP	Effect of n-3 PUFA rich Fish Oil Supplementation during Non-Breeding Season on the Reproductive Performance of Goats in Subtropical Region	poster
IRT27	A. Anjana	School of Applied Animal Production and Biotechnology, College of Veterinary and Animal Sciences, KVASU, Mannuthy, Thrissur, Kerala, India – 680651	Isolation of theca cells from goat ovarian follicles and expression of <i>CYP 19</i> gene in the isolated cells	Poster
IRT31	Dilip Kumar Swain	College of Veterinary Science & Animal Husbandry, U.P. Pandit Deendayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go Anusandhan Sansthan, Mathura - 281001, Uttar Pradesh, India	Extracellular pH regulates sperm functions through Hv1 channels	Poster
IRT32	H. S Birade	Successful Management of Ante-Partum Cervico-Vaginal Prolapse in Doe with PGF2A - A Case Report	Department of Animal Reproduction, Gynecology and Obstetrics Bombay Veterinary College, Parel, Mumbai-12	Poster
IRT33	Prakash Singh	Effect of inulinin noncyclic goats	Dr Prakash Singh College of Veterinary Science & A. H. Nanaji Deshmukh Veterinary Science University Jabalpur-482001	Poster
IRT34	Mayur Pawshe	"Evaluation of Artificial Insemination Performance in Malabari Goats Based on the Site and Dose of Deposition with Chilled Semen	College of Veterinary and Animal Sciences, Mannuthy Kerala Veterinary and Animal Sciences University Pookode (Kerala)	Poster

Asian Regional Conference on Goats (ARCG-2018)

IRT37	M. R. Raut	Evaluation and Freezing of Sirohi Goat Semen	BAIF-Development and Research Foundation CRS, Uruli Kanchan-412202, Maharashtra	Poster
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Goat Products

Paper Presentation

Abstract ID	Corresponding Author	Affiliation	Title	Presentation
GP01	Sachin Kumar	National Dairy Research Institute, Karnal	Influence of Bacopa monnieri extract on milk fatty acid profile, rumen biohydrogenating bacteria and lipogenic gene expression in goats	Paper
GP02	Sándor Kukovics	Hungarian Sheep and Goat Dairying Public Utility Association, Hungary	Relationships among milk production level and the quality of goat dairy products	Paper
GP03	Heena Sharma	ICAR-National Dairy Research Institute, Karnal	Technological Interventions for the Development of Value Added Fermented Goat Milk Products	Paper
GP04	Ravindra Kumar	ICAR-Central Institute for Research on Goats, Makhdoom, Farah, Mathura -281122, UP	Effect of zinc nano particles on milk yield, milk composition and somatic cell count in early lactating barbari does	Paper
GP05	V. V. Deshmukh	Department of Veterinary Public Health & Epidemiology, College of Veterinary & Animal Sciences, MAFSU, Parbhani-431 402	Microbial Quality Assessment of Effect of Various Wrapping Materials on Goat Carcasses	Paper
GP06	Arun K. Das	Eastern Regional Station, ICAR-Indian Veterinary Research Institute, Kolkata-700037	Quinoa seed as antioxidant dietary fibre on quality improvement of meat nuggets	Paper
GP8	Arun K. Verma	ICAR-Central Institute for Research on Goats, Makhdoom, Farah, Mathura -281122, UP	Effect of Breeds and Milking Time on Quality of Goat Milk during Winter Season	Paper
GP10	R. Pourouchottamane	ICAR – Central Institute for Research on Goats, Makhdoom, Farah, Mathura, U.P	Small Scale Meat Products Processing Plant: A Start-up Entrepreneurship Model	Paper

Asian Regional Conference on Goats (ARCG-2018)

GP12	I.Prince Devadason	Indian Veterinary Research Institute, Izatnagar, Bareilly UP 243 122	Efficacy of plastic films as tray over wrap for fresh chevon under refrigerated storage ($4 \pm 1^{\circ}\text{C}$)	Paper
GP13	Somesh Joshi	College of Veterinary and Animal sciences GBPUAT, Pantnagar, Uttarakhand-263145, India	Effect of Incorporation of Chevon(goat meat) Blend Containing Varying Levels of Wheat Bran On Quality Attributes of Chevon Patties	Paper

Poster Presentation

Abstract ID	Author	Affiliation	Title	Presentation
GP07	Y. R. Ambedkar	Department of Livestock Products Technology, PGIVER Jaipur	A Study on Efficacy of Natural Antioxidants on Physio-Chemical and Microbial Stability of Goat Meat (Chevon) Patties during Storage	Poster
GP9	Priyanka Meena	Post Graduate Institute of Veterinary Education and Research, Jaipur- 302031	Health Benefits of Goats Milk	Poster
GP11	Vikram Kumar	Amity Institute of Biotechnology, Amity University Rajasthan	The Advantageous Outlook of Goat Milk Products Corroborate Through Extensive Proteomic Research"	Poster

Socio-Economic, Marketing and Financial Issues in Asia**Paper Presentation**

Abstract ID	Author	Affiliation	Title	Presentation
SE01	Muhammad R. Ja'afar-Furo	Department of Agricultural Economics and Extension, Adamawa State University, PMB 25, Mubi, Nigeria	Economics of sheep and goats marketing in mubi zone, adamawa state, nigeria	Paper
SE02	M. L. Meena	ICAR-CAZR, Krishi Vigyan Kendra, Pali-Marwar (Rajasthan) 306 401	Economic Analysis of Traditional Goat Rearing by Raikas' Folks of Pali District in Western Rajasthan, India	Paper
SE03	B. S. Reddy	College of Agriculture, Kalaburagi, UAS, Raichur-585101	Small Ruminant Farming in Karnataka: A Pathway of Sustainable livelihood security and enhancing farmer's income	Paper
SE04	M V Dhumal	Ila Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India	Osmanabadi goat rearing for rural women empowerment in Parbhani district of Maharashtra	Paper
SE05	Rupesh Rai	Goat village- Nag Tibba, Dist. Tehri Gharwal, Uttarakhand	Goat Farming and Eco-tourism: A Case Study in Uttarakhand	Paper
SE06	Keshav P. Sah	Heifer International Nepal, GPO Box. No. 6043, Kathmandu, Nepal	Contribution of Nepalese Smallholder farmers in achieving self-sufficiency in goat meat	Paper
SE07	Narendra Singh	Department of Agricultural Economics, ASPEE College of Horticulture & Forestry, Navsari Agricultural University, Navsari-Gujarat-396450	Contribution of goat rearing for sustainable farm income: A case study of South Gujarat region	Paper
SE09	Prithviraj Chavan	Sumbran Udyog, Vitthalwadi-Kawathe, Block Wai, Dist. Satara,	Sumbran Goat Farm: The Beginning of Success	Paper

Asian Regional Conference on Goats (ARCG-2018)

		Maharashtra, 415 516		
SE10	Aishwarya Dudi	ICAR-CAZRI, Krishi Vigyan Kendra, Pali-Marwar (Rajasthan) 306 401	Gender Division of Labour and Decision Making in Goat Farming in Pali District of Rajasthan, India	Paper
SE11	S. Sapkota	National Animal Science Research Institute (NASRI), Nepal Agricultural Research Council (NARC), Khumaltar, Lalitpur, PO Box : 1960, Kathmandu (Nepal)	Financial analysis of the Boer pure and crossbred kids reared under different production system at Western hills of Nepal	Paper
SE14	Simran Godara	Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India	Knowledge and adoption of goat rearing farmers	Paper
SE15	Rajesh Kumar	Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India	Marketing practices followed by goat farmers	Paper
SE16	Rajesh Kumar	Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, Haryana, India	Importance of goat farming in rural economy	Paper
SE17	Shaila Vinayak Narawade	Aai Goat Farm, Post Savindane , Block Shirur, Dist Pune 410510, Maharashtra	Rearing Goats for Milk – A Livestock business in Draught Prone Area	Paper
SE18	Chetna Gangwar	Central Institute for Research on Goats Makhdm, Farah, Mathura 281122 (Uttar Pradesh), India	Women are key player in goat farming in rural areas of Mathura	Paper
SE20	Gunaseelan	Division of Extension Education, ICAR-Indian Veterinary Research Institute, Izatnagar, U.P.-243 122, India	Adoption Level of Improved Goat Farming Technologies by Commercial Goat Farmers in Tamil Nadu, India	Paper

Asian Regional Conference on Goats (ARCG-2018)

Poster Presentation

Abstract ID	Author	Affiliation	Title	Presentation
SE08	C. Nimbkar	Animal Husbandry Division, Nimbkar Agricultural Research Institute (NARI), Phaltan, District Satara, Maharashtra	Daily earning of goat keepers from rearing Osmanabadi goats	Poster
SE12	Dushyant Yadav	Post Graduate Institute of Veterinary Education & Research, Jaipur	Goat: A way to doubling farmer's income	Poster
SE13	B. Kumar	Department of Veterinary Pathology, Apollo College Jaipur	Socio-economic role of goat production for poor people in India	Poster
SE19	Akhilesh Kumar Chaubey	Krishi Vigyan Kendra , Singrauli JNKVV Jabalpur, MP	Socio-economic status and management practices of Goat farmers in Singrauli District of Madhya Pradesh	Poster

Goat Health Management and Welfare

Paper Presentation				
Abstract ID	Author	Affiliation	Title	Presentation
GH01	Muhammad Mazhar Ayaz	Department of Pathobiology, Faculty of Veterinary Sciences, Bahauddin Zakariya University, Multan, Pakistan	Anthelmintic Activity of Withania Coagulans and Its Derivatives in Sheep and Goat	Paper
GH02	Kirit B. Patel	Department of Animal Biotechnology and Veterinary Microbiology, College of Veterinary Science & A.H., Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar-385506, Gujarat, India	A Corelation Between Seroclinico Epidemiology and Various Stimulating Parameters for Goat Brucellosis	Paper
GH03	M. L. Meena	ICAR-CAZRI, Krishi Vigyan Kendra, Pali-Marwar (Rajasthan) 306401	Documentation of Ethno-veterinary Medicines for Goat Followed by Raikas' Folks in Arid Zone of Rajasthan, India	Paper
GH04	Bhupamani Das	Sardakrushinagar Dantiwada Agricultural University, Dantiwada, Gujarat	Molecular characterization and Protein profiling of Haemonchus contortus (Nematoda: Trichostrongylidae) in goats of South Gujarat	Paper
GH06	R.G. Nimase	Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist- Ahmednagar (MS)	Mortality pattern of Sangamneri Goats under field conditions	Paper
GH08	Anu Rahal	ICAR-Central institute for Research on Goats, Makhdoom, Farah, Mathura, UP- 281122	Modulation of peripartum inflammation in goats using common Indian plants	Paper

Asian Regional Conference on Goats (ARCG-2018)

GH11	Paula Menzies	Department Population Medicine, University of Guelph, Guelph, Ontario, Canada	Guide to udder health for dairy goats – Providing guidance for veterinarians and producers in improving milk quality	Paper
GH13	Peetambar Kushwaha	GALVmed, Unit 118-120B Splendor Forum Jasola District Centre Jasola New Delhi 110025	Creating PPR vaccination business for sustainable service delivery	Paper
GH14	P. M. Ghalsasi	Animal Husbandry Division, Nimbkar Agricultural Research Institute (NARI), Phaltan, District Satara, Maharashtra	Possible transmission of gastro-intestinal nematode (GIN) infection through ‘cut and carry’ fodder in stall-fed goats	Paper
GH16	S. Paul	ICAR-Central institute for Research on Goats, Makhdoom, Farah, Mathura, UP- 281122	Co-infection and increased shedding of Cryptosporidium spp. oocysts by adult goats endemically infected with Mycobacterium avium subspecies paratuberculosis	Paper
GH17	S. Paul	ICAR-Central institute for Research on Goats, Makhdoom, Farah, Mathura, UP- 281122	An ex ante assessment of economic gain from eye mucosa based targeted selective treatment chart against haemonchosis in goats	Paper
GH23	Jai Sunder	Division of Animal Science, ICAR-Central Island Agricultural Research Institute, Port Blair, A & N Islands, 744 105	Serological investigation of some important RNA viruses affecting goats in A & N Islands	Paper
GH25	S. K. Sharma	Department of Veterinary Microbiology and Biotechnology, Post Graduate Institute of Veterinary Education and Research (PGIVER), Jaipur	Prevalence and incidence of clinical condition in goats in an around Jaipur	Paper
GH27	Yaday	Post Graduate Institute of Veterinary Education and Research, Jamdoli,	Dystocia due to Single Fetus and its Successful Per-Vaginal	Paper

Asian Regional Conference on Goats (ARCG-2018)

		Jaipur (Rajasthan)	Delivery in Non-Descript Goat: A Case Report	
GH28	G. G. Sonawane	Central Sheep and Wool Research Institute, Avikanagar (via-Jaipur), Tehsil- Malpura, Distt-Tonk, Rajasthan-304501	Antimicrobial resistance of certain bacterial species obtained from lambs naturally died due to septicemia and pneumonia	Paper
GH30	N. K. Jeph	Department of Veterinary Medicine, Post Graduate Institute of Veterinary Education and Research (PGIVER), Jaipur	Antibiotic Efficacy Evaluation against Bacterial Pathogens obtained from Mastitic Milk of Goats	Paper
GH32	S. R. Sharma	ICAR-North Temperate Regional Station (CSWRI), Garsa, Kullu (HP), India - 175141	Contagious Ovine Digital Dermatitis (CODD) in an Organized Sheep Farm under Temperate Climate	Paper
GH33	Alka Galav	Department of Veterinary Microbiology & Biotechnology, College of Veterinary and Animal Sciences, Bikaner	Genetic analysis of PPRV strains recently circulating in Rajasthan, India	Paper
GH36	K. Syamala	Department of Veterinary Parasitology, College of Veterinary and Animal Sciences, KVASU, Mannuthy, Thrissur, Kerala, India – 680651	Comprehensive Survey on Worm Management Practices Adopted by Goat Farmers in Kerala	Paper
GH39	Seuli Saha Roy	Department of Veterinary Public Health & Epidemiology, College of Veterinary Sciences and Animal Husbandry, R. K. Nagar, West Tripura - 799008. Tripura, India	Bacteriological Quality of Raw Chevon of Black Bengal Goat Retailed in Different Markets in Tripura	Paper

Asian Regional Conference on Goats (ARCG-2018)

GH41	S. V. Singh	Dept. of Biotechnology, GLA University Post-Chaumuhan, Mathura, India (281 406)	Bio-load and bio-type profile of <i>Mycobacterium avium</i> subspecies <i>paratuberculosis</i> in raw milk samples of goats endemically infected with Johne's disease	Paper
GH45	Neelam Jain	Amity University Rajasthan, Jaipur	Bacteriophages as Novel Arsenal to Combat Escherichia coli Infections in Goat	Paper
GH49	Amit Kumar	Department of Veterinary Microbiology College of Veterinary Sciences DUVASU, Mathura-281001(India)	Assessment of erythrocytic oxidative stress induced by combined nanoparticle based polymer gel mastitis vaccine in lactating female inbred albino mice	Paper
GH51	Anil Dixit	Department of Animal Husbandry Govt. of Uttar Pradesh, Lucknow, UP	Transmission of PPR in Goat in UP"	Paper
GH54	Rudramadevi Punati	Genomix Molecular Diagnostics Pvt.Ltd, 5-36/207, Prashanthinagar, Kukatpally, Hyderabad- 500072, TG	Isothermal PCR Coupled Lateral flow Assay to detect nucleic acids for Para tuberculosis in Small Ruminants at Point of Care Resource Limited Areas	Paper
GH55	Mukta Jain	¹ Amity Center for Mycobacterial Disease Research, Amity Institute of Microbial Technology, Amity University Rajasthan, NH-11C, Delhi-Jaipur Highway, Jaipur (Rajasthan), India- 303 002	Comparative Prevalence of Paratuberculosis and Tuberculosis in Small Ruminants of Herds of Jaipur (Rajasthan)	Paper
GH57	Selvam Ramasamy	Evaluation of Topiure-SG for Paper Lesions in Sheep/Goats	Animal Health Science, R & D Centre, Natural Remedies Private Limited,	Paper

Asian Regional Conference on Goats (ARCG-2018)

			Hosur Road, Electronic City, Bangalore - 560 100, Karnataka, India	
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Poster Presentation

Abstract ID	Author	Affiliation	Title	Presentation
GH05	S. P. Singh	Department of Anatomy, COVSc & AH DUVASU Mathura	Histological studies of uterus during different stages of Pregnancy in Barbari Goat	Poster
GH07	Sarjana Meena	PGIVER, Jaipur	Haemonchus contortus Infestation in Goats : A Case Report	Poster
GH09	C. Jana	ICAR-Indian Veterinary Research Institute, Mukteswar, Nainital (Uttarakhand), India -263138	Molecular detection of contagious ecthyma virus in a field outbreak in goats at Uttarakhand	Poster
GH10	Mukta Jain	Amity Center for Mycobacterial Disease Research, Amity Institute of Microbial Technology, Amity University Rajasthan, NH-11C, Delhi-Jaipur Highway, Jaipur (Rajasthan), India- 303 002	Comparative Prevalence of Paratuberculosis and Tuberculosis in Small Ruminants of Herds of Jaipur (Rajasthan)	Poster
GH12	Sarjana Meena	Department of Veterinary Pathology, Post Graduate Institute of Veterinary Education and Research, Jaipur	Caprine Anaplasmosis : A Case Report	Poster
GH15	Rahul Singh	ICAR- Indian Veterinary Research Institute, Bareilly, Izatnagar-243 122 (U.P) India	Natural jaagsiekte sheep retrovirus infection causing ovine pulmonary	Poster

Asian Regional Conference on Goats (ARCG-2018)

			adenocarcinoma in sheep population of India	
GH18	S Sircar	ICAR - Indian Veterinary Research Institute, Izatnagar, Bareilly (U.P)– 243122	Molecular epidemiology of rotavirus A in caprine population, India	Poster
GH19	P.C Regar	Livestock Production and Management Section, National Dairy Research Institute, Karnal-132001	Health management practices of goats followed by tribal farmers in Rajasthan	Poster
GH20	Philippe Pourquier	IDvet, Grabels, France	A new pen-side test for the rapid detection of PPR virus in field conditions	Poster
GH21	H. C. Chauhan	Department of Animal Biotechnology and Department of Veterinary Microbiology, COVSc and AH, SDAU, Sardarkrushinagar-385 506 , Gujarat	Epidemiology and Diagnosis of Brucellosis in Goats by Serological and Molecular Methods in Gujarat, India	Poster
GH22	Jai Sunder	Division of Animal Science, ICAR-Central Island Agricultural Research Institute, Port Blair, A & N Islands, 744 105	Molecular Identification and Investigation of Contagious Ecthyma (Orf) Outbreak In Goat of A & N Islands- A First Report	Poster
GH24	S. K. Sharma	Department of Veterinary Microbiology and Biotechnology, Post Graduate Institute of Veterinary Education and Research (PGIVER), Jaipur	Multidrug resistant pattern of <i>Escherichia coli</i> obtained from clinical settings of goat	Poster
GH26	P. Perumal	ICAR-Central Island Agricultural Research Institute, Port Blair, Andaman and Nicobar Islands-744 101 (India)	Prevalence and economic impact of gastro-intestinal parasites of indigenous goat in Andaman and Nicobar Islands	Poster

Asian Regional Conference on Goats (ARCG-2018)

GH29	Pratyush Kumar	Post Graduate Institute of Veterinary Education and Research (PGIVER), Jaipur	A brief overview on Contagious Ecthyma in Goat	Poster
GH31	N. K. Jeph	Department of Veterinary Medicine, Post Graduate Institute of Veterinary Education and Research (PGIVER), Jaipur	Studies on prevalence of potential bacterial pathogens of clinical mastitis in Goats (<i>Capra hircus</i>)	Poster
GH34	Alka Galav	Department of Veterinary Microbiology & Biotechnology, College of Veterinary and Animal Sciences, Bikaner	Insights into the Molecular Evolution of PPR Virus	Poster
GH35	G.R. Gowane	Animal Genetics & Breeding Division, ICAR-Central Sheep and Wool Research Institute, Avikanagar	The Pattern of System Wise Morbidity in Malpura Sheep of Field Flocks	Poster
GH37	Jyoti Kumar	Division of Animal Health, ICAR-Central Sheep & Wool Research Institute, Avikanagar, Rajasthan 304501	Evaluation of a multiplex PCR for simultaneous detection of <i>Bibersteinia trehalosi</i> , <i>Mannheimia haemolytica</i> and <i>Pasteurella multocida</i> from culture and tissues	Poster
GH38	Devender Kumar	Post Graduate Institute Of Veterinary Education and Research, Jaipur	Uterine Torsion in goat: A Discussion	Poster
GH40	S. V. Singh	Dept. of Biotechnology, GLA University Post-Chaumuhan, Mathura, India (281 406)	Development and Standardization of visual onsite Loop Mediated Isothermal Amplification (vLAMP) for specific Diagnosis of Johne's Disease	Poster
GH42	Saurabh Gupta	Institute of Applied Sciences and Humanities, Department of Biotechnology, GLA University, Mathura	Immuno-proteomic analysis of secretory proteins of novel 'Indian Bison Type' biotype strain 'S 5' of <i>Mycobacterium</i>	Poster

Asian Regional Conference on Goats (ARCG-2018)

			<i>avium</i> subspecies <i>paratuberculosis</i> and significance in diagnosis of Caprine Johne's Disease	
GH43	Parul Yadav	Amity University Rajasthan, Jaipur	Isolation and Biochemical Characterization of Antibiotic Resistant Micro-organisms From Fecal Samples of Goats in Rajasthan Region	Poster
GH44	Meghna Garg	Institute of Human and Applied Sciences, Department of Biotechnology, GLAU, Mathura	A comprehensive review of herbal and medicinal plants as futuristic model for the therapeutic management of mycobacterial infections with special reference to paraTB infection of caprine populations and human beings	Poster
GH46	Saba Khan	Post-Graduate Institute of Veterinary Education and Research (PGIVER), Jamdoli, Jaipur	Comparative Aetio-Pathological Investigations into Bronchopneumonia in Sheep and Goats,	Poster
GH47	Vinita M. Dangi	Lala Lajpat Rai University of Veterinary and Animal Sciences Hisar, Haryana, India	And Determination of Antibiotic Sensitivity	Poster
GH48	Amit Kumar Lavania	Post Graduate Institute of Veterinary Education and Research Jaipur	Udder Edema in a Doe	Poster
GH50	Amit Kumar	Department of Veterinary Microbiology College of Veterinary Sciences DUVASU, Mathura- 281001(India)	Evaluation of newly formulated oil adjuvant combined mastitis vaccine in mice model	Poster

Asian Regional Conference on Goats (ARCG-2018)

GH52	Revathi Poonati	Genomix Molecular Diagnostics Pvt. Ltd, 5-36/207, Prasanthnagar, Kukatpally, Telangana 500 072, India	Development of Rapid, Inexpensive, Sensitive, Robust and Point of care Diagnostics for Leptospirosis serovars in Small Ruminants	Poster
GH56	Neha Singh	<i>¹Amity Institute of Microbial Technology, Amity University Rajasthan, Jaipur-303 002</i>	Antimicrobial Effect of Some Arid and Semi-Arid Medicinal Plants of Rajasthan Against Enteropathogenic Strains of <i>Escherichia coli</i> in Goat	Poster
GH57	Shivam Mishra	Antimycobacterial Effect of Some Arid and Semi-Arid Medicinal Plants of Rajasthan Against <i>Non-Tuberculosis Mycobacteria</i>	¹ Amity Center for Mycobacterial Disease Research, Amity Institute of Microbial Technology, Amity University Rajasthan, NH-11C, Delhi-Jaipur Highway, Jaipur (Rajasthan), India- 303 002	Poster

Production Systems and Climatic Changes in Asia**Paper Presentation**

Abstract ID	Author	Affiliation	Title	Presentation
PSCC01	Anshita Sharma	Department of Animal Genetics and Breeding, Post Graduate Institute of Veterinary Education and Research, Jaipur (Rajasthan)	Impact of the Climate Change on Livestock	Paper
PSCC02	N. Ramachandran	ICAR-Central Institute for Research on Goats, Makhdoom, Farah, Mathura- 281 122, Uttar Pradesh	Effect of plastic slatted flooring on growth performance of kids and lambs maintained under stallfed semiarid conditions of India	Paper
PSCC03	S. D. Mandakmale	AICRP on Sangamneri Goat, Mahatma Phule Krishi Vidyapeeth, Rahuri-413722, Dist. - Ahmednagar	Effect of Temperature and Temperature Humidity Index on Growth Performance of Sangamneri Goat	Paper
PSCC04	B. Rai	ICAR-Central Institute for Research on Goats, Makhdoom, Farah, Mathura- 281 122, Uttar Pradesh	Effect of alternative bedding materials during winters on growth performance of Barbari kids	Paper
PSCC05	Saket Bhusan	ICAR-Central Institute for Research on Goats, Makhdoom, Farah, Mathura- 281 122, Uttar Pradesh	Growth of kids under semi-intensive management system of Jakhrana flock	Paper
PSCC08	D.S. Chauhan	Cattle Cross Breeding Project, Vasantao Naik Marathwada Krishi Vidyapeeth, Parbhani-431402	Ethology of Black Bengal goats and Garole sheep under semi-intensive system of management	Paper

Asian Regional Conference on Goats (ARCG-2018)

PSCC10	P. P. Rohila	Division of Animal Production & Range Management, Central Arid Zone Research Institute, Jodhpur (Rajasthan) - 342 003	Production System of Marwari Goat in Indian Arid Zone	Paper
PSCC11	P. Perumal	ICAR-Central Island Agricultural Research Institute, Port Blair, Andaman and Nicobar Islands-744 101 (India)	Walking and summer stress on physiological, hematological and antioxidant profiles in Andaman local goat under island tropical ecosystem	Paper
PSCC12	P. Perumal	ICAR-Central Island Agricultural Research Institute, Port Blair, Andaman and Nicobar Islands-744 101 (India)	Endocrinological profiles of Andaman local goat under island tropical ecosystem	Paper
PSCC13	Arpita Mohapatra	Animal Physiology Division, ICAR-Central Sheep and Wool Research Institute, Avikanagar, Rajasthan-304501, India	Effect of solar radiation exposure on physiological response and blood biochemical of Malpura sheep under semi-arid region	Paper
PSCC14	Madhu Mohini	Animal Nutrition Division, National Dairy Research Institute, Karnal- India	Contribution of Small Ruminants to Global warming through emission of GHGs	Paper

Asian Regional Conference on Goats (ARCG-2018)

Poster Presentation

Abstract ID	Author	Affiliation	Title	Presentation
PSCC06	P.C Regar	Krishi Vigyan Kendra,Dungarpur, MPUAT, Udaipur (Rajasthan)	Housing management practices of goats followed by tribal farmers in Rajasthan	Poster
PSCC07	Dharmendra Chharang	Department Of Animal Nutrition, Post Graduate Institute of Veterinary Education and Research, RAJUVAS, Jaipur	Impact of Ruminant's Methane Emission on Climate Change: Challenges and Mitigation Strategies	Poster
PSCC09	P. Perumal	ICAR-Central Island Agricultural Research Institute, Port Blair, Andaman and Nicobar Islands-744 101 (India)	Kidding pattern and mortality rate of indigenous local goat kids reared under semi-intensive system in Andaman and Nicobar Islands	Poster
PSCC15	Anandita Srivastava	Department of Veterinary Physiology College of Veterinary and Animal Science RAJUVAS, Bikaner, Rajasthan, India	Extreme hot environmental temperature vis-à-vis endogenous oxidative stress biomarkers of non-descript goat from arid tracts in India	Poster
PSCC16	Abhinov Verma	Department of Anatomy, College of Veterinary Science and Animal Husbandry, DUVASU, Mathura-281 001	Gross-anatomical Development of Certain Facial Bones in Prenatal Goat (Capra hircus)	Poster

CONTENTS

1. Expert Talk
2. Paper Presentations
3. Poster Presentations

Expert Talk

Goat Health Management and Welfare

Ashok Kumar¹ and M. Suman Kumar²

¹Assistant Director General (Animal Health), ICAR, New Delhi

²Scientist, ICAR-CIRG, Makhdoom

India is home to approx. 14.5% of world's goat population and is a major source of self-employment for 33 million animal holders. The chevon production has almost doubled during the past decade and milk production has shown a stupendous growth rate of 31.53%. However, the lower production of meat and milk leaves us with ample scope for improvement. Sound goat health management with maintenance of overall health and welfare of animals contributes to improved body weight gain and milk production leading to economic gains for the farmer. Neonatal mortality is a vital aspect of goat husbandry with several studies reporting an average mortality even up to the extent of 20% in kids. A high percent of deaths in kids have also been attributed to non-infectious causes such as starvation, nutritional and environmental stress and reproductive problems. The mortality rates are higher in case of small herds. Goats in the country need to be vaccinated against Peste des petits ruminants (PPR), Goat Pox, Foot and Mouth Disease, Enterotoxaemia and Hemorrhagic Septicaemia and additionally against Anthrax and Black Quarter in endemic areas. Johne's disease is also of importance. PPR severely affects small ruminants in almost 70 countries leading to heavy losses. The OIE and FAO have targeted the control and eradication of PPR by 2030 through implementation of good quality veterinary services with vaccination being a key strategy. Animal welfare is an important issue that has drawn considerable scientific, political and public attention during the last few decades. It has become a major concern for consumers in most parts of the world with welfare aspect of animal husbandry having a direct effect on the meat quality and in turn on customer acceptance. A veterinary health plan according to required qualitative and quantitative standard of the conditions of life for animals, including health, behaviour and management is to be outlined at every farm. Goat health and welfare issues are directly linked to the productivity of the animal. Further, upgrading of existing non-descript breed of goats which comprise 62% of total population will further improve productivity and disease resistance capabilities. The impetus on research and development investments needs to be increased in order to realize the due potential of this 'animal of the future'.

Rangeland Management to Improve Feeding Resources for Goat

Prof. (Dr.) R.K. Dhuria (Dean)

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Goat rearing is a traditional occupation of land less, small and marginal farmers. This species is predominantly reared on community output system of production management. Although cost of feed input alone accounts for more than 70% in organized livestock rearing, the expenditure on goat on this account is negligible. Moreover, the rangeland feed resources of the country withering off due to overstocking/over grazing on community resources. Therefore, this is the time to look into the solutions through the regeneration and conservation of the community grazing lands, regeneration of waste lands which were earlier pasture and grazing lands or the wastelands which cannot be put to crop farming due to biophysical and hydrological limitations but can be developed into pasture and grazing land very efficiently.

The scenario of Transgenic Livestock Research

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The advent of transgenic livestock technology has revolutionized the course of biological research and opened up countless opportunities in both the basic and applied area of research. It offers a more direct approach for enhancing quality (e.g., milk quality) and efficiency (e.g., growth) of livestock production, developing livestock with resistance against diseases, as well as, providing a system for producing pharmaceuticals or nutraceutically important recombinant proteins, and xenoplantation products. In comparison to plants and other laboratory animal species, the progress of the application of this technology in livestock species for agricultural use has been very slow.

In 1980, Gordon and coworkers reported the first successful report of making transgenic mice using pronuclear microinjection. But, its application in livestock species was initiated only after the demonstration of a dramatic increase (nearly 50%) in body weight and size of transgenic mice carrying human growth hormone gene (Palmiter et al. 1982). In 1985, the first transgenic livestock, pig expressing human growth hormone, was produced (Hammer et al. 1985). This followed a series of reports demonstrating the generation of transgenic and by the next decade, transgenic animals in almost all the livestock species including cow, sheep, pig, and goat were produced. In the meantime, though retroviral vector came into the existence, the pronuclear microinjection remained as the most popular and used method of producing transgenic animals. In spite of the significant refinement in the existing technology of pronuclear microinjection, the application of transgenic animals for agricultural use remained constrained by three factors: 1) the lack of knowledge of the genetic basis of factors controlling the production traits, 2) the lack for tissue and developmentally appropriate promoters, and 3) the poor efficiency (0.1-3%) of production of transgenic livestock. Besides, the another most important problem was the random integration of the transgene resulting in either off-target effect and/or inefficient expression of the transgene due to the position effect.

In mid 90's the technological breakthrough enabling cloning of mammalian species using somatic cells (Campbell et al. 1996) as well as adult cells (Wilmut et al. 1997) resulted in a paradigm shift. The consequent advent of somatic cell nuclear transfer (SCNT) allowed the

application homologous recombination to genetically modify the cultured cells that could be further employed for generating transgenic animals with 100% efficiency. The application of SCNT resulted in the production of transgenic sheep (Schnieke et al. 1997) and the first knockout (KO) sheep (Denning et al. 2001) and pigs (Dai et al. 2002). These methods, however, are often afflicted by the requirement of highly specialized laboratory techniques and a very skilled early embryonic manipulation.

Almost at the time when "Dolly the sheep" was hitting the headline, Naldini and co-workers (1996) demonstrated that ability of nondividing lentiviral vector for stable *in vivo* gene transfer. The lentiviral-mediated gene transfer method is safer than the retroviral method and shows a comparatively higher efficiency but suffers from insertional mutagenesis (Modlich et al. 2009; Biffi et al. 2011) and limitation in transgene-carrying capacity (Thomas et al. 2003; Meng et al., 2016).

The above-mentioned technologies, including pronuclear microinjection, embryonic stem cell-mediated method, and viral-mediated transfection, are predominantly relied on manipulation of the female germ cells. During the early 2000's, targeting male germ cells emerged as an alternative for transgenic animal production. Generally, two strategies of gene transfer to male germ cells are employed; 1) sperm-mediated gene transfer (SMGT), and 2) testis-mediated gene transfer (TMGT). SMGT includes the direct transfer of genes into sperm cells, whereas TMGT involves *in vivo* introduction of foreign DNA into testicular germ cells to produce transgenic sperm cells. SMGT though appeared as a straightforward method, but poor repeatability (Lavitrano et al. 2002, 2003). On the other hand, the TMGT allows mass gene transfer by natural mating exempting the use of cumbersome procedures like *in vitro* fertilization and embryo transfer. Furthermore, TMGT ensures a greater possibility of stable integration of transgenes into the genome of the host animal (Dhup and Majumdar, 2008; Yamazaki et al. 2000).

Sperm-mediated gene transfer (SMGT), exploits the ability of sperm cells to bind, internalize and transport the exogenous DNA into an oocyte during the process of fertilization, is considered as a much interesting and promising alternative (Lavitrano et al, 1989). The method of SMGT appears to be a simple, efficient and applicable to a variety of species that uses spermatozoa for its propagation. The DNA binding efficiency, however, varies widely ranging from 0.3 to 78% among the sperms of different species. The success of SMGT is influenced by several factors including the donors of spermatozoa, incubation media, size, and type of the

exogenous DNA, and the kind of assisted reproductive technique used. In order to improve the DNA uptake efficiency of sperm cells, several strategies have been employed which include DNA–liposome complexes (Lai et al., 2001), electroporation (Gagne et al., 1991), virus-mediated transfection (Takehashi et al., 2007), linker (receptor) based method (Wu and Wu, 1987), combination of restriction enzyme-mediated integration (REMI) with SMGT (Kroll and Amaya, 1996), as well as combination of intracytoplasmic sperm injection (ICSI) with sperm/DNA interaction (Perry et al., 1999). Amongst those, electroporation-aided SMGT is considered to be a cheaper and more efficient method. Using electroporation-aided SMGT, transgenic offsprings are successfully produced in finfish and shellfish, and also in Rohu fish. Recently we have reported, for the first time, a protocol for electroporation aided SMGT in goat (Pramod et al, 2016). Our study demonstrated that under the optimized condition, electroporation can result in maximum DNA uptake by the caprine sperm cells with minimum adverse effect on their vital parameters including fertilizing ability. We also produced transgenic fluorescent embryos using transfected sperms.

Traditional SMGT experiments are potentially characterized by lack of reproducibility. *In vivo* gene transfer to introduce the transgene into testicular (sperm) stem cells namely testis-mediated gene transfer (TMGT) could be an alternative approach (Dhup and Majumdar, 2008) to solve this problem. Some scientists describe TMGT as an independent technique from SMGT, but others consider it as just a modification or simple variation of it, because, in both cases, sperm cells are undertaking the process of gene transfer. This technique would, in principle, remove the need to collect, manipulate or transfer eggs, thus providing a major streamlining of germline transgenesis (Smith, 2002). This *in vivo* technology introduces foreign DNA directly into testis by injection. In order to increase the efficiency, several strategies including virus-mediated as well as non-viral physical and chemical methods have been employed for TMGT (Dhup and Majumdar, 2008; Sehgal et al., 2011). Owing to higher efficiency, virus-aided TMGT offers an attractive proposition, but it is constrained by biohazard risk and possible harmful effects such as uncontrolled infection or inflammation (Scobey et al., 2001). Amongst the non-viral methods, both lipofection and electroporation aided TMGT are considered as an easier and safer method (Umemoto et al., 2005).

The available literature indicates that the electroporation method of TMGT has immense potential to produce transgenic laboratory animals (Huang et al., 2000; Dhup and Majumdar,

2008). However, till 2018 there was no report of the use of TGMT in large animals species including goat. In our laboratory (at Genome Analysis Lab, IVRI, Izatnagar), under the ICAR-National Fellow programme, we developed a successful method of transgenesis in goat by gene transfer into testicular cells using electroporation. Initially, we demonstrated that electroporation under optimized condition can efficiently transfer the foreign gene into the testicular tissues, particularly in somniferous tubules (Raina et al. 2015). Subsequently, we demonstrated the foreign gene expression in embryo and spermatogonial stem cells (SSCs) and the successful production of a transgenic goat using this method (Pramod & Mitra, 2018).

In conclusion, SMGT appears to be simple, efficient, and relatively inexpensive methods for modifying animals and the genome of animals. However, its underlying molecular basis and the inconsistent reproducibility remain unsolved. Given the wide availability of livestock semen, TMGT can be considered as the method of choice for the production of genetically modified farm animals.

Another problem in transgenic livestock production is the strict ethical regime and difficulties in obtaining the required permission due to lack of precision in transgene integration. However, the advent of genome editing technologies namely zinc finger nucleases (ZFNs; Cui, 2011), transcription activator-like effector nucleases (TALENs; Park et al. 2014) and clustered regularly interspersed short palindromic repeat (CRISPR)/CRISPR-associated protein 9 (Cas9) (Dow, 2015) has improved the precision ensuring the targeted gene integration in the host genome. In the future, the combination of any of the above gene editing technologies and TMGT offers efficient gene transfer in large animals. It is expected that the recent technological advancement in gene delivery techniques along with genome editing will bring the desired success in producing agriculturally important and commercially viable transgenic livestock.

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Use of Reproductive Technologies for Improvement in Goat Production

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Reproductive technologies in farm animals under control system can be useful for enhancement of productivity with minimum input. Assisted reproductive technologies (ARTs) such as in vitro fertilization, stem cell, cloning and gene editing (transgenesis) have the potential to improve efficiency of livestock production. ARTs also dictate the strategies that can be used to select animals genetically for traits that improve production. In vitro embryo production using oocytes collected from slaughterhouse ovaries from particular breeds have the potential to conserve and improve the germplasm. However, the costs and inefficiencies of the system might restrict its use.

ES cells have varied applications for farm animals as well as humans, like enabling studies on the fundamental events in embryonic development, production of therapeutic delivery systems, gene targeting, and regenerative medicine. Production of pluripotent ES cells from farm animal species might have a big influence on the genetic modification of these animal species. Availability of ES cells is expected to be especially useful in cloning technology, gamete (oocyte, sperm) formation. Also, in the context of gene targeting, use of ES cells could overcome current limitation on efficient gene transfer by providing an abundance of stem cells to be genetically manipulated by using conventional recombinant DNA techniques.

Somatic cells cloning through nuclear transfer, to produce healthy cloned animals, remains remarkable but highly inefficient and prone to epigenetic errors. The high rates of mortality throughout development create serious animal welfare issues, which limit the acceptability of somatic cloning. In animal breeding, improved genetic markers, correlated to specific livestock production traits, will provide confidence in cloning selected embryos and their derivatives, especially undifferentiated embryonic stem cells. This will enable rapid dissemination of the most recent elite genotypes to avoid the genetic lag associated with cloning adults. Furthermore, for the production of transgenic animals, embryonic stem cells might also

be beneficial, because they are more amenable to precise genetic modifications and result in higher cloning efficiencies than somatic cells in the mouse. We can say that for agricultural applications, embryonic cloning will ultimately prove more useful than somatic cloning.

Stem cell cloning and transgenic production technology for quality animal production are expected to have a significant impact on the future genetic improvement of goat breeds. However, because of low efficiencies and high costs, their present use is restricted to commercial farming system. Utilization of these technologies for goat genetic improvement and their productivity will be discussed.

Goat Production System: Promising Sustainable Enterprise

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ABSTRACT

Goat farming has shown great promises of enhancing income for rural farmers and entrepreneurs. Goat production systems are always beneficial and the breed shows their maximum performance when reared under their respective native habitat. Hence goat farming has potential for rural development leading to enhancing household income, employment and nutrition. Presently, every production system is under surveillance with respect to maintain balancing, in use of available resources for maximising output. For maintaining sustainability of the production system, programmes and policies requires implementation in a way that optimum production can be achieved in a sustainable manner.

The very basic empirical principle of sustainability is to let every living component of eco-system to grow in most likely natural way so as to permit various external stimuli to interact with, in desired magnitude and rate to maintain the system intact. In this way, livestock husbandry is key activity in determining successful transition towards sustainability in arid regions, for its strong bonding with human society in terms of economy, environment and socio-cultural.

Goat, one of the most important livestock species, is an important source of livelihood security, poverty alleviation and employment generation to a millions of resource poor of this country. Sustainable goat production is outcome of three constituent aspects viz., social, economic and environmental sustainability. Throughout the developing countries, goats are seen as important multifunctional animals, in socio-economic and ecological terms. This is reflected by their wide distribution and ownership by resource-poor small scale farmers, and also the landless.

Goat produces milk which is high in demand, meat due to its *organic* nature, a preferred platter. Impact on environment and climate adaptation also have favourable score under extensive/semi extensive system with controlled management. Goat husbandry mainly relying

on mix-crop Livestock system, Indigenous native germ plasm, Local biomass for feeding and Treatment with traditional wisdom and local herbs. In return, Recycling of nutrients, biodiversity conservation, energy use efficiency are high ranked parameters for sustainability.

On evaluating that, various goat husbandry practices are by *default providing and fitting in sustainability definition*. However, there is need to prepare a suitable model to conserve and propagate them so as the product may reach to commercial markets where premium price may be received. The concept of organic animal farming can fulfill the criteria for sustainability and to diminish environmental pollution of agricultural production Various governments may promote and resourceful organizations may enter in creating a chain net work through combining small scale farmers and provide them a group certification for organic produce with minimum assured premium price. In this way, farming community will encourage to conserve and adopt all organic animal husbandry practices which in turn promotes recycling of resources and increases efficiency of system for sustainable development.

Health practices for the management of major goat diseases for sustainable husbandry, improved productivity and reducing losses in fast developing new animal industry in the country by adopting dynamic 'Annual Health Calendar'

Shoor Vir Singh

In India traditionally goat farming has been 'zero input agriculture'. However, goat industry is fast emerging as new animal industry after the failure of dairy and poultry industries and commercial piggery due to health constrains (FMD, HS, Brucellosis, BQ, Paratuberculosis, Anaplasmosis, probles related to reproduction and reproductive disorders, Bird flu, Swine fever and Swine flu etc). Diseases have major role in the heavy losses incurred by poor goat farmers, entrepreneurs and commercial farmers with collapse of three animal enterprises in the country leading to emergence of 'commercial goat farming' which is now fast developing into an industry. In this journey of goats from 'poor man's cow' to rich man's golden goose' goat has travelled a long distance, though it has been source of livelihood security for millions of poor farmers and landless labours. This change has been going on silently in the recent past. In this emerging scenario, the need for Central Institute for Research on Goats, Makhdoom (South UP) was felt and was created on 12 July 1979, to address the needs of poor farmers on different aspects of goat production system. On the basis of rearing of the 2500 goats of four breeds (Barbari, Jamunapari, Jakhrana and Sirohi), 700 sheep (Muzaffarnagri) and the experience of past 33 years (1985 to 2018) in health care (prophylaxis and clinical management) in the 'Department of Goat Health and Clinics, we formulated packages of practices for health in the form of 'Animal Health Calendar'. This health calendar is dynamic model and can be strategically changed to suit any climatic condition and management system. Six major activities in the calendar; vaccination against five infectious diseases (PPR, FMD, Goat pox, HS and ET). Drenching against coccidiosis, deworming against endo-parasitism and dipping against ecto-parasites. Screening against highly contagious and zoonotic infections like Brucellosis, Johne's disease, Cryptosporidiosis, the infectious causes of neonatal diarrhoea (E.coli, Salmonella, Rota virus, Cryptosporidium etc.), monitoring of other infectious agents (Caseous lymph adinities, Staphylococcus infection, Blue Tongue, Contagious Ecthyma virus etc.) and six monthly health

checkup. If applied judiciously, the Annual Animal Health calendar can substantially reduce the mortality and morbidity and optimised production leading to the development of successful 'goat industry' in the country.

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Progress, Challenges and Strategic approaches in managing infectious viral infections of small ruminants

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The existence of a disease continually hampers the economic animal farming globally. The small ruminant's populations suffer from a number of diseases and even few of them are common with other livestock species like bluetongue, pox and culminates in losses through mortality and morbidity. Published reports confirm that due to acute gastroenteritis nearly 80% of total neonates succumb to death with substantial economic loss due to morbidity, mortality, diagnostics, treatment costs, and reduced growth rates and poor growth performance of animals. Amongst the etiological agents, viruses are most important clinical concerns. Since, the first record of virus associated diarrhoea in 1969, viruses are recognized as the major cause of diarrheal morbidity and mortality worldwide affecting mammals and birds. The strategic approach in timely managing these infections includes clinical diagnosis of enteric viral infections at an early stage of infection by the identification of virus(s) in faeces/body fluids or antibodies in serum of the patient. Following infection, these viruses are shed by hosts and ultimately transmit to susceptible population.

Roughly, it has been estimated that nearly 40% of the gastroenteritis cases remains undiagnosed and unsolved, which could be due to involvement of new viruses. For the detection of such unknown causes use of unbiased metagenomic approaches holds great promise. In several cases where routine diagnostic methods does not reveal any result the metagenomic analysis shows the presence of viruses, bacteria, and parasites. Usually conventional sequencing approaches are based to characterize genomes of a single species of interest, but the metagenomic approaches provides a holistic look at microbial diversity within a given sample. Though the progress over the past few decades in the area of disease diagnosis is very encouraging, still there are many restraints in developing effective and efficacious disease diagnostic approaches reliable on consistently mutable genome of few viruses. Despite the prodigious success in the field of enteric viral diagnostic tools, there is lack of widely accepted, economical and simple diagnostics yet. Mixed infection is another hurdle in disease diagnosis.

Limitations in all methods including cell culture, molecular based, immunological and other advanced technique based method needs to be minimized. Multiplex system offers rapid detection of more than one pathogen in one test. Future perspective will be the multi-target detection tests that currently require multiple testing modalities. Evaluation of non-cultured viral strain to study the epidemiological perspective and disease diagnosis is another future target. Metagenomics has revealed many new viral entities from the samples. Next generation sequencing and biosensor probe based methods are promising rapid detection technologies. The use of molecular diagnostics and advance tools is a new insight into aetiologies of infectious diarrhoea for effective control of infectious diseases of neonates.

With advent of technologies in various areas of immunology, microbiology, molecular biology, biochemistry and statistical sciences, the field of vaccinology has grown beyond imagination. Under current era of emerging microbial resistance, various types of novel and emerging therapies along with development and designing of newer, safer and more effective vaccines would attract the attention of researchers globally to counter the infectious pathogens including small ruminant's microbes. Modern vaccine approaches are based on subunit vaccines, DNA vaccines, vectored vaccines and transgenic plant vaccines and these have led to overcome limitations of conventional vaccines. Recent techniques contributing towards novelty in vaccine designing are reverse vaccinology (RV), structural vaccinology (SV), virus like particles (VLPs), designer cell lines and synthetic RNA vaccines. The talk will discuss on various issues faced by the growing livestock industry and our progress, challenges in the area of research.

Investigating Kid Mortality on Dairy Goat Farms in Ontario, Canada

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Keywords: Epidemiology, Failure of passive transfer, Pneumonia, Diarrhea, Septicaemia, starvation

The dairy goat industry in Ontario has undergone a rapid increase in both number of licensed producers and herd size. Kid mortality was identified by the industry as being one of the biggest animal health issues with estimates of pre-weaning losses in excess of 20%. The objectives of this study are to determine mean herd level mortality from birth to 4 months of age, important causes and risk factors associated with these causes. Colostrum management practices and prevalence of failure of passive transfer are being specifically investigated.

Seventy-five farm visits are underway to gather questionnaire data on kid health and rearing practices. Of these farms, thirty have been enrolled for more in-depth investigation over one year. All kid deaths are necropsied at the University of Guelph and death causes categorized. On-farm assessments of hygiene, air quality, stocking densities and nutrition are being performed over the same period. Tests of colostrum quality and serum immunoglobulins are being performed to assess prevalence of failure of passive transfer.

Results at this point are preliminary with six months worth of data available on some farms. To date, 380 postmortems are complete with the major causes of mortality being pneumonia, septicaemia and starvation. Most deaths have occurred less than 40 days of age. The association of mortality with disbudding lesions has been investigated with kids from 11 farms showing visible changes to the brain. Investigation is ongoing with more results available at the time of presentation.

How to improve the kid survival rates in your dairy goat flock?

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Key words : Kids, survival rate, illness, prevention, rosehip, minerals, premix

ABSTRACT

Industry statistics suggest keeping kids alive as soon as they are born is no easy feat. Almost 50% of total kid losses occur in the first 48 hours of life, with a further 11% coming to an early demise two-to-14 days post-lambing. Hygiene around kidding interval, avoiding lamb illnesses are the most important topics for improving lamb survival rates and rantability in dairy herds. In this paper the premix of rosehip (*rosa canina*) and some mineral matter on illness and survival rates of newborn kids will be determined.

Nutritional Management and Alternate Feeding System of Small Ruminants

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Small ruminants are an integral part of farming systems in the tropical, subtropical, and arid regions of the world. In developing countries, sheep and goats are often kept in marginal environments with scarce grazing and unfavourable climatic conditions. Moreover, the prevalent changing climatic scenario and upcoming environmental distress will have a drastic adverse effect on small ruminant production. Nutritional management of animals exposed to periods of adverse and unstable climatic environment is one of the promising approach to sustain their productivity. The nutritional interventions comprise of supplemental concentrates, utilization of unconventional feed resources, feeding tree foliage and leaves, supplementation of bypass fat, protein and other feed additives, mineral, electrolyte and antioxidant supplementation. In India, more than 90 percent of small ruminants are owned by landless and marginal farmers, who generally rear the livestock on common property resources (CPR) with little or no supplementation. Animals are only managed on fellow lands and commons' which are highly degraded and eroded due to very high stocking density as compared to their actually carrying capacity and zero management practices of these CPR's leading to poor animal performances.

In arid and semiarid region of the country our valuable animal resource is sent for slaughter during their active phase of life i.e. 3-6 month of age due to fear of financial losses in terms of lamb mortality, non-availability of proper nutrition, guidance and also to meet social and family need of the sheep rearing community. These animal resources if reared up to the age of 6 month by adopting proper rearing strategies can bring about sizable change in sheep production and save wastage of national resources, can be instrumental towards the upliftment of socioeconomic status of the sheep farmer. Alternate feeds and feeding systems that meet out the nutritional requirement of small ruminants without affecting their production potential will have a major say on sustainability of this production system. Sheep being a grazer and goat a browser, they most efficiently utilized the feed resources like grasses, forbs, shrubs and trees available on different types of pastures and silvipastures without any serious competition among them resulting in improvement in their overall productivity per unit of land. Studies have indicated that the sheep and goats should be grazed for a minimum period of 6 hours during monsoon and 8 hours during winter. During summer the grazing should be restricted to early

morning and late evening hours depending on the availability of feed resources. Further other options can be explored to meet the requirement of dry matter during scarcity. CPR improvement and strengthening program should be simultaneously taken up.

Unarguably, there is large scope to increase the small ruminants' role in the livelihood of small holder farmers not only to improve their economic and social status but also to explore job opportunity to rural youth. On the other hand, this will meet the growing demand for meat and meat products and enhance protein and nutritional security of Indian population by unleashing increasing production level through higher nutritional inputs.

Phytogetic Bioactive Compounds: Implications on Protein Utilization, Methane Mitigation, Health and Performance of Animals

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Keywords: Bioactive compounds, Plants, Methane emission, Antioxidant status, Immunity, Animal performance

Abstract

Plants produce diverse bioactive compounds, synthesized as secondary metabolites, regarded as products of biochemical side tracks in the plant cells, not generally needed for daily performance. Out of several plant bio-active compounds, phenolic acids, flavanoids, tannins, saponins and essential oils are the most commonly occurred in ubiquitous and have significant implications on animal agriculture. Researchers have become more interested in polyphenols due to their potent antioxidant properties and credible effects in the prevention of cardiovascular, neurodegenerative diseases and cancer. Condensed tannins (CT), flavanoids and essential oils (EO) have the ability to modify the rumen fermentation towards reduced methanogenesis by altering rumen microbial community and their supplementation reduces nitrogen excretion in ruminants by improving its utilization efficiency. Improvement in feed intake, growth rate, reproduction and milk production in ruminants fed tannins, saponins or essential oils containing diets were observed in a dose dependent manner. Supplementation of CT through leaves of *Artocarpus heterophyllus*, *Ficus infectoria*, *Ficus bengalensis* and *Ficus glomerata* at 1.5- 2.0% levels was observed to reduce the rumen degradability of groundnut cake to 60-75% from the normal value of 92%, demonstrating improvement of its utilization at lower digestive tract. Controlling gastro-intestinal parasites by supplementation of CT through *F. infectoria*, *Psidium guajava* and *Ficus bengalensis* leaves has been effective to ameliorate drug resistance. Feeding study on lambs and crossbred cows with supplementation of CT (1.5%) either through *F. Infectoria* or *F. bengalensis* leaves was found to increase feed efficiency, growth rate, milk yield, fat yield, antioxidant status and immunity of animals. Recent study indicated that feeding of plant bio-active compounds containing a blend of CT from *Ficus bengalensis* leaves, saponins

from soapnut fruits (*Sapindus mukorossi*) and eucalyptus EO, improved growth rate and feed utilization with reduction in methane emission from buffalo calves. Therefore, sensible use of plant bioactive compounds could be beneficial for improving health and production performance of animals with reduction of greenhouse gas emission to the environment.

Effects of Different Energy and Protein Levels on Growth Performance and Nutrients Apparent Digestibility in Lambs of Yanshan cashmere Goat

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Key words: energy; protein; growth performance; nutrient apparent digestibility; Yanshan cashmere goat

ABSTRACT

The purpose of this experiment is to study the effects of different energy and protein levels of diets on growth performance and nutrients apparent digestibility in rams of Yanshan cashmere goat. Yanshan cashmere goat is a local breed of China. It is famous in its high cashmere yield and good cashmere quality in China. Ninety 4-month-old weaned rams of Yanshan cashmere goat (15 kg) were randomly divided into 9 groups (10 lambs per group) with 9 different totally mixed diets granulated feed. This experiment was based on a 3×3(energy×protein) completely random experiment design, metabolism energy (ME) and digestible crude protein (DCP) were set to 2 factors in this study and 3 levels were established, this experiment was divided into two stages according to the body weight(BW) of cashmere goat, the first stage was from 15 kg to 25 kg BW, the metabolic energy(ME) in this diet was formulated at 9.5, 10.5 and 11.5 MJ/kg•DM, digestible crude protein (DCP) were 8.5%, 9.5% and 10.5%, respectively; the second stage was from 25 kg to 35 kg BW, the diet was modified according to the first stage with ME of 9, 10 and 11 MJ/kg•DM, DCP were 8.5%, 9.5% and 10.5%, feeding trial and digestion-metabolism trial were conducted to measure the growth performance and nutrients apparent digestibility. The trial results showed that:

(1) The period of from 15 kg to 25 kg BW:

The dry matter intake (DMI) and feed to gain ratio(F/G) were decreased significantly($P<0.05$) with the increase of dietary ME levels but no remarkable effect on average daily gain (ADG)($P>0.05$); the dietary DCP levels improved the ADG with no significant difference($P>0.05$), ADG of high DCP groups were extremely higher than those of low and medium DCP groups($P<0.05$), the dietary DCP levels had no significant effect on DMI; there

was no remarkable difference in ADG between Group IX(high energy and high protein) and Group VI (medium energy and high protein), ADG of Group IX and Group VI were significant higher than Group VII ($P<0.05$) and higher than the other 6 groups with no significant difference($P>0.05$); the interactions of dietary ME×DCP had a remarkable effect on DMI($P<0.05$) but no significant effect on ADG and F/G($P>0.05$).

The fecal energy and urinary energy were decreased significantly with the increase of dietary ME levels($P<0.05$), but the gross energy(GE) apparent digestibility increased significantly($P<0.05$); the dietary DCP levels and the interactions of ME×DCP had no significant effect on GE, fecal energy, urinary energy, digestible energy and GE apparent digestibility($P>0.05$).

The nitrogen (N) intake, fecal N and urinary N were decreased significantly with the increase of dietary ME levels but N apparent digestibility increased significantly($P<0.05$), N apparent digestibility in high ME groups were extremely higher than those of medium and low protein groups($P<0.05$); the N intake, digestible N, N apparent digestibility increased significantly with the increase of dietary DCP levels($P<0.05$); N apparent digestibility in Group IX was the highest (70.88%), the interactions of ME×DCP had no significant effect on N metabolism($P>0.05$).

The apparent digestibility of dry matter(DM), organic matter(OM), ether extract(EE) and calcium(Ca) increased significantly with the increase of dietary ME levels($P<0.05$); the dietary DCP levels and the interactions of ME×DCP had no significant effect on other nutrients apparent digestibility($P>0.05$).

(2) The period of from 25 kg to 35 kg BW:

The DMI and F/G decreased significantly with the increase of dietary ME levels ($P<0.05$) but no significant effect on ADG ($P>0.05$); ADG increased first and decreased afterwards with the increase of dietary DCP levels, ADG and DMI in medium DCP groups were extremely higher than those of low and high protein groups ($P<0.05$); the ADG of Group V (medium energy and medium protein group)was highest (222g/d), the ADG of Group IV (medium energy and low protein group)was lowest (163.78g/d); the interactions of dietary ME×DCP had a remarkable effect on DMI ($P<0.05$) but no significant effect on ADG and F/G($P>0.05$).

The fecal energy decreased significantly with the increase of dietary ME levels but digestible energy and GE apparent digestibility increased significantly ($P<0.05$), GE apparent digestibility of high ME groups was 21.26% higher than low ME groups ($P<0.05$), there was no remarkable difference in urinary energy ($P>0.05$); the dietary DCP levels and the interactions of ME×DCP had no significant effect on fecal energy, urinary energy, digestible energy and GE digestibility ($P>0.05$).

The dietary ME levels had a significant effect on nitrogen (N) intake, fecal N and N apparent digestibility ($P<0.05$) but no significant effect on urinary N, N Retention and net protein utilization (NPU)($P>0.05$), the N intake and fecal N decreased significantly with the increase of dietary ME levels($P<0.05$), digestible N had the trend to decrease($P>0.05$), N apparent digestibility increased significantly($P<0.05$), N apparent digestibility in high ME groups were extremely higher than low and medium ME groups($P<0.05$), the dietary DCP levels significantly affected N apparent digestibility, urinary N, digestible N and N intake($P<0.05$)but no significant effect on fecal N, N Retention and NPU($P>0.05$), N apparent digestibility, urinary N, digestible N and N intake increased significantly in linear with the increase of dietary DCP levels($P<0.05$); the interactions of ME×DCP had no significant effect on N digestion and metabolism($P>0.05$).

The dietary ME levels had a significant effect on the apparent digestibility of DM, OM, EE and Ca($P<0.05$) but no significant effect on NDF, ADF, and P($P>0.05$), the apparent digestibility of DM, OM, EE and Ca increased significantly with the increase of dietary ME levels($P<0.05$); the dietary DCP levels had a significant effect on the apparent digestibility of Ca, Ca apparent digestibility in low DCP groups were extremely lower than those of medium and high protein groups ($P<0.05$).

Comprehensive consideration, ME:10.5 MJ/kg and DCP:10.5% of diet are recommended for Yanshan cashmere goats from 15 kg to 25 kg BW, ME:10 MJ/kg and DCP:9.5% of diet are recommended for Yanshan cashmere goats from 25 kg to 35 kg BW.

Breeding and Selection Criteria for Small Holder Goat Production Systems of Tropics

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Key words: Goat, Breeding objectives, Selection criteria and Small holder production.

Goat is the most prolific domesticated ruminant under tropical and sub-tropical conditions. Majority of the goat breeds have average litter sizes of 1.5 or higher. They have exceptional tolerance to heat stress, ability to grow on poor quality feed and capable of enduring prolonged periods of water deprivation. The popularity of goats in developing countries can be attributed largely to their hardiness, reduced risk as small animal and easy marketability. Therefore, goat farming is equally suited to homestead, marginal, small and large-scale production in the tropics and sub-tropics. Small holder production systems are typically a low input farming predominant in developing countries. Although goat production in rural areas has the potential to contribute to food security and commercial development, it faces several challenges. Problems associated with poor management like reduced weight gain and increased mortality erodes the profitability of goat rearing. Aimless breeding makes the situation more complicated, leading to absence of genetic progress over many generations and the formulation of breeding objectives assume paramount importance. Breeding objectives should be formulated after consultation with the communities which rear them and the prevailing market demand. Realized genetic progress in a generation is largely limited by heritability of the trait. In general, economic traits with heritability less than 0.1 are considered as lowly heritable (eg: prolificacy) and less genetic progress will be achieved per generation even through rigorous selection. Breeding programs in small holder systems are further limited by the inability to assess selection differential. Genetic merits of animals are often masked by factors like poor nutritional status. Before implementation of breeding schemes, awareness programs to modify management to optimum levels in tune with available resources of farmers needs to be launched. In resource poor regions breeds with higher

genetic merit and individual selection are the most promising option. This allows farmers to select bucks based on phenotype, which allow genetic improvement of high and moderately heritable traits. For example, farmers may be advised to used bucks born from larger litters with higher milk yield may improve prolificacy and milk yield. In regions with non descript goats, cross breeding or grading up using breeds with better potential is a logical solution. The selection of breeds should be balanced between available resources and suitability to agro climatic conditions prevailing in the area. Breeding and selection criteria need to be defined for small holder production systems for sustainable genetic improvement.

Goat Replacement in Selection Programs-Weaning management

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Keywords: Weaning, goat kids, coccidia

In selection programs, the older goats have to be replaced periodically. Thus, the efficiency of weaning management has an important impact on the number of new healthy breeding goats. One of the aspects that sometimes goes unnoticed, but has a huge sanitary and economic importance on the goat farms, is the one related to the weaning period. To overtake or delay it, leads to increase or decrease the amount of milk to be recorded and put the health of the animals at greater or lesser risk. Together these issues that seem clear, are joined others that are hardly evaluable for farmers. When the kids spend more time with the mother, their level of immune competence will increase, but the body condition of the goat will decrease, negatively affecting the rest of the lactation, with the consequent economic losses. On the other hand, the lactation stage and subsequent weaning, is usually in which the animal is more immunosuppressed and, therefore, more susceptible to be infected by coccidia, which can cause high morbidity and mortality.

In the Canary Institute of Agronomic Research (ICIA- Spain) a project has been developed related to this issue. The objective was to study the effect of early weaning and artificial lactation on animal health, profitability of farms and reliability of records.

With this aim, three homogeneous groups of 12 kids of the Majorera and Tinerfeña breeds were formed. One of them was fed with milk replacer (MR) for two months. Another was weaned early at 35 days, and then they were fed exclusively with a weaning food. A third group was used as a control. The kids staying with their mothers for two months and immediately later they were weaned.

As expected, greater weight gain was found in the kids that stayed with their dams (15.52 Kg), followed by those fed with MR (13.63 Kg) and finally those of early weaning (11.41 Kg). When it was evaluated the cost of feeding, it was found that MR group had the lowest value (€ 30.70 / kid), followed by early weaning (€ 51.69 / kid) and finally traditional weaning (82.88). €

/ kid). Regarding the breed, no significant difference in weight gain was observed between Tenerife (13.30 Kg) and Majoreras (13.73 Kg) goats. However, when evaluating the influence of sex, males presented higher gains compared to females (14.63 Kg vs 12.36 Kg respectively).

The α -s1, α -s2 and β -casein Contents of Milk collected from Various Goat Breeds and Populations

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Keywords: goat milk, α -s1, α -s2 and β -casein, Hungary

ABSTRACT

The α -s1, α -s2 and β -casein contents of milk originated from 27 goat populations were studied belonging to following breeds: Saanen /S/ (6); Alpine /A/ (6); Hungarian Milking White /HMW/ (3); Hungarian Native /HN/ (2); Hungarian Milking Brown /HMB/ (2); Hungarian Milking Multicolour /HMM/ (2); Hungarian Black /HB/ (1); (Hungarian Native x Nubian) /HNN/ (2); Banathian White /BW/ (1); Carpathian /C/ (1); Balkan goat /BG/ (1). Ten heads of each population were individually sampled. Samples were examined with two repeats.

For measures Agilent 2100 Bioanalyzer equipment was used applying Protein 80 Kit, which enabled to separate proteins within 5 and 80 kDa molecule mass range. One to thirty diluting level was applied before measure. Automatic software determinations were not possible to use calibration equations were developed for α -caseins ($y=4146,9x+22,369$ $R^2=0,9835$) and β -casein ($y=5012,2x+40,42$ $R^2=0,9794$). SPSS for Windows 20 was applied in data processing.

High significant differences were observed among breeds and within breeds between farms.

On the bases of g/100 g milk the β casein, α -s1, α -s2 caseins values varied within very wide range in the case of S (1.170-2.283 and 0.134-0.805 and 0.073-0.228), A (1.103-2.343 and 0.239-0.558 and 0.076-0.217), HMW (2.428-2.609 and 0.670-0.819 and 0.149-0.182), HN (1.669-2.340 and 0.596-0.683 and 0.104-0.168), HMB (2.232-2.501 and 0.667-0.702 and 0.173-0.176), HB (1.958 and 0.337 and 0.120), HMM (2.355-2.488 and 0.472-0.783 and 0.123-0.184), HNN (2.181-2.377 and 0.639-0.792 and 0.148-0.158), BW (1.820 and 0.275 and 0.117), C (2.762 and 0.811 and 0.246), BG (2.612 and 0.829 and 0.178), respectively following the same order.

Goat Production System in Arid Region of Rajasthan

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Key Words: Goat, production system, arid region

Goats play an important role in the food and nutritional security of millions of rural people especially the landless, marginal and small farmers in all eco-systems. Goat production system in arid zone of Rajasthan relies mainly on grazing on common lands that provide the maximum nutrient requirement. About 40% of total area is available for grazing mainly for cows, sheep and goat, however, the availability of green fodder is restricted to monsoon and post monsoon months only and during rest of the period animals depend on dry grasses and crop residues available in cultivated, fallow, wastelands and common grazing lands. In arid region *Cenchrus ciliaris*, *Cenchrus biflorus*, *Cenchrus setigerus*, *Lasiurus indicus*, *Aristida spp* and *Eleusine spp.* are dominant grasses available during monsoon period and some trees/shrubs like *Ziziphus nummularia*, *Prosopis cineraria*, *Acacia senegal*, *Azadirachta indica*, *Ailanthus exclusa* etc also provides green fodder for browsing during post monsoon. However, the nutrient availability and qualities of forages varies greatly and grazing alone is not sufficient to meet out the nutrient requirement of goats especially during late gestation and early lactation periods and therefore, the supplementary feeding either in the form of roughages or concentrate feeds is very essential for optimum production. Feeding of multi-nutrient mixtures comprising wheat bran, guar korma, molasses, urea, vitamin-mineral mixture, common salt to goats after grazing was found to improve body weights and milk yield appreciably. Feeding of non-conventional feed resources like Tumba (*Citrullus colocynthis*) seed cakes, Vilayati Babool (*Prosopis juliflora*) pods, *Opuntia ficus indica*- a thornless cactus were found beneficial for goats in arid zone. The higher production performance of arid goats was observed under intensive or semi-intensive system of management, where limited supplemented feed was provided along with grazing and proper shelter, which not only increased the productivity but maintained the reproductive efficiency and general health in arid animals consequently improving economic viability.

‘Pantja’ Goats and their Improvement Under Field Conditions

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As per 2012 census population of goats in Uttarakhand state was 1.367 million (1.01% of India). State had 136 goats/ 1000 human as against 112 for India. Their number increased @ 0.48%/year as compared to national change of -3.82% during 2007 to 2012. This indicated positive role of goats in the livelihood of goat keepers the State.

The survey in Tarai region of Uttarakhand State during 2007-08 revealed presence of a distinct population of goats, resembling morphologically with deer. These goats were locally called as **‘Pantja’**. These were studied for various performance traits, which led to their detailed characterization, and then for registration at National Bureau of Animal Genetic Resources (NBAGR), Karnal. Consequently, **“Pantja”** were registered as new breed of goats with accession No. **INDIA_GOAT_2420_PANTJA_06024** on Jan. 06, 2015.



Pantja goats



Tripling (7-8%)



Carcass yield (66%)



Nucleus flock



Farmers' exposure



Delicious meat products



Training & Input distribution



Identification in field



Input distribution in field

Pantja are medium sized dual purpose goats, with about 21% share in the breeding tract. These animals are also observed in mid hills of Uttarakhand in large number. They are popular due to their morphological resemblance with deer, having body colour brown to fawn dorsally, becoming lighter ventrally, with white streak on either side of face. Generally, Pantja bucks are castrated in field within fortnight to get excellent quality meat, the practice reducing their population in the past.

Looking to the potential of Pantja goats, ICAR, New Delhi sanctioned an All India Co-ordinated Research Project on Goats to GBPUAT, Pantnagar on June 04, 2014 for their improvement and propagation. So far the project covered 747 households in 117 villages, conducted 18 off-campus trainings to 889 goat keepers; supplied various inputs (10,370 kg goat feed, 835 kg mineral mixture, 295 feeding bowls, 598 kg lime, 83 first aid boxes and performed 12,539 vaccination and 47,351 deworming with sufficient medicinal coverage.

Their average body weight at birth, 3, 6, 9 and 12 month age was 1.90, 9.76, 13.11, 16.70 and 20.06 kg, respectively. Yearling bucks and wethers may range 18.6 to 24.4 kg and 21 to 28 kg, respectively, yielding 62% dressed meat. Pantja goats breed throughout the year with 66% twinning and 7% tripling. Does had average lactation length and lactation yield of 117.46 ± 2.26 days and 58.99 ± 1.04 liter, respectively, containing 3.87% fat and 9.13% SNF.

Nucleus flock of Pantja goats at Pantnagar maintains about 50 does and 28 bucks, to perform natural service to local goats and for their supply to field for genetic up-gradation. So far 165 goats were served and 88 bucks have been supplied and 164 castrations of scrub bucks were done.

Shelter arrangements in commercial goat farms: Present status and Future prospects

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Key words: Shelters, Commercial Goat Farms, Lay out plans and Designs

ABSTRACT

Goat production is gradually shifting from small flocks reared under extensive system for livelihood and nutritional security to the medium and large flocks under semi-intensive and intensive system of rearing for the goat entrepreneurship development in India and other developing countries. Accordingly, the shelter requirements vary from merely protecting goats from predators and extreme weather conditions under extensive system of production to rearing goats economically as per physiological stages and sex and body size under intensive goat production system for maximum efficiency of utilising resources like shelter space, feed, manpower etc. It is anticipated that goat enterprise will become goat industry following the path of poultry industry through establishment of commercial goat farms on large scale like breeder farms, broiler meat goat farms, dairy goat farms etc. For establishment of commercial goat farms sustainably on long run, most critical inputs involved are procurement of foundation stock and its gradual building up of flock strength, arrangement of cost effective feed materials with minimum wastage as well as ensuring round the year availability and successful prophylactic and therapeutic health measures besides proper shelter facilities.

The basic principles of housing in terms of heat gain and heat loss from animals housed inside and from building structure in different environments to attain desirable microenvironment will help in deciding the type of goat house for a particular zone. The limits of thermo-neutrality for goats shall be taken as a climatic environment having an air temperature of 13C-27°C, relative humidity of 60-70%, a wind velocity of 5-8 km/hr and a medium level of solar radiation. The facilities required in large scale goat farms, partitions are to be made in single shed like kids pen up to 3 months for both male and female kids, thereafter male and female kids separately till their life time i.e. from 3-6 months, 6-12 months, then adults dry, pregnant, lactating does, breeding bucks etc. Growing kids and adult animals are grouped based

on sex, age and more practically body size and in each group, 30-40 animals are reared for maintaining group dynamics and social hierarchy for higher productive efficiency in the flock. Then, lactating pens, kidding pens and kid pens are to be adjacent to each other with farm office for better care and management. Therefore, the layout plans irrespective of flock size need to be arranged in such a way that the farm layout yields better resource use efficiency. The facilities for feed storage, bhusa storage, sick ward, quarantine shed, milking parlour etc are also to be ensured in commercial goat farms.

In general, the cost of construction of low cost goat shed for 75-100 goats is about one lakh using locally available materials following scientific housing requirements. The cost for permanent shed is estimated to be about 5-6 lakhs. It is expected that the people interested in goat rearing should know the minimum housing requirements for goats irrespective of the management system under which the goats will be reared. After gaining knowledge about minimum housing requirements, the farmers are generally advised to follow these minimum requirements for constructing the type of shelters needed for goats in their location and socioeconomic conditions rather than investing more than 70% of available fund in constructing permanent shelters in initial farm establishment stage and thereafter facing financial crisis in running the farm. After gaining practical experience of 2-3 years in rearing goats (initial learning period as well as required time for establishment/adjustment of goats in new place and new production system) in a smaller scale (preferably about 50 goats) only, goat keepers are suggested to expand their flock size for sustaining the existence of goat farms on long run. The role of private players in commercial goat farm establishments are initiated in right direction and large scale commercial goat farms on raised floor sheds with advanced and automated management system are coming up gradually to realize the dream of making goat farm to industry to meet the ever increasing demand for goat meat and milk products especially in Asian countries.

Goat Production in Japan

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ABSTRACT

Japan experienced lows and highs in goat production in the past. Goats are again gaining attention as dairy, meat, and weeding purposes. In some elementary schools, goats are kept for juvenile emotional education. This paper introduces the history and current situation of goat production and utilization in Japan.

INTRODUCTION

The first appearance of goats in Japanese literature was in the late Edo era (1821-1842). The description stated that goats were colored and small in size (Nozawa, 1987). Shinjo (2010) investigated the genetic distance and concluded that Japanese local goats are the same origin as the indigenous goats in Southeast Asian countries.

Dairy goats production started in the late Meiji era (1900-1910) with first importation of Saanen goats. Crossbreeding programs employing Japanese indigenous Shiba goats crossed with imported Saanen bucks occurred in Nagano (the main island) to improve milk production and in Okinawa (the southernmost islands) to establish the Okinawa meat goat breed. In 1949, Japanese Saanen was established as an official dairy breed in Japan. The Nagano Station, National Livestock Breeding Center has protected and distributed the genetic resources of the breed.

POST WWII

After the end of the World War II in 1945, Japan suffered food shortages and malnutrition. With donation from the Licensed Agencies for Relief in Asia (1946-1952), Japan received more than 2,000 dairy goats including Saanen, Toggenburg, Nubian, and Alpine breeds from the United States. The Japanese Government recommended and emphasized goat raising in back yards to produce self-sufficient protein sources. As the result, the number of goats increased to 670,000 head in 1957. People, especially children, old, and sick benefited milk and meat from goats, and then general nutrition level was improved.

AGRICULTURAL BASIC ACT

The Agricultural Basic Act that modernized livestock production was promulgated in 1961. Large scale mechanized livestock production systems that only focus cow, beef cattle, swine, chicken expanded rapidly, while the self-sufficient goat production declined sharply. The goats population decreased to 110,000 in 1975 and 13,000 in 2010. However, Okinawa was not directly affected by the governmental policy change and has retained their unique cultures such as goat meat cuisines and fighting goats.

REGAINING GOAT PRODUCTION

Japan recovered from the damages of WWII and became a world leading country of advanced technology. On the other hand the country has maintained food self sufficiency rate of as low as 39% since 2010, facing with the aging agricultural population and increasing in abandoned cultivated areas. To cope with these challenges, the self-sufficient goat production is gradually regaining recently. The popularity of goat cheese has also been rising. Under these circumstances the Japan Goat Network (JGN) was established in 1999 to promote goat production in the country and to connect producers, consumers, experts, and researchers. The JGN holds annual meetings and publishes “Yagi no Tomo” magazines for members twice a year. The Network currently has more than 550 members and constantly increasing the past decade. In 2005, the Japanese Society of Goat Research was also established to promote goat research contributing producers.

CURRENT SITUATION IN JAPAN

The two main Japanese breeds are Japanese Saanen goat for milk production and Shiba native goat for experimental purposes. Most indigenous Tokara goats have been crossed with other breeds and it is rare to find pure animals. Some other European dairy breeds exist and Boer goats were imported in 1999 to improve meat production in Okinawa. The population of goat has reached 20,000 head and the price of a Saanen doeling is \$500 and more. There are around 20 goat cheese producers and some of them are widely known for their excellent goat cheeses. Goats are also utilized for weeding in the cities and abandoned cultivated lands in agricultural areas. In some elementary schools, goats are employed to assist juvenile emotional education; students learn importance of lives, relationships between mother and kids, cooperation with

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others to take care of goats, and more. The issues of goat production in Japan are limited number of slaughterhouses for goats and little information on nutritional requirements of goats under Japanese conditions.

Parthenogenesis: An Innovative Assisted Reproductive Technique for Production of Female Goat

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Keywords: Chimeric embryo, female cloning, embryonic stem cells, parthenogenesis, tetraploid complementation assay

The new innovative idea all together led to a new line of development and a new technique called “Parthenogenesis” which is quite different from the old and usual IVF techniques. Parthenogenesis can be a viable alternative method of producing the identical female and thus faster multiplication of a few superior female animals can be achieved. Parthenogenesis is a form of asexual reproduction found in females, where growth and development of embryos occurs without fertilization by a male. Parthenogenesis occurs naturally in aphids, daphnia, rotifers, nematodes and some other invertebrates but can also be induced efficiently in mammalian oocytes by providing appropriate stimuli/activation in-vitro. Successful activation has been achieved by a range of treatments including electrical stimulation, as well as chemicals such as strontium in mouse, ionomycin/calcium ionophore in cattle, goat and sheep. In addition, there are many factors influencing efficient activation; concentration of chemical agents, duration between fusion and activation, activation media, strength of electric stimulation, post-treatments such as cytochalasin B or D, cycloheximide (CHX), or dimethylaminopurine (DMAP) etc. Success rates and viability of parthenogenetic embryos appear to be organism dependent. Mouse parthenotes are capable of developing beyond the postimplantation stage in-vivo; porcine parthenotes have developed up to day 29; rabbit parthenotes until day 10–11; goat pathenote have developed up to day 34 after post-activation. The reason for this arrested development is believed to be due to genetic imprinting. Since all genetic material in parthenotes is of maternal origin, there is no paternal imprinting component and this prevents proper development of extraembryonic tissues whose expression is regulated by the male genome. Hence, among the various experimental techniques developed over the years to maintain the full term developmental potential of parthenogenetic embryos, one of the most important advances is the application of tetraploid

complementation assay for the production of chimeric embryo from diploid pES and tetraploid embryos. Thus, the diploid cells from chimeric embryos contribute to the inner cell mass, whereas most tetraploid cells contributed to trophoectoderm/ extraembryonic tissues. Thus, the tetraploid complementation assay will have a great potential for the production of female clone goat.

Fertility Improvement through Estrus Synchronization and Timed AI in Goats During Low Breeding Season

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The objectives of the project were to study the efficacy of Intra Vaginal Progesterone Sponges (IVPS) + PG, IVPS + PG + GnRH and IVPS + PG +PMSG protocol for oestrus synchronization and pregnancy rate in oestrus synchronized does. A total twenty four clinically healthy non-pregnant multiparous does ageing between 2 to 6 year and average weight 20 to 35 kg were selected. The experimental 24 does were divided randomly into three groups (8 does each). In group A, intravaginal sponges (CIRG) were inserted in non-pregnant does (the day of insertion = day '0') Cloprostenol (PGF₂ α) @ 125 μ g were injected on day 10 and sponges were removed on day 11 and watched for heat symptoms carefully. The does were inseminated with frozen semen (Each 0.25 ml semen straw contained 100 $\times 10^6$ spermatozoa) procured from Nimbkar Agricultural Research Institute (NARI), Lonand Road, Phaltan, 415 523, Dist. Satara, Maharashtra, India) . The pregnancy was confirmed on day 40 by trans-rectal sonography. In all the three groups i.e. Group A, B and C, the CIRG intra-vaginal sponges were retained for 11 day without any signs of infection after removal of sponges. The retention rate was 100%. In all the does from three groups i.e. Group A, B and C responded to treatment and exhibited estrus i.e. synchronization was 100%. The mean time required for onset of oestrus was 41.87 \pm 0.64, 38.25 \pm 0.70 and 34.25 \pm 1.06 hrs in group A, B and C, respectively. On statistical analysis difference between onset of estrus was highly significant (p<0.01) between different groups. The highest pregnancy rate was obtained in Group B (50.00%) as compared to Group C (37.05%) and Group A (12.5%). According to present observations, it may be concluded that the CIRG intravaginal sponges are highly effective in synchronization of estrus in does during low breeding season and CIRG intravaginal sponges along with PGF₂ α and concurrent hormone GnRH treatment is dependable technique for estrus synchronization and pregnancy rate with fixed time A.I in low breeding season.

Advancement of Transgenic and Genome Editing Techniques in Sheep and Goat Production

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ABSTRACT

Genetically modified sheep and goats represent useful models for large-scale production of novel proteins or products in biomedicine and for improvement of the economically important traits in these species. The first transgenic animal was produced during 1980s by injecting the gene construct into male pro-nucleus of zygote through microinjection, however this technique suffers from several weakness such as uncontrolled and/or random integration of gene, unpredictable transgene expression and appearance of mosaicism. After the advancement and refinement of the nuclear transfer techniques in late 1990s, the somatic cell nuclear transfer (SCNT) has become viable and routine technique for introduction of the gene of interest in donor cells and then subsequently fusion with enucleated oocytes to generate the genetically engineered animals. With the pace of time, several technological advancements were made during the 2000s with the arrival of new techniques like the lentivirus or retroviral system, transposons, RNA interference, site-specific recombinases (Cre-LoxP), and sperm-mediated transgenesis. In the recent years, several modern tools like Zinc finger nucleases (ZFNs), transcription activator like effector nucleases (TALENs), and clustered regularly interspaced palindromic repeats (CRISPR)/CRISPR associated protein 9 (Cas9) molecules have been designed and being used to edit/insert/delete the function of the host DNA sequence or gene of interest very precisely. Genome editing is a type of genetic engineering in which DNA is inserted, deleted or replaced in the genome of an organism using engineered nucleases. These tools have been used in the modification of economically important traits in sheep and goats worldwide. For instance, myostatin gene was edited in sheep and goat by TALEN technique. Similarly, goat primary fibroblast cells were edited using CRISPR/Cas9 and these knockout fibroblasts were used in SCNT to generate edited goat. Indeed, in merely 5-6 years, these 'molecular scissors' have enabled the production of more than 300 differently edited pigs, cattle, sheep and goats

worldwide. Subsequently, transgenic goats were produced for human alpha lactalbumin protein in their milk through SCNT approach. TALEN based homologous recombination (HR) approach was used to knockout the beta-lactoglobulin gene from goat and 'knock in' the human lactoferrin and alpha lactalbumin gene into the genome of goat. These transgenic goats exhibited the down regulation of beta-lactoglobulin protein and abundantly secreted the human alpha lactalbumin in their milk. Such efforts have not been explored in any livestock species including sheep and goats in India. Therefore, production of the sheep and goat with improved traits or novel genes through transgenic and genome editing approach is challenging research. Hence, efforts should be made to use such viable transgenic and genome editing techniques to enhance the animal production potential, to produce therapeutic proteins for bio-medicine and develop several animal genetic models for studying the human and animal diseases in India.

Strength, Opportunities, and Issues Related to Indian Goat Meat Production

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Livestock sector is a vital component of the agriculture of Indian economy. It forms an important livelihood activity for most of the farmers, supporting agriculture in the form of critical inputs, contributing to the health and nutrition of the household, supplementing incomes, offering employment opportunities, and finally being a dependable “bank on hooves” in times of need. It acts as a supplementary and complementary enterprise. India is bestowed with a huge and diverse livestock wealth unique in the world. When we are discussing about meat from small ruminants especially goat, one of the emerging areas is quality of Indian goat meat, the market acceptability of goat meat and its growth potential. Indian goat meat has been established as lean and organic meat with favourable nutritional quality. Goat meat has a number of nutritional benefits. Low in calories, total fat, saturated fat and cholesterol than traditional meats, goat meat has higher levels of iron when compared to a similar serving size of beef, pork, lamb and chicken. Comparatively, goat meat also contains higher potassium content with lower sodium levels and meat with higher conjugated linoleic acid from grass fed goats. India with huge small ruminant population has immense potential to exploit this sector. The advent of stall feeding technology for production of goats provides scope to generate employment opportunities to the educated rural poor. A central program needs to be initiated to popularize the technology in location specific areas. It is essential that this sector be exploited fully by providing appropriate inputs in terms of genetic material, health coverage, value addition and marketing. Given the right incentives and programmes this sector, can transform the social scenario. In spite of few commercial framings of goat, unorganized rural goat production still contributes around 50 to 80% of meat and leather production. This sector still needs to be serviced by State interventions as the possibility of private sector extending their services to the rural sector is limited. In order

to support rural small ruminant production, small ruminant establishments of the Government need to concentrate on programs to support rural goat production to ensure availability of quality raw materials and its proper marketing not only for domestic consumption but also to create the export potential. Moreover, the increasing demand for meat and meat products especially from Indian goat meats could be fulfilled by increasing animal numbers, improving per animal productivity by providing optimum feeding, better management practices and proper health care management using latest innovative technologies pertaining to sheep and goat. India having nearly 28 registered goat breeds and 42 sheep breeds but these breeds are usually in the hands of poor farmers and reared under traditional system in spite of enough efforts given by the apex organization for their improvement. The huge population of these animals are not uniformly distributed through all over the country in a different concentration. Therefore, when the question of quality production comes, the resource of such production is very difficult to get at a sizable quantum. Moreover, the most important considerations for effective marketing are quality and consistency of products. It is hardly to get a good number of any breed of animal at a point of time for any specific purpose. They considered these animals as their ATM (All Time Money) and these rural people often slaughter or sale these animals as per their need and distress defying their age, body weight and value of the breed for conservation and propagation. Therefore, to start with quality production steps to be taken at the level of farming/rearing specially making the concerned farmer educated about the resource possesses by them through a consorted approach involving various stakeholders including scientists. Following are the points to be considered as sequential steps for quality meat production as well as for export purpose from small ruminants-

- Identification of proper meat breeds on the basis of their meat yield characteristics like muscling, width of the girth, confirmation of body etc.
- Development of inclusive package of practices relating to breeding, feeding, uniform management and prophylactic measures with a aim for uniformity in production of food animals, may be breed specific. This is with an objective of expecting desirable output with application of adequate inputs.
- Standardization of slaughter age should commensurate the maturity, quality and productivity of the concerned animal breed.

- Proper standard operating procedure (SOP) needs to be followed for slaughtering of the animals starting from transportation, ante-mortem care and treatment, inspection and so on.
- Sufficient and varying cold chain facilities for obtaining quality meat from muscles of each slaughtered animals.
- Trained manpower for receiving uniform carcass or meat cuts with proper packaging system.

Livestock sector is most steadily growing sector of Indian agrarian economy. When it is compared with developed like other sectors of agriculture Indian meat industry lagging far behind in value addition and product processing. Goat meat i.e. chevon being a taboo free meat, contributes a major chunk in Indian meat industry Meat processing is the only way that can escalate the goat farmer's income at genuine rapidity up to a justified level. Processing increases the shelf life meat and offers possibility of optimum utilization of slaughter house by-products that result in better return to farmer. Further, meat processing offers convenience, variety, safety and functionality to the consumer. In present era a number of technologies viz. curing, smoking, irradiation, freezing, retorting, high pressure are available that may be utilized to offer a better shelf life and safety to meat and meat products. Other technologies like comminution, restructuring, enrobing, fermentation, least cost formulation are in vogue that adds variety to meat products. Processing is a tool through which the nutrient composition of meat may be altered that adds nutrient enrichment and functionality to the meat. Hence goat meat processing will offer many benefits that can be shared by farmer and consumer both.

Goat Farming – A Pathway for Poverty Alleviation in India
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Goat plays an important role in the livelihood and economic sustenance of resource poor farmers in arid, semiarid and mountain regions of the country. Goats are also known as poor man's cow and in recent years projected as Future Animals for rural prosperity under the scenario of deteriorating agro-geo-climatic conditions and grazing resources. Goats produce meat, milk, skin, fibre, manure etc. and considered as 5 star animals. In rural areas, they act as ATM (Any Time Milk and also Any Time Money) for the farmers. Goat is essentially a banking system and serve as a current account. Small farmers sell their goats when they need money for the household requirements. The goats can be milked at any time of the day and are therefore named as the moving refrigerators. Goat milk is prescribed for children, old and sick people as it is easily digestible and has possible medicinal value.

Majority of goat flocks are maintained on a common property resource by employing family members with little capital, resources and traditional knowledge (Prabu et al., 2011). There are about 1002.81 million goats in the world, 556.01 million in Asia and 133.87 million in India (FAOSTAT, 2016), which constitute 13.34% of the world and 24.07% of the Asian goat population. Goat population was 124.35 million in 2002, 140.53 million in 2007 and then decline to 135.17 million in 2012 (Livestock census, 2012). Goat constitute 26.40% of livestock population in the country. India is a rich depository of goat genetic resource with 28 well-defined breeds and non-descript animals, well adapted to different agro-climatic conditions of the country. Most of India's goats (70%) are predominately found in 7 states of the country (West Bengal, Rajasthan, Uttar Pradesh, Maharashtra, Bihar, Tamil Nadu and Madhya Pradesh). Goat contributes 1041.11 million kg of meat and 5.75 million kg of milk (DADF, 2016-17). About 2.00 lakh goats in the high altitude of Himalayan regions produced 50 tonnes of Pashmina fibre in the country.

Goats are marketed through a long chain of intermediaries in the country, as a result, farmers get less price for their produce. Majority of goat farmers belong to the lower strata of the income in the society. Most of them are resource poor farmers with small land holding or landless. The credit from the financial institutions for purchasing goats, constructing sheds and

other recurring expenditure is almost negligible. The insurance cover of goats to protect from economic losses due to mortality losses in case of disease outbreaks or drought or natural calamities is also not taken by the farmer at large. Goats play a significant role in ensuring food and nutritional security of resource poor families in the rural areas. It is one of the important means of income and employment for these families in harsh topographies of the country. It also helps in alleviating poverty and providing a regular source of income. Goat-rearing supports also crop farming by providing cash for the purchase of seed, fertilizers, pesticides etc. in financial distress during drought and crop failure. This paper is prepared to focus on the unique role and potential of goats in India to bring the rural people out of poverty and on a path of nutritional and livelihood security.

Goat based Sustainable Livelihood and Business Models: An Opportunity for Enhancing Farmers' Income

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Key words: Goat production, business models, technology intervention, farmers' income

ABSTRACT

Goat is the second largest livestock species after cattle. Country ranks 2nd in goat population (135 million) and home to around 14% of world goat population. Country stood first in goat milk production and second goat meat and goat skin production in the world. Goat sector contributes Rs. 38,500 crores (9.0%) to the total value of output from livestock sector. Sector contributes 1.04 million tonnes of goat meat (Chevon), 5.78 million tonnes of milk and 0.18 million tonnes of skin to the central pool. Sector has an export potential of sheep and goat meat (22TMT valued Rs. 836 crores) mostly to Middle East. Moreover, it is an important source of income to farmers particularly in disadvantageous regions in the country where crop failure is the recurring phenomenon. Goat rearing is considered to be an important contributor to doubling farmers' income and poverty alleviation. An overview of small holder's goat value chain reflects that small holders dominates (33 million) goat production, custodian of more than 75% goats with significant contribution to household income (15-35%), particularly in ecologically vulnerable and drought prone area. Productivity gap varies from 50 to 150%, mainly due to shrinking pastures, lack of supplementary feeding and low adoption of technologies, inadequate support services (vet and credit). Small holder's goat production can generate efficiency gains from low cost locally feeding options. Increasing domestic demand and market price of goat meat has opened the avenue for entrepreneurs to invest in this sector. Commercialization of goat farming in the country is on the rise. Emerging value chains, nutritional literacy and infrastructure development are some of the factors, drawing interest of rural youth in goat farming with establishment of increasing number of goat farms. Present market sentiments and widening gap between demand and supply of goat meat /mutton indicate price rise in future. Goat milk which is also known as natural functional food contributes 4% to central milk pool (127 million tonnes). Goat based integrated livelihood models developed based on participatory research suggest that with 15 adult female goat and 25 chicks yield a net income of Rs 82,727 per year. This model is suitable for landless and marginal group of farmers. Other goat based success

business models indicates that commercial goat farming with smart marketing is one of lucrative business in agriculture sector. Furthermore, through simple technological and marketing interventions may accrue economic gain of Rs. 5688 crore, net of cost at country level. To fetch this gain, efforts should be made to make goat farming more structured, organized and less fragmented and dispersed. Capacity building and veterinary support in time are the other key aspects for sustainable goat production and enhancing farmers' income.

Indian Research Experience on Goat Products

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ABSTRACT

Goat products has been in the headlines due to the awareness of health conscious consumer. Goat products such as milk and meat are considered as precious since time immortal and the recent scientific experiences proves their values. Goat milk Indian experience starts from milk quality evaluation to various value added products preparation. Recently scientists are paying attention on their antioxidative and therapeutic importance. Synergetic effect of molecular compounds present in the goat milk and meat products are to be studied. Earlier goat meat processing research were related to the processing standardisation and designing, developing emulsion based products such as sausages, nuggets, kofta and patties. Other non emulsion based traditional products such as kebabs, pickle, samosa, cutlets and tikka were reported. Categorisation of products under different subheading was also reported. Some other non refrigerated goat meat products were also scientifically standardised which includes intermediate moisture meat products and non intermediate moisture meat products. The marketability studies of these developed products are still lacking. Marketing studies needs to be conducted. In addition, the advent of commercial goat farmers who invest on production are looking for better markets. Fresh goat meat market is standardised in unorganised manner. Producers are also looking for the international market. Though the market gap in terms of difference in rates are still reported to be very narrow especially for the international market scenario. Producers are still hesitant for the production of healthier products, fat reduced, low salt products, nitrite substituted products and vegetable and dietary fibre enriched products. Organic meat production are also needs to be explored. Products with bio active ingredients like polyunsaturated fatty acids, use of lecithin, various pre and probiotics, isoflavones, saponins, phytosterols, phytates, proteinase inhibitors, oligosaccharides and powdered brewer's yeast's added with the meat products needs to be explored for the international market. Along with above all nanotechnology based products are attracting the younger generations. Better research understandings with the role in safety needs to

be established before entering in to the international market. As reported earlier, it has been expected that in the functional aspect may strengthen goat meat processing sector rapidly. Overall Indian research experience rolls around the products processing and value addition. Marketing research needs to be conducted at a greater extend to support the sustainability of the new entrants.

Physiological vis a vis Genetic Adaptation of Small Ruminants to Climate Change and Livestock Smart Practices for Sustained Production

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Key words: Adaptation, small ruminants, physiological, biochemical, electrolyte, heat shock proteins.

ABSTRACT

India owning rich resources of animal genetic due to its different agro-climatic zones. Different breeds of small ruminant in all the states of India pronounce a diverse germplasm of small ruminants. These descriptive and non-descriptive breeds are of great economic importance, providing livelihood to millions of people. The adapted breeds of small ruminants assumed to play a significant role in near future to face the climate change scenario, which is a major threat to animal's production system under tropical climatic conditions. The climatic events such as high air temperature, humidity, flood, drought, desert, heat wave, feed and fodder scarcity, water scarcity etc. seem to be common in the tropical climate. The adapted breeds of sheep and goat can survive and reproduce in harsh environmental conditions. Therefore, identification of such breeds and revealing the physiological mechanism of adaptation may be a suitable approach for the solution of climate resilient livestock as well as the demand of food security for the growing population. Climate-smart agriculture (including livestock) as 'sustainably increases productivity, enhances resilience (adaptation), reduces greenhouse gases (mitigation) and enhances achievement of national food security and development goals.

Breeding & Genetics

BG-01

Selection Indices for Improvement in Sangamneri Goats Under Field Condition

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Keywords: Sangamneri goat, Selection indices, growth, reproduction

ABSTRACT

The present investigation was undertaken on 500 records of growth and 400 records of reproduction traits of Sangamneri goats collected from field for a period of five years (2004-2008). The year and season of birth, cluster of village, sex and sire were considered as sources of variation and data were analyzed by least squares technique (Harvey, 1990). The phenotypic and genetic correlations and heritability were calculated. Relative economic values were estimated based on price of meat and average cost of animal rearing. The selection indices were constructed considering the various traits in combination and accuracy and relative efficiency of index was calculated (Hogsett and Nordskog, 1958). The overall mean heart girth (cm), body length (cm), height at wither (cm) and body weight (kg) at 3, 6 and 9 months of age were 47.69 ± 0.18 , 55.35 ± 1.18 , 59.06 ± 0.21 ; 42.63 ± 0.17 , 49.30 ± 0.17 , 53.40 ± 0.23 ; 48.13 ± 0.20 , 56.01 ± 0.21 , 60.34 ± 0.21 cm and 9.03 ± 0.08 , 14.09 ± 0.10 and 17.77 ± 0.13 kg, respectively. Cluster of village and sex had highly significant effect on all growth traits except cluster of village on length at 9 months age and sex on girth and height at 9 months age. Year of birth had significant effect on girth at 3, 6 and 9 months age, length at 6 months age, height at 6 and 9 months age and body weight at 9 months age. Season of birth had significant effect only on weight at 6 months age and girth and height at 9 months age. Sire had significant effect on all growth traits except girth and weight at 6 months and length and weight at 9 months age. The age at first kidding, kidding interval and service period observed was 430.38 ± 2.0 , 257.13 ± 1.23 and 105.57 ± 1.97 days, respectively. Cluster of village and year of birth had significant effect on age at first kidding while season of birth had significant effect on service period only. Heritability estimates for growth and reproduction traits were low to moderate. Phenotypic correlation among growth traits was positive and highly significant while genetic correlation among them was negative and significant. Phenotypic and genetic correlation among reproduction traits was significant. Correlation of growth traits with reproduction traits was significant. Among the selection indices constructed with different number of traits in combination $I_3 (M) = [(8.764) (9MWt.) + (-3.232) (9 MBL) + (1.438) (9MHW) + (-1.467) (9MCG)]$ for male and $I_6 (F) = [(3.519) (3MWt.) + (3.527) (6MWt.) + (3.562) (9MWt.) + 0.354 (AFK)]$ for female goats were found to be relatively efficient indices and rated as most useful indices for its high reliability and expected genetic gain.

BG-02

Genetic and Non-Genetic Factors Affecting the Economic Traits of Sangamneri Goats under Field Conditions

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Keywords: Sangamneri goats, genetic factors, economic traits, breeding

ABSTRACT

The Sangamneri is one of the predominant breed of Maharashtra found Ahmednagar, Pune and Nasik district. The data pertaining to growth and reproduction were collected from 35 villages by registering 2310 breedable does. The area under execution is divided in five centers (clusters) viz; Sangamner, Shirampur, Rahuri, Belha and Sinner covering three districts i.e. Ahmednagar, Nasik and Pune. Total 44 breeding bucks were rotated in the field during 2017-18 and total 2290 births were obtained in the field. The overall least square means obtained for birth, 3, 6, 9 and 12 month body weights were 2.16 ± 0.03 , 9.57 ± 0.12 , 15.37 ± 0.11 , 19.25 ± 0.13 and 23.31 ± 0.18 kg respectively. The corresponding least squares means noticed during the period were 2.14 ± 0.05 , 9.71 ± 0.13 , 15.32 ± 0.14 , 19.37 ± 0.14 and 23.53 ± 0.23 kg respectively. All the non-genetic factors i.e. village cluster, year of birth and season of birth exerted significance influence ($p < 0.01$) on body weights upto six month of age, while sex and sire influenced the body weights significantly ($p < 0.01$) upto 12 months of age. The overall means for age at maturity, age at first conception and age at first kidding were 245.87 ± 6.17 , 264.82 ± 19.51 and 418.62 ± 19.59 days, respectively. While the service period and kidding interval were 123.98 ± 4.87 and 256.84 ± 4.86 days, respectively. The number of kids per kidding were 1.52 ± 0.08 . The non-genetic factors i.e. village clusters, year of birth and season of birth had significant influence on pre-partum traits. The 90 days milk yield was 99.03 ± 2.17 L which was significantly affected by village cluster, year and season of kidding and kidding interval.

BG-03

Factors Affecting Body Weight in Barbari Goats at Different Ages in Nucleus Flock

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Keywords: Barbari goats, body weight, breeding, morbidity, mortality

ABSTRACT

Barbari breed of goat has attained special significance as a meat breed due to higher weight gain, prolificacy, reproductive efficiency and most importantly suitability for stall-feeding. Nucleus flock of these goats is maintained under semi-intensive feeding system from 1983 as nucleus flock of Institute/ AICRP on Goat Improvement. Data on 2281 kids born from 2012 to 2017 at the Barbari goat unit were used to analyze the effect of environmental factors on body weights at different ages. The overall least-squares means for body weight at birth, 3, 6, 9 and 12 month of ages were 1.86 ± 0.007 kg, 8.41 ± 0.04 kg, 12.74 ± 0.06 kg, 16.89 ± 0.09 kg and 21.37 ± 0.12 kg, respectively. Period and type of birth, sex and parity were significantly affecting body weights at different ages. The body weights of these kids showed improving trends over the periods of birth. Kids born in spring season were heavier at birth than those born in autumn, however autumn born kids showed higher growth rate and become significantly heavier over their counterparts at 3 months of age onwards up to 12 months of age. Data indicated lower morbidity, mortality and higher growth rate of kids born in autumn season as compared to those which born in spring season. Males over females and singles over multiple born kids were heavier at birth and remain heavier up to 12 months of age. Kids belong to 1st and $\geq 6^{\text{th}}$ parity were slightly lower body weights than those from 2nd to 5th parity. Present study suggests planning more number of kidding for autumn season for lower morbidity, mortality and higher growth rate of kids.

BG-04

Genetic Analysis of Growth Traits for Sangamneri Goats under Field Conditions

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Keywords: Selection, candidate gene approach, diseases

ABSTRACT

The record of growth data of Sangamneri goat available at All India Coordinated Research Project on Goat Improvement (Sangamneri field unit), M.P.K.V., Rahuri over a period of 13 years (2004-2016) were collected and subjected to least squares analysis. Effect of village cluster, year and season of birth, type of birth and sex as non-genetic factors and sire as genetic factor on growth traits were studied. The overall least squares means for body weights at 1, 3, 6, 9 and 12 months of age in Sangamneri goats were 5.07 ± 0.01 , 9.50 ± 0.02 , 14.80 ± 0.03 , 18.85 ± 0.06 and 22.78 ± 0.10 kg, respectively. The corresponding least squares means for chest girth were 39.21 ± 0.05 , 48.11 ± 0.05 , 56.05 ± 0.08 , 60.56 ± 0.13 and 64.37 ± 0.19 cm, for body length were 34.86 ± 0.05 , 42.54 ± 0.04 , 49.98 ± 0.08 , 53.84 ± 0.11 and 57.37 ± 0.17 cm, and for wither height were 40.41 ± 0.05 , 49.22 ± 0.05 , 57.39 ± 0.08 , 61.92 ± 0.11 and 65.12 ± 0.16 cm, respectively. The body weights and body measurements at 1, 3 and 6 months in Sangamneri goat were significantly influenced by village cluster, year of birth, sex, type of birth and sire except body length not affected by type of birth. However, body weight at 9 and 12 month of age significantly affected by village cluster, year of birth, sex, type of birth and sire except season of birth. Whereas, body measurements at 9 and 12 month of age significantly affected by village cluster, year of birth, sex, type of birth and sire except type of birth on body length at 9 and 12 month of age and sex and type of birth on 12 month of age. Genetic and phenotypic correlations between body weight and body weight with body measurements were reported positive and significant ($P < 0.01$) at all stages of age studied. The maximum accuracy determined by R^2 value was 0.91 when the predictions were based on the three body measurements together. The heritability for growth traits i.e. 1, 3, 6, 9 and 12 months body weight was 0.192 ± 0.02 , 0.402 ± 0.02 , 0.641 ± 0.02 , 0.756 ± 0.02 and 0.512 ± 0.02 , respectively.

BG-05

Selection of Goat for Disease Resistance

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Keywords: Selection, candidate gene approach, diseases

ABSTRACT

Presently India possesses 135.2 million goats (19th Livestock census). Goat provides milk, meat, hide, skin, manure and other valuable by products thus significantly contributing to sustainable human nutrition and economy of the nation. Goat milk and meat contribution is 3 percent and 14.25 percent respectively of total milk and meat production in India. Goats contribute more than 52% of household's total income of the family of goat keepers. The losses due to diseases in goats scaled at national level were estimated at Rs. 11,720 million per annum. Conventionally selection for disease resistance based on treatment records, host immune responses, host biological responses and pathogenic responses. Clinical screening, pedigree analysis, test mating, biochemical screening, DNA markers, Candidate gene strategy, gene therapy are the new techniques to get disease resistance strains of goat. A total of 271 candidate genes have been detected in goats with passable effect on economically important traits. The identification of genes that influence the biological response to diseases would provide a better understanding of the physiological processes of the susceptibility to infection and immune response which could contribute to the development of genetic tools to fight disease. Therefore, selection of goats for disease resistance is important to reduce economic losses of goat keepers and nation.

BG-06

Reproduction and Production Performance of Sangamneri Goats under Field Conditions

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Keywords: Selection, candidate gene approach, diseases, reproduction

ABSTRACT

The reproduction and production data of Sangamneri goat available at All India Coordinated Research Project on Goat Improvement (Sangamneri field unit), M.P.K.V., Rahuri over a period of 13 years (2004-2016) were collected and subjected to least squares analysis. Effect of village cluster, year and season of birth/kidding, type of birth and kidding order as non-genetic factors and sire as genetic factor on reproduction and production traits were studied. Overall least-squares mean for age at maturity, age at first conception, age at first kidding, service period, and kidding interval of Sangamneri doe were 260.73 ± 2.12 , 307.20 ± 3.92 , 457.99 ± 3.93 , 121.79 ± 5.27 and 272.74 ± 5.31 days, respectively. The overall least-squares mean for number of kids per kidding of Sangamneri goat was 1.82 ± 0.04 . Twinning and sex ratio was of 62.05 per cent and 1:0.99 noticed in different cluster and year of birth in Sangamneri goat. While all pre partum reproduction traits were significantly influenced by village cluster, year of birth, season of birth and sire except type of birth while the post partum reproduction traits significantly influenced by village cluster, year of birth, season of birth and kidding order. The overall least squares means for test day milk yield and 90 days milk yield were 1048.91 ± 12.41 ml and 94.40 ± 1.12 L, respectively. Year of kidding and kidding order exerted significant ($P < 0.01$) effect while village cluster and season of kidding exerted significant ($P < 0.05$) effect on test day milk yield and 90 days milk yield. Genetic and phenotypic correlations among reproduction traits in Sangamneri goat were positive and significant ($P < 0.01$). The AAM, KI and SP had negative and significant ($P < 0.01$) genetic correlations with production traits however, AFC, AFK and NOKB had positive and significant ($P < 0.01$) phenotypic correlations with test day milk yield in Sangamneri goat. Among the reproduction traits heritability for AFK, NOKB and AFC were 0.796 ± 0.16 , 0.541 ± 0.13 and 0.333 ± 0.11 , respectively. Heritability estimates for test day milk yield and 90 days milk yield were 0.659 ± 0.14 and 0.648 ± 0.14 , respectively.

BG-07

Genetic Diversity and Population Structure in Muzaffarnagari Sheep of India Assessed through Pedigree Analysis

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Keywords: Genetic diversity, pedigree, Muzaffarnagari sheep, Genealogical parameters

ABSTRACT

Genetic diversity in Muzaffarnagari sheep, maintained at the Central Institute for Research on Goats, Makhdoom, Mathura, Uttar Pradesh, India, was assessed using the pedigree records by quantifying demographic parameters under pedigree analysis. The pedigree information over a 28-year period (from 1976 to 2003) was used for this study. Lambs born during 2001–2003 were considered as reference population. The mean generation interval from four pathways was 3.35 years. The generation interval in dam-progeny pathway was longer than sire-progeny. Mean inbreeding and average coancestry for whole population were computed as 1.79% and 1.96%, respectively. Average equivalent complete generation, as a measure of pedigree completeness, was 3.41. Effective population size for reference population was estimated to be 75 from the individual rate in coancestry and 239 from the individual increase in inbreeding. Genealogical parameters estimated based on probabilities of gene origin including the effective number of founders, the effective number of ancestors, the effective number of founder genomes (founder genome equivalents) and the effective number of non-founder genomes for reference population were estimated as 166, 30, 33 and 71, respectively. Approximately, 75% of total genetic variation was explained by the 21 most influential ancestors, with a maximum individual contribution of 6.53%. The average relationship coefficient among active rams and the average relationship coefficient between active rams and ewes during the last 3 years (2001–2003) were 0.07 and 0.06, respectively. The results indicated that a relatively considerable genetic variability exists in this population.

BG-08

Origin and Genetic Diversity of Nepalese Indigenous Goats (*Capra hircus*)

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Keywords: Goat (*Capra hircus*), Hypervariable (HVI) region, Mitochondrial DNA, Nepalese indigenous breeds

ABSTRACT

Very little study has been conducted on phylogenetic diversity of Nepalese indigenous goats where four breeds, Khari, Chyangra, Terai and Sinhal, have been identified. The 625-bp long sequences of the mitochondrial DNA hyper-variable region generated from 93 goats in this study revealed high haplotype diversity among breeds, which come under four haplogroups (A-D). The study demonstrated certain level of gene flow among the neighboring goat populations exhibiting no correspondence between the geographic regions of origin and relationships among breeds. The complex mtDNA diversity and structure identified among indigenous Nepalese goats can be explained by gene flow through ancient trading and current 'free' movement of goats across the geographic vicinities in India and China. Furthermore, HapG B showed the southward direction of gene flow which does not cross the Himalayas, whereas HapG B1 revealed the south-west gene flow from the claimed domestication center for HapG B, China, to Nepal.

BG-09

**Effect of Non-Genetic Factors on Body Morphometry of Khari Goat Kids
(*Capra Hircus L.*) in Nawalparasi, Nepal**

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Key words: Non genetic factors, body morphology, *Khari*, weaning, variation

ABSTRACT

This study was carried out mainly aiming at studying the effect of non-genetic factors on major body morphological traits of *Khari* goats in Nawalparasi, Nepal during February, 2012 to January, 2015. Body length, wither height and heart girth at the age of birth, weaning, nine months and fifteen months of 1260 kids born from 1005 does were recorded. Data were analyzed by Least Square Mixed Model and Maximum Likelihood Computer Program (LSMMML PC-2). Significantly different means of body length, wither height and heart girth were between different sub-classes of six non-genetic factors compared using Duncan's Multiple Range Test (DMRT) computer software. Findings revealed that overall mean wither height of kids at birth, weaning, nine months and fifteen months was 28.84±0.59 cm, 46.29±1.09 cm, 54.34±1.06 cm and 61.95±1.03 cm, respectively. Whereas, overall mean hearth girth of kids at birth, weaning, nine months and fifteen months was observed 29.62±0.58 cm, 49.41±1.05 cm, 57.09±1.02 cm and 65.04±1.17 cm, respectively. Similarly, overall mean body length of *Khari* goat kids was at birth, weaning, nine months and fifteen months age was determined 28.09±0.67 cm, 43.94±1.07 cm, 51.67±0.95 cm and 59.96±0.98 cm respectively. Altitude, season of kidding, dam's parity, dam's size, sex and birth type were important sources of variation with respect to body length, wither height and heart girth of Nepalese hill-goat kids at birth, weaning, nine months and fifteen months age. Thus, the results of present study help describe *Khari* breed of goat using the phenotypic values of morphological characters such as body length, heart girth and wither height which may be useful to estimate variations within breeds.

BG-10

Community Led Goat Genetic Improvement Program in Nepal

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Keywords: Community Members, Seed Goats, Litter Weight

ABSTRACT

Limited availability of quality breeding goats is one of the major constraints faced by smallholders in Nepal. To address this, Heifer Nepal initiated a community led genetic improvement in goat program in 2013 in Sindhuli district, engaging community members to produce genetically superior local seed goats through selection. Currently, trained community members are maintaining production performance record cards of 1,500 goats in 500 households. Under this scheme, performances of the nannies and kids are maintained in the card, and the data is processed using a software “Access database program”. As of December 2018, the parameters analyzed at year interval show that average daily weight gain increased from 81.90 ± 22.38 g to 95.23 ± 18.79 g in male kids and 72.14 ± 13.80 g to 84.08 ± 17.01 g in female kids. Similarly, average three months litter weight/doe increased from 13.43 ± 5.42 kg to 16.11 ± 5.12 kg; and five months live weight increased from 14.12 ± 3.39 kg to 19.38 ± 3.23 kg in male and 12.53 ± 2.06 kg to 15.85 ± 2.59 kg in female. Till date, around 600 male and 1000 female seed goats were produced and marketed for further multiplication, through the “women cooperatives”. Since the produced seed goats are marketed at the prime price, community members have strong bonding with the cooperative to continue production and marketing of seed goats. Such programs need to be scaled up in feasible areas and can be replicated elsewhere in the world.

BG-11

Status and Scope of Goat Breeding in Kashmir & Laddakh Region of Jammu & Kashmir

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Keywords: Breed, Breeding, Goat, Kashmir & Laddakh, Livelihood, Tribals

ABSTRACT

The tribals viz Bakerwals, Gaddies and Changpas have developed perfect professionalism in Sheep & Goat rearing in Jammu and Kashmir, being the sole source of their livelihood; they have become the saviors of goats over the centuries. Sheep Husbandry department has initiated development of muttonous goats by introducing improved breeds among the existing goat population in the area. The total goat population in J&K is 20.179 lacs including 5.344 lacs in Kashmir and Laddakh exclusively for meat and fibre production. Annual mutton/Chevon requirement of the state is 926.86 lac kg and the availability is only 510.62 including importation (41.37%) of live animals, still the deficit is 416.24 lac kg. To meet the emerging demand of the meat, milk and fibre, the state has introduced crossbreeding of local valley flocks with Alpine on a large scale to increase Milk production. Similarly, Beetal breed of goat has also been introduced in Uri and Karnah area. The state government has establishment seven goat breeding farms in the region. Native goats are poor in economic traits with a growth rate of 0.40% during 1997 and 2007 census. Selective breeding of Khagani and Pashmina goat were also not tried since the priority of the state was sheep and mutton production and significant achievements have been made. The main objective of this study is to highlight the breeding strategy of goats for better production and contribution in farmers (tribals) income. To meet the huge demand of mutton in the region, it is necessary to exploit the other options also, the goat breed improvement is utmost important after sheep. Introduction of potential breeds, breed improvement, selective breeding are key factors to improve the breeds and production in the area.

BG-12

Genetic Diversity of Indigenous Goats of Andaman and Nicobar islands Based on the Mitochondrial DNA Sequence Variation

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Keywords: Genetic Diversity, Andaman Local Goat, Teressa Goat, Mitochondrial DNA Sequence

ABSTRACT

The aim of the present study was to characterize the genetic diversity of indigenous goat breeds of Andaman and Nicobar Islands based on mitochondrial DNA sequence variation. There are two distinct domestic goat breeds available in these islands, viz. Andaman local goat and Teressa goat. Andaman local goats are found in Andaman group of islands and are medium to short in stature with colour combination of black, brown and white. Teressa goat, which has been recently recognized as a registered goat breed by ICAR-NBAGR, Karnal, India is native to the Nicobar group of islands and is reared by the Nicobari tribes. In the present study, the complete mitochondrial DNA D-loop and the cytochrome b gene of the two goat breeds were analyzed. Thirty blood samples from Andaman local goat and ten blood samples from Teressa goat were collected from different parts of Andaman and Nicobar islands. Mitochondrial D loop and cytochrome b (Cytb) were amplified using the gene specific primers and sequence information was generated by dideoxy fingerprinting. Sequence information revealed that the length of D loop and CytB gene were 1212 bp and 1140 bp respectively. The estimated transition/transversion bias (R) were 5.18 and 3.68 based on D loop and CytB respectively. Nucleotide frequencies of CytB gene were 31.68 % (A), 26.81% (T), 28.17 % (C) and 13.16% (G). The nucleotide diversity of CytB gene was 0.0026669 and Tajima's Neutrality test exhibited the value of 0.100345. By NJ method of phylogenetic analysis this has been found that, Andaman local goat belong to one cluster whereas Teressa goat belong to another cluster. The results of the study will be helpful for development of breeding strategy of the indigenous goat breeds for their future conservation.

BG-13

Identification, Characterization and Functional Annotation of SNPs from Pashmina Goat Transcriptome

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Keywords: Sangamneri Goat, Selection Indices, Growth, Reproduction SNP, INDELs, KAP6, Pashmina fiber.

ABSTRACT

Pashmina goat is known for its ability to produce fine quality fiber called pashmina fiber, normally used for making shawls. The Pashmina fiber is famous for fineness, warmth and softness. Recently, the omics of this breed has been studied to some extent but lot more is yet to be explored in the context of fiber development. Specifically, the molecular markers associated with its coat color are significantly useful for breeders. One of the important molecular markers is Single nucleotide Polymorphism (SNP). The SNPs are widely distributed throughout the genome, including coding and non-coding regions. However, the identification of SNPs in pashmina goat transcriptome is not available. Thus, the goal of this study was to identify the SNPs from transcriptome data of three coat colors: white, black and brown tissue. We have identified 453696, 314748 and 279186 SNPs in white, black and brown coat colored Pashmina goat respectively. Further, we have detected small insertions and deletions (INDELs) in all the three tissues. The number of indels in white, black and brown is 13473, 10656 and 8993 respectively. We found that SNPs are participating in various functions like stress mechanism, bone formation, regulation of immune tolerance etc. We predict the association of SNPs with high-glycine tyrosine keratin type II.5 (KAP6) gene that might be responsible for fiber weight and a higher curly fibers. Our study will help in the understanding of molecular mechanisms of SNPs in fiber development. We developed a database for easy retrieval of SNPs, their functions and flanking sequences.

BG-14

Comparison of Body Weight of Graded and *Inter se* Mated Boer Kids

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Keywords: Non-descript goats, Boer goat, Grading up, *Inter se* mating.

ABSTRACT

In an experiment undertaken to improve the body weight of nondescript goats by grading up with Boer bucks in an organized farm at Post Graduate Research Institute in Animal Sciences, TANUVAS, Tamil Nadu, non-descript females in the age group of two to three years were allowed for natural mating with two Boer bucks whenever they come to heat. Simultaneously the available F₁ generation of Boer graded animals were mated *inter se* to produce F₂ generation. The body weights taken at different stages of growth of both Boer graded kids (F₁) and kids born by *inter se* mating (F₂) in a period of one year (2016-17) were compared. Average body weights at birth, three, six, nine and twelve months were 2.43 ± 0.04 (56) and 2.34 ± 0.10 (40), 11.40 ± 0.31 (30) and 10.85 ± 0.64 (17), 14.06 ± 0.54 (17) and 13.27 ± 0.51 (13), 19.07 ± 1.49 (7) and 17.27 ± 0.74 (5) and 22.55 ± 1.38 (7) and 20.13 ± 0.97 (5) for Boer graded kids (F₁) and kids born by *inter se* mating (F₂), respectively. Boer graded animals (F₁) were having higher body weight at all ages. The difference was not significant up to six months age, after which it was significant up to twelve months of age. Second generation kids born of *inter se* mating of graded Boer had in reduced body weights at later stages of growth, compared to first generation animals. Grading up with Boer was found to be better method to increase the body weight of non-descript goats under the prevailing conditions of Kancheepuram district of Tamil Nadu.

BG-15

Breeding Management Practices of Goats Followed by Tribal Farmers in Rajasthan

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Keywords: Breeding, Local Farmers, Grouping, Categories of Farms, Diversity

ABSTRACT

The aim of present study was to assess the breeding management practices of tribal farmers in Rajasthan. A total of 120 tribal goat farmers were selected from 12 villages from 6 blocks in 3 tribal dominated districts viz., Banswara, Dungarpur and Udaipur. Ten farmers from each village were selected purposively based on the number of goats. The selected goat farmers were grouped into three categories based on flock size as small (<25 goats, N= 60), medium (26-50 goats, N = 36) and large (>50 goats, N = 24). The data on feed intake and feeding management practices were recorded on-field. The average flock size as small, medium and large categories of farmers were 22.63 ± 0.210 , 33.72 ± 1.05 and 58.54 ± 1.28 respectively. Majority of goat farmers in tribal area of Rajasthan hold a small flock size. The overall proportion of milking goats, dry goats, goatlings, kids and bucks were 12.52 ± 0.31 (32.63%), 8.62 ± 0.30 (22.50%), 6.64 ± 0.27 (17.33%), 9.52 ± 0.29 (24.85%) and 0.79 ± 0.06 respectively. On an average 25, 55.56 and 75% the small, medium and large categories of farmers respectively were using nondescript breeding bucks whereas 75, 44.44 and 25% were using improved breeding buck respectively for breeding purpose. Overall 49.17% of farmers were using nondescript and 50.83 % were using improved breeding bucks. The per cent of farmers with small, medium and large flocks using their own breeding bucks was 53.33, 55.56 and 75%, whereas 46.67, 44.44 and 25 % were using community/ neighbor's breeding buck respectively for breeding purpose. On the whole an overwhelming majority (71.67 %) of the farmers was using their own breeding bucks and the remaining small number of them (28.33 %) was using neighbor/community breeding bucks. pregnant goats was 70, 61.11 and 58.33 % respectively, whereas 30, 38.89 and 41.67 % of

farmers were not providing any extra care to pregnant goats in small, medium and large groups of farmers respectively. The percentage of farmers who castrated their male kids among small, medium and large groups of farmers respectively was 23.33, 36.11 and 54.17 % respectively castrated their male kids. The data on selection criteria of bucks indicated that an overall average of 36.67 per cent respondents selected breeding bucks on the basis of body weight whereas 45 per cent respondents selecting their breeding bucks on the basis of their physical appearance/breed characteristics and only 18.33 per cent respondent selected their breeding bucks on the basis of milk yield of doe. The average age at first mating of goats was 73.33, 77.78 and 58.33 % respectively; whereas in 26.67, 22.22 and 41.67 % of flocks the age at first mating of goats was more than 15 months respectively. Result revealed that overall age at first mating was between 10-15 months in case of 71.67 per cent of farmers whereas at 28.33 per cent of flocks the age at first mating was more than 15 month. It was found that the average number of goats covered by a buck was 50-100 goats as reported by a majority of respondents (60.83 %) whereas 24.17 per cent respondents reported this figure to be up to 50 goats per bucks per year. It was concluded that breeding management practices were mostly traditional without much regard to scientific recommendations. However, these management practices in general were better in case of small farmers as compared to medium and large farmers.

BG-16

The Breeding Structure of the Indian Sheep Resources: Impact of Effective Population Size on the Genetic Architecture of the Population

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Keywords: Effective Population Size, Sheep and Goat Breeding, Census data, Genetic Diversity

ABSTRACT

Intense selection for a few desired traits has resulted in reduction of the effective population size (N_e) in most of the plant and livestock populations across the world. Objective of the research was to assess the impact of N_e on the genetic architecture of the population in a simulated data. Along with this, the estimate of N_e and its ratio to adult breeding population (N) in the census data of small ruminants of India were also investigated. Results indicated that the average inbreeding ($(F_i)^-$) decreased with increase in N_e , similarly, increase in $(F_i)^-$ per generation was highest in population with lowest N_e . Accuracy of estimated breeding value (EBV) with true breeding value (TBV) was not much affected with effective population size. Effective number of chromosome segments (M_e) in the populations under selection were significantly affected by magnitude of N_e , with linear positive relation between N_e and M_e . Results on livestock census data revealed that all the sheep and goat breeds have sufficiently large N_e . Karnah and Poonchi sheep shares the status of endangered breeds due to less number of breeding female population and hence need attention for conservation. The N_e was large in sheep and goat due to less selection pressure because of low coverage of breed improvement programmes, availability of large number of breeding males and absence of AI in the field flocks. The estimates of N_e and its ratio to the adult census size (N), excluded several factors such as fluctuating population size and overlapping generations. Study revealed introspection from most of the industrial breeding programmes on the issue of N_e in for populations under selection Programme. Similarly, in small ruminants, large N_e indicates huge genetic diversity and chances of improvement in the productivity.

BG-17

Genetic Trend of Growth Traits in a Closed Flock of Sirohi Goat Maintained under Semi-Arid Condition

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Keywords: Genetic trend, Growth, Sirohi

ABSTRACT

Sirohi is a popular dual-purpose medium sized goat breed distributed throughout Rajasthan and adjoining areas of other states. In the present study, the data of different growth traits (live body weights at birth (BWT), 3 (3WT), 6 (6WT), 9 (9WT) and 12 (12WT) month of age) pertaining to maximum 4944 Sirohi goat kids born over 23 years (1995-2017) maintained under All India Coordinated Research Project (AICRP) on Goat Improvement in semi-arid condition at ICAR-Central Sheep & Wool Research Institute (CSWRI), Avikanagar, Rajasthan, were analyzed by the restricted maximum likelihood method (REML) in mixed model using WOMBAT program. The fixed effects included were year of kidding, sex and type of birth with doe weight at kidding taken as covariate in the model. The genetic trends were calculated as regression of average predicted breeding values (APBV) of the traits on year of birth of the animals. The genetic trends for all the traits were positive; the fit of the regression equations were having more than 90% coefficient of determination for all the traits except BWT (68.88%). The genetic gain for BWT, 3WT, 6WT, 9WT and 12WT were 6.2 g, 80.6 g, 160.4 g, 173.1 g and 165.1 g per year, respectively. Very less genetic gain in BWT indicates that it is highly influenced by the maternal effects. The maximum genetic gain in 9WT may be due to the fact that this is one of the component traits in the selection index for genetic improvement Programme of Sirohi goats. The results showed that selection was effective in bringing about genetic improvement in the other growth traits also. Further improvement in the growth performances of Sirohi goats can be achieved through adoption of better management practices.

BG-18

Survival Analysis of Sirohi Goat Kids by Frailty Survival Model

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Keywords: Sirohi, Survival analysis, Frailty, Censoring

ABSTRACT

Pre-weaning animals leave the flock through mortality and culling caused by various reasons. Animal mortality is frequently treated as binary/threshold trait by the investigators and is generally analyzed by chi-squares, analysis of variance, simple regression techniques and logistic regression techniques ignoring the skewness of the mortality data and continuity of mortality process. Further, there is censoring observed in mortality data, which is often ignored in the analyses. During pre-weaning age, the kids are disposed of mostly due to mortality and involuntary culling attributable to incurable diseases, injuries or other unknown reasons. The survival analysis approach was used to study the disposal pattern until weaning (90 days) of Sirohi goat kids. Sirohi is a dual-purpose goat breed and is maintained under All India Coordinated Research Project (AICRP) on Goat Improvement at ICAR - Central Sheep & Wool Research Institute, Avikanagar. The data were collected on 4417 animals from the year 1997 to 2017. For each animal, tag number, date of birth, sex, type of birth, season of birth, birth weight, doe weight at the time of kidding and date of exits were retrieved from the database maintained at the institute. The modes of disposal (mortality and culling) were also recorded. R package “Survival, version 2.42-6” was used for the Cox proportional hazards regression model. Sex, type of birth, season of birth, birth weight and doe weight at kidding were taken as the covariates. Year of birth was modeled as frailty (random) factor. A total of 382 (8.65%) animals were disposed off until weaning. Majority of the observations were censored (91.35%). Cox proportional hazards regression analysis showed that the covariates sex, season of birth, birth weight and doe weight at kidding were significant ($P < 0.05$). Year of birth (with a variance of 0.318) was also significant. Only type of birth was non-significant. The results indicated that the mortality and involuntary culling until weaning of Sirohi kids could be improved by controlling the nutrition of the does and microenvironment of the kids.

BG-19

Comparative Growth Performance of Cross (Black Bengal X Boer) Kids with Black Bengal in Bihar

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Keywords: Boer, Weight Gain, Frozen Semen.

ABSTRACT

The objective of study was to investigate the performance of Black Bengal X Boer goat kids under semi intensive based-rearing system in goat unit of the Animal Production Research Institute (APRI), RPCAU, Pusa, Bihar. The Boer semen straw was collected from Bangalore for AI in Black Bengal goat. The means along with standard errors for Growth performance of cross bred kids were 10.85 ± 0.40 , 16.00 ± 0.40 , 5.75 ± 0.29 , 9.54 ± 0.35 , 92.27 ± 3.17 , 75.79 ± 3.21 , 48.18 ± 3.45 , 45.39 ± 1.89 , respectively for Body weight of Boer X Black Bengal at 3 Months (Kg.) of age, Body weight of Boer X Black Bengal at 6 Months (Kg.), Body weight of Black Bengal at 3 Months (Kg.), Body weight of Black Bengal at 6 Months (Kg.), Average daily wt. gain of Boer X Black Bengal at 3 Months (g/d), Average daily wt. gain of Boer X Black Bengal at 6 Months (g/d), Average daily wt. gain of Black Bengal at 3 Months (g/d), Average daily wt. gain of Black Bengal at 6 Months (g/d). The experiment result showed that a significant difference in weight gain in cross kids. Therefore, the AI Programme with frozen semen of Boer buck would be beneficial to the farmers under community-based rearing system.

BG-20

Analysis of Genetic Diversity in Chegu Goat Population of Himachal Pradesh Using Microsatellite Markers

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Keywords: Chegu Goat, Microsatellite, Genetic Characterization

ABSTRACT

In the present study, genetic characterization of Chegu goat breed, a native to western Himalayan region of India, was carried out for breed characterization and assessing existing intra-population genetic diversity. Total, 50 blood samples were collected from genetically unrelated animals from different locations in the breeding tract of which only 35 samples with desired quantity and quality were subjected to further processing for DNA isolation. The multi-locus genotype data were generated on 35 Chegu goats using 12 FAO recommended goat specific microsatellite markers, which gave amplification and observed and effective number of alleles, gene frequency, observed and expected heterozygosity were estimated through PopGene software (1.3.1). A total of 78 distinct alleles were observed with mean observed and effective number of alleles as 6.50 ± 1.5 and 4.96 ± 1.3 respectively across all 12 studied loci. The maximum (9) alleles were contributed by loci(TGLA 53) and the least alleles (4) by MAF065. The average heterozygosity ranged from 0.6869 (ILSTS 029) to 0.8646 (TGLA 53). The observed heterozygosity was lesser than expected heterozygosity at all loci studied except SRCRSP5, OarFCB48 and MAF 065. The within population inbreeding estimate ($F_{IS} = 0.072 \pm 0.04$) ranged between -0.2463 (SRCRSP5) to 0.2654 (DRBP1). The Ewens-Watterson test for neutrality indicated that observed F value of all microsatellite loci except these 4 (MAF065, INRA 023, DRBP1 and BM6444) lied within the lower and upper boundaries of the 95% confidence region for expected F. Chi-square test for Hardy Weinberg Equilibrium revealed the present Chegu goat population to be in Hardy Weinberg's Equilibrium proportion for 4 loci namely OarFCB48, SRCRSP5, INRABERN172 and MAF065 out of 12 loci. Microsatellite analysis revealed high level of polymorphism across studied microsatellite markers and informativeness of the markers for genetic diversity analysis studies in Chegu goats. This high level of polymorphism can be utilized to plan future association studies to exploit the uniqueness and adaptability of indigenous Chegu goat population of Himachal Pradesh.

BG-21

Genotyping of Mhc Class Ii Drb3 Gene Using Pcr-Rflp and Dna Sequencing in Small Ruminant Breeds of Western Himalayan State of Himachal Pradesh, India

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Keywords: Small ruminants, Migratory system, Disease resistance

ABSTRACT

Sheep and goat farming especially under migratory system is an important activity in state of Himachal Pradesh. DRB locus of major histocompatibility complex is widely studied for its association with disease resistance. Present study was planned to analyse genetic diversity of DRB3 locus in small ruminant breeds of Himachal Pradesh using PCR-RFLP and DNA sequencing. 63, 68, 80 and 73 true to the breed animals belonging to Gaddi sheep, Rampur-Bushair sheep, Gaddi goats and Chegu goats, respectively were utilized. Amplification of exon 2 of DRB3 gene yielded 285bp amplified product in different breeds. Three different digestion patterns corresponding to 2 alleles and seven digestion patterns corresponding to 4 alleles were observed with PstI and HaeIII restriction digestion. For Pst I digestion frequency of AA, AB and BB genotypes ranged from 0.09 to 0.22, 0.40 to 0.53 and 0.28 to 0.46 in different breeds studied. For HaeIII digestion frequency of five genotypes (AA, BB, CC, AB and AC) which were detected in all breeds varied from 0.18 to 0.32, 0.11 to 0.13, 0.07 to 0.17, 0.18 to 0.30 and 0.09 to 0.3 in different breeds, while frequency of CD and AD genotype unique to Rampur-Bushair sheep population was 0.09 and 0.06, respectively. The observed allele number (N_o) ranged from 5 to 6 in different breeds while effective allele number (N_e) ranged from 4.46 to 5.15 in different populations. H_{obs} and H_{exp} values ranged 0.42 to 0.49 and 0.55 to 0.59, respectively in different breeds. The nucleotide variability was detected using sequences from different breeds which was found at 36 places. In the present study, the specific amplification of the exon 2 of DRB3 gene native sheep and goat populations demonstrated marked polymorphism. Further association studies need to be carried out to investigate the association of these SNPs of DRB region with parasitic diseases.

BG-22

Keratin Gene Expression Differences in Wool Follicles and Sequence Diversity of High Glycine-Tyrosine Keratin-Associated Proteins (Kaps) in Magra Sheep of India

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Keywords: Wool, Luster, Gene, Keratin, KAP, HGT

ABSTRACT

Wool is made up of proteins with majority belongs to family of keratin proteins and genes governing their expression in wool follicles determine the characteristics of wool fiber. Keratin associated proteins (KAPs) are structural components of the wool fibre forming a semi-rigid matrix surrounding the keratin intermediate filaments (KIFs) and play an important role in defining the physico-mechanical properties of the fiber. In the present study transcript abundance of keratin and KAP genes in wool follicles of lustrous Magra sheep was evaluated using quantitative real time PCR (QPCR). Furthermore, nucleotide sequences of full open reading frame (ORF) of HGT-KAPs (KAP6, KAP7 and KAP8) were analyzed for presence of single nucleotide polymorphisms (SNPs). Samples were collected from lustrous Magra sheep from ARC sheep farms and Uttarada region of Bikaner district of Rajasthan, India. DNA was extracted from blood samples following standard phenol-chloroform method and RNA was extracted from wool follicle samples. Real time PCR assay revealed that type 1 hair cortex keratin K33A (K1.2) was significantly ($p \leq 0.05$) upregulated in lustrous Magra wool follicle however other keratin and keratin associated protein (KAP) genes studied were down regulated. Furthermore, nucleotide sequence analysis revealed 4, 30 and 7 single nucleotide polymorphisms (SNPs) in KAP6, KAP7 and KAP8 gene, respectively. The presence of differing amount of type I and type II keratin and hydrophobic high glycine-tyrosine proteins in wool might be partially responsible for different glass transitions exhibited by wool and hair and consequently imparts different physical properties like wool luster.

BG-23

Indian Indigenous Caprine Genetic Diversity and its Population Status

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Keywords: Diversity, Population Status, Breeds, Breeding

ABSTRACT

The domestic goat or simply goat is a subspecies of *Caprine aegagrus* domesticated from the wild goat of southwest Asia and Eastern Europe. The goat is a member of the animal family Bovidae and the goat-antelope subfamily Caprinae, meaning it is closely related to the sheep. Indian goats include well defined and documented populations designated by breeds and those so called lesser known populations which are not studied adequately and are least documented. The lesser known goats form a major chunk (65%) of the total goat population. Majority of these is the result of indiscriminate and uncontrolled breeding thus lacking the uniformity in their phenotype. The remaining population can be divided into breeds, each having uniform phenotypes and are established under a specific environment. There are 28 registered goat breeds as on date. Each breed is known for its specific or multi utility (Meat/Milk/fiber). Most of the goats are multipurpose yielding mainly meat in addition to their other specific performance e.g. milk /fine fiber. Goats in India contribute (26.40%) to the total livestock population of the country and is next to the cattle (37.28%). The estimated population of goats as per the latest livestock census (LC) is 135.17 million consisting of 37.61 m males and 97.55 m females (19th LC, 2012). There has been a decrease by 3.82% in the goat population as compared to the previous population of 140.53 million (18th LC, 2007). Male animals contributed more to this reduction (-7.79%) as compared to the females (-2.19%). The changes in goat population in rural and urban areas have been reported as -3.18 and -15.66%, respectively. Among the different states, maximum decrease (-23.65%) in goat population was recorded in West Bengal. Increase in goat population was recorded in Assam (42.81%) followed by Bihar (19.54%), Chhattisgarh (16.52%), Gujarat (6.87%) and Uttar Pradesh (5.36%). 28 goat breeds which have been registered by ICAR-NBAGR consists of 1(Changthangi) from Jammu & Kashmir, 2 (Chegu and Gaddi) from Himachal Pradesh, 1 (Beetal) from Punjab, 2 (Jamnapari and Barbari) from Uttar Pradesh, 1 (Pantja) from Uttarakhand, 3 (Jakhrana, Marwari and Sirohi) from

Rajasthan, 5 (Surti, Gohilwadi, Kutchi, Mehsani and Zalawadi) from Gujarat, 4 (Sangamneri, Osmanabadi, Konkan Kanyal and Berari) from Maharashtra, 1(Ganjam) from Odisha, 1(Black Bengal) from West Bengal, 3 (Kanniadu, Kodiadu and Salem Black) from Tamilnadu, 2 (Malabari and Attapaddy Black) from Kerala, 1 (Teressa) from Andaman & Nicobar, 1(Sume-Ne) from Nagaland.

Non- descript goat breeds of temperate Himalayan region are Shingari and non-pashmina goat of Ladakh . Goats of North East region's are Singharey, Sikkim Black. North West arid and semiarid region's non-descript goats are Udaipuri, Jaunpuri , Bundelkhandi, Rohilkhandi/ Bareilly, Chaugarkha and Tarai goat. Goats of Southern region are Andaman goat, Teressa, Barren, Bidri goat, Nandidurga, Mahabubnagar whereas that of Eastern Region are Black Bengal type, Jharkhand Black , Kalahandi, Raigarhi , Ghumusari, Malkangiri, Narayanpatnam and Assam Hill goats. Some of these populations have been studied but not found fit for breed status.

The present diversity in caprine species is the result of a combination of various processes, including domestication, migration, genetic isolation, environmental adaptation, selective breeding, introgression and admixture of subpopulations. Molecular characterization can help unravel the genetic history of breed differentiation of this species.

BG-24

Reproductive and productive performance of Crossbreeds (Bundelkhandi Buck X Local Female) and Local goats in Chitrakoot district of the Bundelkhand region of Uttar Pradesh

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Keywords: Reproduction, Breeds, Crossbreeding, Stress, Genetic Merit

ABSTRACT

Bundelkhandi goat is a native of Bundelkhand region of Uttar Pradesh and Madhya Pradesh. The other name of this breed is Lalitpuri. Bundelkhandi is a meat purpose breed of east – west region of India. It is large, predominantly black in colour, few with white spot in the body. Lalitpuri pure breed buck five numbers were distributed to the farmers of five adopted villages of Krishi Vigyan Kendra of the Chitrakoot district for up - gradation of local goats in semi - intensive system. A study was conducted both reproductive and productive performance in combined sex of both cross breed and local goats in Chitrakoot district of the Bundelkhand region. In reproductive performance traits like age at sexual maturity, age at first conception, age at first kidding and gestation length in crossbreds and local goats were studied. In productive performance of data were recorded body weight at 0, 3, 6, 9 and 12 months of age in combined sex. The data on 46 crossbreds (Bundelkhandi buck X Local female) and 60 local goats either of the sex belonging to 8 villages of 40 farmers of Chitrakoot district were studied. The average body weight at sexual maturity was found as 26.5 kg and 22.5 kg in crossbreds and local goats, respectively. The age at first conception, age at first kidding and gestation length was observed to be 370.28, 446.15 and 156.28 days, respectively. Compare to local 390.12, 526.23 and 152.16 days respectively. Average body weight at 0, 3, 6, 9 and 12 months were found as 2.8 kg, 11.25 kg, 15.5 kg and 24.5 kg respectively compare to local 1.8 kg, 8 kg, 12.25 kg and 18.15 kg respectively. These finding revealed that influence of environmental, behavioral and nutritional stress on reproductive and productive traits modified the genetic merit. The year of kidding, type of birth, sex and weight at kidding nutritional factors had significant influence on reproductive and productive traits at different stages. The results indicate that both reproductive and productive performance are better in crossbred than the local and the cross breeds may be used for semi intensive goat farming for better response.

BG-25

Selection Criteria for Avikalin Sheep

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Keywords: Growth Traits, Genetic Parameters, Heritability, Avikalin Sheep

ABSTRACT

“Avikalin” is a synthetic dual type sheep evolved for carpet wool and mutton production at ICAR-CSWRI, Avikanagar by stabilizing the crossbred population of Rambouillet and Malpura at 50% exotic inheritance. Genetic parameters for birth weight (BWT), weaning weight (WWT), 6-month weight (6WT), 9-month weight (9WT), 12-month weight (12WT), average daily gains from birth to weaning (ADG1), weaning to 6 months (ADG2), 6 months to 12 months (ADG3), Kleiber Ratio (KR) from birth to weaning (KR1), weaning to 6 months (KR2) and 6 months to 12 months for Avikalin sheep were estimated by Average Information Restricted Maximum Likelihood(AIREML), fitting six animal models with various combinations of direct additive and maternal effects. Records of 7274 animals descended from 398 sires and 2163 dams were used for this study over a period of 41 years (1976–2016). Moderate estimates of total heritability 0.15, 0.20, 0.17, 0.16, 0.13, 0.14, 0.18, 0.11, 0.18, 0.13 and 0.14 were estimated for BWT, WWT, 6WT, 9WT, 12WT, ADG1, ADG2, ADG3, KR1, KR2 and KR3 which indicate that there is scope for selection for growth traits. The direct genetic correlation between body weights ranged from -0.14 (BWT-12WT) to 0.92 (9WT-12WT) indicating animals with above average at 6WT would tend to be above average in genetic merit for 12WT too. Maternal genetic correlation declined as the animal grew old. Results suggest that six month is optimum age for selection for obtaining higher adult weight.

BG-26

Assessment of Reproductive Traits in Sirohi Goats for Non-Genetic Factors

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Keywords: Reproductive Traits, Non Genetic factors, Sirohi Goats

ABSTRACT

Reproductive traits are the most important traits in small ruminant production systems as they lead to more efficient goat production. Assessment of Reproductive traits for non-genetic factors was carried out on 2302 Sirohi kids belonging to 691 Sirohi goat spread over a period of 16 years from 2001 to 2016 at ICAR-Central Sheep & Wool Research Institute, Avikanagar in the semi-arid region of Rajasthan. The weight at first kidding (WFS) was significantly affected by the year of birth; however age at first kidding (AFK) and kidding interval (KI) were non-significantly influenced by the effect of year. Only age at first service (AFS) was significantly affected by the kidding season and all other traits had non-significant effect of kidding season. The average value of AFS was 1.72 ± 0.02 years, WFS was 28.18 ± 0.22 kg, AFK was 2.28 ± 0.03 years and KI was 1.25 ± 0.02 years. This revealed normal reproductive efficiency of the ewes, however restricted breeding practices followed in farm could not reveal the exact genetic potential of these ewes for AFS and AFK. Year of birth was significant source of variation; however, WFS group and lambing season were non-significant sources of variation for all traits. AFS was significantly affected by WFS group. The heritability estimates of AFK and WFS were observed to be 0.07 ± 0.08 and 0.03 ± 0.07 , respectively; indicating very less additive genetic variability for AFK and WFS compared to phenotypic variance so these traits cannot be changed by genetic manipulation. The heritability estimates of AFS and KI were observed to be zero, indicating lack of additive genetic variability. The reproductive traits were influenced by non-genetic factors and can further be improved by proper management of the flock.

BG-27

Evaluation of Selective Value for Non-Genetic Factors in Sirohi Goats

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Keywords: Selective value, Non Genetic factors, Sirohi Goats

ABSTRACT

Selective value or the fitness of the individual is the contribution by the doe in terms of the offspring to the next generation. Selective value of Sirohi goats and its components were evaluated on 2302 kids belonging to 691 Sirohi goat spread over a period of 16 years from 2001 to 2016 at ICAR-Central Sheep & Wool Research Institute Avikanagar in the semi-arid region of Rajasthan. The longevity, productive flock life (PFL) and total female kid reached to age at first kidding (selective value) were significantly affected by the year of birth, however total kids born (TKB) and total female kids born (TFKB) had non-significant effect of year. All these traits were significantly influenced by parity and non-significantly affected by kidding season, weight at first service and age at first service. The average value of longevity was 5.84 ± 0.17 years, productive flock life (PFL) was 3.72 ± 0.12 years, TKB was 3.49 ± 0.13 , TFKB was 1.8 ± 0.09 , and total female kid reached to age at first kidding or selective value was 1.01 ± 0.07 . This revealed normal reproductive efficiency of the ewes. Coefficient of Gene Replication (CGR) was 0.51 ± 0.06 indicating that each goat could replicate its genes quite efficiently in the flock. The heritability (h^2) of TKB, TFKB and selective value was 0.02 ± 0.06 , 0.06 ± 0.06 and 0.05 ± 0.07 , respectively; indicating no additive genetic variance for these traits and the major role of management that influence the selective value. Rank correlation of sires for selective value was highly significant with TKB (0.51), TFKB (0.64), Longevity (0.55) and PFL (0.37). Results indicate that fitness traits are highly influenced by environmental determinants and the selective value can further be improved by proper management of the flock.

BG-28

Identification of Single Nucleotide Polymorphisms in Intron 4 of the *ghrelin* Gene

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Keywords: Ghrelin gene, PCR-SSCP, Malabari Goat and Attappaddy Goat

ABSTRACT

Ghrelin is a 28 amino acid bioactive peptide possessing n-octanoyl modification at its 3rd position. Previous studies have indicated its influence on growth hormone secretion, regulation of energy homeostasis and its role in appetite stimulation. It is also considered to be a good candidate gene for economically important traits like growth, body conformation and carcass traits. Present investigation was undertaken with an aim to identify single nucleotide polymorphisms (SNP) in intron 4 of the caprine ghrelin gene and to find out the possible association these variants with growth traits. Blood samples were collected from 122 goats belonging to Malabari and Attappady Black breed. The DNA was extracted and isolated using the phenol chloroform method. Quality and integrity of the samples was checked using NanoDrop and agarose gel electrophoresis. Polymerase chain reaction was performed using custom synthesized primers. Genotyping of the samples was done by Single Strand Confirmation Polymorphism (SSCP). Representative samples from different band patterns were sequenced. Sequence analysis revealed the presence of two SNPs at 45th (C→T transition) and 89th (C→T transition) positions in intron 4. Significant association was observed between body measurement traits and the identified single nucleotide polymorphisms. However, no association was found with litter size or body weight. Since an association has been observed between growth traits and single nucleotide polymorphisms, in the caprine *ghrelin* gene, it can be used in marker assisted selection for improving conformation traits in goats.

BG-29

Average Daily Gain and Kleiber Ratio in Bharat Merino Sheep

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Keywords: Average Daily Gain, Bharat Merino Sheep, Kleiber Ratio

ABSTRACT

The present investigation was undertaken to study the effect of non-genetic factors affecting on average daily gain and Kleiber ratio in Bharat Merino flock comprising records of 7523 animals maintained at semi-arid region of ICAR-CSWRI, Avikanagar, Rajasthan and sub-temperate region of SRRC, Mannavanur, Tamil Nadu for forty years. The leastsquares mean Average daily gain (ADG) from birth to three month, ADG1 (3-6month) and ADG2 (6-12month) recorded were 150.96 ± 0.56 , 63.84 ± 0.61 and 39.17 ± 0.50 g whereas Kleiber ratio birth to three month (3WTKR) & three to 6month (6WTKR), were 57.68 ± 0.24 and 5.91 ± 0.04 , respectively. The leastsquares analysis of variance revealed highly significant effect ($P < 0.01$) of sex, location, year and season of birth on ADG, ADG1, ADG2, 3WTKR and 6WTKR. However the effect of ewe weight was highly significant effect ($P < 0.01$) on ADG, 3WTKR & 6WTKR and non-significant on ADG1 and ADG2. The heritability estimates for Average daily gain and corresponding Kleiber ratio ranged from 0.15 to 0.18. The estimates of phenotypic correlations among the traits ranged between -0.107 (ADG1- 6WTKR) and 0.94 (ADG2-6WTKR). The moderate estimates of heritability, high and positive phenotypic correlations among the traits in the study were suggestive of moderate genetic progress in the Bharat Merino sheep through selection.

BG-30

Genetic Variability and Expression Profile of Ghrelin Gene in Native Goats of Kerala

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Keywords: Ghrelin gene, Malabari Goat, Attappady Black Goat, Expression Profile and SSCP.

ABSTRACT

The present study was carried out to find out the expression profile of ghrelin gene in different tissues and the association between the genetic variants and growth traits in goats. The DNA was isolated from the blood of 122 Malabari and Attappady black breed of goats and PCR-SSCP was performed to find out genetic variability. Representative samples of each SSCP pattern were sequenced to ascertain the genotypes. Tissue samples (ovary, fallopian tube, abomasum, lung, spleen and liver) were collected from three Malabari and Attappady Black breed goats. Total RNA was isolated, and Real Time-PCR was performed to find out the relative expression. The expression of β -Actin was taken as reference and the $2^{-\Delta\Delta Ct}$ values were calculated. Tissue wise comparison revealed higher expression of GHRL i.e. 3.68 fold in the abomasum compared to ovary, fallopian tube, lung, spleen and liver. Significantly, higher level of expression was noticed in Attappady Black than Malabari goats. The level of expression for was 3.85, 3.80 and 4.07 fold higher for lung, abomasal and ovarian tissues, respectively. Two patterns, two band and three band were observed. Sequencing revealed the presence of two SNPs in the exon 4 at 9th position (C→A transversion) and at 38th position (G→T transversion) of the 142 bp product. No significant association was observed between SNPs and litter size, body weight and body length index. However a significant association was noticed between the SNPs and body measurements as well as chest circumference index and trunk index ($p < 0.05$). The results obtained from this study indicate the potential role of ghrelin in growth, hence it can be used as a candidate gene for the improvement of growth traits.

BG-31

Production and Genetic Parameters of Malabari Breed of Goat in the Home Tract of Kerala, India

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Keywords: Malabari, Production, Reproduction, Genetic Parameters Performance, Tellicherry

ABSTRACT

Data were recorded from the six field centres in the home tract of Malabari goats viz. Thalassery, Taliparamba, Vadakara, Perambra, Kottakkal and Tanur from 2001 to 2018 under ICAR- AICRP on Goat Improvement from 4152 records. Overall population growth recorded was 75.53%. The overall mean body weight recorded at birth, three, six, nine and twelve months of age were 2.21 ± 0.14 , 8.53 ± 0.32 , 15.23 ± 0.04 , 21.43 ± 0.42 and 22.24 ± 0.32 kg, respectively. Mean average daily milk yield recorded was 0.88 ± 0.05 litres. The overall mean average lactation yield was 75.50 ± 6.80 litres with lactation length of 84.70 ± 6.40 days. The overall mean of age at first service and age at first kidding were 246.25 ± 14.10 and 390.31 ± 12.70 days, respectively. The overall mean of gestation length and inter kidding interval were 149.50 ± 0.20 and 276.81 ± 12.50 days, respectively. Average litter size was 1.62. The percentage of singles, twins, triplets and quadruplets were 47.03, 45.52, 7.28 and 0.17, respectively. The genetic trend of body weight was highest at six months (0.59 ± 0.27) followed by three months (0.49 ± 0.27) age. The estimated heritability was maximum at nine months (0.60 ± 0.19) followed by six months age (0.57 ± 0.10). Centre, year and type of birth had significant effect on body weights at all age groups. Males are heavier over females. The effect of season of birth had significant effect on three and six months body weight only. Centre had significant effect on body measurements at birth, six and twelve months of ages. The effect of season and type of birth varied in different measurements at different age groups. Among different body measurements the chest girth was highest followed by height at withers and body length.

BG-32

Prolificacy and Body Weights of Prolific Avishaan Sheep in Semi-Arid Region of Rajasthan

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Keywords: Avishaan, Prolificacy, *FecB* gene

ABSTRACT

Improving prolificacy in sheep will increase life time production and thereby become helpful in enhancing profitability in sheep rearing as maximum earnings of the sheep farmers comes from lamb production only. The total litter weight harvested per unit of time by prolific sheep indicates great potential for augmenting mutton production. By realizing the importance of *FecB* mutation, extensive work has been done all over the world including India for improving prolificacy in sheep. At ICAR-CSWRI Avikanagar, a crossbreeding scheme was initiated during the year 1997 to introgress the *FecB* gene (responsible for prolificacy in sheep) from small sized prolific Garole sheep breed of West Bengal into non-prolific large sized Malpura sheep breed of Rajasthan for evolving prolific strain of sheep to produce twins/ triplets having optimum body weights. With the implementation of structured breeding plan and *FecB* gene detection in lambs, a high performing triple breed (Garole-Malpura-Patanwadi) cross in terms of increased prolificacy, more litter weight, more milk per dam and adaptable to harsh climatic conditions has been developed by CSWRI which was named “Avishaan” on 04th January, 2016. This newly developed prolific genotype of sheep is a composite cross possessing 12.5% Garole, 37.5% Malpura and 50% Patanwadi inheritance in which *FecB* gene has been introgressed successfully. In the current female population of Avishaan, more than 58% females produced 2 lambs and 9% produced 3 lambs and 1% produced 4 lambs in a year leading to 69% prolificacy with litter size at birth is 1.75. Ewe Productivity Efficiency is a very important economic parameter in mutton production programme and Avishaan ewes with 24.0kg of EPE at weaning excelled local monocus Malpura ewes by 46%. The average growth performance of Avishaan lambs under farm conditions averaged to be 2.6kg at birth, 15.0kg at 3-month, 23.3kg at 6-month and 29.7kg at 12-month of age. Results obtained so far in case of prolific Avishaan sheep are encouraging and igniting a new way ahead for profitable sheep husbandry. In times to come, prolific Avishaan sheep may prove as a boon towards enhancing the economic returns per sheep for livelihood security of Indian sheep rearers.

BG-33

Bhakarwali Goat- A Unique Goat Of Jammu & Kashmir

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Keywords: Bhakarwali goat, Jammu & Kashmir, Body conformation and Body weight

ABSTRACT

The State of Jammu and Kashmir is ideally suited for rearing of sheep and goats owing to its favourable agro-climatic conditions. Bhakarwali goat is medium to large goat. Bhakarwali goat is hardy and has great potential to resist diseases. Bhakarwali goat's habitat is mainly in hilly tracts of J&K comprising of Poonch, Rajouri, Reasi, Udhampur, Jammu, Kathua, Doda, Kishtwar and Ramban districts. Goats were housed in kutchha sheds during night only. Goats are raised on grazing only with no supplementation. Bhakarwali goats are maintained in large flocks under extensive system of rearing. Breeding of Bhakarwali goats is generally by natural service. Average flock consists of Doe 55.56 %, Breeding Buck- 4.52% and Kids 23.87 %. Coat colour is white and black. Single kidding is more common in Bhakarwali goat. However twinning is also observed but very rare. The population is semi-migratory in nature. The breed is very hardy and large and animals travel very long distances during migration from the plains of Jammu to the trans-Himalayas. The most prevalent body colours were white and black. There two types of ears observed in the population. One type is short and erect and another is long and drooping. In some males wattles are present. Horns are screw shape. Body is covered with very long hairs. Breed utility is mainly meat. Eyelids and hooves are brown or black. Adult weight varies from 35 to 60 kg in males and 30 to 50 kg in females.

BG-34

Genomic Selection: Potent Tool for Goat Breed Improvement

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Keywords: Genomic Selection, Breeding Tools, Genomic Estimated Breeding Values (GEBV)

ABSTRACT

India is a rich repository of goat genetic resources with 34 distinct goat breeds. Out of the 138 million Indian rural households, more than 45% keep goats. The genetic potential of most Indian local goat breeds is not yet been characterized. The lack of genetic characterization in rural goats prevents the implementation of genetic selection programmes. The conventional selection strategies require longer generation interval. Genomic selection has however opened up an entirely new option for science of breeding and genetics that has proven beyond doubt to overcome all the earlier discussed hurdles in traditional breeding and selection approaches. Genomic selection, has literally replaced the pedigree selection at many places. It enables prediction of the genetic merit of animals from genome-wide SNP markers and large population can be easily brought under the genetic improvement programmes and hence the benefits to the livestock industry could be increased many-fold. Three technological breakthroughs resulted in the current wide-spread use of DNA information in animal breeding: the development of the genomic selection technology, the discovery of massive numbers of genetic markers (single nucleotide polymorphisms; SNPs), and high-throughput technology to genotype animals for (hundreds of) thousands of SNPs in a cost-effective manner. Genotypic data for nearly 50 K SNPs (even more) is regularly used these days for prediction of the genetic worth of individual / genomic estimated breeding values (GEBV) of animals for whom the phenotypic data is not yet available. Genomic selection allows identifying the differences in the DNA information of the individuals. Further this information could be used to predict their genetic merit for selection to bring about genetic improvement with higher accuracy in a shorter period of time. Genomics has offered the opportunity to identify and include major genes (QTLs) associated with reproductive, disease or production traits. Therefore, genomic selection could significantly impacts the structure of future breeding and breed improvement programmes. Traits of economic importance, which are difficult to improve in the conventional systems, could be emphasized and improved through genomic selection.

BG-35

Influence of Breeds in Goat Milk Composition under Field and Farm Rearing Conditions

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Keywords: Rearing condition, Breeds, Influence, Goat milk, Milk composition.

ABSTRACT

The results showed that all the factors investigated had significant ($P < 0.001$) influence on the milk composition. In this study, laboratory and field experiments were conducted to estimate milk composition applied to two breeds (Jamunapari and Jakhrana) and to determine the effect of different breeds on goat milk composition under field and farm rearing conditions. Total 1215 samples were analyzed for the analysis of field and farm rearing conditions. The Jakhrana does had the highest (1.0306 ± 0.0004) specific gravity under farm rearing conditions followed by Jamunapari (1.0294 ± 0.0004) farm conditions and lowest in Jamunapari (1.0286 ± 0.0004) does under field rearing conditions and total solids was significantly ($p < 0.050$) higher (13.15 ± 0.030) in field rearing condition than farm rearing conditions in Jakhrana goat milk whereas in case of Jamunapari goat breed milk the total solids per cent was slightly higher (13.22 ± 0.035) in field rearing condition than farm rearing conditions. The solids-not-fat percentage was significantly ($p < 0.01$) much higher (8.58 ± 0.053) in field rearing conditions either Jakhrana or Jamunapari goat breed than that of farm rearing conditions. It is due to higher fat percentage (4.69 ± 0.044) and lower percentage of protein (3.19 ± 0.034), lactose (4.42 ± 0.012) and ash (0.76 ± 0.007) in farm rearing conditions of Jakhrana as well as Jamunapari goat breeds.

BG-36

Economic Traits in Attappady Black Goats of Kerala, India

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Keywords: Attappady Black goat, Body weight, Production, Reproduction

Attappady Black goat originated around Attappady hill region in Palakkad District of Kerala, India and is reared mainly by the tribal people of the region. It is a meat type animal, known for their hardiness and disease resistance. They are black in colour with no markings, long legs and slender body. The animals included in the present study were between 2 and 5 years of age (n=86), maintained at Livestock Research Station, Thiruvazhamkunnu and University Goat and Sheep farm, Mannuthy under Kerala Veterinary and Animal Sciences University. Average body weight of females was 33.72 ± 4.42 Kg. Average height at withers, body length and chest girth of Attappady Black females were 64.68 ± 3.94 cm, 55.34 ± 4.50 cm and 67.76 ± 3.75 cm respectively. The average body weight of adult males was 38.60 ± 1.26 Kg. The mean height at withers, body length and chest girth were 69.60 ± 1.70 cm, 71.0 ± 0.32 cm and 77.76 ± 3.75 cm, respectively. Influence of sex on all these measurements was found to be statistically significant. Body length index, Chest circumference Index and Trunk index were 78.35 ± 1.60 , 116.29 ± 1.88 and 152.56 ± 3.82 , respectively. The age at first mating was 259.80 ± 2.57 days. Age at first kidding was 394 ± 3.25 days with the gestation length of 151.25 days. Inter-kidding interval was 242.20 ± 3.10 days. The overall mean litter size was 1.28 ± 0.02 . The mean daily milk yield recorded was 373.22 ± 44.24 ml in a lactation length of 62 days.

BG-37

Molecular Characterization and Detection of Two Novel SNPs of Caprine *Sirtuin3 (SIRT3)* Gene in Malabari and Attappady Black Goats

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Keywords: *SIRT3*; SNP; Molecular characterization; Malabari; Attappady Black.

ABSTRACT

Sirtuin3 (*SIRT3*) plays a vital role in protecting the cells from oxidative stress. A novel study, first of its kind, was conducted on caprine *SIRT3* to, characterize caprine *SIRT3*, detect potential polymorphisms in *SIRT3* and analyze their association with production traits in two indigenous goat breeds of Kerala viz., Malabari and Attappady Black goats. A 1070 bp mRNA sequence of *SIRT3* cDNA was amplified from ovarian cDNA by PCR which on sequencing followed by further bioinformatics analysis revealed that it comprised of an ORF of 1002 bp encoding 333 amino acids, having 96% identity with bovine *SIRT3*. The isolated genomic DNAs (n = 196) were subjected to PCR-SSCP of 576 bp fragment comprising of exon-2, intron-2 and exon-3 regions of caprine *SIRT3*. On analysis, three diplotypes viz., HH, HI and HJ were observed which on sequencing revealed two novel SNPs c.384C>T and c.450T>G in exon 3. Further analysis showed that the c.384C>T was a synonymous mutation while c.450T>G was a non-synonymous SNP which on Polyphen-2 tool analysis had a possibly damaging effect on protein function (p.His150Gln). Following this, a novel PCR-RFLP protocol was developed using *PstI* enzyme at 487th position of the 576 bp fragment (c.450T>G). The animals with this SNP showed lower litter size compared to other genotypes. In the light of results obtained and functional properties, *SIRT3* can be considered as a potential candidate gene for future marker assisted selection for litter size in goats.

Nutrition
Management
& Alternative
Feeding Systems

NM-01

Effects of Feeding Rice Gruel Based Milk Replacer on Growth and Rumen Development in Kids

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Keywords: Goats, Growth, Rice-gruel, Rumen Development, Milk Replacer

ABSTRACT

The present study was conducted to find the effects of feeding rice gruel based milk replacer on growth and rumen development in kids. Fifteen male Black Bengal kids were allocated to three groups each containing five. Those were reared with 100% whole milk, 75% whole milk + 25% milk replacer and 50% whole milk + 50% milk replacer. An amount of 125g soy flour was dissolved with 1000 ml of rice-gruel and boiled for 10-15 minutes. After cooling, rice-gruel in combination with whole milk was supplied to the kids. Kids were weighed once a week. Growth of kids in terms of live weight gain and pre-slaughter body measurements did not show any significant change due to feeding milk replacers. Total live weight gain of control and the milk replacer groups (25% and 50%) were 2.72 ± 0.15 , 2.94 ± 0.64 and 2.96 ± 0.10 kg, respectively. Rumen weights were higher ($P < 0.05$) in 50% milk replacer offered goats than others. Lowest rumen weight was recorded in whole milk fed kids. The weight of reticulum, omasum and abomasum did not differ ($P > 0.05$) among the different dietary treatment groups. Rumen wall thicknesses and rumen papillae densities were significantly ($P < 0.01$) higher in 50% whole milk feeding group than others. Histological examination revealed that length and width of papillae were higher ($P < 0.05$) in milk replacer fed kids than whole milk fed counterparts. The results of the present investigation suggested that whole milk could be replaced up to 50% by rice gruel based milk replacer without detrimental changes in growth and rumen development of Black Bengal kids.

NM-02

Effects of Different Energy and Protein Levels on Growth Performance and Nutrients Apparent Digestibility in Lambs of Yanshan Cashmere Goat

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Keywords: Yanshan Cashmere Goat, Energy, Protein, Growth Performance, Nutrient, Apparent digestibility

ABSTRACT

The purpose of this experiment is to study the effects of different energy and protein levels of diets on growth performance and nutrients apparent digestibility in lambs of Yanshan cashmere goat. Ninety 3-month-old weaned male lambs (15 ± 1.50 kg) of Yanshan cashmere goat were randomly divided into 9 groups (10 lambs per group) with 9 different totally mixed diets (metabolism energy (ME) at 9.5, 10.5 and 11.5 MJ/kg•DM ; digestible crude protein (DCP) at 8.5%, 9.5% and 10.5%). The growth performance and nutrients apparent digestibility were measured. The results showed that the dry matter intake (DMI) decreased significantly ($P < 0.05$) with the increase of dietary ME levels. Average daily gain (ADG) of the medium energy and high protein group (ME, 10.5 MJ/kg•DM ; DCP, 10.5%) was significantly higher than that of high energy and low protein group ($P < 0.05$) and higher than other group ($P > 0.05$). The interactions of dietary ME×DCP had a remarkable effect on DMI ($P < 0.05$) but no significant effect on ADG ($P > 0.05$). The gross energy (GE) apparent digestibility increased significantly with the increase of dietary ME levels ($P < 0.05$). The dietary DCP levels and the interactions of ME×DCP had no significant effect on GE apparent digestibility ($P > 0.05$). N apparent digestibility in high ME groups were extremely higher than those of medium and low protein groups ($P < 0.05$), and increased significantly with the increase of dietary DCP levels ($P < 0.05$). The interactions of ME×DCP had no significant effect on N metabolism ($P > 0.05$). In conclusion, the suitable ME and DCP for growing lambs of Yanshan cashmere goat were 10.5 MJ/kg•DM and 10.5%.

NM-03

Effect of Concentrate Replacement with AFEX Pellets on Rumen Fermentation, Blood Profile and Acetamide in Rumen of Crossbred Goats

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Keywords: Ammonia fiber Expansion, Crossbred (Alpine×Beetle) goats, Rumen Fermentation, Blood Profile, Acetamide

ABSTRACT

Present study evaluated ammonia fiber expansion (AFEX) treated wheat straw on health, growth and rumen fermentation of goats relative to concentrate in economizing feeding. Twenty growing crossbred (Alpine× Beetle) female goats were blocked in two equal groups (n=10), control and treatment. Animals of Control group were maintained on a diet containing concentrate and green fodder (50:50 on DM basis), whereas diet fed to Treatment group replaced 50% concentrate part with AFEX pellets to that of control. Goats fed treatment diet exhibited lower dry matter intake (DMI), average daily gain and feed conversion ratio (FCR) than control animals (P<0.05). Rumen acetamide and acetamidase enzyme activity were measured to determine if non-protein nitrogen in the AFEX feed was being metabolized. Rumen acetamide and acetamidase activity was higher (P<0.05) in treatment group. Goats receiving AFEX pellets showed a decrease (P<0.05) in rumen ammonia-N, total volatile fatty acids and propionic acid whereas acetic acid increased (P<0.05). Rumen pH and butyric acid concentration were not different between two groups. Blood metabolites were similar between two groups. Feeding of AFEX-treated wheat straw in growing goats did not affect the blood metabolites and rumen fermentation, whereas reduced dry matter intake and growth of goats. Therefore, AFEX treatment of wheat straw has potential to improve the quality, however long term experiments require.

NM-04

Effect of Feed Selenium-Lysine Supplementation on Milk Compositions in Saanen Dairy Goats

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Keywords: Selenium, Milk, Fat, Somatic cell, Goat, Roughage

ABSTRACT

An experiment was carried out to evaluate the effect of feed selenium-lysine (Se-Lys) supplementation on milk compositions of Saanen dairy goats in Korea. A total of twelve 36 months old Saanen dairy goats (47 ± 6 kg) with similar dry matter intake (DMI), milk yield and parity were randomly selected and subjected for the present study, divided into two groups with six replicates in each group. A total of 0.89% of Se and 0.99% of Lys were mixed with 98.15% PFAD (Palm fatty acid distillate) to prepare Se-Lys (0.024 ppm). The goats in the control group receive rice hulls (10 g/ day) only, and did not receive Se-Lys; goats in the treatment group were fed 0.06 g of Se-Lys with 10 g of rice hulls every day before feeding roughage for six weeks. The milk was collected, and its compositions analyzed every week. Results showed that significantly increased milk production when compared with control group goats ($P < 0.05$). Also, Se-Lys treatment significantly increased the milk protein content (3.98 ± 0.16 %), fat (3.72 ± 0.27 %), lactose (4.07 ± 0.14 %), total solids (12.51 ± 0.28 %) and urea (14.42 ± 1.45) content as compared with control group goats ($P < 0.05$). However, the somatic cell counts (207740 ± 28.81 cell/ml) were significantly lower in the Se-Lys treated group than in the control group ($P < 0.05$). In conclusion, feed Se-Lys supplementation can increase milk yield with its components of milk protein, fat, lactose, total solids and urea content without adverse effects on milk production traits.

NM-05

EFFECT OF REPLACEMENT OF BARLEY AND COTTON SEED CAKE BY MESQUITE (*Prosopis juliflora*) PODS AND MATIRA (*Citrullus lanatus*) SEED CAKE IN COMPLETE RATION ON RUMEN METABOLITES OF GOATS

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Keywords: pH, TVFA, NH₃-N, Total protozoal count

ABSTRACT

An experiment was conducted to study the effect of replacement of barley and cotton seed cake by mesquite pods and matira seed cake in complete feed on rumen environment taking sixteen male marwari goat kids of uniform conformation, divided into four groups of four animals in each. Four iso-nitrogenous and nearly iso-caloric complete feed designated as T₁, T₂, T₃ and T₄ were prepared. T₁ served as control having all the conventional ingredients. Whereas, barley of control was replaced by mesquite pods in T₂, cotton seed cake was replaced by matira seed cake in T₃ and both barley and cotton seed cake were replaced by mesquite pods and matira seed cake in T₄, respectively. The rumen parameters *viz.* pH, TVFA, ammonia-nitrogen and total protozoal count were estimated at 0 (before feeding), 3 and 6hrs post feeding exhibited significant variations across time of sampling and treatment groups but the pattern of rumen fermentation exhibited similar trend in all the four groups. At 3hrs there were significant decreases in pH and total protozoal count, which was minimum in T₃ for pH and in T₄ for protozoal count among the groups. While at 6hrs the pH tended to increase and total protozoal count achieved peak concentration. However, among the groups the counts were maximum in T₁ and minimum in T₄ whereas the ammonia-nitrogen concentration showed peak at 3hrs in all the groups with highest concentration in T₂ and TVFA showed continuous rising trend from 0 to 6hrs attaining peak at 6hrs post feeding.

NM-06

Feeding Management Practices of Goats Followed by Tribal Farmers in Rajasthan

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Keywords: Tribal Goat Farming, Feeding, Feeding System

ABSTRACT

The aim of present study was to assess the feed intake and feeding management practices of tribal farmers in Rajasthan. A total of 120 tribal goat farmers were selected from 12 villages from 6 blocks in 3 tribal dominated districts viz., Banswara, Dungarpur and Udaipur. Ten farmers from each village were selected purposively based on the number of goats. The selected goat farmers were grouped into three categories based on flock size as small (<25 goats, N= 60), medium (26-50 goats, N = 36) and large (>50 goats, N = 24). The data on feed intake and feeding management practices were recorded on-field. A half of goat farmers (51.57 %) were adopting partial grazing followed by complete grazing (48.33%) and none of the selected farmers was practicing complete stall-feeding. About two-thirds of farmer (75%) sent their goats for grazing for more than 5 hours daily and the remaining 25 per cent farmer sent their animals for grazing for less than 5 hours. The proportion of goat farmers who sent their animals for more than 5 hours was 76.67, 66.67 and 83.33 per cent among small, medium and large farmers respectively. Most of goat farmers (77.5%) were feeding colostrum after the birth of the kids whereas some of the farmers (22.5%) were not feeding colostrums at all to kids at all due to the myth of spread of diseases. About a half of the farmers (49.17 %) offered grasses, fodders (berseem, lucerne, bajra, jowar and oats) followed by 34.16 per cent goat farmers feeding tree leaves (ber, neem, babool, khejri) and 16.67 per cent farmers were feeding weeds and grass (stylo, cenchrus spp., crop weeds) and about the same number of farmers (16.66 %) in small, medium and large flock size practiced feeding weeds and grass (stylo, cenchrus spp., crop weeds). It was observed that overall average amount of green fodder offered to milking goats, dry goats, goatlings, kids and breeding buck was 1.33 ± 0.07 , 0.85 ± 0.07 , 0.45 ± 0.03 , 0.37 ± 0.02 and 1.71 ± 0.10 kg/day respectively. The average amount of green fodder offered daily was

significantly ($p<0.05$) higher in case of small farmers as compared to medium and large goat farmers in case of milking as well as dry goats and significantly higher in case of breeding bucks in case of large farmers as compared to other categories of farmers. The overall available dry fodders fed to milking goats, dry goats, goatlings, kids and breeding buck was 0.95 ± 0.67 , 0.93 ± 0.07 , 0.87 ± 0.06 , 0.37 ± 0.02 and 1.72 ± 0.11 kg/day respectively. Being significantly ($p<0.05$) higher in small farmers followed by medium and large goat farmers. Overall average amount of concentrate mixture offered to milking/pregnant goats, dry goats, goat lings, kids and breeding buck was 210.09 ± 14.26 , 85.37 ± 6.84 , 86.76 ± 5.83 , 85.65 ± 5.86 and 246.11 ± 16.89 g/day respectively. Being significantly ($p<0.05$) higher in small farmers followed by medium and large farmers among milking goats and breeding bucks. A sizable majority of farmers (56 %) were offering fattening ration to their male kids for their higher body weight gain so that they attain early market weight and on an overall average 255.79 ± 7923.12 g of concentrate mixture per buck/day was fed as fattening ration. The overall total DM intake through stall feeding in case of milking goats, dry, goatlings, kids and breeding bucks was 1.16, 0.90, 1.01, 0.52 and 1.38 kg respectively. The total DM intake in different categories of goats was similar among the three flock size categories. It was concluded that feeding management practices were mostly traditional without much regard to scientific recommendations. However, these management practices in general were better in case of small farmers as compared to medium and large farmers.

NM-07

Effect of Replacement of Concentrate Mixture with Hydroponic Maize Fodder on the Growth Performance of Tellicherry Buck Kids

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Keywords: Tellicherry kid, Hydroponic maize fodder, Growth performance, Economics

ABSTRACT

Hydroponic fodder production is one of the emerging technologies widely adopted in many parts of the world. In India, very limited research has been done on feeding of hydroponic fodder for small ruminants. Hence, the present investigation was attempted to study the effect of replacement of concentrate mixture with hydroponic maize fodder on the growth performance of Tellicherry kids. Twenty four Tellicherry buck kids aged around 3 months were randomly selected and allotted into three groups namely, treatment 1 (100% concentrate mixture), treatment 2 (75% concentrate & 25% hydroponic maize fodder) and treatment 3 (50% concentrate & 50% hydroponic maize fodder). The study was conducted for a period of six months. No significant difference was noticed between the groups in terms of initial body weight (11.85±0.53 kg, 12.75±0.48 kg, 13.23±0.31 kg), final body weight (19.42 ±0.67 kg, 21.23±0.66 kg, 22.12±0.56 kg), fortnight body weight gain (0.62±0.25 g, 0.71±0.25 g, 0.76±0.24 g), average daily gain (0.04±0.07 g, 0.05±0.07 g, 0.05±0.06 g), total body weight gain (7.57±0.15 kg, 8.48±0.18 kg, 8.89±0.24 kg), average dry matter intake/day (399.54±0.74 g, 441.72±0.44 g, 483.65±0.45 g), feed conversion efficiency (9.72±0.80, 9.59±0.87, 9.30±0.80) and body condition score (2.76±0.18, 2.80±0.17, 2.87±0.13). However, the cost of production / kg live weight gain was significantly ($p < 0.05$) lower in hydroponic maize fodder fed groups (Rs.134.17±2.93, Rs.131.79±3.29) than concentrate fed group (Rs.146.18±3.39). To conclude, hydroponic maize fodder can be used as an alternate to concentrate in the diet of Tellicherry buck kids at 25% and 50% level with reduced cost of production.

NM-08

Mineral Imbalance Induces Cellular Stress and Interferes with Immune Gene Regulation in Goat: A Field Level Case Study

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Keywords: Mineral imbalance, Nutrition, Genetics, gene regulation

ABSTRACT

The present study deals with a field level case study in which effect of mineral imbalance in goat on haematology, serum biochemistry, cellular stress and immune gene regulation was studied. A farmer named Bhagirath Haldar of Sippighat village, South Andaman approached Animal Science Division, ICAR-CIARI, Port Blair as his goats were suffering from alopecia, rough hair coat, scaly skin, low libido, poor appetite, weight loss, swollen feet, small testes, bone deformity and cathectic condition. An insight into the serum mineral profile revealed severe zinc deficiency and imbalance in the ratio of calcium and phosphorous. Further investigation was done to understand the relationship between mineral imbalance and physico-chemical homeostasis, cellular stress and immunity. Samples from healthy population were taken as control. Haematology analysis revealed elevated neutrophil to lymphocyte ratio in mineral deficient animals. The mineral deficient goats expressed increased serum level of aspartate transaminase (AST) and alanine aminotransferase (ALT) as compared to control animals. Significantly, higher levels of serum heat shock proteins (Hsp 90, Hsp 70 and Hsp 27) were detected in mineral deficient goats as compared to control goats which indicated that mineral imbalance induced cellular stress. It was also found that mineral imbalance reduced serum level of Th1 cytokines (IFN-gamma, TNF-Alpha, IL-12) and induced the production of Th2 cytokines (IL-4, IL-1 β) which indicated Th1 to th2 shift. Serum IgG level in mineral deficient goats also reduced significantly as compared to control animals. As treatment, Calcium and Zinc supplementation was recommended for 2 month and it improved the condition of the goats and homeostasis was restored.

NM-09

Effect of Supplementing dried Meal of Two Aquatic Macrophytes on Growth Rate and Blood Parameters of Black Bengal Goats

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Keywords: Aquatic Macrophytes, Black Bengal goats, blood metabolites, growth rate

ABSTRACT

In India, 7 million ha. area is covered by inland water bodies. Wetland vegetation/ aquatic macrophytes are widely available in these water bodies throughout India. Most of these wetland vegetation grow naturally in water bodies or in marshy areas and become weeds in many water bodies. Some of these plants are having good nutritional value and utilization of these plants as animal feed, will not only be helpful to fulfil the gap between demand and supply of fodder to large extent but also will help to clean the water bodies. The present experiment was carried out to study the effect of supplementation of two selected Aquatic Macrophytes namely, *Jussearepens* and *Enhydrafluctans* on intake, growth, blood parameters, feed conversion efficiency and economics of feeding in Black Bengal goats. A ninety days growth trial was conducted on eighteen growing black Bengal goats divided equally into three groups (T₀, T₁ and T₂). Concentrate mixture of T₁ and T₂ were prepared by replacing 20% of wheat bran with dried *Jusseaa* and *Enhydrameal*, respectively. Average daily gain and feed conversion efficiency were significantly (P<0.01) higher in T₁ and T₂ than T₀ without affecting DMI, CPI, TDNI. Blood parameters (Glucose, BUN, total protein, albumin, globulin, AST and ALT) were within the normal range having no significant difference (P>0.05). It can be concluded that, utilization of *Enhydrafluctans* and *Jussearepens* as alternative feed resources may improve average daily gain & economized the goat ration without any adverse effect on Intake & blood parameters.

NM-10

Advances in Nutrition on Chinese Cashmere Goat:A review

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Keywords: Cashmere goat, Nutrition, Hair follicle, Diets evaluation

ABSTRACT

China has the world's largest number of cashmere goat populations, and produce over 50% the world's total cashmere. The quality of the cashmere is best, and output quantity is the highest in the world. Inner Mongolian cashmere goats are one of the best Cashmere goats breeds in the China and the world. This paper review reveals the progress in chinese cashmere goat nutrition research. Inner Mongolian cashmere goats are one of the best Cashmere goats breeds in the world. Cashmere goat industry has made a great contribution in promoting local economic development and improving farmer's living standard because of providing excellent cashmere raw material. For years the cashmere goats grazing and protecting ecological environment on grassland have been in intense conflict due to overgrazing. The best choice to solve this problem is to carry out a confinement and semi confinement feeding instead of year-round grazing system only. However, after confinement feeding system extending, a considerable problem has been found: Feeding costs are increased and the economic returns are decreased compared with year-around grazing system. Nevertheless, a profitable confinement system for cashmere goats can be established for manipulation of nutrient partitioning. The one is to develop techniques for using light duration or melatonin treatment, the other is to develop a basic technique of manipulating dietary nutrient balance. The purpose of this paper is to identify the nutritional ways responsible for increasing fiber production and economic returns.

NM-11

Assessment of Status of Arsenic in Goats, Soil, Water, Feeds and Fodder of Gaighata Block, West Bengal

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Keywords: Arsenic, Goat, Faeces, Hair, Milk, Feeds and fodder

ABSTRACT

More than 30 countries, including India, have been reported to have quite high levels of arsenic in groundwater, soil, plants and/ or animal tissues. West Bengal is an arsenic endemic state in India, with at least 9 out of 18 districts exposed to high level of arsenic. The present experiment was designed to assess the status of arsenic in Gaighata block of North 24 Paraganas district of West Bengal. Therefore, 25 numbers goats from 4 villages were selected and faeces, hair and milk samples were collected from them. Soil and water samples were collected from the sources having animal access. Arsenic concentration of faeces, hair, milk, soil samples were found to be 202.72 ± 4.27 ppb, 2257.37 ± 47.37 ppb, 7.13 ± 0.42 ppb, 9.51 ± 0.49 ppm, respectively. Average arsenic concentration of water samples from different sources was 52.4 ± 6.33 ppb which is above the WHO's maximum permissible limit of 10 ppb. Among the water sources maximum and minimum arsenic concentration (ppb) were observed in pond water (136.56 ± 22.29) and deep tube well water (11.30 ± 2.25), respectively. Among common feeds and fodder available for the animals, arsenic concentration (ppb) of maize fodder, maize grain, wheat bran, paddy straw, mustard oil cake and subabul leaves were found to be 196.44 ± 8.31 , 223.58 ± 4.43 , 187.92 ± 26.82 , 736.82 ± 17.49 , 172.05 ± 3.91 , 593.33 ± 12.28 , respectively. Therefore, from the present survey it can be concluded that goats of the Gaighata block are exposed to arsenic toxicity and steps should be taken to reduce the toxicity from water, soil, feeds & fodder and animals.

NM-12

Importance of Garlic in Ruminants Feeding

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Keywords: Plant extract, Garlic, Antimicrobial

ABSTRACT

Plant extracts have been used for centuries for various purposes (e.g., traditional medicine, industrial applications, food preservatives) due to their antimicrobial properties and because most of them are categorized as Generally Recognized as Safe (GRAS) for human consumption. The main purpose of ruminant nutritionists is to manipulate the ruminal microbial ecosystems to improve the efficiency of converting feed to animal products. The use of feed additives such as antibiotics has proven to be a useful tool to reduce energy losses (in the form of methane) and nitrogen (in the form of ammonia). Garlic (*Allium sativum*) has many biological activities, such as protective roles in cardiovascular function, as antihypertensive. Garlic can have positive effects on the performance of different animals. Garlic has various properties including improve nutrient digestibility, antimicrobial, anti-inflammatory, anti-oxidant and immune-stimulant in animal's nutrition.

NM-13

Mitigation of ruminal methane production using plant secondary metabolites for improving animal productivity

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Keywords: Ciliate protozoa, Methane, Plant secondary metabolites, Rumen fermentation

ABSTRACT

Methane from enteric fermentation represents a loss of dietary energy in ruminants up to 12% of gross energy intake. Methane is also an important green house gas and has 21 times more global warming potential than carbon dioxide. It is estimated that the world's population of ruminants produced about 15 % of total methane emission. So there is an urgent need to reduce methane emission from ruminants. Natural products containing plant secondary compounds instead of chemical feed additives had been recent trend to modify rumen fermentation for reducing ruminal methane production. Different plant extracts having high content of plant secondary metabolites were tested to observe their effect on ruminal methanogenesis *in vitro* to explore the possibility of rumen manipulation. Plants extracts were prepared @ 10 g dried and ground plant material per 100 ml solvent in three different solvents e.g. water, 50% methanol and 50% ethanol. The effect of different plant extracts on ruminal methanogenesis, were tested at three levels e.g., 0 (control), 1.0 and 2.0 ml for each plant using rumen liquor by *in vitro* gas production test. Ruminal methane production decreased ($P < 0.01$) due to inclusion of the methanol and ethanol extract of *Zingiber officinale* rhizome, *Psidium guajava* and *Piper betle* leaves in the incubation media. Highest reduction (40%) in ruminal methane production was observed due to inclusion of ethanol extract of *Piper betle* leaves in incubation media. Further, it was noticed that ethanol extract of these tested plants were more effective to reduce ruminal methanogenesis than the methanol extract. Whereas, water extract of tested plants had no effect on ruminal methanogenesis *in vitro*. It was concluded that, ethanol extract of beetel (*Piper betle*) leaves may be used to manipulate the rumen fermentation to reduce ruminal methanogenesis for improving animal productivity.

NM-14

Effects of spineless cactus silage feeding on manure compost production in goats

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Keywords: Ammonia, Goat, Manure compost, Silage, Spineless cactus

ABSTRACT

Feeding of spineless cactus (*Opuntia* spp.) cactus was reported to reduce water intake and facilitate digestion in animals. Ensiling was identified to reduce cell wall contents and increase phenolic compounds in cactus. Thus, the feeding of spineless cactus silage (CS) has possibility to improve animal production. However, the effects of CS feeding on manure compost in animals are obscure. Therefore, this study aimed to identify the effects of CS feeding on manure compost production in goats. The spineless cactus was chopped and mixed with wheat bran (7:3 in a fresh matter basis) and fermented for 70 days in anaerobic condition. Four castrated Japanese Saanen goats were divided into two groups and fed CS or wheat bran (control) as supplemental feed with ryegrass straw, respectively. The feeding amount per goat for a day was 1300 g dry matter and 107 g crude protein (CP) in both the group. Feces of goats were added distilled water for adjusting to 65% moisture and processed for 28 days using experimental composters. The temperature change during composting did not show significant difference between the groups. The manure showed lower CP and ammonium nitrogen in CS group than in control group. The amount of volatile ammonia (NH₃) during the first seven days was lower in CS group than in control group. The pH and calcium contents of compost was higher in CS group than in control group. The CS feeding possibly reduce NH₃ volatilization during composting and increase pH and calcium in the goat manure compost.

NM-15

Effect of Oil Cake and Mineral Mixture Supplementation on Growth Performance of Goat in Tribal Odisha

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Keywords: Oil cake, Growth, Goat farming, Nutrition

ABSTRACT

Goat farming is the domain of women and plays an important role in employment generation, improving household nutrition and livelihood security. Farm women mostly rear goats on zero inputs which is most popular in the tribal community. The productivity of goats under prevailing traditional system is very low as goats are maintained in extensive system on natural vegetation with low plane of nutrition and farm women are unaware about improved feeding practices which incurs loss. Strategic nutritional intervention with protein rich feed and catalytic supplementation of micronutrients during peak phase of growth may enhance growth performance of goats. Based on goat population density, 2 major goat producing districts i.e Ganjam and Khurda of Odisha were selected for study. Study on 50 farm families in study area revealed that feeding of proteinaceous oil cakes and supplementation of mineral mixture is rarely practised. A field trial of 4 months was conducted on effect of supplementary feeding of locally available proteinaceous oil cakes and mineral mixture in growing kids to assess growth performance of male kids. Forty goat kids of about 6 months age were randomly divided into four treatment groups of 10 kids in each. Animals were fed conventional bran based diet in T₁(control) devoid of mineral mixture and oil cake. However, supplemental mineral mixture (5g/kid/day) was provided to kids in T₂ and T₄. Oil cake (GNC) @ 50 g/day was incorporated in concentrate mixture offered to kids replacing rice bran supplemented in T₃ and T₄. During the growth trial, only 100 g of concentrate mixture consisting of ground nut oil cake and bran was provided throughout the study. Body weight was recorded at fortnight intervals. Feed intake was similar in all the four groups. It was observed that final body weight was improved by 9.7% in T₂, 13.0% in T₃ and 17.3% in T₄ as compared to control group (T₁) showing higher (P<0.05) growth rate by feeding supplemental protein through GNC. Supplementation of mineral mixture along with GNC showed synergistic effect of protein and mineral mixture on growth performance of goats.

NM-16

Development and Evaluation of Efficiency of Lamb Incubator and Herbal Antioxidant (Moringa Flower) Pellets as a Means to Protect Lambs from Cold Stress

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Keywords: Lamb incubator, Winter, Moringa, cold, Antioxidant, Shelter.

ABSTRACT

The lambs of poor and migratory farmer remain completely unprotected from cold stress during chilling winter nights, that increases lamb mortality and slow growth rate. For protection from chilling wind a dome-shaped lightweight movable lamb incubator was developed using local materials, like; umbrella - generally used by the street shop, coarse wool mat, and parachute cloth. Another protection is Moringa (*Moringa oleifera*) flower pellet is an easily available rich source of antioxidant. Hence, the present study was carried out to evaluate the efficiency of the lamb incubator and herbal antioxidant (Moringa flower) pellets in reducing the deleterious effect of cold stress during winter nights. For this purpose, eighteen growing Malpura lambs were divided into three groups and kept in different treatment for one month. The first group was kept in an asbestos roofed conventional shed (G1) with side curtain to protect lambs from cold winds during nights. The second group was kept inside the lamb incubator (G2) during night time. The third group was kept inside lamb incubator during night time and each lamb was provided with 50 gm of herbal antioxidant (moringa flower) pellets (G3) by replacing the same amount of concentrate mixture. The minimum temperature (13.2° C and 15.6° C in G2 and G3; respectively) and the temperature humidity index (THI) (16.4 and 20.6 in G2 and G3; respectively) was significantly ($P < 0.05$) higher in G2 and G3 as compared to G1 (8.2° C minimum temperature and 12.3 THI) indicated lamb incubator provide better comfortable microenvironment to the growing lambs during chilling nights. There was no significant ($P > 0.05$) difference in blood biochemical levels, however; the total antioxidant capacity was significantly ($P < 0.05$) higher in G2 and G3 (2.84 and 2.88 Trolox equivalent in G2 and G3; respectively) as compared to G1 (2.37 Trolox equivalent); reflected higher capability to combat cold stress during winter nights in G2 and G3. The average daily gain was 166g, 161g, and 188g in G1, G2 and G3; respectively. From this study, it may be concluded that lamb incubator and herbal antioxidant (moringa flower) pellet supplementation protect the growing lamb from cold stress during chilling winter nights. This technology can be very much useful especially for the migratory flock.

NM-17

Assessment of mineral status of goat under rural conditions of Bassi block of Jaipur district of Rajasthan

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Keywords: Serum, Mineral, Protein Growing and Adult

ABSTRACT

The present study was undertaken to assess the metabolic profile of growing and adult goat under rural conditions with the aim to identify specific deficient elements. The study was conducted in Bassi tehsil of Jaipur district. Five villages, i.e. Banshko, Bassi, Devgaon, Kanota and Tunga were selected for survey and collection of data. The animals were maintained by farmers in the rural areas as per the traditional animal husbandry practices. Blood samples of growing and adult goat were collected to assess their mineral and protein status. A total of 20 blood samples were collected randomly and centrifuged for separation of serum. All the minerals except phosphorus were estimated by Atomic Absorption Spectrophotometer (Shimadzu model No 6300). Phosphorus in serum was estimated calorimetrically. The estimated serum calcium level was 11.20 ± 2.12 % in growing kid and 11.30 ± 1.08 % in adult goat. Magnesium level was recorded in growing and adult goat i.e. 2.24 ± 0.46 % and 2.55 ± 0.52 % respectively. The level of Phosphorous and zinc in growing and adult goat was observed lower than the critical range i.e. 3.80 ± 1.32 ppm and 3.79 ± 0.89 ppm and 0.73 ± 0.10 ppm and 0.86 ± 0.20 ppm respectively. The levels of total protein, albumin and globulin in both groups were also lower than the critical level. It is concluded that goat of this block have phosphorus, zinc and protein deficiency. This can be corrected by providing adequate quantity of concentrates, particularly sesame cake, cottonseed cake and wheat bran which good source of zinc and phosphorus and provide mineral supplements with phosphorus and zinc salts

NM-18

Effect of Feeding Hydroponic Maize Fodder on the Reproductive Performance of Tellicherry Doe Kids

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Keywords: Tellicherry kids, Hydroponic maize fodder, Age at puberty, Conception rate

ABSTRACT

Hydroponic fodder production is one of the most feasible and easily adoptable technologies proven to enhance the growth and reproduction in farm animals. Hence, the present investigation was attempted to study the effect of replacement of concentrate mixture with hydroponic maize fodder on the reproductive performance of Tellicherry doe kids. Twenty four Tellicherry doe kids aged around 3 months were randomly selected and allotted into three groups namely, treatment 1 (T1 - 100% concentrate mixture), treatment 2 (T2 - 75% concentrate & 25% hydroponic maize fodder) and treatment 3 (T3 - 50% concentrate & 50% hydroponic maize fodder). The study was conducted for a period of six months. Parameters such as age at puberty, weight at puberty, oestrus intensity scoring, conception rate and cost of feeding / kid / day were studied. Teaser males were utilized for detection of estrus in doe kids from 5th month of age to establish age at puberty. After 8 months of age all the doe kids were synchronised using progesterone sponges and allowed for natural service in order to study the conception rate. Kids fed with hydroponic maize fodder attained puberty earlier ($P < 0.01$) (T2: 228.38 ± 1.83 days; T3: 217.13 ± 1.76 days) with better estrus intensity score (T2: 3.38 ± 0.25 ; T3: 3.63 ± 0.25) and had higher conception rate (T2: 87.5%; T3: 100%) than concentrate fed group (252.50 ± 2.24 days; 3.00 ± 0.00 ; 37.5%). However, all the treatment groups had similar weight at puberty (14.49 ± 0.21 kg; 14.56 ± 0.24 kg; 14.48 ± 0.23 kg) and cost of feeding / kid / day (Rs. 8.29 ± 2.50 ; Rs. 8.57 ± 2.67 ; Rs. 8.22 ± 2.63). To conclude, hydroponic maize fodder can be included in the diet of Tellicherry doe kids to enhance its reproductive performance.

NM-19

Impact of Feeding Area Specific Mineral Mixture on Goat Productivity and Socio Economic Status of Goat Farmers

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Keywords: Area Specific Mineral mixture, Goat, Milk,

ABSTRACT

The present study was conducted to observe the effects of area specific mineral mixture supplementation on milk yield and milk components of goats of two tehsils of Jaipur district of Rajasthan over a period of twenty days. Twenty five goats (15 in treatment group, 10 in control group) were selected randomly from each tehsils viz. Bassi and Chaksu. All goats were dewormed twice at fifteen days interval prior to the start of mineral mixture supplementation. All treatment groups were fed area specific mineral mixture @ 10 grams/goat/day for a period of 20 days; whereas goats from control group were not supplemented. Both the groups were kept in same managerial conditions. Milk yield of these animals was recorded by workers in morning and evening through structured questionnaire. Milk yield and milk components such as milk fat and milk solids not fat were also evaluated from milk samples collected at village level through milk society. In this study, area specific mineral mixture supplementation resulted in increased milk yield during early, mid and later stages of lactation and also increased the values of milk component i.e. fat and SNF. It may be concluded that the supplementation of 10gm of area specific mineral mixture along with rural managerial condition gave better results in milk quality as well as quantity. Area specific mineral mixture is an approach of low input and high output for the end users. Therefore, there is an ample scope for exploring the concept of area specific mineral mixture for improving the socio economic status of goat farmers.

NM-20

Importance of Top Feeds in Goat Feeding

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Keywords: TDN, Crude fiber, Crude Protein, Ether Extract, Top feeds, Proximate

ABSTRACT

Tree leaves have been used traditionally by farmers as animal feed but relatively little is known about their potential to replace conventional protein-rich concentrates such as groundnut cake and cotton seed cake. Trees also fulfill a valuable environmental role. In many tropical countries, deforestation is a widespread problem. Encouraging farmers to plant trees and shrubs which can be used as animal feed helps to alleviate the problem. Two approaches are possible for developing feeding systems using tree leaves. One is to use the leaves from trees already established in the traditional farming systems. The other is to introduce trees with known potential as animal feed. Goats also prefer to browse on small bushes, or thorny plants rather than grazing but due to the limitation of bushes and thorny plants, tree leaves form a major part of their diet. Some information about trees along with chemical compositions and nutritive values of their leaves for goats have been reviewed which showed that most of these are rich in crude protein and TDN contents which can meet the requirements of goats. In proximate study of some tree leaves such as *Ficus religiosa*, *Ailanthus ecelsa* and *Prosopis cineraria*, the crude protein were found 15.2%, 20.13%, 13.99%, crude fibers 2.4%, 13.25%, 17.80% and ether extract were found 2.4%, 4.83%, 1.88%, respectively. The leaves of these trees can even fully satisfy the maintenance requirement of goats. The leaves of *Ficus religiosa* are consumed in greater quantities by goats as compared to bullocks. Tree leaves are available practically at no cost so much attention should be given to their utilization for rearing goats economically.

NM-21

Effect of Different Energy Sources and Estrous Synchronization Protocol on Fertility of Magra Sheep Reared in Arid Region of Rajasthan

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Keywords: Energy Source, Estrous, Magra,

ABSTRACT

The study was aimed to evaluate the blood metabolic profile, estrous induction rate, conception rate and fertility potential of Magra sheep under different estrous synchronization protocols and supplementation of energy source during rainy season at Arid Region Campus of CSWRI, Bikaner. Magra sheep (n=40, average body weight 35 kg) were divided in 5 groups equally and subjected to different estrous synchronization protocols and energy supplementation regimes for 60 days i.e., T1: BF-P (50g bypass fat daily with progesterone sponge+ Inj PGF2alpha 24 hours before withdrawal of sponge), T2: BF-Pe (50g bypass fat daily with progesterone sponge+ Inj PGF2 alpha 24 hours before withdrawal of sponge + eCG 400IU at withdrawal of sponge), T3: CB-P (400 gm crushed barely with progesterone sponge + Inj PGF2alpha 24 hours before withdrawal of sponge), T4: CB-Pe (400 gm crushed barely with progesterone sponge + Inj PGF2alpha 24 hours before withdrawal of sponge+ Inj eCG 400IU at withdrawal of sponge) and the control group maintained on grazing and maintenance ration. For synchronize estrous, progesterone sponge were inserted to all ewes after 15 days of feeding and kept in vagina for 12 days. Blood sampling were done before start of feeding and at the time of estrus. At the time of estrus, significant increase in plasma glucose ($P<0.05$) and decrease ($P<0.05$) in BUN values with no changes in total protein and cholesterol values were recorded as compared to initial value. No significant change in body weight was observed. The conception rate recorded was 83%, 100%, 100%, 71.44%, and 57.14% in T1 T2, T3, T4 compared to control group, respectively showed improvement in conception rate with combination of energy supplementation and estrous synchronization protocol.

NM-22

Effect of Milk Replacer Feeding on Growth Performance of Lambs During pre-weaning Phase

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Keywords: Body weight, Feeding, Growth, Lambs, Milk replacer

ABSTRACT

The growth of lambs during pre-weaning phase could be improved through better feeding management. Feeding of milk replacer to lambs besides suckling improves growth of lambs during pre-weaning phase. However, the information on milk replacer feeding to lambs besides the suckling are scanty. Therefore, the effect of feeding the milk replacer to lambs besides suckling during the pre-weaning phase was envisaged under present study. Fifty two intercross lambs in their pre-weaning phase (27 to 41 days of age) were randomly divided in to two groups (G1 and G2) of 26 each. Group G1 lambs were fed milk replacer maximum up to 200 ml besides suckling while G 2 was maintained on suckling only. Milk replacer fed to lambs during pre-weaning phase contained (g/kg) skim milk powder 258, sesame cake 85, groundnut cake 90, soy flour 150, maize flour 100, rice flour 125, soybean oil 30, linseed oil 20, sesame oil 20, mineral mixture 20, citric acid 2, and hyblend 0.2. Butyric acid 0.2 ml was also added in one kg milk replacer. 170 g milk replacer mesh was used to constitute one liter of milk replacer. The age (days) of lambs in G1 and G2 at the start of experiment was 35.96 and 30.11 and the differences were non-significant. Average fortnightly intake (ml/day) of milk replacer was 89.7, 148.6, 168.9 and 193.9 at 15, 30, 45 and 60 days of experiment, respectively. Initial body weight (kg) of lambs in G1 and G2 was 9.51 and 9.11, respectively. The body weight (kg) of lambs in two groups G1 and G2 did not differ at fortnightly intervals and the values were 11.67 and 11.28, 13.92 and 13.49, 15.95 and 15.91 and 18.44 and 17.39 at 15, 30, 45 and 60 days of experiment, respectively. Body weight gain of lambs in 60 days was 8.94 and 8.28 kg in G1 and G2 respectively. Average daily gain (ADG) was 149 and 138 g in G1 and G2, respectively. It is inferred from the results that feeding of milk replacer to lambs besides suckling improves growth performance of intercross lambs during pre-weaning phase.

NM-23

Effect of Different Levels of Concentrate Mixture Feeding on Milk

Composition in Sirohi Goats

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Keywords: Concentrate mixture, Milk composition, Fat, Solid-not fat, Total solid, Sirohi Goats

ABSTRACT

A study was conducted on Effect of different levels of concentrate mixture feeding on milk composition in Sirohi goats. The experiment was conducted at RKVY Goat unit, S.K.N. College of Agriculture, Jobner (Jaipur) during November 2016 to May, 2017. Twenty four lactating Sirohi goats (36.2±0.7 kg) were taken to investigate the effect of different levels of concentrate mixture feeding on milk composition in Sirohi goats. The total duration of feeding experiment was 90 days. Apart from daily grazing, concentrate mixture feeding were given to Sirohi goats in ratio of 0.00 gm (T1), 100gm (T2), 200gm (T3) and 300gm (T4) respectively with *Prosopis cineraria* (Khejri) dry leaves ad libitum. The results revealed that the Sirohi goats showed significantly ($P<0.05$) higher milk composition in T4 than T3, T2 and control T1. The overall means of milk composition for fat % was found higher in T4 than T3, T2 and T1 ie., 3.91, 3.62, 3.40 and 3.17%. The solid-not fat % was found higher in T4 than T3, T2 and T1 ie., 10.29, 9.75, 9.29 and 8.62%. The total solid % was also found higher in T4 than T3, T2 and T1 ie., 14.73, 13.36, 12.70 and 10.78% respectively. It was observed that with increasing amount in feeding ratio was successive increase in milk composition. The present results help to conclude that there is a certain beneficial effect of concentrate mixture feeding on daily fat %, solid not fat %, total solid % and overall means of milk composition performance during lactation period in Sirohi goats.

Innovations in Reproduction Technologies

IRT-01

Effect of Day Length on Follicular Characteristics of Gaddi Goats

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Keywords: Gaddi goats, Ultrasonography, Follicular dynamics, Season

ABSTRACT

The effect of day length was studied on follicular dynamics and the circulatory peripheral progesterone concentrations in Gaddi goats. Accordingly, eleven and seven goats, respectively, were subjected to once daily ovarian ultrasonography and progesterone estimation on alternate days during conventional non-breeding (NB) season (May-June 2016) and breeding (B) season (January-February 2017) at CSK Himachal Pradesh Krishi Vishvavidyalya, Palampur (32.6°N, 76.3°E, altitude 1290.8m). The investigation during NB was planned to last for a period simulating to one interestrus interval in B and the results during two seasons were compared. The follicular wave pattern comprised of either three (81.8%, n=9) or four (18.2%, n=2) waves, the average being 3.18 ± 0.12 during NB, similarly during B, animals mainly exhibited four wave pattern (n=5, 71.4%), while the remaining animals had either three or five wave pattern (n=1 each; 14.3%), respectively. Average follicular wave parameters viz. inter wave interval (5.66 ± 0.28 versus 4.90 ± 0.31 days), average growth rate (0.65 ± 0.03 versus 0.79 ± 0.04 mm per day) and maximum size of dominant follicles (7.66 ± 0.10 versus 7.11 ± 0.14 mm), were observed during NB and B, respectively with inter-ovulatory interval of 20.85 ± 0.63 days during B season. Average mean progesterone concentration was 0.30 ng/ml throughout the estrous cycle during NB whereas, peak progesterone concentration of 11.89 ± 1.55 ng/ml was observed at Day 14 of estrous cycle during B season. Significant difference ($P < 0.05$) between average daily count of small and medium sized follicles were observed with better follicular activity during breeding season. In conclusion, follicular activity is present during both the season with ovulation occurring only during the B season.

IRT-02

Successful Induction of Oestrus, Ovulation and Pregnancy with Avikesil-S-PMSG Protocol in Anoestrus Sirohi Goats

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Keywords: Sirohi, Goat, Anoestrus, Intravaginal sponges and Fertility

ABSTRACT

Sirohi goat is a dual purpose breed maintained at ICAR-CSWRI, Avikanagar under semi intensive system of rearing, with 8-10 hour daily browsing along with supplementation of 300g concentrate/head/day. The present work was carried out to study the oestrus induction and subsequent fertility in anoestrus does. Thirty three anoestrus does (teaser based) were presented for oestrus induction at the end of major breeding season (May-June). All the does were subjected to oestrus induction by inserting Avikesil-S sponge in the vagina for 14 days. On day 14, intravaginal sponges were removed and does were injected 200 IU of PMSG (Folligon, Intervet). Aproned teaser buck was let into the paddock for oestrus detection from day 14. Out of 33 does, 29 (87.87%) expressed the heat signs and were bred naturally by breeding bucks. The kidding percent was 58.06 on available basis, thereby accounting fertility of induced oestrus to 66.66%. The percentage of twinning and triplet were 33.33 and 11.11, respectively. Moreover, one doe succeeded in giving quintuplets which were born live, accounting multiple births to 50%. However, one among the quins died within 24 hours of birth and the kid crop tolled to 31. It is concluded from the present study, that Avikesil-S- PMSG protocol is a useful technology for oestrus induction in anoestrus goats and thus leading to additional kid crop production in the flock.

IRT-03

**Effect of Different PMSG Does on Reproductive Performance in
Yanshanashmere Goats**

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Keywords: Cashmere goat; PMSG; Reproductive performance

ABSTRACT

The objective of this study was to evaluate the effect of different PMSG does on reproductive performance in Yanshan cashmere goats. Eighty Ewes aged between 2–3 years old with live body weights ranging from 32 to 42 kg, were equally and randomly allotted into four groups (A, B, C, D). Four treatment groups were synchronized their estrous cycles by CIDR and respectively injected 250 IU, 300 IU, 350 IU and 450 IU PMSG after the CIDR was withdrawn from the vagina for a 12-day period. The estrus rate and lambing rate had been measured. The results revealed that estrus rate of four groups in 96 hours after the CIDR was withdrawn from the vagina had no significant differences. The lambing rate were significantly higher in group B and C (A, 135.71%, B, 188.89%, C, 190.00% and D, 166.67% respectively). In conclusion, results show that the dose of 300 IU of PMSG administered after CIDR withdrawal in an estrus synchronization protocol improved lambing rate of Yanshan cashmere goats.

IRT-04

Effect of Beta Defensin-1 on Conception Rate Using Artificial Insemination in Barbari Goat

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Keywords: Artificial Insemination, Barbari, Beta defensin, kidding percent

ABSTRACT

Defensins are antimicrobial peptides and uniformly spans the entire sperm surface. Goat Beta Defensin 1 (GBD1) helps in initiation of motility and capacitation of sperm. It forms a coat on sperm that provides protection from recognition by immune competent cells in *in vivo* as well as when challenged with antisperm antibodies *in vitro*. The present study was carried out to know the effect of GBD1 as an additive in goat semen diluent on post thaw quality and subsequent conception rate in Barbari goat. Goat semen (N-10) was collected by artificial vagina method and were cryopreserved with semen diluent having beta defensin-1 @ 10 ng/mL. The supplementation of beta defensin-1 in goat semen diluent maintains the concentration of GBD1 even after cryopreservation and significantly ($P < 0.05$) improve the post thaw qualities. The semen straw having beta defensin @ 10 ng/mL in semen diluent were cryopreserved and used for AI in 20 natural estrous conditions of Barbari Goats. The insemination was carried out 12 h after detection of estrous and repeated after 12 h of first insemination. A total 7 goat conceived by using frozen semen AI technology and total 15 kids (6 female and 9 male) were born through this technology. Overall, a success rate of 35.00% was recorded on the basis of actual kidding rate in Barbari goat breed maintained at this Institute under Semi-Intensive Management System. So, the supplementation of beta defensin-1 in goat semen diluent improved the post thaw immune modulatory properties of semen and subsequent conception rate.

IRT-05

Development of Artificial Insemination Technique of Goat for Non-Experts

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Keywords: Artificial insemination, Goat holder, AI gun, Goat, Semen

ABSTRACT

This study was carried out to develop a technique to preserve and restore male genetic resources of goats. Therefore, the semen was collected from Korean native buck using electro-ejaculation. The collected semen was centrifuged to remove seminal fluid. Then the pellet was mixed with Andromed[®] stock solution (diluted 5 times with double distilled water) at a ratio of 1:1. The pellet-Andromed[®] mixture was diluted 10 times with 30 minutes intervals by doubling. Finally, the dilute was packed into the 0.5ml straws, followed by frozen for 5 minutes at the top of liquid nitrogen, and were kept in the liquid nitrogen tank. Results showed that semen viability after freezing and thawing was >65%. Estrus of Korean native female goats synchronized with goat CIDR-G and injected PMSG 400IU and PGF2a 7.5mg at day 9. The CIDR-G was removed at day 11. Artificial insemination (AI) was performed with frozen semen at 3436 h after removal of CIDR-G. AI with 6 non-lactating goats in the laboratory, 4 heads gave births (66.7%), and AI passed through the cervix with 10 lactating goats in 3 commercial farms resulted that 6 heads gave births. However, the newborn in commercial farms were not originated from semen by paternity discrimination when compared to the laboratory, because of natural mating after artificial insemination. In conclusion, the developed AI technique of the goat was performed by farmers (non-experts), and they could effectively fix goat with holder and easily inject semen with goat AI gun through the cervix. However, lactation may affect the reproductive physiology, hence further research is needed.

IRT-06

Effect of Monosaccharides Supplementation on Sperm Characteristics of Barbari Buck Semen During Long Term Preservation

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Keywords: Barbari buck, acrosomal, semen, Tris

ABSTRACT

The experiment was designed to explore a better monosaccharide suited for long term preservation of Barbari buck semen at refrigerated temperature. For this ten Barbari bucks were selected and semen was collected at twice a week interval in artificial vagina. After collection, good semen samples were pooled and split into two parts: one part of the pooled semen was diluted in egg yolk, Tris, citric acid and fructose diluter and second part was diluted in egg yolk, Tris, citric acid and glucose diluter. After proper dilution semen samples were kept in equilibration chamber for 4hr at 5° C. Semen samples were evaluated for viability, motility, plasma membrane integrity and acrosomal integrity at 0 hr, 24 hr, 48 hr and 72hr after dilution. There was significantly higher ($p<0.05$) motility observed at 24 hr in extender containing glucose as compared to extender containing fructose. However, the motility was decreased subsequently at other time intervals i.e. at 48hr and 72hr. Other parameters like viability, plasma membrane integrity and acrosomal integrity also decreased significantly ($p<0.05$) at 72 hr in extender containing glucose when compared with that of fructose. In conclusion, the results demonstrated that fructose is more suitable sugar for long term storage of goat semen than glucose at refrigerated temperature.

IRT-07

**Transcriptional Gene Response and Its Modulation With Respect to Fertility
in Jamunapari Buck Semen**

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Keywords: Buck, RNAs, Transcripts, Semen

ABSTRACT

Mammalian sperm contains an array of RNAs including messenger RNAs (mRNAs), ribosomal RNAs (rRNAs) and small RNAs (sRNAs), largely representing remnant transcripts produced during spermatogenesis. Increasing evidence has indicated that ncRNAs, which control gene expression at transcriptional, post-transcriptional, and epigenetic levels, play critical role in male germ cell development. The present study was carried out on Jamunapari bucks (n=26) to isolate RNA from fertile and non-fertile bucks. Before being collection of semen, all glassware's, liner was given DEPC treatment. Semen samples were collected using artificial vagina once in a week during May – August months 2018, maintained under intensive system at Jamunapari and Animal physiology reproduction experimental shed of ICAR-CIRG, Makhdoom. Immediately after collection volume, color, consistency mass activity was assessed. Semen samples having mass activity of ≥ 5 , volume ≥ 0.3 ml free of coagulation after dilution were used further. 0.1 ml sample was stored for whole genome and transcriptome study while remaining sample was diluted (1:8) with tris extender (Tris- 3.604 gm, citric acid- 1.902gm, fructose- 1 gm, streptomycin- 100 mg, penicillin- 100000 I.U., Triple distilled water- 100 ml, pH- 6.75-6.8). The seminal traits *viz.* concentration, Live & dead%, acrosomal integrity%, progressive motility were analyzed. RNA was extracted by trizol method and checked for its quality, purity and concentration. We found that sperm transcribe their RNA, RNAs have different role, high fertile buck have more RNA yield /spermatozoon *vs* low fertile buck, transcripts influence semen quality and fertility.

IRT-08

Spermatogonial Stem Cells Technology: An Attractive Option for Conservation of Endangered Species

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Keyword: Characterization, Conservation, Purification, Spermatogonial Stem Cells.

ABSTRACT

India has rich biodiversity, the livestock have played important role for the development of agriculture and the productivity in India. However, some of the goat breeds are at the risk of extinction and marked as endangered species. Therefore, there is an urgent need to preserve the important livestock breeds. Assisted reproductive technologies like IVF, embryo transfer, cloning and stem cells have been emerged as a powerful tool for the development and propagation of animal breed. Spermatogonial Stem cell (SSCs) from male testis will have great importance for conservation of male animals for breeding program. Through this, infertile male of the endangered breeds can be transformed into fertile male. For this, we have isolated SSCs from pre-pubertal goat testes (3 to 6 months of age) by using two step enzymatic digestion method followed by per coll discontinuous gradient purification and enrichment. The putative SSCs were cultured in DMEM with 15% FBS, 1% L-Glutamine, 1% Non-essential amino acids, 50µg/ml Gentamycin, 10µg/ml Antibiotic-antimycotic solution (streptomycin, penicillin and amphotericin B), incubated at 37⁰C with 5% CO₂ in CO₂ incubator. These pluripotent SSCs colonies were further enriched by culturing into the SSC medium with GDNF (40ng/ml). After 15 days of culture, the developed putative SSCs formed colonies and expressed alkaline phosphatase, OCT4 and PGP9.5 activities, thus indicate the presence of SSCs in our culture system. Once these cells are fully characterized, these will be further transplanted into recipient infertile males for the conservation of endangered species.

IRT-09

**Role of Vitamin D and Its Receptor in Proliferation and Steroidogenesis of
Goat Luteinized Granulosa Cells**

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Keywords: Vit D₃; VDR; proliferation; steroidogenesis; LGCs; goat

ABSTRACT

The objectives of the present study were to investigate whether 1 α ,25-(OH)₂VD₃ (Vit D₃) has a dose-dependent (0, 1, 10, 100 nM Vit D₃) effect on the *in vitro* proliferation and steroidogenesis and to determine the underlying mechanisms by overexpressing or silencing VDR in goat luteinized granulosa cells (LGCs). After treatment with for 48 h, the MTT, flow cytometric and immunofluorescence assays were used to detect cell proliferation and apoptosis. E₂ and P₄ level in the culture medium were determined by ELISA. The mRNA expression and protein abundance of cell cycle, apoptosis and steroid synthesis-related genes were detected using qRT-PCR and western blot analysis. Results showed that the highest and lowest proliferation rates were obtained in the 10 nM and control groups, respectively. Furthermore, the high proliferation could be attributed to increases in the expression of CDK4, CyclinD1, SOD2, and CAT, and decreases in p21. In addition, 10 nM Vit D₃ optimally increased E₂ production; however, the highest mRNA expression of CYP19A1 was obtained with 100 nM Vit D₃. P₄ production increased with increasing Vit D₃ concentrations, but there were no significant differences between the 10 nM and 100 nM groups; this was accompanied by upregulation of StAR and 3 β -HSD. Moreover, VDR knockdown induced apoptosis of LGCs accompanied by upregulation of CDK4, CyClinD1, and Bcl-2 expression, and downregulation of p21, p27 and BAX, whereas its overexpression had opposing effects. These results demonstrated that Vit D₃ affected

proliferation and steroidogenesis of goat LGCs in a dose-dependent manner, by regulating antioxidant-, cell cycle-, and steroid synthesis-related genes. The aberrant expression of VDR triggered apoptosis of LGCs via regulatory cell cycle- and apoptosis-related genes. These findings will enhance the understanding of the molecular roles of Vit D₃/VDR in goat ovarian follicular development.

IRT-10

Production of anti-Progesterone Antisera Using Glutaraldehyde-Fixed and Progesterone Sensitized Chicken Erythrocytes

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Keywords: Antisera, antigenicity, GA-CRBCs, PBS, IgGs

ABSTRACT

Production of polyclonal antisera against several antigens was highly successful on large scale. However, this couldn't be achieved in producing antibodies against steroids like progesterone (P4) due to its low antigenicity. To solve this problem, we attempted production of anti-P4 antisera in young Jakhranabucks (n=2) by using glutaraldehyde-fixed chicken erythrocytes (GA-CRBCs). For sensitizing chicken erythrocytes with P4, chicken blood were collected in Alsever solution (1:3) and used 2-10 days after collection. Then, erythrocytes were washed 3 times in 0.15 M PBS (pH 7.2). To 0.1 ml of packed cells, 1 ml of PBS was added followed by 0.2 ml of 2.5% glutaraldehyde. The mixture was then rotated on a rotator at room temperature for 2 h. The GA-CRBCs were washed three times in 0.15 M PBS. A 10% suspension of GA-CRBCs was mixed with an equal volume of PBS containing 0.005% tannic acid. The mixture was incubated at 37°C for 30 min with occasional shaking. The tanned GA-CRBCs were pelleted by centrifugation at 650×g for 10 min at 25°C and washed three times with PBS. P4 sensitized erythrocytes were dissolved in 2 ml of PBS and this suspension was used for immunization. By following 90 days standard protocol of immunization, each buck was inoculated subcutaneously at 8 sites with 2ml suspension. The serum was harvested after each inoculation and was used for titer estimation. Based on the results, it seems promising that either crude antisera or purified IgGs produced through this method can be used for development of immunoassay for P4 estimation.

IRT-11

Production of anti-Progesterone Antisera Using Glutaraldehyde-Fixed and Progesterone Sensitized Chicken Erythrocytes

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Keywords: Antisera, antigenicity, GA-CRBCs, PBS, IgGs

ABSTRACT

Production of polyclonal antisera against several antigens was highly successful on large scale. However, this couldn't be achieved in producing antibodies against steroids like progesterone (P4) due to its low antigenicity. To solve this problem, we attempted production of anti-P4 antisera in young Jakhranabucks (n=2) by using glutaraldehyde-fixed chicken erythrocytes (GA-CRBCs). For sensitizing chicken erythrocytes with P4, chicken blood were collected in Alsever solution (1:3) and used 2-10 days after collection. Then, erythrocytes were washed 3 times in 0.15 M PBS (pH 7.2). To 0.1 ml of packed cells, 1 ml of PBS was added followed by 0.2 ml of 2.5% glutaraldehyde. The mixture was then rotated on a rotator at room temperature for 2 h. The GA-CRBCs were washed three times in 0.15 M PBS. A 10% suspension of GA-CRBCs was mixed with an equal volume of PBS containing 0.005% tannic acid. The mixture was incubated at 37°C for 30 min with occasional shaking. The tanned GA-CRBCs were pelleted by centrifugation at 650×g for 10 min at 25°C and washed three times with PBS. P4 sensitized erythrocytes were dissolved in 2 ml of PBS and this suspension was used for immunization. By following 90 days standard protocol of immunization, each buck was inoculated subcutaneously at 8 sites with 2ml suspension. The serum was harvested after each inoculation and was used for titer estimation. Based on the results, it seems promising that either crude antisera or purified IgGs produced through this method can be used for development of immunoassay for P4 estimation.

IRT-12

Highly Methylated *Xist* in SCNT Embryos was Retained in Female Deceased Cloned Goats

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Keywords: *Xist*, DNA methylation, somatic cell nuclear transfer, goat

ABSTRACT

X inactive-specific transcript (*Xist*) is crucial in murine cloned embryo development, but its role in cloned goats remains unknown. Therefore, we studied the expression and methylation status of *Xist* in somatic cell nuclear transfer (SCNT)-generated embryos and in ear, lung, and brain tissue of female deceased cloned goats. Firstly, we amplified the *Xist* sequence and identified a differentially methylated region (DMR), which was differently methylated in oocytes, spermatozoa, and female fibroblast cells. Secondly, *Xist* methylation level was greater in SCNT-generated than in ICSI-generated XX embryos. Thirdly, when compared to naturally bred controls, the methylation level of *Xist* was significantly increased in ear, lung, and brain tissue of 3-day-old female deceased cloned goats but remained unchanged in ear tissue of female live cloned goats and in lung and brain tissue of male deceased cloned goats. Lastly, *Xist* expression remains unchanged in SCNT-generated 8-cell embryos, however, *Xist* was up-regulated in ear tissue of female live cloned goats but down-regulated in lung and brain tissue of female deceased cloned goats. In conclusion, the hypermethylation of *Xist* might have resulted from incomplete nuclear transfer reprogramming. Moreover, the hypermethylation was retained in 3-day-old female deceased cloned goats and subsequently led to dysregulation of *Xist*.

IRT-13

Morpho-Biometric Evaluations And Isolation Of Spermatogonial Stem Cells From Pre Pubertal And Post Pubertal Goat (*Capra Hircus*) Testes

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Keywords: *Capra hircus*, pre pubertal testis, Post pubertal testis, Spermatogonial stem cells, Density gradient.

ABSTRACT

The aim of the present experiment to study the morpho-Biometric evaluations and isolation of spermatogonial stem cells from pre pubertal and post pubertal goat (*caprahircus*) testes. Gross anatomical and biometrical observations of pre and post pubertal testes were recorded. The average weight of pre pubertal and post pubertal testes was 25.08 and 62.42 gm, respectively. The average length of pre pubertal and post pubertal testes was 7.25 and 10.61 cm, respectively. The average mid circumference of pre pubertal and post pubertal testes was 8.82 and 12.98 cm, respectively. The average volume of pre pubertal and post pubertal testes was 24.6 and 63.5 cc, respectively. The average density of pre pubertal and post pubertal testes was 1.03 and 0.98 gm/cc, respectively. All the biometrical parameters except density were significantly higher ($p < 0.05$) in the post pubertal testes as compared with pre pubertal testes. Isolation of goat spermatogonial stem cells (gSSC) from pre and post pubertal testes was done. The isolated cells were further enriched by filtration through 80 μ m nylon mesh filters, followed by Discontinuous percoll density gradient centrifugation. After overnight incubation, the unattached cells were cultured on sertoli cell feeder layers in SSC medium (DMEM supplemented with 15% FBS, GDNF (40 ng/mL), bFGF (10 ng/mL) and EGF (10 ng/mL)). Number of cells isolated from pre pubertal testes (6.85×10^6 cells/ml) were significantly higher ($P < 0.05$) than post pubertal testes (2.40×10^6 cells/ml). It was also observed that the attachment, proliferation and colonies of spermatogonial like stem cells isolated from pre pubertal testes was higher as compared to post pubertal testes. The colonies were also characterized by alkaline phosphatase (AP) activity, OCT-4 and PGP9.5. In conclusion, prepubertal testes are better source for isolation and culture of caprine spermatogonial stem cells.

IRT-14

Effect of Culture Media on Developmental Potency of Caprine Chimeric Embryos

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Keywords: Caprine, Chimeric embryos, Culture media, ES-Tetraploid Complementation assay

ABSTRACT

Several techniques have been developed over the years to achieve full term development of parthenogenetic embryos and one of the most important technique is the application of tetraploid complementation assay for the production of chimeric embryos. The aim of this study was to evaluate the developmental potency of chimeric embryos in different culture media. Parthenogenetic embryonic stem cell-like cells (pESCs, n=103) were obtained from inner cell mass from hatched parthenogenetic blastocysts while tetraploid embryos (n=231) were obtained from 4 cell IVF embryos. A pair of zona-free tetraploid embryos and one clump of pESCs at passage 2 and 3 were aggregated in such a manner that the clump of pESCs was sandwiched between the tetraploid embryos. The preparation of aggregates was divided into two groups. Group 1 (n=53) in RVCL medium and group 2 (n=50) in mCR2aa medium supplemented with 10% FBS and were cultured in humidified atmosphere of 5% CO₂ at 38.5⁰C in a CO₂ incubator. The percentage of aggregation efficiency, 8-16 cell, morula and blastocyst in group 1 (RVCL) was 83.33±6.00%, 38.79±7.56%, 25.86±7.08% and 11.49±5.36%, respectively while in group 2 (mCR2aa+10% FBS) was 91.66±4.32%, 54.76±7.75%, 22.32±5.75% and 14.58±5.18%, respectively. The aggregate, 8-16 cell stage and blastocyst formed in group 2 were comparatively higher than in group 1 while morula formation in group 2 was comparatively lower than in group 1. Higher number of morula in group 1 might be due to the reason that more number of embryos got arrested at morula stage and did not develop to blastocyst. The results indicated that the culture of aggregates in mCR2aa+10% FBS leads to improved aggregation efficiency and also enhances the production of blastocysts rather than with RVCL medium.

IRT-15

Effect of Cryopreservation on Bone Marrow Derived Caprine Mesenchymal Stem Cells

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Keywords: Bone marrow, caprine, cryopreservation, mesenchymal stem cells.

ABSTRACT

MSCs have emerged as a prominent candidate for cell-based therapies, tissue repair and immune modulation. Because of their tremendous potential for cellular therapy, regenerative medicine and tissue engineering, it is desirable to cryopreserve and bank MSCs to increase their access and availability. For this, bone marrow samples were randomly divided into two groups, group 1 (fresh culture) and group 2 (frozen thawed). For group 1, bone marrow blood was loaded carefully on histopaque (4:3 ratios) and centrifuged at 2800 rpm for 30 min. Bone marrow got separated into different phases, plasma, polynuclear cells and a buffy coat. Buffy coat was collected carefully and was washed with 5 ml of PBS at 1200 rpm for 10 minutes. Supernatant was discarded and cell pellet was again washed with PBS. Pellet formed was re-suspended in culture media (DMEM supplemented with 15% FBS, low glucose, 1% Non-essential amino acids, 1% L-glutamine, 50µg/ml gentamycin and 10µg/ml antibiotic antimycotic solution). The re-suspended cells were seeded in to T-75 culture flasks and incubated at 37°C in humidified atmosphere with 5% CO₂. For group 2, whole bone marrow blood was cryopreserved in freezing media (80% FBS, 10% DMSO and 10% Ethylene Glycol). After 6 months, frozen cells were thawed and washed with PBS to remove cryoprotectants. Pellet formed was dissolved in PBS and MSCs were separated as described in group 1. Total cells isolated in group 1 and group 2 were 34.61X10⁶ and 32.59X10⁶, respectively and live cells (by trypan blue exclusion method) counted were 34.25X10⁶ and 27.59 X10⁶, respectively. Significant difference was observed between group 1 and group 2 in terms of cell viability while no significant difference was observed in terms of karyotypic profiles and alkaline phosphatase activity. However, frozen thawed culture showed delayed cell attachment and proliferation. In conclusion, cryopreservation of bone marrow blood can be an attractive alternate method for the storage and recovery of MSCs.

IRT-16

Long Noncoding RNAs Changes During Oocyte Maturation In Goat

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Keywords: Oocyte, lncRNAs. Downregulated, upregulated, GVDB

ABSTRACT

In mammals, the process of oocyte maturation is an accurate and ordered multi-stage including germinal vesicle (GV) stage, germinal vesicle breakdown (GVBD) stage, metaphase (M) and metaphase (M). More and more long noncoding RNAs (lncRNAs) have been identified as key regulators to participate in so many essential pathways. However, there are largely unknown on lncRNAs participating in oocyte maturation, especially in goat. Thus, we collected GV and M goat oocyte for single-cell RNA sequencing. Our seq-results identified that there were 3901 downregulated DEs and 3634 upregulated DEs, including 4516 DE mRNAs (2195 upregulated and 2321 downregulated) and 3019 DE lncRNAs (1439 upregulated and 1580 downregulated). Meanwhile, 27,033 novel lncRNAs in goat oocyte were identified by an intersection of the results of CNCI, CPC, PFAM, and CPAT analyses. Based on KEGG analysis, there are 29 DE genes participating in oocyte meiosis, 27 DE genes in progesterone-mediated oocyte maturation, 41 DE genes in cell cycle, 23 DE genes in RNA degradation and 59 DE genes in RNA transport. Oocyte maturation from GV to M is not only a meiotic maturation but also a process of maternal RNA metabolism including RNA splicing, modification, translation, and degradation, and there are barely transcription activities during oocyte maturation. We focused on the pathways involving meiotic maturation and RNA metabolism, and tried to find lncRNAs participating in goat oocyte maturation, these seq-data will provide a valuable resource for further study on lncRNA functions during oocyte maturation

IRT-17

Heparin Binding Proteins and their Correlation With *In Vitro* Sperm Characters of Black Bengal Buck Semen

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Keywords: Buck semen; heparin binding proteins

ABSTRACT

This experiment was carried out to study the electrophoretic profile of heparin binding proteins (HBPs) and their relations with *in-vitro* sperm characters and freezability in Black Bengal buck semen. Nine Black Bengal bucks maintained at NDRI, Kalyani were used. Semen ejaculates (n=20/buck) were collected by artificial vagina. *In vitro* characters of the semen were studied at immediately after collection, after equilibration and at post freeze thaw. Seminal proteins were isolated by ice cold ethanol method while sperm proteins were extracted by Triton-X detergent method. HBPs were isolated by heparin column and characterized by SDS-PAGE. Significant variation among the bucks in their *in vitro* sperm characters were observed during different stages of semen evaluation. 8 protein bands of molecular weight 17 to 180 kDa in HBPs of seminal plasma and 7 bands starting from 17 to 134 kDa in the HBPs of sperm were found in the SDS-PAGE. 180 - 136 kDa HBPs of seminal plasma showed a high correlation with mass motility (0.711) and functional membrane integrity (0.699) in neat semen; and high correlation with functional membrane integrity(0.707) and negative correlation with malondialdehyde (-0.825) in equilibration and moderate correlation with membrane integrity(0.532) in post thaw. These protein bands 180 - 136 kDa were present in 55% of bucks screened. Further works on identification of these proteins and their correlation with *in vivo* pregnancy rates needs to be carried out to find whether they can be used as a marker for buck selection.

IRT-18

Fecundity Improvement Trials in Estrus Synchronized Osmanabadi Goats

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Keywords: GnRH, Osmanbadi goats, fecundity, dextrose, ultrasonography

ABSTRACT

Fecundity aspects are least considered in small animal reproduction but record of seven kids per term has been documented in Osmanabadi goats. The trials were conducted to study the efficacy of fecundity improvement protocols in Osmanabadi Goats synchronized with standard select-synch protocol. Total 48 non-pregnant does were selected after USG examinations and then were treated with standard Select-synch protocol (GnRH @ 4 µg IM on day 1+ PGF_{2α} @ 125 µg IM on day 7) for estrus induction and synchronization. The treated goats were divided into five groups to assign different fecundity improvement protocols viz. Group-I goats(n=08) were administered with GnRH @ 6 µg IM on day 9; Group-II goats (n=08) were supplemented with micro-minerals @ 2 tablets once daily for 10 days of select-synch treatment along with injections of vitamin A, D₃, E @ 3 ml on day 1 and 7; Group-III goats (n=08) were injected with 5% Dextrose injection @ 10 ml/kg BW, intravenously on day 7; Goats(n=12) in Group-IV were treated with GnRH @ 8 µg IM on day 8 and Group-V does(n=12) were given propylene glycol @ 20 ml/kg BW orally for 10 days of select-synch treatment. Responded goats to select-synch treatment were identified in oestrus through buck parading and were allowed to settle through natural services of potent bucks.

All does were followed for recording estrous synchronization response and it was noted that 87.50, 75.00, 62.50, 66.0 and 83.3 per cent goats were in estrous in group I to V, respectively. Scanning by ultrasonography to diagnose pregnancy by trans-rectal and trans-abdominal approaches revealed number of embryos on 35 days post mating as 15, 09, 08, 16 and 22 with average kid crop as 2.1, 1.5, 1.6, 2.1 and 2.2 kid per doe. It was observed that irrespective of dose of GnRH, fecundity rate was at par in goats (group I and IV), but constant energy supply has significant effect in improvement of fecundity rate (group III and V), where least stimulus was provided by mineral vitamin supplementation in goats for fecundity improvement. Fecundity rate was not found to be improved with any of the protocols attempted in the present trials and efforts are necessary to explore mechanism of higher fecundity induction in goats.

IRT-19

Effect of Soybean Lecithin Based Extender and OviX cell on Quality of Frozen Semen in Beetal, Sirohi and Assam Hill Goat

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Keywords: ALT, AST, ovixcell, sperm motility, lecithin

ABSTRACT

Goat rearing is an integral part of livelihood, particularly for women, landless labours and marginal farmers. Goat husbandry is ideally suited for the poorest, because of short gestation period, low capital investment, low cost of maintenance and growing demand for its milk and meat. A total of 45 pooled ejaculates comprising, three Beetal, three Sirohi and three Assam Hill Goat, 15 from each breed were evaluated for routine sperm parameters and sperm abnormalities. Each pooled ejaculate was split into three parts and then extended in three extenders *i.e.*, Tris extender containing 20 % egg yolk, Tris extender containing 1.5 % soya lecithin and OviXcell and frozen using liquid nitrogen vapour. Each semen sample was evaluated after equilibration and after freezing. Semen after freezing was also evaluated for extracellular release of ALT and AST. The fertility rate of semen frozen using three extenders was recorded. In Beetal, Sirohi and Assam Hill Goat bucks all the seminal attributes studied immediately after collection and after pooling were within normal ranges. The mean post-thaw sperm motility, live sperm, intact acrosome, HOST-reacted sperm, extracellular ALT and AST irrespective of breed in Tris extender containing 20 % egg yolk, 1.5 % soya lecithin and in commercial OviXcell extender was 62.11 ± 0.65 , 57.67 ± 0.52 and 35.33 ± 0.64 %; 64.94 ± 0.30 , 61.39 ± 0.14 and 38.77 ± 0.30 %; 44.60 ± 0.40 , 42.84 ± 0.28 and 29.83 ± 0.28 %; 49.59 ± 0.32 , 46.72 ± 0.38 and 30.82 ± 0.18 %; 41.75 ± 2.07 , 45.04 ± 1.94 and 115.92 ± 12.81 U/L; and 70.56 ± 3.38 , 84.07 ± 3.58 and 109.89 ± 7.11 U/L respectively. The post thaw values in Tris extender with 20 % egg yolk were significantly ($P < 0.05$) higher than in that containing 1.5 % soya lecithin and in commercial OviXcell extender, and also in Tris extender containing 1.5 % soya lecithin than that in OviXcell extender for sperm motility, live sperm, intact acrosome and HOST-reacted sperm. The fertility rate was found to be the highest in 1.5 % soya lecithin.

IRT-20

Effect of Freezing on Seminal Plasma of Sirohi Buck Semen through SDS Profiling

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Keywords: Cryoprotectant, glycerol, SDS-PAGE, seminal plasma.

ABSTRACT

The benefits of a semen cryobank to ensure long-term availability of genetic resources especially for those from endangered species are well recognized. This study was conducted to assess protein profile of Sirohi buck seminal plasma through SDS-PAGE. A total of 50 ejaculates were utilized from eight adult Sirohi bucks aged between 2 to 5 years using artificial vagina method. Ejaculates were subjected to separation of seminal plasma immediately after collection by centrifugation at 1500 rpm for 15 minutes and stored at -70° C. The semen samples were diluted (1:8, 1:10) in TRIS based extender; the addition was done in two parts (Part A and Part B). Part A contained TRIS-Egg yolk while Part B contained TRIS-Egg yolk and cryoprotectants (glycerol, ethylene glycol, propylene glycol and dimethyl sulfoxide). Samples were kept frozen in liquid nitrogen for 2 days, before being thawed for evaluation. Frozen samples were thawed and re-centrifuged at 10,000xg for 60 minutes at 4°C and 50 µl of the supernatant was transferred to cryovials for storage at -70°C. SDS- PAGE showed bands with more intensity in post thawed sample where as it was lesser in pre freeze semen samples. In lane with fresh neat diluted semen without egg yolk, protein bands were visible between 12 kDa to 21 kDa bands. The concentration of proteins in bands between 42 kDa to 66 kDa, was very low as compared to all other samples, when samples were frozen with glycerol. It was concluded that there were differences in the seminal plasma protein profile from Sirohi bucks with different semen freezability. A higher proportion of spermatozoa possessed intact membrane prior to cooling.

IRT-21

Conception Rate of Black Bengal Goat Using Frozen Semen of Boer in Bihar

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Keywords: Frozen semen, Boer, PPR, semi- intensive.

ABSTRACT

This study was to investigate the conception rate of Black Bengal goat using frozen semen of Boer under semi intensive based-rearing system in goat unit of the Animal Production Research Institute (APRI), RPCAU, Pusa, Bihar. The boer semen straw was collected from Bangalore (institute) for AI in Black Bengal. Ten Black Bengal does were selected as experimental material. The animals were allowed to grazing with officering concentrated feed. The animals were vaccinated against Peste des Petits Ruminants (PPR) disease. The experimental results showed that 60% conception rate in black Bengal Goat and also observed that depth of semen deposition affected pregnancy rate. It is also concluded that, whenever the semen deposited in deeper the genital tract during AI lead to higher rate of pregnancy without any adverse effect like dystocia and other factors.

IRT-22

Seminal Attributes and Cryopreservation Semen of Different Goat Breeds in India

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Keywords: Artificial insemination, Goat Breeds, Cryopreservation, Seminal attributes

ABSTRACT

Seminal attributes of different breed viz. Beetal, Black Bengal, Osmanabadi and Sangamneri of goat were evaluated in present research work. The mean ejaculate volume was 1.02 , 0.66 , 1.09 and 0.76 ml while the means semen concentrations was 3033.76 , 2609.77 , 3305.06 and 2746.76 million/ml in Beetal, Black Bengal, Osmanabadi and Sangamneri bucks, respectively. Initial motility was found to be 82.37%, 81.64%, 82.95% and 77.94% respectively in Beetal, Black Bengal, Osmanabadi and Sangamneri bucks, respectively. The semen sample with motility more than 75% and sperm concentration 1.5×10^9 sperm/ml were cryopreserved. The post-thaw motility was 58.07%, 54.07%, 54.50% and 55.95%, in Beetal, Black Bengal, Osmanabadi and Sangamneri bucks, respectively. Semen concentration and volume were highly correlated with number of straw produced, while semen concentration and volume were less correlated. The month of collection have significant difference in semen concentration and volume whereas breed showed significant difference in the semen concentration, volume, initial and post-thaw motility. It was concluded that month and breed variation was observed in seminal attributes of different goat breeds in the study.

IRT-23

Effect of n-3 PUFA rich Fish Oil Supplementation during Non-Breeding Season on the Reproductive Performance of Goats in Subtropical Region

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Keywords: Endometrium, PUFA, DHA, Isocaloric, intravaginal

ABSTRACT

Supplementation of n-3 polyunsaturated fatty acid (n-3 PUFA) rich fish oil (FO) increased the ovulation rate and inhibited the luteolytic prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) from the endometrium during the window of pregnancy recognition in the spontaneously cycling doe. Since off-season breeding is a way to improve the reproduction rate, we studied the effect of dietary supplementation of n-3 PUFA on the reproductive performance during the non-breeding season. Experimental does were fed an isocaloric diet of eicosapentaenoic acid (EPA) and docosohexaenoic acid (DHA) rich FO (n=11) or palm oil (PO; n=11) for 70 days. Ovarian scanning at 4 day interval for 21 days from the day of supplementation (Day 0) confirmed acyclicity. Estrus induction was done by intravaginal progesterone (P_4) for 14 days from supplementation day 22 to 35. Dietary FO did not affect serum P_4 throughout the period of supplementation. Ovarian scanning studies revealed that neither the number of surface follicles nor the diameter of largest surface follicle was significantly different between the groups ($P>0.05$) at any point of supplementation. Similarly, the concentration of serum E_2 and P_4 on the day of induced estrus was comparable between the groups. Further, FO supplementation did not affect the estrus induction rate and pregnancy. An estrus induction rate of 42-67% in the experimental does indicate the strong inhibitory effect of non-breeding season on the reproduction. Supplementation of FO inhibited the serum PGFM significantly on day 16-18 post-estrus ($P<0.05$). In conclusion supplementation of EPA and DHA rich FO for 10 weeks could inhibit the endometrial $PGF_{2\alpha}$ production during the luteolytic window at estrus; however, it did not improve the ovarian function and fertility during the non-breeding season in the goat.

IRT-24

Differential Expression of Imprinting Related Genes in Goat (*Capra hircus*) Chimeric Embryos

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Keywords: Uniparental, Pathogenetic, Paracrine, Chimeric

ABSTRACT

Parthenogenetic embryos are the uniparental embryos derived from the chemical activation of *in vitro* matured oocytes. Due to lack of paternal genome, parthenogenetic embryos show developmental delay during mid-gestation. This developmental failure can be overcome by tetraploid complementation in which tetraploid cells help in the formation of functional placental tissues whereas pESCs contribute in the fetus development. The aim of present study was to study the expression of Insulin like growth factor 2 receptor (*IGF2R*) and insulin like growth factor 2 (*IGF2*) genes in goat chimeric embryos. *IGF2R* is a maternally expressed gene and plays crucial role in embryonic growth and placental function. In case of *IGF2* is a paternally expressed imprinting related gene which mediates autocrine cell proliferation, paracrine growth and survival factor during mammalian embryo development. Goat embryonic chimeras were produced by aggregation of tetraploid (4n) embryos (Produced by electrofusion of goat IVF 2-cell embryos) and parthenogenetic embryonic stem cells (pESCs; Established from the ICM of parthenogenetic blastocysts). During complementation, two zona-free tetraploid (4n) embryos were aggregated with a small clump of pESCs (2n) to produce a chimera. The total mRNA was extracted from a pool of 20 parthenogenetic, fertilized, tetraploid & chimeric blastocysts on Day 8 and cDNA was prepared. The qPCR analysis revealed that relative mRNA abundance of *IGF2R* was significantly higher ($P < 0.05$) in parthenogenetic and tetraploid embryos but its expression gets reduced in chimeric embryos compared parthenogenetic embryos. *IGF2* showed significantly higher ($P < 0.05$) expression in tetraploid and chimeric embryos but its expression was unchanged in parthenogenetic embryos compared to control IVF embryos. It indicates that the difference in imprinting related gene expression of *IGF2R* & *IGF2* was complemented upon embryo aggregation. These results suggest that the complementation increased the expression of imprinting related genes and altered the epigenetic status of chimeric embryos that is similar to IVF embryos. This work was supported by NFBSFARA project on “Development of Parthenogenetic Goat from Embryonic Stem Cells (CA-4002)” New Delhi, India.

IRT-25

Stem cells: A promising field of Reproductive Biotechnology and Regenerative Medicine

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Keywords: Stem Cells, Embryonic Stem Cells, iPSCs, Mesenchymal Stem Cells, Oocyte, Reproduction.

ABSTRACT

Reproductive biotechnologies have played an important role to improve livestock. It helps to increase productivity, reproduction and improving health condition with impending environmental conditions. These biotechniques have revolutionized and opened new avenues for manipulating the reproductive process of *in vitro* and *in vivo* condition in livestock for improving efficiency. Stem cells can play a pivotal role for improvement of reproduction and regenerative medicine to cure chronic diseases. Oocytes are important for the existence and propagation of live animals. But increasing infertility problems in livestock is causing a significant economic loss to the farmers and dairy industry. Goat embryonic stem cells (ESCs) can be differentiated into primordial germ cell-like cells and sperm cells in *in vitro* condition. In this study, ESCs were isolated from *in vitro* produced blastocysts and characterized with pluripotency specific intracellular markers Oct-4, SOX2, NANOG, and LIN28 genes and surface markers Oct-4, TRA-1-60, TRA-1-81, SSEA1, SSEA3, and SSEA4. The characterized ESCs were differentiated with retinoic acid and BMP4 in *in vitro* condition in the CO₂ incubator and obtained oocyte-like cells. They were immunostained for primordial germ cell-specific protein like VASA, STELLA, DAZL, and SCP3. These *in vitro* produced oocytes were parthenogenetically activated and able to produce blastocysts which are showing expression of oocyte-specific markers like GDF-9, NOBOX, ZP1, ZP2, and ZP3 proteins. Similarly, induced pluripotent stem cells (iPSCs) were produced in goat fibroblast cells with transcription factors Oct4, Sox2 and Nanog and able to generate goat oocyte-like cells from these goat iPSCs. The differentiated PGCs were characterized by immunocytochemistry, immunoblotting, flow cytometry, SEM and detection of germ cells markers. This approach of female oocytes/ova production from ESCs and iPS cells

will significantly help to cure infertility in the female, elite animal and conserve endangered species. We were also cultured the adipose tissues derived adult mesenchymal stem cells (MSCs) of cattle, buffaloes, and mice for treatment of hoof wound cattle and buffalo and tibial fracture of mice. MSCs were characterized with alkaline phosphatase; different molecular markers like CD29, CD44, CD166, CD99, and CD34 were expressed whereas no expression was observed for CD45 and CD71 markers in cattle adipose tissue-derived MSCs. The cultured MSCs were aseptically isolated from the culture flask and injected around 10^7 cells/animal in the site of the wound. We have already treated the massive wounded more than 300 cattle, 28 bulls and 41 buffaloes with MSCs and all the patients were cured completely one an average 30 days. Tibial bone fractures of mice were cured in 35 days treated with allogeneic and xenogeneic MSCs. Mesenchymal stem cells therapy is very much possible to cure the hoof wound of cattle and buffaloes permanently within a short period of time.

IRT-26

***In vivo* isolation, culture and characterization of granulosa cells from Booroola carrier and non-carrier ewes**

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Keywords: Genotyping, Supernatant, Granulosa, GMM

ABSTRACT

Prolificacy in sheep plays a significant role on the economic return to the sheep farmers. Mutations in three major genes; BMP1B, BMP15, and GDF9 are responsible for fecundity. The objective of this study was to standardize *in vivo* GC isolation and their characterization in different genotype ewes. Ewes were randomly grouped into three groups prolific GMM (FecB^{BB}), non-prolific GMM and non-prolific Malpura (FecB⁺⁺), based on FecB genotyping. Estrus induction and synchronization was carried out in all ewes using indigenously developed intra-vaginal sponges impregnated with progesterone (Avikesil®-S) and examined by laparoscope for ovarian response. The granulosa cell (GC) isolation and culture conditions was optimized. Small follicles (<3mm) and large follicles (>3mm) were aspirated (*i*)using 27 gauge syringe and pooled (n=4) together for each size. Cell debris like ovarian tissues were removed by centrifugation. Supernatant was diluted with DPBS and cells were separated by centrifuging at 2700 rpm twice. cells from adult ewes of prolific GMM (n=5) and non prolific GMM (n=4) and non profilic Malpura (n=3) breeds were pooled separately and in 12 well culture plate and cultured in McCoy's 5A medium to characterize them based on morphology and immumofluerence (IF) anti-FSHR antibody. Number of small and large follicles were significantly (P<0.5) higher in ovaries of Malpura and carrier GMM ewes respectively. The total number of GCs in non carrier ewes was significantly (P<0.5) higher than that in carrier GMM ewes. Higher progesterone (2.73±1.29ng/ml) in Malpura ewes justified the higher GC cell number associated with non prolificacy as compared to the low progesterone (1.28±0.62ng/ml) in carrier GMM. There was no difference in growth and morphology in GCs of different genotypes. IF indicated higher FSH receptor with dominancy in FecB carrier ewes.

IRT-27

Isolation of theca cells from goat ovarian follicles and expression of *CYP 19* gene in the isolated cells

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Keywords: Caprine slaughter ovaries, *CYP 17*, *CYP 19*, β -actin and qRT-PCR

ABSTRACT

Ovarian Theca Cells (TCs) isolation is quite difficult as they are attached to connective tissue and usually isolated TCs have contamination with Granulosa cells (GCs). Contamination of TCs with GCs can be detected by the marker genes which are expressed only in GCs. *Cytochrome P450 aromatase (CYP 19)* is a marker for GCs which is responsible for the formation of enzyme aromatase for the synthesis of oestradiol from androgen. This study was undertaken to isolate TCs from caprine ovarian follicles by two different methods and to assess the efficacy of these methods to isolate theca cells with minimum contamination by GCs. Follicles measuring three to six mm diameter were used for isolation of TCs. Theca cells were isolated by two different methods –Trypsin (Stoklostowaet *al.*, 1978) and Collagenase (Kataokaet *al.*, 1994) methods. In the first method, trypsin with hyaluronidase was used and in the second method different concentrations and combinations of collagenase and hyaluronidase enzymes were used. The isolated TCs were visualized under the inverted microscope and samples from both the methods were subjected to real time qPCR for the presence of GC specific marker *Cytochrome P450 aromatase (CYP 19)*. *Cytochrome P450 17 α -hydroxylase (CYP 17)*, marker for TC, gene expression was also studied to estimate the yield of TC by two methods. It was confirmed that collagenase was the better method for TCs isolation.

IRT-28

Comparative Analysis of Semen Attributes of Beetal Goat Bucks reared in Sub-tropical conditions

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Keywords: MDA, Glutathione Reductase, Beetal Buck, Semen, Functional, Tests, Sub-Tropical

ABSTRACT

Semen attributes in three ejaculates each of fifteen sexually mature beetalgoat bucks (12-20 months of age) under stall-fed system were evaluated. Volume, individual motility, viability, sperm count, membrane-, acrosome – integrity ranged varied from $0.47 \pm 0.38 - 2.33 \pm 1.33$, $43.33 \pm 8.83 - 80 \pm 5.78$, $45.01 \pm 10.94 - 90.96 \pm 0.94$, $0.96 \times 10^9 \pm 0.08 - 2.47 \times 10^9 \pm 0.44$, $1.39 \pm 0.2 - 42.23 \pm 5.6$ and $58.80 \pm 7.9 - 95.5 \pm 0.58$ among the evaluated bucks. Difference in these semen attributes were highly significant ($p < 0.05$) among the bucks and ejaculates of the same buck. Similarly, MDA production ($9.52 \pm 3.33 - 97.13 \pm 64.33 \mu\text{M} / 10^9$ spermatozoa,) and antioxidant enzymes (SOD, $366.67 \pm 139.36 - 1140 \pm 439.87 \text{ IU} / \text{min} / 10^6$; catalase, $83.33 \pm 3.33 - 530 \pm 278.71 \text{ IU} / 10^6$ and Glutathione reductase, $1.20 \pm 0.9 - 15.33 \pm 4.91 \text{ IU} / \text{min} / 10^6$ spermatozoa) also showed a significant ($p < 0.05$) variation among the ejaculates and bucks. Normal semen parameters of an ejaculate in a mature buck should be 0.5-1.0 ml volume, $2-5 \times 10^9$ spermatozoa /ml, 70-90 % motile and 75-95% viable spermatozoa. Sperm count / ml, individual motility and viability were in recommended range only in 6, 7 and 7 bucks, respectively. Since, there is a link between fertility of semen and its parameters, therefore, it is of utmost importance to evaluate physiological and cytological parameters of spermatozoa before breeding, which may reduce the economic and time constraints in field conditions.

IRT-29

**Semen Quality Evaluation and Artificial Insemination with Liquid Semen
in Sheep of Arid Region of Rajasthan**

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Keywords: Chokla, Magra, Marwari, Insemination

ABSTRACT

Sheep with its multi-facet utility for wool, meat, milk, skins and manure, form an important component of rural economy particularly in the arid, semi-arid and mountainous areas of the country. This study was designed to uncover breed differences in semen quality parameters in tropical rams at ICAR- CSWRI Arid Region Campus, Bikaner. A total of 30 rams (10 Chokla, 10 Magra and 10 marwari) having almost same age group (2-3 years) and body weight (30-35kg) with normal libido were selected for the study and maintained in isomanagerial conditions with 7-8 hours grazing period and provide standard ration along with *ad-libitum* water. Semen was collected twice a week (total 6 ejaculates from each ram) from 30 rams using artificial vagina method in August – September, 2017. Semen was evaluated for volume, mass motility, individual motility, sperm concentration (million/ml) and sperm abnormalities. Artificial insemination was also done in 41 ewes with liquid semen in natural estrus period at 12 hours after onset of heat. Results of the investigation revealed no significant ($p>0.05$) differences in semen quality parameters with volume varies from 0.79 ± 0.03 to 0.86 ± 0.09 , mass motility (0-5 scale) was +3 to +4, however in some animals it was +5, individual motility varied from 70 to 88%, sperm concentration (million/ml) was between 2875 ± 123.09 to 52875 ± 241.05 , sperm abnormalities were less than 10% in all in three breeds. Artificial insemination was also done in 41 ewes in natural estrus with liquid semen at 12 hours after onset of heat and conception rate was promising with 62 percent in all three breeds under the study highlighting the bright future scope of AI in sheep at mass level.

IRT-30

Functional Insights in to Endocannabinoid Signaling in Goat Spermatozoa

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Keywords: Endocannabinoid, Hypermotility, Barbari buck, Transmembrane

ABSTRACT

Endocannabinoid receptors have been identified to be present on spermatozoa and are functionally involved in the regulation of sperm motility, hypermotility, capacitation and acrosome reaction. No studies are reported in buck spermatozoa regarding the functional involvement of endocannabinoid receptors (CB1 and CB2) in the regulation of sperm functions. Proposed study was an attempt to evaluate the functional involvement of endocannabinoid receptors in regulating buck sperm function. Semen ejaculates were collected from four Barbari bucks and a total of 24 ejaculates were collected (six from each). Collected semen samples were diluted with sperm dilution medium to obtain final concentration of 10×10^6 /ml. In the study, both CB1 and CB2 receptor functions on spermatozoa were evaluated using their specific blockers SR-141716A @ $10 \mu\text{M}$ and SR-144528 @ $10 \mu\text{M}$ (15 minutes before treatment), respectively followed by their specific activator (meth-AEA) @ $1 \mu\text{M}$ till 90 minutes. Sperm functions like progressive motility, viability, hyperactive motility, capacitation status and mitochondrial potential were evaluated using suitable techniques. Meth-AEA significantly ($P < 0.05$) lowered progressive sperm motility and viability *in vitro* which was blocked by CB1 antagonist SR-141716A but not the CB2 antagonist, SR-144528, indicating the effects of meth-AEA on sperm motility and viability are mediated via the CB1 but not the CB2 receptor. Similarly, Meth-AEA significantly ($P < 0.05$) lowered the sperm mitochondrial activity by lowering the mitochondrial transmembrane potential. Incubation with Meth-AEA significantly ($P < 0.05$) decreased per cent spermatozoa showing hyperactivity and acrosome reaction at higher concentrations of $1 \mu\text{M}$ as compared to lower 100nM . In conclusion- this is the first study to unravel the probable involvement of endocannabinoid receptors in mediating buck spermatozoa function and providing new insights of action of endocannabinoids through the activation of CB1 receptors.

IRT-31

Extracellular pH Regulates Sperm Functions through Hv1 Channels

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Keywords: Spermatozoa, Motility, Anandamide, Barbari bucks

ABSTRACT

Sperm motility and other functional aspects are regulated by an array of external factors and pH plays one of the most significant roles. The sperm along with its journey for fertilisation also encounters number of extracellular medium having different pH. Therefore, regulation of proton gradient in and along of spermatozoa is dynamic and mostly governed through voltage gated H⁺ (Hv1) channels. To understand the involvement of Hv1 channels in regulation of sperm function, present study was proposed in goat spermatozoa and *in vitro* studies were executed by taking spermatozoa in sperm dilution medium having different pH (4.5, 5.0, 5.5, 6, 6.5, 8 and control pH of 7.4). To evaluate the functional role of Hv1, its blocker zinc chloride @ 1mM and its activator Anandamide (AEA) @ 1μM were used in alone and in combination. Study was carried out in 24 ejaculates collected from 4 Barbari bucks; sperm motility, viability, capacitation and acrosome reaction were evaluated using standardised techniques. Per cent live spermatozoa did not vary significantly at various extracellular pH mediums and remained lower as compared to the control (pH-7.4). Progressive sperm motility was significantly (P< 0.05) decreased in all the mediums over time but it was found to be lowest at pH 5.5 and pH 8. Further, with the treatment of ZnCl₂ to spermatozoa in different pH mediums, progressive sperm motility was significantly (P< 0.05) decreased except at pH 6.5. Degree of reduction of sperm motility in non-treated to ZnCl₂ treated, the *per cent* of reduction in sperm motility was less. AEA treatment to spermatozoa in different pH mediums also exhibited similar trend of reduction in motility and maximum reduction was observed at pH 6.5 and 8 (Significance, P< 0.05). Similarly, with increasing pH, *per cent* spermatozoa showing capacitation and acrosome reaction were significantly (P< 0.05) lowered and at pH 8, it was completely abolished. With blocking and activation, the trend in capacitation and acrosome reaction were reversed to earlier results. From the results, it was evident that extracellular pH plays a critical role in regulating sperm functions and the regulation of proton gradient across the goat spermatozoa was regulated through the selective activation and inactivation of Hv1.

IRT-32

Successful Management of Ante-Partum Cervico-Vaginal Prolapse in Doe with Pgf₂α - a Case Report

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Keywords: Cervico Vaginal Prolapse (CPV), Parturate, Vaginal prolapse

ABSTRACT

Two does, 2½ and 3 year old respectively, were presented with history of ante-partum Cervico Vaginal Prolapse (CPV), since one week. The CVP was more pronounced during sitting posture and disappearing when doe was standing. It was first degree CVP. The does were advanced pregnant and about to Parturate within a week. As the does were in advance stage of pregnancy, symptomatic treatment along with Inj. Dinoprost Tromethamine 12.5 mg (PGF₂α analogue i.e. PG) intramuscularly was given to induce kidding. One of the doe delivered twins (Both Male) weighing 2.3 and 2.4 Kg after 42 hrs of PG administration. Another doe delivered triplets after 38 hrs of PG administration, weighing 3.0, 2.5 and 1.9 Kg. After kidding there was uneventful recovery and vaginal prolapse never reoccurred in that post partum period.

IRT-33

EFFECT OF INULIN IN NON CYCLIC GOATS

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Key words; *Insulin, estrogen, progesterone, cyclic and non cyclic goats.*

ABSTRACT

Insulin and glucose metabolism are involved intimately with normal pituitary and ovarian function in ruminants. The binding sites for insulin have been demonstrated in ovary, oviduct, uterus and embryo. Insulin and IGF-1 enhance granulosa cell proliferation, aromatase activity and progesterone biosynthesis exhibiting an important role in the selection of FSH/LH dependent follicle. The effect of insulin on non cyclic goats was studied. The experiment was conducted in six non-cyclic Barbari goats which were administered 0.2 IU insulin/kg/day for five consecutive days (Treatment group). Six normal cyclic goats were grouped as control. Blood was collected on day 0, 6, 12, day of estrus and day 10th post estrus. Estrogen and progesterone was estimated by ELISA kits. At day 0, the concentration of estrogen was 2.55 ± 0.18 in non cycling goats whereas it was 12.4 ± 0.2 pg/ml in cyclic goats. A significant increasing pattern of estrogen concentration was observed thereafter and was highest to the day of estrus which decline on 10th day post estrus in both cyclic and non cyclic goats. The progesterone concentration was low on day 0 and day of estrus. Significantly higher values were recorded on day 6 and a peak on day 12 and fell down on day of estrus. However, it rose significantly on day 10th post estrus. There was no significant difference in concentration of progesterone in cyclic and noncyclic goats on day 0, 6, 12 and day of estrus, though the difference was significant on 10th day post estrus in both the groups.

IRT-34

Evaluation of Artificial Insemination Performance in Malabari Goats Based on the Site and Dose of Deposition with Chilled Semen

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Key words: Chilled Semen, Artificial Insemination, Os cervix, Deep cervical, Intrauterine,

ABSTRACT

The study was designed to investigate the efficiency of chilled semen artificial insemination (AI) based on the dose and the site of semen deposition in Malabari goats. Semen collected from four Malabari bucks was preserved by refrigeration using Tris-egg yolk extender. The semen was used to perform AI following the standard protocol in Malabari goats presented with oestrus signs at the AI Centre, College of Veterinary and Animal Sciences, Mannuthy. The study was designed to evaluate optimum site of chilled semen deposition using single and double dose protocol and its fertility rate. Three sites were identified as os cervix, deep cervical and intrauterine for AI; in each group single and double insemination protocol was assessed. Trans-abdominal or trans-rectal methods of ultra sound were used to detect pregnancy 45 days post AI. The study suggests that when the semen was deposited at os cervix in single dose (n=10) the NRR (Non Return Rate) 60.00%, CR (Conception Rate) 50.00%, KR (Kidding Rate) 50.00% and ALS (Actual Litter Size) 1.4, whereas in double dose (n=12) NRR was 75.00%, CR 58.30%, KR 58.30% and ALS 1.71, respectively. In deep cervical approach; in single dose (n=16) the NRR 75.00%, CR 62.50%, KR 56.25% and ALS 1.44, whereas in double dose (n=12) NRR 75.00%, CR 66.70%, KR 58.33% and ALS 2.43, respectively. In the intrauterine approach in single dose (n=10) the NRR was 80.00%, CR 60.00%, KR 60.00% and ALS 2.17, whereas in double dose (n=13) NRR 69.23%, CR 61.50%, KR 61.50% and ALS 2.14, respectively. The results showed that optimum results were obtained when chilled semen was deposited at a deep cervical site with either one or two days of AI.

IRT-35

Evaluation of Artificial Insemination Performance in Malabari Goats Based on the Site and Dose of Deposition with Cryopreserved Semen

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Key words: - Frozen Semen, Artificial Insemination, Os cervix, Deep cervical, Intrauterine,
Malabari Goat

ABSTRACT

The study was designed to investigate the efficiency of artificial insemination (AI) based on the dose and the site of cryopreserved semen deposition in Malabari goats. Semen collected from four Malabari bucks was freeze preserved using Triladyl extender. The semen was used to perform AI following the standard protocol in Malabari goats presented with oestrus signs at the AI Centre, College of Veterinary and Animal Sciences, Mannuthy, Kerala. The study was designed to evaluate the fertility rate and optimum site of cryopreserved semen deposition using single and double day insemination protocol. Three sites were identified as os cervix, deep cervical and intrauterine for artificial insemination; in each group a single and double day insemination protocol was assessed. Trans-abdominal or trans-rectal methods of ultra sound was used to detect pregnancy 45 days post artificial insemination. The study suggests that when the semen was deposited at os cervix in single dose (n=11) the NRR (Non Return Rate) 45.45%, CR (Conception Rate) 36.40%, KR (Kidding Rate) 36.40% and ALS (Actual Litter Size) 1.5, whereas in double dose (n=10) NRR 40.00%, CR 40.00%, KR 40.00% and ALS 1.75, respectively. In deep cervical approach; in single dose (n=21) the NRR 66.66%, CR 52.40%, KR 52.40% and ALS 2.0, whereas in double dose (n=10) NRR 70.00%, CR 60.00%, KR 60.00% and ALS 1.66, respectively was observed. In the intrauterine approach, in single dose (n=15) the NRR 60.00%, CR 53.30%, KR 53.30% and ALS 1.63, whereas in double dose (n=10) NRR 70.00%, CR 60.00%, KR 60.00% and ALS 1.66, respectively were observed. The results showed that optimum results with cryopreserved semen in Malabari does were obtained when double day insemination protocol was employed with semen being deposited at intra uterine site.

IRT-36

CRISPR/Cas9 Mediated Human Erythropoietin Gene Knockin into Mammary Epithelial cells of Goat

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Keywords: CRISPR/Cas9, MMEJ, hEPO, Microhomology

ABSTRACT

CRISPR/Cas9 (clustered regularly interspaced short palindromic repeats) is RNA-guided DNA endonuclease, Cas9 can be easily programmed to target sites of interest in genome-guided by RNA. CRISPR/Cas9 can customize easily and specific to the target, the hence revolutionary genome-editing tool for biological and therapeutic applications. Recently, microhomologies mediated end joining (MMEJ) approach of gene knockin utilize an extremely short homologous sequence (5–25 bp) for double-strand break (DSB) repair by homologous recombination. Human erythropoietin (hEPO) is a therapeutically important glycoprotein and key hormone responsible for the regulation of red blood cell production in mammals shown to be an effective measure to treat anemic patients due to chemotherapy of end-stage renal diseases, cancer, and HIV. CRISPR/Cas9 technique has been successfully used for knockin and knockout of therapeutically important genes or sequences. Microhomology based (5-25bp) site-specific integration approach can be used for site-specific knockin of the hEPO gene construct into the genome. In the present study, MMEJ, CRISPR/Cas9 approach was used for site specific integration of pAc-CSN2-hEPO-GFP vector into goat mammary epithelial cell line. PCR amplification and cloning of goat beta-casein promoter (CSN2), as well as hEPO gene was carried out from goat and human genomic DNA respectively. Isolation and characterization of GMEC were performed of mammary gland tissues in DMEM/F12, FBS 10%, and growth factors. The gRNA was designed (CHOPCHOP software) and cloned into CRISPR/Cas9 vector (42230 Addgene vector). CRISPR/Cas9 and pAc-CSN2-hEPO-GFP vectors were co-transfected into GMEC using Lipofectamine-3000 in the present study. Mammalian expression vector pAc-CSN2-hEPO-GFP was constructed using pAc-GFP -n1 vector. PCR, restriction digestion and Sanger sequencing were used to validate the cloned fragment of goat Beta CSN2 and hEPO gene into this pAc-GFP-

n1 mammalian expression vector. GMEC was isolated, cultured, passaged and cryopreserved from goat mammary gland explants. Morphological (Polygonal shape) and karyotyping (chromosome number 60) based characterization of GMEC was performed. Formation of the EPO-GFP fusion protein was confirmed by the presence of green fluorescence in pAc-CSN2-hEPO-GFP transfected GMEC after 24-48 hrs. pAc-CSN2-hEPO-GFP construct amplified by primers using 25 bp long homologies on both sides and co-transfected with CRISPR/Cas9 vectors. Genotypic PCR was carried out to confirm site-specific integration, but amplification PCR product was not observed in GMEC genomic DNA.

It has been concluded that pAc-CSN2-hEPO-GFP mammalian expression vector has been producing the hEPO-GFP fusion protein in GMEC. But microhomologies arm (25 bp) was not enough to provide site-specific integration. MMEJ approach needs to be further improvements to increase the efficiency of site-specific integration.

IRT-37

Evaluation and Freezing of Sirohi Goat Semen

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Keywords: Sperm, Goat Breed, Freezing

ABSTRACT

The objective of study was to evaluate the effect of freeze-thwing procedure on seminal quality parameters of goat. Total 1538 ejaculates were collected from 12 mature Sirohi bucks. The year effect was divided into 3 season viz. summer, rainy and winter. Each ejaculate was subjected to evaluation and extended with tris egg yolk fructose citric acid glycerol. The mean volume, sperm concentration, initial motility, pre-freezing motility and post thaw motility were 1.06 ± 0.01 ml, $22631 \pm 17.61 \times 10^6$ / ml, 86.51 ± 0.19 per cent, 83.87 ± 0.24 per cent and 58.17 ± 0.43 , respectively. The other parameters studied were diluted volume of semen, number of straws and reaction time had mean values were 11.18 ± 0.47 ml, 28.62 ± 0.47 and 48.35 ± 0.76 seconds, respectively. The mean ejaculate volume was found to be maximum as 1.13 ± 0.02 ml. in rainy season and maximum sperm concentration was found in winter season ($2762.5 \pm 30.62 \times 10^6$ /ml). Initial motility of sperm was averaged 86.51%. There was slight change on all seasons for initial motility. Mean post thaw motility in rainy, winter and summer season was 60.13 ± 0.8 per cent, 57.17 ± 0.54 per cent and 55.68 ± 1.09 , respectively. Ejaculate volume was negatively and significantly correlated to sperm concentration ($r=0.17$) and post thaw motility ($r=0.10$). Reaction time was negatively correlated to ejaculate volume ($r=0.56$) and initial motility ($r=0.16$).

IRT-38

Studies on Differential Regulation of Lysophospholipids Receptors in Endometrium during Ovulation of Sheep Breeds

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Keywords: Ovulation, LPA, S1P, Pregnancy, Implantation, Sheep

ABSTRACT

The lysophospholipids (LPA and S1P) metabolic pathways play a critical regulator in successful pregnancy and controlling the process of uterine receptivity and implantation in human. LPA and S1P act through G protein-coupled receptors (GPCRs; S1PR1-5 and LPAR1-6) that have diverse biological roles such as embryo implantation, decidualization and placental development. The role of LPA and S1P pathways during sheep pregnancy are poorly understood. In this study, we asked whether LPA and S1P receptor genes are regulated in sheep. Sheep endometrium was isolated from ovulated and non-ovulated uterine of Malpura and Avikalin Indian sheep breeds under semi-arid region. The abundance expression of S1P and LPA receptors and its metabolic genes were measured via using quantitative real-time PCR. We found that S1PR1 was the only receptor subtype of S1P which was highly expressed in both sheep uterine. Additionally S1PR1 mRNA expression was 4-fold higher in Malpura compared to Avikalin sheep breed. The data also shown that LPAR1 receptor was the major receptor in Avkalin sheep. In contrast LPAR1, LPAR2, LPAR3 and LPAR6 were expressed in Malpura sheep breed. Interestingly, the expression of S1PR1 receptor was significantly unregulated (5 fold) during ovulation in endomaterium of Avikalin compared to the Malpura breed. There is no significant effect of expression of LPAR1 receptor in both breeds. These data suggest that S1PR1 receptor may play a crucial role in sheep endomaterium for establishment and maintenance of pregnancy. The differential expression level of LPA and S1P receptors in Avikalin and Malpura indicated that the reproductive behavior of these breeds might be vary individually. The conclusive data of study will help to understanding the pregnancy outcomes at molecular level in different breeds of sheep. It will also help us to improve the artificial reproductive technology (ART) such as IVF (in vitro fertilization) that is the major requirement of animal breeding.

IRT-39

Studies on Cervical Dilatation in Oestral, Parturient and Maternal Dystocic Does

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Keywords: Cervical dilation, Oestrus, Osmanbadi, Misoprostol tablet, Prostaglandin gel

ABSTRACT

Cervical dynamics was studied to visualize the cervical dilatation, to record photo images, to record time required and extent of cervical dilatation in case of parturient goats. Six *Osmanabadi* does from college instructional unit during oestrus stages and other six does due for kidding, were observed before expected date of parturition for fortnight to record the cervical changes related with dilatation. Cervico-meter designed for the experimentation was used to record extent of dilatation of cervix. Duration and extent of cervical dilatation at the time of estrus and parturition was recorded in does. It was observed that mean time interval of 2.00 ± 0.21 hours was required in goats for cervical dilatation to express the estrual stage. The duration required for cervical dilatation at the time of parturition was recorded and it was 4.17 ± 0.60 hours. Mean time interval of 4.17 ± 0.60 hours was required in goats for cervical dilatation at the time of parturition. It was observed that mean luminal cervical diameter in goats was 13.47 ± 0.86 cm during kidding. Additionally, clinical cases of failure of cervical dilatation in does were treated with Prostaglandin gel containing Dinoprostone (PGE_2) @ 0.25 mg endo-cervically, where treated does parturated within 25.43 ± 2.90 hours whereas does treated with Misoprostol tablet (PGE_1) @ 200 μ g endo-cervically delivered after 20.15 ± 2.38 hrs of treatment.

Goat Products

GP-01

Influence of *Bacopa monnieri* Extract on Milk Fatty Acid Profile, Rumen Biohydrogenating Bacteria and Lipogenic Gene Expression in Goats

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Keywords: *Bacopa monnieri*, Milk fatty acid profile, Lipogenic gene, Goats

ABSTRACT

A study of 60 days duration was conducted to investigate the effects of *Bacopa monnieri* extract supplementation on nutraceutical value i.e. milk fatty acid profile, rumen biohydrogenating bacteria and mammary lipogenic gene expression in goats. Twenty-one lactating goats were selected and divided into 3 treatment groups. The control group (CON) was fed with basal diet comprising of maize and concentrate mixture (70:30) without any supplementation. The second (T₁) and third (T₂) groups were supplemented with *B. monnieri* extract @ 0.5 and 1% of dry matter intake, respectively, along with the basal diet. Results indicated that supplementation of *B. monnieri* had no significant effect on the dry matter intake, milk yield and milk composition. However, milk fatty acid profile was influenced (P<0.05) positively and increased amount of linoleic acid (C18:2n-6), conjugated linoleic acid (C18:2; *cis* 9, *trans* 11 CLA), gamma linolenic acid (C18:3n-6) with a concomitant reduction in the amount of stearic acid (C18:0) and palmitic acid (C16:0) was observed. Total saturated fatty acids (SFA) content in milk and saturation index was reduced (P<0.05) in supplemented groups as compared to control. Total polyunsaturated fatty acid (PUFA), monounsaturated fatty acid (MUFA), stearoyl-CoA desaturase (SCD) and Δ-9 desaturase enzyme index were higher (P≤0.05) in T₁ and T₂ in compared to CON. The atherogenicity index remained uninfluenced with dietary supplementation of *Bacopa monnieri* extract among all the groups. It was also observed that inclusion of *B. monnieri* in diet enhanced the ruminal population of CLA producing *B. fibrisolvens* bacteria by 1.71 and 2.18 times in T₁ and T₂ respectively, at the end of experimental feeding, whereas, population of stearate forming *B. proteoclasticus* bacteria remain unchanged throughout the experimental period. The mRNA expression of SCD, ACC, FAS and LPL were not influenced by dietary supplementation of *B. monnieri* extract, however expression of SCD showed an increasing (P>0.05) trend in the supplemented groups as compared to control. Overall, the study concluded that supplementation of *Bacopa monnieri* extract manipulate the rumen biohydrogenating microbes and enhanced the nutraceutical value of milk.

GP-02

Relationships among Milk Production Level and The Quality of Goat Dairy Products

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Keywords: Goat milk, Production level, Cheese yield, Sensory evaluation

ABSTRACT

Three goat farms were included in the experiment where the animals were grouped according to their production level. On Farm A there were two Alpine groups producing daily milk yield under and above 3 litres. Three Saanen goat groups were milked on Farm B: one below 2, one between 2 and 3, and one above three litres of average daily milk yield. On Farm C two Saanen and two Alpine groups were kept, where one yielded under and other one above two litres of daily milk yield. Six breeds (Alpine, Saanen, Sandy /Alpine x Saanen/, Hungarian Multicolour and Black and Hungarian Native) were milked on farm D. Bulk milk samples were collected from each group and smearcase, yoghurt, and kefir were produced. Milk samples and the products went through laboratory examinations determining fat, protein, sugar, and total solid content. Sensory evaluation of the products was carried out by well skilled specialized panel members. In 5 point system (1 worst -5 best) colour, flavour, smell, consistency and total acceptability were classified. SPSS for Windows 20 was applied to processing the data received. Strong relationships were observed among farm, breed and level of production and the quality of products. While cheese yield varied between 8.27 and 12.27 kg as well as decreased along with increasing production level, differences were not consistent. Concerning ranks Saanen above 3 litres won in the case of yoghurt, while in kefir the Saanen below two litres and in smearcase Hungarian Native reached the best result.

GP-03

Technological Interventions for the Development of Value Added Fermented Goat Milk Products

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Keywords: Goat milk, Fermented milk products, Yoghurt, Cheese rolls, Ultrafiltration

ABSTRACT

Among the small ruminants, goats are a major supplier of milk, meat, skin and fiber products to cater the needs of rural people. Traditionally, goats were reared for their meat but health awareness among the consumers has generated significant amount of interest for goat milk and its value addition. However, the inherent compositional variation limits the goat milk value addition and conventional optimized processing technology often produces poor quality products. Therefore, an attempt was undertaken to develop goat milk based fermented products with suitable technological interventions. Quality of goat milk yoghurt was improved using ultrafiltration followed by high shearing of goat skim milk retentate and its addition in base yoghurt mix. Yoghurt mix was standardized to 15% total solids using 3x UF retentate and the effects of high shear mixing (15000 rpm/ 5 min, 18000 rpm/ 5 min) and heat treatment (85°C/ 30 min, 90°C/ 10 min) were evaluated on the quality of yoghurt. Acceptable quality goat milk yoghurt could be produced by ultrafiltration and heat treatment of 90°C for 10 min without high shear treatment, as the latter adversely affected its acceptability. In another study, cheese rolls were developed by admixing buffalo and goat milk in suitable proportions and varying casein:fat ratio. Effects of these variables were studied by analyzing chemical constituents and texture profile of the product. Principal component analysis was done for sensorial analysis data of the product and it was found that 60:40 ratio of goat milk and buffalo milk along with casein:fat ratio of 0.8 was found to be optimum for the development of cheese rolls.

GP-04

Effect of Zinc Nano Particles on Milk Yield, Milk Composition and Somatic Cell Count in Early Lactating Barbari Does

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Keywords: Lactating does, Nano zinc, Milk, Somatic cell count.

ABSTARCT

Nano minerals have better bioavailability, efficient utilization, smaller dose rate and stable interactions within the biological system. Efficacy of dietary supplementation of nano zinc particles on milk yield, milk composition and somatic cell count was studied in Barbari does. Twenty-four Barbari goats (mean body weight 35 ± 1.5 kg) of about four months of pregnancy were divided into four groups (Gr I, Gr II, Gr III and Gr IV) of six animals each. All the does were fed with a basal diet of bengal gram straw and concentrate pellet. No zinc was supplemented in does of Gr I (control group), while Gr II, Gr III and Gr IV (treatment groups) does were supplemented with 20 ppm inorganic zinc oxide, 10 ppm of nano zinc and 20 ppm of nano zinc respectively. The experimental feeding was conducted for 75 days (30 days before kidding to 45 days after kidding). Milk was collected at 30 and 45 days post parturition to study the yield and composition. Results showed that yield and composition of milk in different groups of lactating does were not significantly ($P > 0.05$) affected by zinc supplementation. The percentage of solid-nonfat, fat, protein, lactose, and total solid were comparable ($P > 0.05$) among different groups of lactating does. The milk mineral levels of Zn, Cu, Na, Ca and K were statistically similar ($P > 0.05$) in all the group of goats. There was significantly ($P < 0.05$) lower somatic cell count (SCC) in zinc supplemented groups (Gr II, Gr III and Gr IV) as compared to control (Gr I) group of does. SCC was lowest in Gr IV followed by Gr III, Gr II, Gr I. Present study concluded that supplementation of zinc @ 20ppm and nano zinc @ 10, and 20 ppm had no significant effect on milk yield/composition but reduced milk somatic cell count. The efficacy of nano zinc was found to be better as compared to normal inorganic form.

GP-05

Microbial Quality Assessment of Effect of Various Wrapping Materials on Goat Carcasses

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Keywords: Butchers, *Staphylococcus spp.*, yeast, molds, Carcasses

ABSTRACT

The present study was planned with the objectives to assess microbial quality of goat carcasses using cotton cloth traditionally used by butchers, cellulose paper and muslin cloth as wrapping materials with sanitizer and comparison of efficacy on retail goat meat in Parbhani city of Maharashtra State, India. A total of 120 meat samples were collected from goat carcasses containing equal no of samples in each group. The groups were control group (C), cotton cloth wrapped group (C1), cellulose paper wrapped group(C2) and muslin cloth wrapped group (C3). All the samples were subjected to microbial quality assessment by using TVC and Differential count (DC) in relation to *Staphylococcus spp.*, *E. coli*, *Pseudomonas spp.*, *Yeast and mould* .Attempts were made to screen all the samples for *Clostridial spp.* and *Salmonella spp.* Isolation. The TVC counts of all four groups (C, C1, C 2 &C3) were at par with each other at zero hr. The counts rose significantly at each interval of study (6, 12, 18&24hrs) during experiment within all groups. The C1, C2& C3 group showed significantly ($p<0.05$) lower TVC counts at six hour than control group (C). However, C2 group showed significantly ($p<0.05$) lower TVC counts at each interval of study (12, 18&24 hrs) compare to other groups. All four groups (C, C1, C2&C3) showed presence of *Staphylococcus spp.* The counts could not be detected at 6 hrs post treatment. However, in cellulose paper wrapped group (C2) *Staphylococcus spp.* count could not be detected on 6 and 18 hrs post treatment. *E.coli* count at 0 hrs of experiment was at par with each other in all four groups (C1, C2&C3). *Pseudomonas spp.* contamination was seen in control group (C) from 12 hrs (1.055 ± 0.03) where as it was from 12 hrs in cotton cloth wrapped group (C1) (1.092 ± 0.03) and muslin cloth wrapped group (C3) (1.185 ± 0.02). It was interesting to note that *Pseudomonas spp.* was absent in cellulose paper wrapped group (C2) at each intervals of study except at zero hr. *Clostridial spp.* isolation attempt resulted into isolation from all groups viz. C (56%), C1 (13.33%), C2

(6.66) & C3 (6.66). *Yeast and Mould* counts of all groups C1, C2 & C3 were significantly ($p < 0.05$) lower than control group (C) from 6 hrs till end of the experiment. The *Yeast & Mould* could not be detected up to 6 hrs from C1, C2 & C3 groups. The C1 & C3 groups showed significantly ($p < 0.05$) higher *Yeast & Mould* count from 12 hr till the end of experiment (24 hr). The cellulose paper wrapped group (C2) showed *Yeast & Mould* count from 18 hr post treatment till end of the experiment. Comparison amongst group indicate that the cellulose paper wrapped group (C2) gave significantly ($p < 0.05$) lower *Yeast & Mould* count than C1 & C3 groups at each interval of study there by indicating its superiority. *Salmonella* contamination of meat was absent. It was concluded that dipping of wrapping material with sodium hypochlorite solution (200ppm) followed by wrapping of goat carcasses give sanitizing effects up to 12 hrs. The cellulose paper wrapping of goat carcasses was found to be comparatively effective than muslin cloth and traditional cloth.

GP-06

Quinoa Seed as Antioxidant Dietary Fiber on Quality Improvement of Meat Nuggets

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Keywords: Goat meat nuggets, Quinoa seed, Antioxidant dietary fibre, Quality and acceptability

ABSTRACT

This study was conducted to know the effects of quinoa seed powder (@ 0, 1.5, 3 and 5%) as antioxidant dietary fiber on the physico-chemical properties, sensory qualities and storage stability of goat meat nuggets. Chemical composition, dietary fiber and total phenolic of quinoa seed powder (QSP) were determined. The goat meat emulsions were analyzed for pH, emulsion stability and cooking yield and also nuggets prepared out of this emulsion, were analyzed for sensory qualities such as, appearance, flavor, tenderness, juiciness and overall acceptability, proximate composition, thiobarbituric acid value (TBA), total phenolic content, total plate count(TPC). QSP contains 14.68% protein, 4.48% fat and 2.54% ash and is very rich in dietary fibre (43.91%) and have good amount of phenolics (600µg GAE/g). QSP significantly increased pH, emulsion stability and cooking yield and on the other hand, the protein, fat and total phenolic content was improved in treated nuggets than that of control nuggets. Nuggets with QSP had significantly higher dietary fibre content than control. TBA values were significantly higher in control nuggets and nuggets with 5% QSP showed lowest lipid oxidation. TBA value, TPC and sensory attributes of meat nuggets were within the acceptable level up to 14th day of refrigerated storage but treated nuggets received higher acceptability scores. Therefore, QSP being rich in bioactive components had positive influence in improving the quality of goat meat nuggets and it could be used as an antioxidant dietary fiber without affecting its quality and acceptability.

GP-07

A Study on Efficacy of Natural Antioxidants on Physio-Chemical and Microbial Stability of Goat Meat (Chevon) Patties during Storage

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Keywords: Antimicrobial efficacy, TBARS, FFA, BHA, GTE

ABSTRACT

The comparative antioxidant and antimicrobial efficacy of green tea (*Camellia sinensis*) extract and grape seed (*Vitius vinifera*) at % with synthetic antioxidant butylated hydroxyanisole (BHA) at 0.01% was studied in cooked chevon patties under anaerobic packing conditions during refrigerated storage. The chevon patties treated with GSE had significantly ($p < 0.05$) lower thiobarbituric acid reactive substance (TBARS) value and free fatty acids (FFA) content compared to control © and other samples in aerobic packaged conditions. A significant ($P < 0.05$) lower anti-microbial counts were noted in the chevon patties added with natural anti-oxidants. The GSE treated chevon patties rated significantly ($P < 0.05$) superior scores of color flavor tenderness juiciness and overall acceptability than control. BHA and GTE have excellent antioxidant and anti-microbial properties compared to control. BHA and GTE treated chevon patties during refrigerated storage under anaerobic conditions.

GP-08

Effect of Breeds and Milking Time on Quality of Goat Milk during Winter Season

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Keywords: Goat milk, Breeds, Milking time, Quality, Somatic cell

ABSTRACT

In this study physicochemical properties of Barbari and Jakhrana goat milk from our Institute as well as representative milk samples from outside, were evaluated during winter season. In the CIRG goat milk samples, in both the breeds morning milk had significantly ($P<0.05$) higher moisture contents while fat contents showed the reverse trend. Protein content in the Barbari goat milk was higher with respect to the milk from Jakhrana goats. Ash contents in all the milk samples did not differ significantly. Viscosity of Barbari evening goat milk recorded significantly ($P<0.05$) higher while in case of Jakhrana, morning milk had higher viscosity value. As per the expectation evening milk in both the breeds had higher total solids, though milk solid-not-fat content in the morning milk was high. pH value in the evening milk was recorded higher in both the breeds. Somatic cell count in the morning milk from Jakhrana was significantly lower. In the representative goat milks moisture contents in evening milk from both the breeds was significantly ($P<0.05$) lower when compared to morning milk while fat content showed the reverse trend. Protein content in Barbari goat milk was significantly ($P<0.05$) higher with respect to corresponding Jakhrana milk. No significant difference was recorded in the ash contents and viscosity values of all the milk samples. Total solids as well as milk solid-not-fat in evening milk were significantly higher in both the breeds than morning milk. pH value in Jakhrana goat milk was significantly lower as compared to Barbari milk. Morning milk showed lower somatic cell count than the evening milk.

GP-09

Health Benefits of Goats Milk

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Keywords: Casein, Digestibility, Fatty acids, Goat milk, Therapeutic

ABSTRACT

Interest in goat milk and milk products is a part of the recent trend in health food demand and consumption in several developed countries. Goat milk provide essential nutrients in human diet, as well as income sources for the survival of mankind in ecosystems of many parts of the world. Goat milk having higher digestibility of protein and fat, alkalinity, buffering capacity and certain therapeutic values in medicine and human nutrition. Goat milk contains substantially higher protein and ash, but lower lactose, than human milk. Goat milk has smaller fat globules and more short and medium chain fatty acids (MCT), which have the unique metabolic ability to provide energy in growing children and treat mal absorption patients. Goat milk is also of great importance to infants and patients who suffer from cow milk allergy because goat milk protein is hypoallergenic. Such unique properties of goat milk contribute to the sustainability of the dairy goat industry. Goat milk serves some important ways for humanity like home consumption, specialty gourmet foods and medical-therapeutic uses. Goat milk has some unique differences in several important constituents and physical parameters, including proteins, lipids, minerals, vitamins, glycerol ethers, enzymes, fat globule size, casein polymorphisms, which are significant in human nutrition.

GP-10

Small Scale Meat Products Processing Plant: A Start-up Entrepreneurship Model

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Keywords: Meat Products, Entrepreneurship, Small scale

ABSTRACT

Out of total 7 million tons of meat produced in the country during 2015-16, the contribution of goats towards country's meat production stands at 19 % (Poultry 36%, sheep 8%, Buffalo 22%, Pig 9 %) with total chevon production of 942 thousand tons. In current scenario of globalization and changing lifestyles, modern consumer demands convenience oriented, healthy meat products with a meagre concern towards price. Hence, there exists an ample scope of increasing the returns from goat husbandry through value addition to its meat and milk products as at present only 2% of meat output undergoes value addition. The present paper has been intended to study the viability appraisal of small scale meat processing unit with a capacity of producing 200 kg of meat products daily. The following assumptions were taken to calculate viability assessment which includes production cost for preparing 200 kg of products, equipments and civil structures required, man power and electric consumptions to be incurred and working capital requirements. Bank loans will be taken to cover 75% of project cost at the rate of 14 % and will be repaid in a duration of eight years. The set of approvals/ clearance required from various government agencies for starting meat processing plant were also taken into account. The loss due to depreciation was calculated at the rate of 5 % and 10% respectively for civil structures and equipments. It is also assumed that for having realistic marketing avenues, the plant will be functioning at the 50 %, 60% and 75% capacity in first, second and third years of its installation, respectively. From fourth year onwards, it will function at 90% of its capacity so that all products can be sold without any issues commensurating with increased demand of the product. Input cost of ingredients for preparing one kg of end product was worked out to be Rs. 450.25 (without including overhead expenses of manpower and electricity charges). It is also assumed that finished products are sold at the rate of Rs. 576.00 per kg to the distributors who gets 20 % margin who in turn will sell the products to consumer @ Rs 720.00 per kg. The revenue and

expenditure statement of the processing unit was worked out for 10 years. It was observed that from second year onwards, plant functions in profit after taking into account deducting the amount for loan repayment and interest, depreciation factor etc. The Internal rate of return (IRR) was found to be 65% and benefit cost ratio was 1.18 if the plant functions optimally with no issues in marketing the products. It can be concluded that taking up small scale meat processing unit as a business is a profitable venture. Such initiatives from the progressive goat farmers can be promoted by the government as start-up program for promoting entrepreneurship in value chain of goat industry.

GP-11

The Advantageous Outlook of Goat Milk Products Corroborate Through Extensive Proteomic Research

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Keywords: Goat Milk, Proteomic Research, Nourishment, Health

ABSTRACT

Milk and dairy products manage to be a keen area of interest and have been accredited as a vital part of human be it either the developing countries or the already developed nations of the world. Experiments carried out throughout the globe shows that milk from goats has water, protein, fat, sugar, minerals, and vitamins that prove to be essential for the maintenance of good health. Recently, goat milk along with its products is receiving great attention in the research field. They are useful as functional foods that may maintain nourishment and human health irrespective of their gender and age; especially who have allergy to cow milk. The advancement in the field of electrophoresis and chromatography and mass spectrometry, has broaden the potential application of proteomics to study milk from smaller ruminants. The principal aim of this paper is to provide an in-depth summary of the development and progress of proteomics applications in goat milk after examining various proteomic approaches that are currently applied to this field.

GP-12

Efficacy of Plastic Films as Tray over Wrap for Fresh Chevon Under Refrigerated Storage ($4 \pm 1^\circ\text{C}$)

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Keywords: LDPE, HDPE, Chevon, PVC, Plastic

ABSTRACT

Placing the chilled meat portions in a hygienic cellulose or plastic tray and tightly wrapped with single-layer plastic film is one of the appealing ways of fresh meat marketing for self-service outlets. The present study was made with objective of evaluation of the efficacy of different plastic films viz: LDPE, HDPE, LLDPE and PVC used as polystyrene tray overwrap for fresh chevon under refrigerated storage ($4 \pm 1^\circ\text{C}$). Chevon meat around 200 grams cubed in to a size of around 1.5” were packed in food grade polypropylene trays wrapped with LDPE, HDPE, LLDPE and PVC films and stored at refrigerated temperature. The physico-chemical, microbiological and sensorial attributes of these stored products were studied at an interval of 0, 3, 6 and 9 days of storage. There was a gradual increase in the pH, TBARS, tyrosine and total plate count (TPC) of chevon with advancement of storage period. The pH, TBARS and tyrosin value of the chevon under different packaging film overwrap lied between 5.77-5.82, 0.75-0.92 and 0.44-0.62 respectively. There was gradual decrease in instrumental colour and sensory scores with advancement of storage period. The total plate count of chevon packed in tray using film overwraps of LDPE, LLDPE and PVC were higher than critical limit on day 6th itself where as in case of HDPE wrapped film it was within acceptable limit even on day 9th of storage. Changes in physico-chemical, microbiological and sensory scores on different days of observations were indicative of superiority of plastic films as package overwrap in order of HDPE> LLDPE>PVC > LDPE. Thus, it was conclude that HDPE films can be a better alternate as tray overwrap film for packaging of fresh chevon having shelf life of 9 days, higher than usual 5 days under refrigerated storage system.

GP-13

Effect of Incorporation of Chevon(goat meat) Blend Containing Varying Levels of Wheat Bran On Quality Attributes of Chevon Patties

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Keywords: Chevon, Patties, Cholestrol

ABSTRACT

The present study was undertaken to prepare an optimized chevon blend (CB) containing wheat bran, oat and isolated soy protein to study the effect of its incorporation at varying levels of wheat bran on quality attributes of chevon patties. Three levels of wheat bran 3%, 6% and 9% containing Chevon Blend were formulated with control (Con) containing no wheat bran and patties were prepared and evaluated. The treatments exhibited higher cooking yield and fat retention than Con. Texture Profile Analysis revealed that 9% wheat bran showed highest hardness values. Springiness was found to be highest in 9% wheat bran and lowest in 3% wheat bran. Sensory evaluation did not reveal significant differences in scores for appearance, texture and juiciness, However 6% wheat bran showed significantly higher flavour scores than other treatments. Cholesterol level reduced in treatments compare to control. Overall acceptability was found to be highest in Con and lowest in 9% wheat bran. Therefore, the optimized Chevon Blend containing wheat bran can be incorporated in chevon patties with advantages of improved functionality due to reduced fat & cholesterol and increased protein & ash.

GP-14

Genetic and Environmental effects on Quality of Goat Milk and Meat Production

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Keywords: - Genetic, Environmental, Goat milk, Goat Meat, Goat Products

ABSTRACT

Goats are small ruminants which are well adapted to varied environments and are very rich in providing resources such as food, milk, meat and skin. In this context, goat livestock is promising and strategic for our country which has wide ecosystem diversity. Of the total global population of goats, approximately 94 percent are found in developing countries, supplying 73 percent of the milk produced by goats. More than tree-fourth of the world consumes goat meat which makes about 10 percentage of worldwide meat consumption and more than 60 percentage for red meat while goat milk averages about 2 percentage of world milk supply per annum. This milk can further be processed for cheese, butter, yoghurt and other dairy products. The impact of consuming poor quality meat and milk can lead to great epidemics in severe cases. In this review, we discuss genetic and environmental factors that influence the quality of goat milk and meat. We can grow the industry by many folds thereby increasing economic conditions along with promoting good health.

**Socio-Economic,
Marketing
& Financial
Issues in Asia**

SE-01

Economics of Sheep and Goats Marketing in Mubi Zone, Adamawa State, Nigeria

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Keywords: Adamawa, Goats, Marketing, Nigeria, Profitable, Sheep.

ABSTRACT

The study examined the nature of sheep and goats marketing by determining the marketing margins, efficiencies and structures in Mubi Zone, Adamawa State, Nigeria. Mubi Cattle Market was purposely selected for the study. The selection was based on the high concentration of sheep and goat marketers. Simple random sampling method was used to select 20% of the registered sheep and goats marketers giving a total of 162 respondents who were used for the study. A structured questionnaire was used to collect relevant information from the selected marketers. Data analyses were done using descriptive statistics, farm budgeting, measures of performance and Gini-coefficient. Results showed that sheep marketers were faced with higher cost per head (N33, 274. 08) and obtained higher net profit per head (N11, 409.2). While goat marketing was faced with higher cost of marketing (N2, 522.58), on the one hand, it attracted higher marketing margin (N92.60) and higher marketing efficiency (2.92) than the sheep. Although the two markets were oligopolistic in nature, sheep market was found to be more concentrated (1.12) than goat market (0.98). Based on the results of the study, it was concluded that both sheep and goat marketing were profitable. However, while sheep marketing was more lucrative in terms of business turnover than goat, goat marketing was more stable and had more capacity to respond to competition in the market. It is therefore, recommended that marketers should organise themselves into groups of cooperative societies for ease of access to soft loans for expansion of business, and the government to assist in establishment of separate markets for sheep and goats in the area.

SE-02

Economic Analysis of Traditional Goat Rearing by *Raikas* Folks of Pali District in Western Rajasthan, India

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Keywords: *Raikas*' community, Economic, Traditional, Goat farming and Rajasthan

ABSTRACT

Raikas' community is known for goat rearing as their sole occupation sustaining on waste lands of Pali district in western Rajasthan since centuries. The present study introspected economic aspects of traditional goat rearing by *Raikas*' under field conditions. A survey was conducted during 2016-17 in Pali district of Rajasthan to find out the economics of goat rearing. A total of 240 goat farmers belonging to 18 villages spread in six blocks were selected using multi-stage random sampling techniques. Among the selected farmers 46.32% were belonging to small holder category (1-5 goats/family). Capital investment per goat was highest in medium holder category (6-10 goats/family) and lowest in small holder category of farmers. The variable and fixed costs shared 83.54 and 16.21% of the gross cost. The labour cost shared 69.24% of variable cost and interest on investment shared 15.17% of fixed cost. Gross cost per goat decreased with increase in herd size. Income from sale of kids/adults contributed (58.47%) to return followed by sale of milk (43.12%) and manure (5.70%). Net income was maximum in large herd size and minimum in small herd size. Income and employment generation also increased with increase in herd size. It was concluded that goat rearing plays a vital role in generating income and employment to farmers in the Pali district of Rajasthan. The study suggested that *Raikas*' community of Pali district engaged in goat rearing as their sole and profitable occupation.

SE-03

Small Ruminant Farming in Karnataka: A Pathway of Sustainable Livelihood Security and Enhancing Farmer's Income

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Keywords: Goat flock, Net returns, Technical efficiency

ABSTRACT

Goat farming is a profitable and sustainable enterprise to different categories of rural households. The study was conducted in Tumakuru, Chitradurga, Belagavi and Kalaburagi districts of Karnataka. The results revealed that majority of the goat farmers belonged to age group of above 40 years and are illiterate (50-52%). Maximum number of farmers were having income of less than ₹1 lakh per annum, who belonged to backward class, scheduled caste and scheduled tribe. Further, majority of the farmers are having kaccha type of shed. The gross income was high in large flock (₹365404) compared to medium (₹266822) and small (₹168741) flock size. The overall gross income was estimated to be ₹265558. The annual net returns per animal of goat farm was ₹1980. Among goat flock size, net returns was higher (₹2138) in large flock size compared to medium (₹1962) and small (₹1513) flock size. The mean technical efficiency of goat farming was 92 per cent. Non-availability of grazing land with high cost of feed, especially during summer, incidence of PPR, ET and FMD diseases were the major constraints in goat rearing as perceived by the farmer.

SE-04

Osmanabadi Goat Rearing for Rural Women Empowerment in Parbhani District of Maharashtra

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Keywords: Osmanabadi goat, Women empowerment

ABSTRACT

The project entitled “Sustainable income generating goat rearing for rural women empowerment in Parbhani district of Maharashtra” was approved by Department of Biotechnology, Ministry of Science and Technology, New Delhi for the period of two years. Eight villages were selected from Gangakhed block of Parbhani district for implementation of Project *Viz.*, Padegaon, Shivajinagar, Muli, Dharkheda, Jawala, Shankarwadi, Mahatpuri and Rumana. Nine awareness camps were organized to demonstrate the importance of Osmanabadi goat rearing. The base line survey was undertaken in the selected villages for identification of 221 women interested in an income generation through Osmanabadi goat farming. Eight women groups were formed to undertake intensive training on scientific and technical aspects of goat farming. An effective training material consist of training booklet, information folder, DVDs of success stories, 18 lectures prepared in Marathi with photographs are delivered with projector. Eight trainings for a period of three days were imparted to the groups of women. The experts from the other organizations were also invited to address the trainees. To improve the genetic qualities of local non-descript goats, 10 role models of Osmanabadi goats were established in each selected village. The beneficiaries extended the breeding services of Osmanabadi bucks to the other non-descript goats and covered the large breedable goat population through upgrading. Eight field level demonstrations were organized for implementation of managerial and health packages for making awareness among rural women. The data collected from selected villages revealed that 925 kids born from 320 does supplied. Each beneficiary was successful in generating income of Rs 4000/month. The increased income of beneficiaries is due to awareness created for introduction of Osmanabadi goat breed, having higher growth, prolificacy, resistance and adoptability compared to non-descript goats.

SE-05

Goat Farming and Eco-tourism: A Case Study in Uttarakhand

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Keywords: Goat farming, hill agriculture, management system, eco-tourism

ABSTRACT

Majority of land holdings are having subsistence farming leads poor price realization for their produce. Agriculture in Uttarakhand is hit by animal menace, lack of irrigation facility, distress internal migration resulting in barren villages and fallow farm lands. Traditional non-innovative farming system, poor agriculture extension network, poor veterinary infrastructure, non-availability of quality inputs, lack of integration of value chain are the flagrant issues to ponder upon. With the advantage of suitable climate for livestock production and good market of livestock products, goat production can be practiced intensively in the middle hill areas and sheep in the upper hill areas, despite of challenges of food deficit, low productivity, largely unorganized goat sector, low genetic merit animals and tough geographical conditions in hills. Surprisingly 89% of goat farmers own less than 10 goats herd size and only 1% of goat farmers own more than 50 goats herd size in Uttarakhand. Production parameters on the sample size of 2000 goats, including our goats and which are associated with us through other farmers in Pantwari village (the base village for The Goat Village): milk yield – 300 ml./day, average body weight of male at 6 (7-10 kgs), 9 (10-15 kgs) and 12 months (18-20 Kgs), kidding rate 15 % of twins & average reproduction rates is 3 kids in 2 years. To increase the income of farmers it is very important to increase the herd size with adoption of commercial goat farming techniques with the inclusion of state government support, motivation, integrated, well managed and efficient agriculture extension network, quality inputs, value addition to the local produce, political will and tourism linkage to farming activity or vice versa. Farmers can earn sustainable income and cope up with the food security issue among their families in remote areas by dint of goat rearing alone or goat rearing as adds on to livelihood projects. There is enormous scope for establishing cottage industry based on goat meat and milk products and value addition to the skin and fiber. Agro forestry, development of linkage between producers and buyers, rural infrastructure

development, organic farming of area specific products for discerning buyers, intensive approach in agriculture, development of small and medium enterprises, local agro based industries, promotion of tourism specially eco-tourism, agro tourism, cultural tourism, without eco traumatic tourism, special emphasis on female education and health, area specific livelihood projects, development of medicinal plants based industry, devoted vocational trainings for the skill development of farmers etc can change the scenario of Uttarakhand hills agriculture but require more and more instant policies with rigorous implementation.

SE-06

**Contribution of Nepalese Smallholder Farmers in Achieving Self-sufficiency
in Goat Meat**

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Keywords: smallholder, production & productivity, marketable age and weight

ABSTRACT

Despite the fact that 50 % households keep goat, Nepal imports half million live goats every year and the demand is still growing. The major constraint is low production and productivity due to inadequate adoption of improved package of practices by small holder farmers. Realizing the gap, Heifer Nepal started a “Smallholders in Livestock Value Chain” project in 2012 engaging 138,000 smallholder goat farmers. They were empowered and further institutionalized into 144 women led Social Entrepreneurs Cooperatives that encouraged and motivated them to adopt improved goat health and management practices. Within 5 years by 2017, the sustainable system of accessibility and availability of veterinary services and input supplies to each individual household were established through proper mobilization of 311 local level technicians. Around 60 % families had year round availability of green grass planted in 10,000 hector land. Goat productivity increased from the baseline 1.54 kids to end line 2.4 kids/doe/year. Similarly, average marketable age and weight of castrated male goat decreased and increased from 15.5 month and 25.5 kg to 12 months and 30 kg respectively. The significant increase in goat production and productivity added 164,108 heads of saleable goats to the Nepalese goat market and that resulted in increase in average annual income per family per year from \$ 74 to \$ 297 from goats only. This successful model needs to be replicated in wider areas to contribute in fulfilling Government commitment to attain self-sufficiency in goat meat to contribute in poverty reduction and economic growth in Nepal.

SE-07

Contribution of Goat Rearing for Sustainable Farm Income: A Case Study of South Gujarat region

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Keywords: Goat farming, Surati, Goat keepers

ABSTRACT

Goat rearing is a profitable entity in the study region therefore the study focuses on the assessment of the contribution of goat rearing for sustainable farm income of South Gujarat region. The study was undertaken in randomly selected 180 farmers 18 villages of three districts of South Gujarat region. The goat keepers were divided in to two groups maintaining surati and local breeds. The study revealed that the net income derived from different herd size groups of goats was much higher among surati breed than local breed. The study clearly shows that large herd size group of goat keepers achieved higher profits than small and medium herd size groups in both breed of goats. The overall net annual income per goat was worked out to be Rs. 1283.51 from surati breed and Rs. 994.90 from local breed of goats. The annual income of surati breed of different herd size groups was higher in comparison to local breed of goats. This shows that adoption of the improved breed of surati goats have positive impact on the income of goat keepers. The results showed that goats provided the main source of income to small and marginal farmers. Furthermore, policy makers, researchers and farmers should be made aware of the economic viability of goat farming in the country.

SE-08

Daily Earning of Goat Keepers from Rearing Osmanabadi Goats

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Keywords: Goat, Income, Osmanabadi, Villager

ABSTRACT

The Nimbkar Agricultural Research Institute (NARI) in Phaltan in Maharashtra state hosts the Osmanabadi Goat Field Unit of the ICAR-All India Coordinated Research Project on Goat Improvement. Under this project, growth, reproductive and milking performance of goats belonging to villagers in four districts of Maharashtra state is recorded. The main objective of the project is “to assess the production performance of goat breeds in farmers’ flocks under village management system and improve the germplasm through selection”. Accordingly, twin- and triplet-born young Osmanabadi bucks born to does having a milk yield higher than 90 kg in 90 days and having 6 months body weights at least one standard deviation above the population mean, are selected, reared and then sent back to the villages for breeding. Some of the bucks are kept for semen collection, their semen is frozen and straws are supplied to many districts in Maharashtra and also other states such as Karnataka. Free vaccination, deworming and spraying against ecto-parasites are provided to all goats in adopted villages. Capacity building of villagers in carrying out these operations and first-aid treatment of goats is also done.

The objective of this paper is to compare the daily earning from goat rearing, of goat keepers rearing different numbers of goats. Four industrious and successful goat keepers were considered as case studies. The number of adult does reared was 4-6 by two of them, 7-10 by one and 10 to 13 by one. The items of income were the actual sale proceeds of kids and does sold by them during 2016-17 and 2017-18 and the average potential (notional) sale proceeds of kids and does retained by them at the end of the year. The main item of expenditure was the cost of concentrate feed and oil cake fed to the goats and kids. The net income so calculated was divided by 365, considering one person was fully occupied in herding the goats while grazing and other aspects of goat management. It was found that the per day return to one person’s labour was

approximately Rs.180, Rs.300 and Rs.350 for goat keepers owning 4-6 goats, 7-10 goats and 10-13 goats respectively. The number of kids available for sale per doe per year (after deducting mortality) was 1.9, 2.0 and 2.1 respectively for the three levels of income. This was achieved because they could obtain 1.3 to 1.4 kiddings per doe per year and the majority of does had twins or triplets. The prevailing daily wage for women and men agricultural labourers is Rs.200 and Rs.300 but on average, work is available for only half the year. It was concluded that with proper goat management, goat rearing can be a substantially better source of livelihood for a rural family in drought-prone districts of Maharashtra than working as an agricultural labourer.

SE-09

Sumbran Goat Farm: The Beginning of Success

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Keywords: Sumbran, Goat farm

ABSTRACT

I have initiated stalled fed goat rearing as a source of sustainable livelihood after getting training in Goat Management from Bombay Veterinary College (BVC), Mumbai. In year Feb.14, 2011 by purchasing non-descript 12 Does and expanded by purchasing 10 Sirohi from BVC + 1 Boer buck from Nimkar Agri. Research Institute (NARI) , Phaltan , Dist. Satara.

I followed the good management practices like control of Endo and Ectoparasites, Vaccination, body weight monitoring, feeding based on body weight, culling, “separate Day and Night Shelter System which is a unique example” and it helps me to maintain as “ZERO MORTALITY” at my farm till date. I have successfully conducted a Buck Fashion Show before Bakri Id, an innovative idea to overcome the traditional challenges in marketing.

To explore the better price to our produce by making value added products from Chevron,we eleven goat farmers from various districts of Maharashtra visited National Research Centre on Meat (NRCM), Hyderabad for four days training where we trained in mutton pickles and various Ready to Eat Products. Based on above training, in December 2017 I had participated in local exhibition at Pune, “BhimthadiJatra” by launching 125 kg Chevron Pickle, sale at Rs.1200/- per kg as “Sumbran Mutton Pickle” as a brand name where I got better public response. To expand the business on commercial level now I have Food Safety Standard Authority of India (FSSAI) and other necessary licenses. I come to opinion that goat keepers should try for value added products which will give more price to their produce for their sustainable livelihood.

SE-10

**Gender Division of Labour and Decision Making in Goat Farming in Pali
District of Rajasthan, India**

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Keywords: Adoption, Decision making, Gender, Goat farming, Women

ABSTRACT

The contribution of women in agriculture and allied operations is three-fourths of the total labour requirement. Gender is a major dimension in mixed crop-livestock farming. A study was conducted among the 240 goat farmers of Pali district of Rajasthan with the objectives of identifying gender-wise division of labour and decision making in goat farming. The study revealed that the activities like care of young ones (63.21%) and household maintenance (68.28%), were performed mainly by women. Further, the role of women was also higher in grazing (56.44%), feeding and watering (45.23%) and cleaning (48.12%) operations. The activity which demands caring might be the reasons for more women involved in it. More or less equal contribution was found from men and women in the activities of sale of animals (51.23%), utilization of income (55.45%) and credit acquisition and use (53.66%) which are carried out jointly by them. These activities are outdoor activities which need interaction with their counterparts leading to joint contribution. The decision making of respondents is presented in results the activities of grazing (55.33%), feeding (44.77%), cleaning (50.24%) and care of young stock (53.61%) were carried out mainly by women and their decision making was least in adoption of extension recommendation (2.59%) and spending credit and income (22.06%). The decision making by women was higher in grazing, feeding, cleaning and care of young stock as these activities were mainly carried out by women and they had the liberty to take decision in these activities. The result clearly indicated that most of the activities and decision making were carried out jointly. It could be concluded that from the study that routine activities like feeding, watering, grazing, cleaning and care of young ones were carried out mainly by women. But jointly activities and decision making were high in sale of animals, credit acquisition and income spending.

SE-11

Financial analysis of the Boer pure and crossbred kids reared under different production system at Western hills of Nepal

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Keywords: Economic analysis, Boer, Khari, crossbred, management system

ABSTRACT

A study was carried out to analyse the economics of Khari and its crosses with different blood level of Boer goat in Mauja, Kahun and Pokhara of Kaski districts and Pekhuthana village of Syangja districts. Altogether 12 commercial and breeder farms from Kaski and Syangja districts practicing stall fed (intensive) and mixed farming (semi intensive) systems were chosen to compare the most profitable breed combination under farmers' condition. Standard Microsoft Excel Worksheets developed by Professional Financial Analyst of Community Livestock Development Project (CLDP) was used. For this, financial analysis of the Boer crossbred kids reared under different production system revealed that crossbred kids having 50% Boer blood level resulted highest economic returns in terms of Internal Rate of Return (IRR-47%), Break Even Point (BEP-35%), Net Present Value (NPV- NRs 34,88,793), Net profit (NRs 7,00,043), per kg live weight cost (NRs 244.23) and Benefit Cost ratio (BC-1:1.53) under stall-fed (intensive) management system. Thus, the crossbred kids born from pure Khari mated with 100 % Boer could be the best option in terms of economic returns in the mid hill condition of Nepal.

SE-12

Goat: A Way to Doubling Farmer's Income

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Keywords: Economic and Education status, Integration farming system

ABSTRACT

As Gandhi Ji said “Goat is a poor man cow”; no doubt in the present scenario where the livelihood of rural peoples is quite tougher than urban mankind, the goat reforms the economic status of farmers not only by providing wealth but also giving the employment to the younger generation. India has passes about 34 registered breeds till now, of which most are meat type. The rearing of goat is a profitable business when performed in a well-planned manner along with the advice of Veterinary Professionals and progressive farmers. The integrated approach of goat farming is nowadays very much popular and seeking attraction of youth toward it. Nevertheless, the above approach provides the platform for highly profitable business as well as upliftment of rural society in term of their economic and educational status. Production of goat is in the integrated farming system can be done along with fish, poultry or duck production. The goat can be kept above the fish pond on an iron net flooring. The faecal material of goat is used as feed for fishes. Capital investment in this system is very much less than convention method of rearing. Another method of goat rearing is a semi-intensive method in which cost-benefit ratio is very much less than the intensive system. All these systems of rearing of goats provide the better management and profit to the farmers in relation to doubling their own income. The modern way of goat rearing and marketing can make the youth and rural peoples to increase their economy and also encourages others to start their own business.

SE-13

Socio-Economic Role of Goat Production for Poor People in India

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Keywords: Goat, Production and Socio-economic

ABSTRACT

Goats were found to play an important role in the livelihood security of the rural resource of poor people. There were plays an important role in the food and nutritional security of the rural poor. About 70 per cent of the landless people or agricultural labourers, marginal and small farmers in the country are associated with goat husbandry. Especially in the rainfed regions where crop production is uncertain, and rearing large ruminants is restricted by acute scarcity of feed and fodder. Goat rearing has distinct economic and managerial advantages over other livestock because of its lack initial investment, less input requirement, early sexual maturity, and ease in marketing. Goats can efficiently survive on available shrubs and trees in unfavorable environments and the rural poor who cannot afford to maintain a cow or a buffalo, find goat as the best alternative source of supplementary income and milk along with poor rural households maintain a few numbers of goats. Unlike a cow or buffalo, a few goats can be maintained easily. They are not only an important source of income and employment for them, but also a vital source of animal protein for the family and along with a good source of economic returns from goat rearing. Goat rearing, which is one of the most widely adopted livestock activities in the country, has the potential to emerge as a very good source of income and employment for the rural people especially in the unflavored environments. An overview was enriched our understanding on the socio-economics of goat production in the arid or semi-arid region of India and demonstrated that goat rearing in an economically viable rural enterprise.

SE-14

Knowledge and Adoption of Goat Rearing Farmers

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Keywords: Goat, Adoption, Knowledge, Constraints, Management Practice

ABSTRACT

Goats are multipurpose animal producing milk, meat, hair and skin. Their elemental function is meat production. Goat rearing occupies crucial place in economy of desert districts of India as it give livelihood to million goat keepers. Goat farming can be possible with little expenditure and undulating lands. But majority of goat keepers have moderate level of knowledge on different aspects of goat breeding and very low level of knowledge on upgradation of genetic potential and preventive health measures. Therefore the majority of goat rearers have medium adoption of improved scientific management practices increases income and economic status of goat farmers. The farmer rears goat mainly in extensive management system using traditional management practice relying on community land for grazing and are yet ignorant of scientific management practice. The adoption of improved management practice specially improve feeding, breeding and management practice not only help to achieve the desire level of goat production but also income of farmers. Few of goat farmers have knowledge on different health care management practice but in respect to extend of adoption of these practices, it was found low. To improve adoption goat rearing practice in any area, extension agencies have to arrange training and demonstration programme of improved practice to goat rearing farmers. So the adoption and attitude of farmers become more acceptable for goat rearing. Some of the major constraints perceived by goat rearers are lack of pure breed buck, high incidence of disease, high mortality rate in kids, lack of knowledge about parasitic problem, lack of capital to start a new farm. Therefore, goat owners should be trained through various training programs conducted by SAU's, KVK's, NGO's and some extension agencies. We must encountered the need of goat farmers and be well adapted to different production system in order to lower the research deficient in the goat sector and investment for better supplies particularly to the goat farmers. Goat farming is in a good position to pursue its development in 21st century if satisfactory policies are applied tactfully.

SE-15

Marketing Practices Followed by goat farmers

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Keywords: Goat, Marketing practices, Organized market, Price

ABSTRACT

The goat sector has a significant potential for round the year employment generation particularly in rural areas. Goat sector provides cheap nutritional food of animal origin to millions of people in our country and also generate gainful employment, provides enormous amounts of organic manure. Above all the goat converts vast quantities of crop residues of little value into valuable milk, meat and other products for human use. The study was carried out in Bihar state which comprised of three agro-climatic zones. To access the real status marketing practices, two districts were selected from each selected district, two blocks were randomly selected to make a total number of 12 blocks. Subsequently, two villages were selected randomly from each block. In this way 80 goat farmers as respondents were selected from each zone to make a sample size of 240. The result of the study reveals that that majority of the overall goat farmers (75 %) were lacking of organized market for goat trading. Further, 90 per cent farmer lacked information on marketing, 69.17 per cent did not follow marketing plan, 80.42 per cent did not perform survey of price before selling of goat and 100 per cent found difference in price offered between market and middleman.

SE-16

Importance of Goat Farming in Rural Economy

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ABSTRACT

Key words: Goat farming, income, marginal farmers, rural youth

Goat is the backbone of economy for small and landless farmers in India. It is an insurance against crop failure and provides alternate source of livelihood to farmers all the year round. In the prevailing socio-economic conditions in the country where per capita land holding is hardly 0.2 Ha, goat rearing becomes an inseparable component of mixed farming system. Goat farming has been recommended as the best choice for the rural people in developing countries because of the low investment, wide adaptability, high fertility and fecundity, low feed and management needs, high feed conversion efficiency, quick pay-off and low risk involved. The goat is a versatile animal. It is known as the poor man's cow in India and wet nurse of infants in Europe. Goat is a multifunctional animal and plays a significant role in economy and nutrition of landless, marginal farmers and village artisans. It is small ruminant maintained mainly for meat, milk, fiber and also for skin and manure. As per the Indian 19th Livestock census (2012), 26.40% of the livestock population in India is goat (135.17 millions). The goat farming is an important avocation in generating reasonable level of income to the goat farmers. The contributions includes multipurpose products and uses, such as skin, feather, fibre, manure for fertilizer and fuel, power and transportation, as well as a means of capital accumulation and as a barter product in societies where there is no circulation of currency.

SE-17

Rearing Goats for Milk-A Livestock business in Draught Prone Area

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ABSTRACT

I read the article in Feb. 2008 in “Sakal “ a Marathi news paper on “Goat Development through Boer Goats “ where it is mentioned that some of them goatary is a profitable business for drought prone area of Shirur , dist. Pune . Famers will get substantial income from goatary and it will a new addition to source of income to support their livelihood. Considering above positive points about goat rearing, we decided to start a commercial goat unit at village Savindane, Block Shirur, district Pune where we have 2.5 acres (100R) of agricultural land as our an ancestral property and we have decided to construct goat shed and undertake fodder cultivation to meet feed requirements of goats for goats.

We initiated our goat rearing as a “Aai Goat Farm “ (In Marathi Aai means Mother) since 2008 by purchasing following breeds of goats as a foundation stock. One doe of Boer breed from Raikar farm, Maval, district Pune. One culled doe from NARI, Phaltan .Three does and 1 buck of Sannen breed from Rural Agricultural Institute Narayangaon (RAIN), dist. Pune. During 2008-2016, we had a focus on producing elite breeding stock for meat purpose. Scientists and Governments’ breeding policy for goats is mainly focuses to rear goats for meat purpose. Majority of farmers’ think that goat farming is done for only meat production only but we planned to rear goats for milk. While establishing the farms we faced various challenges such as technical Know How, availability of elite foundation stock, fodder, skilled labor, quality of milk and typical goaty smell, keeping quality are the major marketing challenges in goat milk marketing. However, we overcome on these challenges and proved that goat farming can be done for milking as an entrepreneurial activity in draught prone area. Since 2016 to till Aug. in metro cities like Mumbai and Pune we sold about 3730 liters of goat milk and earned Rs.473750/- and 22 kg of ghee which contributed a revenue of Rs. 56100/- and total livelihood support of Rs. 529850/- to our family. There is substantial scope to produce indigenous products like Paneer, Butter that have local market but it needs market awareness.

Based on my experience I have realized that goat keeping for milk production can be a sustainable livelihood support through value addition to goat farmers.

I appeal goat keepers to focus on goat milk production and value added products to realize better revenue.

SE-18

Women are Key Player in Goat Farming in Rural Areas of Mathura

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Keywords: Goat farming, Rural Areas, Women

ABSTRACT

India is an agriculture based country and livestock sector is an integral component of it where, livestock production is largely in the hands of women. In fact animal husbandry is becoming feminized. The goat sector has tremendous potential for employment generation and provides insurance against natural calamities, unfavorable/changing environmental condition, uncertainty in crop production and provides alternate source of livelihood to farmers all the year round particularly in rural areas. Goats can efficiently utilize available grasses and various tree tops in unfavorable environment and the rural poor women who cannot afford to maintain large animal, find goat as the best alternative source of supplementary income. Progress in livestock sector cannot be possible without the contribution of woman. Unlike cow and buffalo, few goats can be easily managed by woman or even old lady. Goats not only provide the source of income but also insure the nutritional security of their family. The study revealed that the major activities like sale/purchase of goats (54.08%), grazing of goats (56.48%), feeding and watering (75.11%), care of kids (83.21%), cleaning of pen and household maintenance (72.18%), milking of goats (84.39%), health management (82.23%) and breeding management (60.41%) of goats were performed mainly by women. Besides, considerable involvement and contribution of women, considerable gender inequalities also exist in Indian villages. Therefore, there is a need to correct gender bias in livestock sector. Efforts are needed to increase the capacity of women to negotiate with confidence and meet their strategic needs.

SE-19

Socio-Economic Status and Management Practices of Goat Farmers in Singrauli, District of Madhya Pradesh

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Keywords: Goat farming, Management practices, Socio economic status

ABSTRACT

The farmers of district Singrauli in Madhya Pradesh is distributed in three major categories, the marginal farmers (70 %), small farmers (24%) and medium & large farmers (06%) and among the total population of the district, 19.25 percent is urban population and the rural population is 80.75 percent. Generally, the landless & marginal farmers, who maintain the goat population in the district, are the targeted group under the present study. The goat farming is a source for benefiting poorly endowed areas like drought prone areas. This sector provides additional income and employment opportunities to the rural population, especially to the farm-women, who are mostly responsible for the management of goat rearing in the area; hence it is a major source of empowering the rural women besides other resources and is a good source of women income. The goat farming also plays an important role in improving the socio-economic status of the farmers in the area. The present study also attempt, the management practices followed for rearing of the goats in the area which includes, the type of goat farm ownership, existing routine pattern in goat rearing, percentage of local and identify goats breed, feeding pattern, breeding, labour use pattern, health care and the utility for the individual, which plays a vital role in the production of goat meat and milk, ultimately for income generation. It was found that the socio-economic status of goat farmers directly or indirectly influenced the goat meat production in the area.

SE-20

Adoption Level of Improved Goat Farming Technologies by Commercial Goat Farmers in Tamil Nadu, India

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Key words: Adoption level, Commercial Goat farmers, Tamil Nadu

ABSTRACT

A study was undertaken to assess the adoption level of commercial goat farmers under semi-intensive and intensive systems of management in Tamil Nadu. To this survey, a sample of 120 commercial goat farmers (20 farmers from each district) was selected randomly from 6 districts of Tamil Nadu. Data revealed that, overall 46.67 per cent of the commercial goat farmers had medium level of adoption of improved goat farming practices, followed by high (33.33 %) and low (20.00 %) extent of adoption. Average adoption indices of improved goat farming technologies were 60.71, 64.61, 76.19 and 67.20 for small, medium, large and overall categories of farmers, respectively. Overall adoption index of improve goat husbandry practices by the commercial goat farmers revealed that, housing practices obtained highest adoption index (74.41-I) followed by feeding (67.42-II), health care (66.00-III), breeding (65.33-IV) and general management practices (62.81-V). Multiple linear regression analysis showed that, the factors *viz.*, family income, investment on goat farming, flock size and economic motivation had positive and significant (1% level) influence on the variability in adoption levels of commercial goat farmers. Education and system of management of goats showed positive and significant (5% level) towards adoption of commercial goat farmers.

Goat Health

GH-01

Anthelmintic Activity of *Withania Coagulans* and Its Derivatives in Sheep and Goat

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Keywords: Anthelmintic activity, *Withania coagulans*, steroidal lactones, Small ruminants

ABSTRACT

There in nature animals close to humans use to treat them but in livestock it was not thought that they can select the herbs or plants of medicinal properties. The selection of herbs like *Withania coagulans* by adult sheep and goat and also learning of offspring by their parents is a new study that has never been observed before. Zoopharmacognosy was studied in small ruminants by taking *Withania coagulans* or *paneer dodoa* which were infested with various intestinal helminthiasis or GIT problem. The selection of the same plants by the next generation or offspring was never studied in small ruminants as observed here. One hundred sheep of buchi or balochi breed were selected in study area Fort Munro, Dera Ghazi Khan, Punjab, Pakistan at 29.9256° N, 69.9833° E where this herb is endemic. The fecal samples were subjected to flotation technique and eggs were counted by Mc Master Counting Technique. The ANOVA and mean percentage methods were used. The results showed a maximum of 10 % prevalence of *H. contortus* along with other intestinal helminthes including trematodes and Cestodes. The *W. coagulans* contains three new steroidal lactones, withacoagulin G (1), withacoagulin H (2), and withacoagulin I (3), along with six known derivatives (4–9) and all containing NO (Nitric oxide) activity along with steroidal lactones, alkaloids, flavonoids and tannin. This plant has proved its efficacy in sheep and goat as Phytoanthelmintic by zoopharmacognosy by the presence of three new steroidal lactones, withacoagulin G (1), withacoagulin H (2), and withacoagulin I (3), along with six known derivatives (4–9) and all containing NO (Nitric oxide) activity along with steroidal lactones, alkaloids, flavonoids and tannin.

GH-02

A Corelation Between Seroclinico Epidemiology and Various Stimulating Parameters for Goat Brucellosis

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Keywords: Goat, Brucellosis, *Brucella melitensis*, seroepidemiology, RBPT, i-Elisa

ABSTRACT

Brucellosis bacterial zoonotic disease affecting many domestic species including goats. Species *B.melitensis* responsible to cause this disease in goats and beside potent zoonotic species among other brucella organisms it also causes substantial economic loss to the marginal farmers of the developing country. The disease is transmitted by direct contact with infected materials as well as sexually. But other factors like herd size, disease specific clinical symptoms, housing and rearing system, geographical location, education level of owner and access to veterinary service are the leading factors which may aggravate the condition. So, in the present study we had correlated the sero-prevalence (using RBPT and i-Elisa) of brucellosis with these factors. In the present study we observed the high prevalence in the flock of >100 goats, located in rural area, history of abortion, orchitis, repeat breeder and reared in extensive system. In addition to these we also noticed that the level of farmers understanding about the disease is inversely proportional to the disease prevalence. Those farmers which are aware about disease are immediately take helps of veterinary service and also pre-test their animals before purchase have less prevalence rate. Flock which regularly incorporating new animals from unknown source and without pre-testing have high chances of getting brucellosis infection of new comer. The main aim of the present study was to evaluate the role of silent stimulating factors which increase the prevalence of the disease and suggesting remedies to combat such factors for control of the disease.

GH-03

**Documentation of Ethno-Veterinary Medicines for Goat Followed by *Raikas*'
Folks in Arid Zone of Rajasthan, India**

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Keywords: Goat, Ethno-veterinary practices, knowledge and *Raikas*'

ABSTRACT

The present study is aimed at identification of the traditional medical practices being adopted by the *Raikas*' folks in the treatment of goat diseases in Pali district of Rajasthan state. The present study was carried out in the purposively selected arid region of Rajasthan. A multistage stratified random sampling design was used to select the districts, blocks, villages and sample households. A sample of 240 households was selected for the present study. Data were collected personally through a well structured and pre-tested interview schedule. It was found that majority of the households (66.25%) were initially providing self medication using traditional practices and in cases of severity of disease/ailment, village quack was consulted. Vaccination of goat was followed in only 48.75 per cent of the selected households. In addition, only 36 households (31.25%) the sick animals were isolated from the flock. A total of 38 species of herbal plants have been identified which were used either alone or in combination as traditional remedies for 8 diseases in goat including important conditions like hoof infection, liver disorder, PPR, FMD and enteritis to emergency conditions like bloat and haemorrhage. A variety of traditional practices were observed being followed for treatment of various ailments and diseases of the goat with the use of locally available material, herbs, *etc.* the success rate of the practices used was claimed to the native folk to 45-52%. Use of such medicinal plants is of greater value in view of the socio-economic conditions of the goat owners in reducing the cost of treatment.

GH-04

Molecular Characterization and Protein Profiling of *Haemonchus Contortus* (Nematoda: Trichostrongylidae) in Goats of South Gujarat

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Keywords: *Haemonchus contortus*, Goat, ITS 1-2, Cysteine Proteinase and SDS –PAGE

ABSTRACT

Parasitic gastroenteritis caused by *Haemonchus contortus* is the major constraint in goat industry and their impact on animal health, production and welfare is likely to increase. This parasite can be devastating to producers as it causes decreased production levels due to clinical sign such as anemia, edema and death and its excretory and its secretory products (HcESPs) interact extensively with the host cells. Alignment of ITS-1/ ITS-2 sequence of 198/ 350 bp in size revealed 100/ 100 and 98.6-99.3/ 97.2-99.5% homology in male versus female genotype. Electrophoretic separation of somatic antigen (HcSAg) in reducing condition on 15% polyacrylamide gel resolved into 16 proteins of the molecular weight ranging from 14-100 kDa. Two step ethanolic extraction of the supernatant of *in-vitro* culture yielded E-S antigen (HcESAg)/ cysteine proteinase of molecular weight 28 kDa types and Navsari versus published isolates with 0.0105/ 0.0183 evolutionary divergences.

GH-05

**Histological Studies of Uterus During Different Stages of Pregnancy in
Barbari Goat**

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Keywords: Barbari goat, Fertilization, Peritonium, Pregnancy

ABSTRACT

The present study was conducted on 18 gravid uteri obtained from healthy goats of Barbari breed procured from local slaughter house. The uteri were divided into three groups according to their gestational ages as Gr I (0-50 days), Gr II (51-100 days) and Gr III (101 till term). The tissue were fixed in the 10% buffered formalin for histological study. Surface epithelium of uterus was eroded from maximum place during early stage of pregnancy. During mid and late pregnancy surface epithelium was reappearing in discontinuous manner and the epithelium was simple columnar, pseudo stratified columnar and stratified columnar type. The lamina propria was consisted of different type of connective tissue cells and densely arranged collagenous fibers and also contains with few reticular and elastic fiber. As pregnancy progressed the number of collagen and reticular fibers were increased and elastic fibers were decreased. The epithelium of different part of uterine glands varies from simple columnar to pseudostratified ciliated but mostly simple columnar and some places simple cuboidal epithelium are also present during different stage of pregnancy. During late pregnancy the epithelium of neck, middle and basal segment of uterine glands were simple columnar. The epithelial height of the uterine gland in gravid and non-gravid horn range increases significantly with advancement of pregnancy. The size of sinus was increases as pregnancy progressed and during late stage of pregnancy sinuses of endometrial glands were merged to form large size sinuses. Every segment of uterus the outer and inner lumen diameter and epithelial height of neck, middle and basal segments was significantly increased as pregnancy progressed. The diameter of the individual muscle cells in myometrium were increased several times as pregnancy advanced. Particularly the thickness of tunica muscularis layer increases due to hypertrophy and hyperplasia. The thickness of perimetrium not varied as pregnancy progressed.

GH-06

Mortality Pattern of Sangamneri Goats Under Field Conditions

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Keywords: Sangmneri goat, breed, breeding, mortality

ABSTRACT

Sangamneri is categorised as threatened breed of Maharashtra. The AICRP is taking efforts to conserve and improve the breed by supplying elite genetic material to the farmers. In order to study the mortality pattern of Sangamneri Goat the present study was under taken from the period from 2013 to 2018. The population of 20475 was studied for year wise, age wise and cause wise mortality of Sangamneri goats. During the period 661 mortality cases has been noticed out of which highest mortality has been noticed in kids up to 3 months of age followed by 3-6 months and the lowest mortality was noticed in adult group. The highest mortality of 4.99% was noticed in year 2013-14 which was steadily decreased as 4.14% in 2014-15, 1.17% in 2015-16, 1.07 in 2016-17 and lowest mortality of 1.02 was noticed in 2017-18. The major cause of mortality is pneumonia (25.93%) followed by pnumo - enteritis 20.99%, polybaccilosis 19.75%, coccidiosis 14.82%, general weakness 8.64%, acidosis 4.94% and liver abscess 2.47%. The mortality due to predation was also noticed by 1.23%. The considerable decline in mortality is clearly indicated that the preventive and curative measures taken in health control worked satisfactorily.

GH-07

***Haemonchus Contortus* Infestation in Goats: A Case Report**

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Keywords: Ruminant, Faecal, Parasitological examination, *Haemonchus contortus*

ABSTRACT

Gastrointestinal parasitism is associated with economic losses, lowered productivity, reduced performance, mortality and morbidity in ruminants. Globally the most common nematode species known to affect small ruminants is *Haemonchus contortus*, a blood sucking parasite resulting anaemia, loss of body weight and can lead to death in infected animal. Its higher prevalence could be due to that adult females are capable of producing thousands of eggs per day, which can lead to rapid larval pasture contamination and associated outbreaks of haemonchosis. Another downside of *Haemonchus contortus* is its great ability to develop resistance to anthelmintic drugs, which poses a problem in terms of prevention and control. In the present case a total of 48 indigenous goats were presented to District Mobile Unit, Jaipur with the history of anorexia, weight loss and voiding dark colour diarrheic faeces. On clinical examination, severe dehydration, rough hair coat, depression, oedema of dependent parts and gums, perineum, and eyes appear whitish – pale and anaemic. Faecal samples were collected into airtight containers from each animal for Parasitological examination using standard methods. On microscopic examination, high burdens of *Haemonchus* species eggs observed, approximately in all faecal samples along with mild infestation of *Eimeria oocysts*. The flock was treated with tablet albendazole 200 mg orally with liver supplement (injection B. Complex, 2.5 ml, I/M once daily) and sulfadiazine trimethoprim bolus (Biotrim, half bolus orally twice daily) for 5 days. The condition of the all affected animals improved after 5 days of dosing, started taking feed and water normally.

GH-08

Modulation of Peripartum Inflammation in Goats Using Common Indian Plants

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Keyword: Peripartum, Inflammation, Acute phase protein, CRP, SAA, HPT

ABSTRACT

Peripartum inflammatory changes play an important role in the initiation and development of many transition disorders and metabolic diseases in livestock which affect their productivity. The sensitive and rapid indicators of these inflammatory disturbances are acute phase proteins (APPs) of which haptoglobin (HPT) and serum amyloid A (SAA) are considered the major APPs, while C-reactive protein (CRP) is a universal inflammatory marker. Many Indian plants have been claimed for being effective in modulating the inflammatory changes at parturition and productivity in ruminants but lack scientific evidence. The present study was designed to study the effect of feeding (15 days peripartum) of five combinations (Control, NB, NBCG, BCG1, BCG2 and NBCG) of neem (dried leaves), babool (dried leaves), guduchi (stem) and calotropis plant on HPT, SAA and CRP in plasma of thirty six transitory goats. In the present study, the haptoglobin levels gradually reduced after kidding in BCG1, BCG2 and NBCG indicative of a homeostatic state while in other groups abrupt changes were observed. SAA was markedly elevated in BG indicative of oxidative crisis or inflammatory burst while it was minimal at all stages in BCG1, BCG2 and NBCG. CRP was steeply reduced in NB group while the change was steady in BCG1 and BCG2. In control, BG and NBCG groups, though CRP levels reduced to some extent after kidding, the levels were maintained upto 2weeks postpartum indicating a significant production or remodelling stress in the animals.

GH-09

Molecular Detection of Contagious Ecthyma Virus in a Field Outbreak in Goats at Uttarakhand

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Keywords: Contagious ecthyma, orf virus, B2L gene, Uttarakhand

ABSTRACT

Contagious ecthyma is an acute, contagious and debilitating disease of sheep and goats with occasional infections in human, cattle and wild ruminants. The disease is characterized by proliferative skin lesions mainly around muzzle and lips. The disease has economic importance due to high morbidity, loss of condition, hide damage and secondary infections. The etiological agent, Orf virus (ORFV) belongs to genus *Parapoxvirus* of family *Poxviridae*. The present study was undertaken to investigate outbreaks of contagious ecthyma in goats at Almora district of Uttarakhand state, India. The disease outbreak occurred in the month of April 2018 in flock of Chaugarkha goat (local breed) at Khola village, Almora, Uttarakhand. All affected animals had history of grazing on common pasture land having thorny bushes and tree leaves. Out of 12 goats of the flock, 4 goats of 3-5 months age manifested the clinical signs like fever (104 °F), anorexia, dullness and typical proliferative lesions around lips. Grossly, widespread proliferative dermatitis with thick layer of grey elevated crusts was seen over the margin of lips. The farmer reported history of previous occurrence of similar clinical disease in goats in the same village in 2017. Scab samples from affected animals were collected for laboratory investigation. The scab samples were processed and subject to identification by counter immunoelectrophoresis (CIE) and PCR tests. After preliminary confirmation of scab samples in CIE, the virus identity was confirmed using diagnostic PCR based on B2L gene which showed amplicon size of 1.2 kbp. The present study confirms the orf virus infection in the outbreak. Due to ability of the orf virus to re-infect the same host and ability to survive in environment for longer periods, virus might be circulating in the region. This requires active surveillance for the disease in the region and further molecular characterization of the virus in future.

GH-10

Comparative Prevalence of Paratuberculosis and Tuberculosis in Small Ruminants of Herds of Jaipur (Rajasthan)

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Keywords: Johnin, tuberculin, Paratuberculosis, Tuberculosis

ABSTRACT

Paratuberculosis and tuberculosis are two major infections of ruminants that severely affect farm economy. Both diseases also have zoonotic concerns. We have recently initiated a screening program for both the diseases in our center. We are using johnin and tuberculin reagents (by IVRI, Izatnagar) for the on farm screening of animals. In the present study we screened one sheep farm and one goat farm. Both farms were on semi-intensive management and grazing our major practice. In total, we tested 101 animals (sheep- 56 & goat- 45). In the skin test, we found that goat herd was free of both infections. However, high prevalence of paratuberculosis infection was observed in sheep flock, 32 (57.1%) animals had strong skin reaction, also 4 (7.14%) reacted for tuberculin reagent. Also 4 (7.14%) sheep reacted for both johnin and tuberculin. High prevalence of infection reflects the poor hygienic maintenance of sheep flock

GH-11

**Guide to Udder Health for Dairy Goats –
Providing Guidance for Veterinarians and Producers in Improving Milk
Quality**

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Keywords: Mastitis, Somatic cell count, Bactoscan, Staphylococcus, Streptococcus

ABSTRACT

An udder health guide developed for dairy goats provides guidance to producers, veterinarians and dairy support personnel in how to control mastitis and maintain milk quality. It was developed to fill a need in the dairy goat industry as poor milk quality plagues and frustrates producers and the processors that rely on a suitable product. The guide was developed through consultation of both the small ruminant and dairy cow mastitis and milking management literature. The synthesis of information has, as its intent as being a source of practical and easy to understand information to guide producers and veterinarians through all aspects of keeping the udder health and the milk of high quality. The guide is divided into sections that cover normal anatomy and physiology, the causes of mastitis and how to detect it, best practices for milking management, maintenance of milking equipment and troubleshooting poor milk quality. Other sections cover treatment and control of mastitis, monitoring udder health and health management of the dairy doe. At the end is a glossary of terms, a quiz for self-assessment and additional sources of information and references. More research is needed in some areas, although there is sufficient information available to provide a high quality udder health program to this dairy sector.

GH-12

Caprine Anaplasmosis: A Case Report

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Keywords: Blood parasite, Anaplasmosis, anemia, *Rhipicephalus microplus*

ABSTRACT

Blood parasite constituent a major problem in goat breeding due to severe economic losses and lowered vitality which lead to a decrease of animal production and increase the susceptibility to various infections. Anaplasmosis is an infectious disease characterized by fever, anaemia, jaundice, lethargy and anorexia and substantial economic impact due to lower weight gains, productivity losses, reduced fertility, abortions and case fatalities. It is caused by *Anaplasma* species which is an obligate intraerythrocytic rickettsial organism belonging to the order Rickettsiales and principally transmitted by *Rhipicephalus microplus* ticks. The hot and humid climate is very conducive for the development and survival of these potential vectors.

In the present report, a case of *Caprine Anaplasmosis* is discussed. A two year old female goat was brought to the Veterinary Clinical Complex, PGIVER, Jaipur with a history of depression, anorexia, fever, and progressive anaemia. Clinical examination revealed rectal temperature of 104.6°F, pale mucous membrane, dullness and anaemia. The blood sample was collected in vacutainer tube containing EDTA and processed to prepare thin blood smears for microscopic examination at the laboratory of Central Testing Facility, PGIVER. Blood smears were stained with Giemsa's stain and examined under a light microscope with 100X magnification. The diagnosis is made by demonstrating Inclusion bodies of *Anaplasma* species within infected erythrocytes in the blood smear. The case was treated with oxytetracycline given intramuscularly for 3 to 5 days along with supportive treatment. Post-treatment, increased the values of RBCs, hemoglobin while fever decreased and parasitemia was undetectable by means of Giemsa staining

GH-13

Creating PPR Vaccination Business for Sustainable Service Delivery

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Keywords: PPR Vaccination, Vaccine, Sheep

ABSTRACT

Peste des Petis Ruminants (PPR) is an endemic disease of goats and sheep in India. 62 outbreaks of PPR, putting 261035 goats and sheep at risk of the disease, were reported to OIE in 2017. A very effective vaccine with long lasting immunity is available in India but the vaccine has not been widely used. A total of only 10.3 million sheep and goats have been vaccinated (OIE 2017) out of 200 million sheep and goats in the country. Most of the vaccination so far is the result of public sector initiatives that run in a campaign mode mostly once a year. Alternatively the service can also be made available as a paid-for private good on a regular basis to benefit goat and sheep keepers. The latter concept was tested through a pilot project in 2 blocks of Moradabad district in UP and a collaborative project with Jharkhand State Livelihood Promotion Society (JSLPS) in Jharkhand. Goats in Moradabad area are kept mostly by smallholder farmers having 3-4 goats. They are mostly unaware of the benefit of using technology like vaccination in goats and the history of vaccine provision free from government posed a problem when PPR vaccination was offered on a paid basis through trained paravets who work under the guidance of veterinarians. Motivating the goat keepers through meetings, training and exposure and bundling the service of deworming with vaccination at goat keeper's doorstep for a fixed service fee proved to be a successful approach and led to administration of 68000 doses of PPR vaccination in goats in a period of 9 months. For the first time a local retail medicine shop kept and sold PPR vaccine and also for the first time paravets delivered the service of PPR vaccination on paid basis. PPR vaccine was offered to eligible goat population on a regular basis. Above all the average goat herd size in that area increased from 3.8 to 4.7. In another project in Jharkhand, GALVmed project partner Hester Biosciences Limited collaborated with JSLPS, to administer a total of 76000 doses of PPR vaccine into goats in 18 months by 751 trained Pashu Sakhi (Women Animal Health Worker) on a paid basis. The service is still continuing. PPR vaccination on paid basis concept has been proved by these 2 initiatives: one in UP and another in Jharkhand. PPR vaccination along with deworming on paid basis can be promoted to stop the mortality and infection as well as enhancing the growth performance in goat and sheep populations.

GH-14

Possible Transmission of Gastro-Intestinal Nematode (GIN) Infection Through ‘Cut and Carry’ Fodder in Stall-Fed Goats

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Key words: goat, gastro-intestinal nematode infection, stall-fed

ABSTRACT

GIN infection is less prevalent in stall-fed than grazing goats because of reduced chances of re-infection. However, stall-fed goats may get infected through ‘cut and carry’ fodder fed to them if fresh goat manure containing worm eggs and larvae is applied to fodder plots and fodder from these plots is cut and fed without allowing sufficient time for any third stage larvae to perish. The objective of this study was to find out the source of GIN infection in stall-fed goats on an organized farm. Faecal Worm Egg Counts (FEC) of 17 stall-fed Osmanabadi bucks were measured in June and October 2017 using the Modified McMaster Technique. The bucks were drenched with Albendazole in June. The test FEC were found to be zero, indicating the drenching was fully effective. On finding the bucks re-infected in October, several fodder samples from the plot from where green fodder was cut for feeding the bucks, were taken at a height of 4-5 cm from the ground, using the method described by Hansen and Perry (1994). A pooled sample weighing 500 g was used for analysis. A clear sediment was obtained from the pooled sample by repeated washing, filtration and sedimentation to eliminate the debris. Staining and counter staining was done using Lugols iodine and Sodium thiosulphate respectively. The larval species were identified and the number of larvae counted. The number of rainy days were 8, 10 and 8 in August, September and October respectively, with 58, 330 and 180 mm rain respectively. The bucks had a mean FEC of 1224 epg with the range of 200 to 2800 epg in October. The coproculture of pooled faecal samples indicated 85-90% *H. contortus* larvae followed by *Trichostrongylus* spp. From the fodder sample analysis, it was estimated that there were 4000-5000 infective L3 larvae per kg dry herbage and *H. contortus* was the predominant species, followed by *Trichostrongylus* spp. It was therefore concluded that the GIN infection was probably transmitted to the bucks through the fodder.

GH-15

Natural Jaagsiekte Sheep Retrovirus Infection Causing Ovine Pulmonary Adenocarcinoma in Sheep Population Of India

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Keywords: Jaagsiekte sheep retrovirus, ovine pulmonary adenocarcinoma, histopathology, immunohistochemistry

ABSTRACT

The authentic epidemiological status of ovine pulmonary adenocarcinoma (OPA), a major menace to sheep industry, needs to be figured out *via* proper diagnosis and regular surveillance in order to combat escalating cases. Therefore, an explorative investigation of suspected pneumonic lung samples (n = 270) out of 1350 screened lung samples of sacrificed and fallen sheep from three states (Andhra Pradesh, Delhi and Uttar Pradesh) of India was conducted *via* monitoring of patho-morphological changes, detection of JSRV capsid antigen on the basis of immunohistochemistry (IHC) and employing polymerase chain reaction (PCR) based on *gag* and U3 gene and the sequencing and phylogenetic analysis of amplified *gag* gene PCR products scrupulously. Only 31 out of 270 collected sheep's lung samples were found grossly enlarged, deflated and had firm grayish-white nodules on the cranio-ventral or diaphragmatic lobes. Histopathologically, these lungs showed neoplastic foci of proliferated pneumocytes type II forming acinar or papillary broncho-alveolar growth pattern pointing toward OPA infection. Portraying of Jaagsiekte sheep retrovirus (JSRV) specific viral capsid antigen in the cytoplasm of neoplastic cells, alveolar macrophages and type II alveolar cells *via* IHC and amplified PCR products of 229 bp and 176 bp size correspond to JSRV *gag* gene and U3 gene, respectively, confirm OPA infection. The sequencing and phylogenetic analysis of amplified *gag* gene-specific PCR products showed 98-100 % homology with each other and 95% to 98% homology with Indian JSRV, KU312093, AF153615 and U.K JSRV isolates.

GH-16

Co-Infection and Increased Shedding of *Cryptosporidium* Spp. Oocysts by Adult Goats Endemically Infected with *Mycobacterium Avium* Subspecies

Paratuberculosis

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Keywords: Cryptosporidiosis, paratuberculosis, *Mycobacterium avium* subspecies *paratuberculosis* (MAP), *Cryptosporidium* spp., adult goats, immunosuppression, diarrhea, zoonoses.

ABSTRACT

Caprine cryptosporidiosis is globally distributed and it's well known for causing neonatal diarrhea in goat kids. *Cryptosporidium parvum* and *Cryptosporidium xiaoi* are the major species involved in the disease in goats. Disease incurs significant losses to the goat industry due to mortality and morbidity in neonatal kids. Cryptosporidiosis is considered as one of the major health problem of the neonatal goats kids, but in adult goats disease is mostly asymptomatic owing to the competence of immune system and adult goats act as carrier of infection. However, in-view of the influence of stress factors e.g, generalized or debilitating diseases, malnutrition or other conditions which suppresses immune system, disease may flare up even in adult goats leading to diarrhea or increased oocyst shedding. Caprine cryptosporidiosis is a potential zoonosis, human infection may be serious and life threatening in paediatric, geriatric and immuno-compromised hosts. Johne's disease (JD) or paratuberculosis is caused by *Mycobacterium avium* subspecies *paratuberculosis* (MAP) is a serious infection of ruminants, especially goats world-wide. Incubation period is long and highly variable and disease is characterized by diarrhoea, chronic wasting, emaciation, debility and death. Diarrhea is not commonly evident in small ruminants and infected animals may take months to several years to exhibit clinical signs. But infected animals contribute to environmental contamination by constant shedding of MAP. Another aspect of Johne's disease is immunological exhaustion which ultimately leads to immunosuppression.

In the present study we primarily screened adult goats for the shedding of MAP but several samples also showed presence of oocysts in the Ziehl-Neelsen (ZN) stained slides. On

microscopy oocysts were suspected for *Cryptosporidium* spp. owing to their morphology and acid fast nature. A total of 38 samples from adult diarrheic goats were subjected to both ZN staining and slides exhibiting oocyst like bodies were then subjected to modified Ziehl-Neelsen (mZN) staining and 31 samples were found positive for the presence of MAP, on microscopy. Positive samples were also subjected to IS900 PCR for the confirmation of MAP. Of 31 MAP positive samples, 27 were also positive for the presence of oocysts of *Cryptosporidium* spp., which were again subjected to confirmation by 18S ssu rRNA PCR. The 413 bp band in IS900 PCR and an amplicon of 845 bp in the 18S ssu rRNA nested PCR confirmed the presence of MAP and *Cryptosporidium* spp., respectively. There was irregularity in oocyst shedding among the goats, which may be due to the immune status and various stages of development of the parasite. MAP mediated immunological exhaustion and subsequent immunosuppression may be the reason for the flare-up of Cryptosporidiosis and oocysts shedding in adult goats. This joint infection may be of serious concern to human health, since oocyst may be a source of infection to human and cryptosporidiosis is a noted disease of zoonotic importance. Study suggested that there should be compulsory screening of adult goats suffering from other chronic and generalized disorders.

GH-17

An *Ex Ante* Assessment of Economic Gain From Eye Mucosa Based Targeted Selective Treatment Chart Against Haemonchosis in Goats

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Keywords- Hemonchosis, anemia, eye mucosa, anthelmintic resistance, TST chart, economic gain

ABSTRACT

Goat farming of rural India a significant livestock enterprise acting as the backbone of rural economy by making the resource poor farmers self-sufficient. Hemonchosis is well known to induce important economic losses in goat production in organized farms where anthelmintics are extensively used. The intestinal worm *Haemonchus contortus* is arguably the most economically important helminth parasite for small ruminant production and represents the primary constraint to profitable production of sheep and goats worldwide. Anaemia is the most prominent sign of hemonchosis along with development of “Bottle Jaw”. Anthelmintic resistance is of major concern in controlling hemonchosis and it has reached to an alarming level, thereby threatening the sustainability of goat production systems throughout the country. Targeted selective treatments are the treatment of only those animals that will most benefit from treatment, leaving the rest of the flock untreated thereby exploiting both epidemiologically appropriate treatment times and treat only those animals that require drug intervention. It’s based on the fact that, GI parasite populations in small ruminants are highly aggregated and over-dispersed within the host, with approximately 80% of the worms found in only 20–30% of the hosts, whilst the vast majority of hosts possess low worm burdens. Based on available literature it was aimed to develop and evaluate the field potential of an eye mucosa based Targeted Selective Treatment (sTST) strategy against haemonchosis in Indian Goats- PARACHEK. In the present study An *ex ante* assessment was done to calculate the economic gain from application of the technology under field conditions. It was assumed that only 40-45% of total goat population was under systemic treatment with 3-4 dosing with anthelmintic under current scenario. With the application of eye mucosa based PARACHEK card the treatment could be brought down to about 20% animals only and that too with a single dose in a year. Tentative monetary evaluation

revealed that nearly INR 185 crores could be saved annually alongwith a drastic reduction in the cost of anthelmintic treatment in the flock by the farmer. Additionally, the cost of veterinary intervention could also be reduced as the farmer could themselves evaluate and treat the animals. Further field evaluation would provide better picture on field adaptability and on farm economic gains with the TST based chart.

GH-18

Molecular Epidemiology of Rotavirus a in Caprine Population, India

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Keywords: epidemiology, rotavirus, caprine population, ruminants

ABSTRACT

Rotavirus A (RVA) is among the leading causes of viral gastroenteritis in humans and animals worldwide. In livestock, RVA causes severe enteric infection in young calves, piglets and foals. As per the group specific capsid protein VP6 gene, RVA is classified into nine species, namely A-I (RVA, RVB....RVI). Of them, three species (RVA, RVB, and RVC) have been described in small ruminants. RVA infection has been reported from all over the world but reports from India are very scanty, especially from caprine. In this report, we testify the prevalence of RVA in caprine and characterize major genes of caprine RVA. From July 2015 to June 2018, 180 samples were collected from caprine covering different states of India. Samples were screened for RVA infection using RT-PCR assay targeting the capsid protein VP6 gene. Major structural (VP6 and VP7), and non-structural (NSP4) genes were amplified, cloned and sequenced for genetic analysis using online software's. In the RT-PCR based diagnosis, RVA infection was seen in 30.5 % (55/180) of animals screened. A caprine isolates (K-98) from UP collected in the year 2015 was cloned and sequenced covering the major genes like VP6, VP7, and NSP4. Phylogenetic analysis revealed a closeness of caprine sequences to bovine and human isolates from India, Vietnam, China and Italian strains. The percent identity to human and bovine isolates ranged from 88.7 to 94.5% and 90.2 to 97.4% respectively. The findings confirm the presence of RVA infection in caprine population of India. Genetic relatedness to human and bovine isolates point towards the ongoing reassortments and recombination events among RVA isolates. Further, nation-wide surveillance programme is needed to understand the in-depth molecular epidemiology of RVA infection in small ruminant population.

GH-19

Health Management Practices of Goats Followed by Tribal Farmers in Rajasthan

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Keywords: Tribal farmers, goat, practices

ABSTRACT

The aim of present study was to assess the health management practice of goats followed by tribal farmers in Rajasthan. A total of 120 tribal goat farmers were selected from 12 villages from 6 blocks in 3 tribal dominated districts viz., Banswara, Dungarpur and Udaipur. Ten farmers from each village were selected purposively based on the number of goats. The selected goat farmers were grouped into three categories based on flock size as small (<25 goats, N= 60), medium (26-50 goats, N = 36) and large (>50 goats, N = 24). The floor space and other housing practices at the farmers flocks were recorded on-farm. The average flock size as small, medium and large categories of farmer was 22.63 ± 0.210 , 33.72 ± 1.05 and 58.54 ± 1.28 respectively. The overall proportion of milking goats, dry goats, goatlings, kids and bucks were 12.52 ± 0.31 (32.63%), 8.62 ± 0.30 (22.50%), 6.64 ± 0.27 (17.33%), 9.52 ± 0.29 (24.85%) and 0.79 ± 0.06 respectively. The major diseases reported by large number of respondents were various infestations (45 %), followed by FMD (25.83 %), digestive disorder (20 %) and viral disease like pneumonia (9.17 %). This could be due to the fact that the majority of farmers might have not followed good hygiene practices. Majority of farmers (59.67%) practiced disinfection of goat shed by application of lime on the walls or by plastering a mixture of mud and cow dung twice in a year. The remaining 40.83 per cent farmers did not do any disinfection. It was found that none of the tribal respondents were burying the dead animals while 22.50 % farmers disposed off in open area away from village and 77.50 % respondent give the dead body to the carcass collector. It was concluded that health management practices were mostly traditional without much regard to scientific recommendations. However, these management practices in general were better in case of small farmers as compared to medium and large farmers.

GH-20

A New Pen-Side Test for the Rapid Detection of PPR Virus in Field Conditions

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Keywords: PPR, IDrapid, pen-side

ABSTRACT

Peste des Petits Ruminants (PPR) affects goats and sheep primarily in Africa, the Middle East and India. It is caused by the Peste des Petits Ruminants Virus (PPRV), a species of the Morbillivirus genus. The disease is highly contagious, with approximately 80 percent mortality in acute disease. The ID Rapid[®] PPR Antigen is an immuno-chromatographic assay for the detection of all 4 lineages of the PPRV antigen in swabs. Results are obtained in less than 20 minutes. Ocular swabs were sampled from 70 goats and 6 sheep in a PPRV-free area without vaccination (France) and 22 ocular swabs sampled from animals infected with PPR virus having clinical signs when sampled, were tested with the ID Rapid[®] PPR Antigen. Results obtained were compared with RT-QPCR and the ID Screen[®] PPR Antigen capture ELISA. Analytical sensitivity was assessed by testing serial dilutions of inactivated PPRV and compared with commercially available lateral flow devices. All negative samples were found negative with ID Rapid[®] PPR antigen (specificity = 100%) and the two other techniques. All samples were found positive regardless of the technique tested, demonstrating the capacity of the pen-side test to identify PPRV infections (sensitivity = 100%). The ID Rapid[®] PPR Antigen has an equivalent sensitivity to the ID Screen[®] PPRV Antigen ELISA, and higher detection limit compared to other LFD. The ID Rapid[®] PPR Antigen has an excellent specificity, successfully detected all the PPR virus isolates, regardless of the genotype tested, and can be used in field conditions.

GH-21

Epidemiology And Diagnosis Of Brucellosis In Goats By Serological And Molecular Methods In Gujarat, India.

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Keywords: Epidemiology and Diagnosis, Brucellosis, Molecular, PCR

ABSTRACT

The present study reports the diagnosis of Brucella infection in goats using serological, molecular and isolation methods. Out of 1994 sera screened for presence of brucella antibodies by i-ELISA in goats, 134 (6.72 %) were found positive. Serologically detection brucella antibodies were further analysed based regionwise, breedwise, sexwise, clinical statuswise. Further the study was expanded to screen the clinical samples viz., vaginal swabs, vaginal discharge, placenta, hygroma fluid, cotyledons, orchitis fluid, fetal stomach contents, fetal lung, fetal heart blood , serum of seropositive animals and semen for detection of Brucella organisms. These samples were collected from goats showing the symptoms or having the history suggestive of brucellosis and processed for extraction of DNA followed by detection of Brucella using genus specific PCR using the B4/B5 primers as reported by Bailey et al (1992) and SYBR green based realtime PCR. The samples which detected positive for presence of Brucella were further screened for confirmation of species of brucella by species specific PCR based on Omp 31 PCR and bruce ladder multiplex PCR. Out of 365 samples screened 13 samples (Vaginal discharge-5, placenta -04, Fetal stomach contents -02 , fetal heart blood-1 detected positive for brucella, which were identified as *Brucella melitensis*.

GH-22

**Molecular Identification and Investigation of Contagious Ecthyma (Orf)
Outbreak in Goat of A & N Islands- A First Report**

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Keywords: Contagious ecthyma (orf), Goat, Andaman, Nested PCR

ABSTRACT

Goat constitutes almost 42.1 % of the total livestock population of the Andaman & Nicobar Islands. Generally the livestock of A & N Islands are free from many dreaded diseases which are prevalent in mainland, India. Orf (*contagious pustular dermatitis or contagious ecthyma*) is one of the most widespread, benign or contagious, communicable, zoonotic, economically important viral diseases caused by parapox virus of the subfamily Chordopoxvirinae, family Poxviridae. The disease is transmitted through direct contact and through contaminated materials. The disease is prevalent in worldwide and morbidity is very high usually ranges from 70-85 % causing huge economic losses. In India, this disease has been reported from many areas, however, so far no outbreak or any confirmed cases of the orf has been reported from this Islands. In the present study detail study has been carried out to study the outbreak of orf during different season and confirmation by PCR assay. The outbreak occurred during the year 2017 in Andaman local goats in various villages of South Andaman. Animals of all ages were affected and showed the typical lesions of contagious ecthyma. A total of 10 outbreaks were reported affecting 171 goats. The disease mainly observed in the month of August, September, October and February; the drier period of the season. Highest cases were observed in the month of September from the Middle Andaman zone. The clinical symptoms observed were mainly erythematous spots or swellings followed by formation of papules and then scab in and around the mouth, gums, inner thigh. The morbidity of the disease was found to be more than 75%. However mortality was less than 5%. The attack rate in the population was found to be 27.8 %. The scab samples from the affected goats were collected and processed for extraction of viral

DNA. Major envelope membrane glycoprotein (B2L) gene of the orf virus was targeted using PCR assay. A set of three primers pair in a semi nested PCR format was used. Nested PCR assay was done by using the forward and reverse primers of parapox virus. The analysis of the semi nested PCR revealed the confirmation of the Orf virus in the scab samples. The product size was approximately 235 bp in all the positive samples. The results revealed the confirmation of the outbreak of Contagious ecthyma (orf) virus in the goats of Andaman & Nicobar Islands for the first time. The present confirmative diagnosis of Orf is the first of its kind of molecular detection and confirmation of outbreak of CE from Andamans. However, detail study is required to establish the epidemiology and virus lineage.

GH-23

Serological Investigation of Some Important RNA Viruses Affecting Goats in A & N Islands

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Keywords: A & N Islands, Bluetongue, Goat, PPR, Sero-prevalence

ABSTRACT

Bluetongue (BT) and *Peste des petits ruminants* (PPR) are considered as the important diseases of goats in India and other parts of the worlds. Bluetongue is infectious, non-contagious, arthropod borne viral disease caused due to Orbivirus. The disease is of most importance in sheep, however infection in cattle and goats is often inapparent. This is listed in the OIE list A diseases and is characterized by odema, fever, ulceration of gums and lameness. PPR is highly contagious disease of small ruminants caused by morbillivirus belonging to genus paramyxoviridae. The disease is mainly manifested by muco-purulent, nasal and ocular discharge, enteritis, stomatitis and pneumonia. Both bluetongue and PPR are endemic in India and every year a number of outbreaks have been reported from different parts of the country. In A& N Islands no clinical cases of PPR and BT have been reported from livestock earlier. The livestock and poultry of Andaman and Nicobar group of islands are generally free from many of the important diseases which are usually prevalent in mainland, India. However, continuous monitoring and surveillance is very much important to study the incidence and prevalence of important diseases and the threat of occurrence of emerging and exotic diseases of goats. In the present study the sero-monitoring of goat sera samples were done from different parts of the A & N Islands during the last three year. A total of 527 sera samples were screened for presence of bluetongue virus antibodies and 1074 samples were screened for presence of PPR antibodies by standard ELISA test. Based on the results of the ELISA test, it is confirmed that there is high sero-prevalence of bluetongue virus antibodies (76.28%) and PPR virus antibodies (37.98%) in

the goat population of A & N Islands. Highest prevalence of BT was found in South Andaman district (82.19 %) compared to North & Middle Andaman district (70.25%). The trend of the sero-prevalence of bluetongue for the last two years indicated that all the teshils of the A & N Islands showed very high prevalence rate. However there is a slight reduction of 2.45 % of the total prevalence rate compared to the previous year. None of the sero-positive goats showed any clinical symptoms of bluetongue. The bluetongue virus is an arthropod vector born disease and can only be transmitted through the culicoides spp. The high prevalence of antibodies in the blood sera of goats suggests that there may be presence of Culicoides vector and virus is in circulation. Till date, no clinical case of bluetongue has been found from this island. However, presence of high level of bluetongue virus antibodies in the goat sera samples indicates the presence of bluetongue virus in the islands. The sero-prevalence of bluetongue as well as PPR in goat is a serious concern. No clinical cases of bluetongue and PPR have been observed in the goat. Based on the sero-positivity of bluetongue virus and PPR virus, it is inferred that the Bluetongue virus and PPR are in circulation in the goat population of A& N Islands. Therefore, studies on identification of the Culicoides vector and detail studies are suggested to establish the epidemiology and confirmation of virus circulation.

GH-24

Multidrug Resistant Pattern of *Escherichia coli* Obtained From Clinical Settings Of Goat

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Keywords- Multidrug resistance, *Escherichia coli*, Clinical settings and Goat

ABSTRACT

Escherichia coli- a commensal or opportunistic pathogen is associated with various clinical conditions in host animal like GI and respiratory tract infections, UTIs, mastitis, colibacillosis besides being carrier of zoonotic diseases. It encodes several virulent properties and unique adaptability to acquire AMR and has well established antimicrobial resistant gene profiles- making it “model organism” to study the multi drug resistant pattern. The present study was designed to screen resistance pattern of *E. coli* specifically with its association in various goat ailments. Therefore, out of the total 82 genotypic confirmed isolates of goats, the twelve isolates were screened with 61 antibiotics of various available groups. All isolates were 100% resistant to faropenem, cefpodoxime, cefotaxime-clavulanate, ceftazidime-clavulanate and cefotaxime while more than 90% resistance was observed for ampicillin, cephalothin, cefipime, cefdinir and cefonicid. Almost all isolates were multi- drug resistant. Eleven (91.66%) and ten (83.33%) of the twelve isolates were found sensitive towards fosfomycin and chloramphenicol, respectively. Isolates showed low and intermediate level of susceptibility towards rest of the antibiotics. None of the isolate was found 100% sensitive towards any of the antibiotic used. Aggregate score of resistance towards antibiotic for all the isolates were 366 while multiple antibiotic resistance (MAR) value came out to be 0.5. The high MAR value indicated the risk of isolates as a potential source of spread of multi drug resistance. The unravelling of genes responsible for antibiotic resistance would be of immense significance in formulation of database and strategy to curb the menace of widespread antibacterial resistance in *E. coli*.

GH-25

Prevalence and Economic Impact of Gastro-Intestinal Parasites of Indigenous Goat in Andaman and Nicobar Islands

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Key Words: Goat, internal parasites, monthly variation, Andaman and Nicobar Islands

ABSTRACT

A study was conducted to assess the prevalence and economic impact of gastro-intestinal parasites of goat in Andaman and Nicobar Islands in different months. A total of 148 faecal samples of goat were collected and screened from South Andaman to evaluate the quantum of parasitic infection. By coproscopy four types of nematode ova (*Trichostrongyles*, *Strongyloides*, *Nematodirus* and *Trichuris*) and eimerian oocysts were detected. The highest eggs per gram of faeces (EPG) of strongyles were seen in the month of October and the lowest EPG for this group of worm was seen in the month of December whereas, egg count of *Strongyloides* was the maximum in the month of September followed by the month of October, January, December and November. The mean EPG of *Nematodirus* and *Trichuris* ranged between 0 to 2.60 ± 1.8 and 0 to 0.65 ± 0.65 , respectively. So far, the eimerian oocyst count was concerned having the highest oocysts per gram of faeces (OPG) was seen in the month of November and the lowest OPG was recorded in the month of January. A total of four species of eimerian oocysts were identified on the basis of shape index of *Eimeria* oocyst and the species were *E. arloingi*, *E. parva*, *E. pallida* and *E. faurei*.

GH-26

Dystocia Due to Single Fetus and Its Successful Per-Vaginal Delivery in Non-Descript Goat: A Case Report

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Keywords: dystocia, delivery, fetus

ABSTRACT

A non-descript female goat of about 2½ year aged on her second parity brought to Veterinary Clinical Complex, PGIVER, Jaipur, Rajasthan with the history of labour pain since last 12- 15 hrs. First water bag was ruptured after 4 to 6 hrs of straining. The feed and water intake were reduced remarkably since the labour started. Per-vaginal examination revealed the fully dilated birth canal having sufficient lubrication. The fetus was in anterior presentation with a downward deviation of head and neck along with flexed fore limbs. After thorough visual and per-vaginal clinical examination the case was diagnosed as dystocia because the progression of kidding was stopped as abdominal staining was almost nill at the time of examination. Correction of deviated head and neck was done by lifting both jaws dorsally where space was comparatively more. The alignment of fetal head and neck was done after the application of one finger in the inner canthus of left eye-socket of the fetus; subsequently, gentle traction was applied for the removal of fetal head out side the birth canal. Furtherly, both fore limbs were extracted out after the extension applying fingers in the palpable joints of the fetus. A gentle traction was given to the fetus after tying both fore limbs with obstetrical snair and inserting the finger the inner canthus of both eyes, resulting into the delivery of a single dead female fetus having 2.250 kg weight. The length of the fetus and hind limb were 44.3 cm and 21.4 cm respectively. The length of fore limb was 22.2 cm. The distance between highest points of head was 8.6 cm. The dam was uneventfully recovered after giving the supportive therapy for four consecutive days, as per owner reports.

GH-27

Antimicrobial Resistance Of Certain Bacterial Species Obtained From Lambs Naturally Died Due To Septicemia And Pneumonia

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Keywords: Antimicrobial resistance, Lambs, Pneumonia, Septicemia

ABSTRACT

Pneumonia and septicemia in sheep are the most commonly occurring diseases caused by multiple etiological agents, results in high lamb mortality and significant economic losses. The bacterial etiological agents have drawn attention due to variable clinical manifestations, severity of diseases, and re-emergence of strains resistant to a number of chemotherapeutic agents. The present study was conducted to know antimicrobial resistance of various bacterial species isolated and identified from naturally died lambs due to pneumonia and septicemia. During necropsy, tissue sample of lungs and heart blood were collected for microbiology from 64 lambs died due to pneumonia and septicemia. The affected portions of major organs such as lungs, liver, heart, kidney and spleen were collected in 10 % neutral buffer formalin for histopathology. Antibiotic sensitivity was conducted by Kirby Bauer method using 24 antibiotic discs and Muller Hinton agar plates. Using the reference table size of zone, results were recorded as whether the organism is susceptible (S), intermediately susceptible (I), or resistant (R) to a particular antibiotic. Histologically, the lung affections in lambs were classified as acute interstitial pneumonia (n=7), acute fibrinous bronchopneumonia (n=9), chronic fibrinous bronchopneumonia (n= 5), suppurative broncho pneumonia (n= 8). The septicemia and mixed lesions of pneumonia and septicemia were observed in 16 and 19 lambs respectively. On bacterial culture, 20 bacterial species consisting of *Alcaligenes faecalis*, *Proteus mirabilis*, *Enterobacter aerogenes*, *Morganella morganii*, *Brevundimonas nejansanesis*, *Acinetobacter indicus*, *Kocuria sp.*, *Brevibacterium sp.*, *Streptococcus pasteurianus*, *Enterococcus sp.*, *Escherichia coli*, *Shigella sp.*, and *Escherichia fergusonii* were isolated and identified by cultural characteristic, biochemical test, 16s rRNA PCR sequencing and NCBI blast analysis. Antibiotic susceptibility test conducted for these isolates revealed 25% to 75% resistance to commonly used antibiotics. The results of the present study indicated that bacterial species isolated from the pneumonic and septicemic lambs were found to be resistant to several commonly used antibiotics in the prevention and treatment of diseases. In view of the clinical and public health importance, the present findings warrant development of multi drug resistance of the organisms to the major antimicrobials.

GH-28

A Brief Overview On Contagious Ecthyma In Goat

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Keywords: ecthyma, viral infection, breeders, breeding, mortality

ABSTRACT

Contagious ecthyma is an infectious viral zoonotic disease of sheep and goats that affects primarily the lips of young animals. The disease is usually more severe in goats than in sheep; it is marked by an increase in incidence and severity if not controlled among small ruminant herds. Primary orf lesions are the most severe with a clinical progression of erythematous macule, papule, vesicle, pustule and scab formation in and around mouth and nostrils. Though the disease is self-limiting, secondary bacterial infections lead to cause complications that may lead to mortality. People are occasionally affected through direct contact. This review of present disease helps in the effective and systemic management of the disease leading to reduce economic losses to a great extent to the animal breeders.

GH-29

Antibiotic Efficacy Evaluation Against Bacterial Pathogens Obtained from Mastitic Milk of Goats

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Keywords: Antibiotic Efficacy, Mastitic Milk and Goats

ABSTRACT

The present study was designed to evaluate the *in-vitro* and *in-vivo* efficacy of routinely used antibiotics with special reference of mastitic milk of goats. For this study, total sixteen mastitis positive goats were sampled and randomly divided into 2 groups, having 8 animals in each group. In microbiological screening, total 21 gram positive and gram negative bacterial isolates were obtained and examined against twelve commonly used antibiotics. The *in-vitro* antibiotic sensitivity pattern revealed that more than 90.0% isolates were sensitive to ceftriaxone-tazobactam, ciprofloxacin, cefoperazone, enrofloxacin and gentamicin while most of isolates were resistant to lincomycin, colistin and cloxacillin. The *in-vivo* antibiotic evaluation was carried out for two antibiotic combinations such as ceftriaxone -tazobactam and amoxicillin-sulbactam. Out of those ceftriaxone –tazobactam was more effective in comparison to amoxicillin- sulbactam.

GH-30

Studies on Prevalence of Potential Bacterial Pathogens of Clinical Mastitis in Goats (*Capra hircus*)

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Keywords: Clinical mastitis, *Capra hircus* and Bacterial Pathogens

ABSTRACT

Goats are very important small ruminant species of livestock in India mainly due to their unique ability of short generation intervals, higher rates of prolificacy and sustainability on sparse forage and extreme climatic conditions. Goat milk is particularly valuable because it's nutritional value, similarity with human milk and easy to digest in comparison to cow milk. Mastitis is the most frequently encountered disease leading to reduced milk yield, increased treatment costs and increased culling rates, hence it is very important to determine the causative agents of clinical mastitis in goats. The present study was designed to find prevalence of bacterial pathogens associated with clinical mastitis of goats. Total sixteen mastitis affected goats were examined and after confirmation by clinical signs and California Mastitis Test, the samples were taken from confirmed cases. It was found that gram positive organisms were more prevalent in comparison of gram negative coli-forms. Out of the total gram positives, *Staphylococcus* spp. were most prevalent with 33.33% occurrence, followed by *Streptococcus* spp. (23.81%) and *Bacillus* spp. (14.29%) while gram negative such as *E. coli* and *Klebsiella* spp. were observed as 19.05%, and 9.62%, respectively. The all organisms were confirmed by various biochemical and phenotypic test. The study further suggests the genotypic characterization of detected organisms.

GH-31

Contagious Ovine Digital Dermatitis (CODD) in an Organized Sheep Farm under Temperate Climate

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Keywords: Sheep, CODD, Disease, Lameness, Treatment

ABSTRACT

Diseases, restricting the movement of sheep for grazing cause significant loss in production; in addition to increased burden on resources to contain or treat such infections. In any organized sheep farm, the chances of introduction of such diseases are minimized with strict quarantine, restricted movement of persons and animals from outside and better hygienic conditions. However, sometime unforeseen fomites like shearing machine can also introduce infections into the farm, appears to have direct connection with an outbreak of Contagious Ovine Digital Dermatitis (CODD) recorded in this sheep farm for the first time. Adult sheep flock of both male (n=59) and females (n=209) of germplasm having 75% of exotic blood (Merino and Rambouillet) were subjected to machine shearing, from external source, during the month of May, 2018. The symptoms of CODD appeared in 10 ewes 7-8days post shearing with initial signs of limping and painful toe in any single limb and no apparent damage to affected hoof. These animals did not respond to routine treatment with analgesics. After 5th day of initial signs, animals exhibited marked symptoms in the form of severe lameness, constant lifting of affected limb/foot and appearance of cracks/ separation of hoof horn near coronary band. The overall incidence of the disease in sheep flocks was 18.3% while in male and female flocks was 20.3 and 17.7%, respectively. Young (aged 4-5months) flock maintained in the same premises and not subjected to shearing did not show any symptom of the disease. Frequency of limbs affected as single limb, two limbs or three limbs with the disease was 71.4, 20.4 and 8.2%, respectively. All the four limbs were not affected in any of the animals. The affected animals were administered parenteral oxytetracycline and NSAID, daily, continuously for 5days. In addition, the affected limbs were dipped in 10% copper sulphate solution for 1 minute daily for 7 days. About 98% of the animals recovered within five days of treatment. While one had complication with maggots

after initial recovery and took about a month to recover fully. Two animals had relapse of infection after 14 and 28days of recovery and involved toes previously not affected. There was no permanent damage to the toe(s) in any of the affected animal and no mortality was recorded due to CODD. Therefore, CODD can be managed effectively with timely diagnosis and proper treatment.

GH-32

Genetic Analysis of PPRV Strains Recently Circulating in Rajasthan, India

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Keywords: Peste des petits ruminants virus (PPRV), Phylogenetic analysis, Mutation

ABSTRACT

The study was undertaken to comprehensively analyse genetic changes in peste des petits ruminants virus (PPRV) currently circulating in Rajasthan. Twenty suspected PPR outbreaks (during 2017-18) from all across the state were followed. The PPRV strains from 9 different districts (Bikaner, Barmer, Chittoregarh, Dausa, Dholpur, Hanumangarh-Nohar, Hanumangarh-Gharsana, Tonk & Udaipur) and were subjected for sequences analysis of Nucleocapsid (N), Matrix (M) and Fusion (F) genes. Upon, Maximum likelihood phylogenetic analysis, all PPRV isolates from Rajasthan belonged to lineage IV and closely related to some Indian strains, followed by their close similarity with China, Tibet and Bangladesh. The sequence analysis revealed unique amino acid substitutions in deduced N, M and F gene proteins. Notable mutation (R105K) was observed at cleavage site of fusion proteins in PPRV/Dausa. The N, M and F gene showed a substitution rate of 1.36×10^{-3} , 6.76×10^{-4} , 9.039×10^{-4} substitutions/site/year respectively. The time scaled Bayesian analysis predicted evolution of these PPRV strains (Rajasthan) nearly in first decade of 21st century and PPRV/Dausa seemed to be oldest among them. The Bayesian Skyline Plot (BSP) for N and F gene showed steady genetic diversity until late 1990s followed by increase till first decade of the 21st century and again a declining trend since 2017, though M gene did not indicate any genetic diversity. The selection pressure analysis revealed dn/ds ratio for all three genes <1 indicating a negative selection pressure on these selected genes of PPRV.

GH-33

Insights into the Molecular Evolution of PPR Virus

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Keywords: Peste des petits ruminant's virus (PPRV), phylogenetic analysis, mutation

ABSTRACT

Peste des petites ruminants (PPR) has emerged as an important disease posing most serious health challenges small ruminants industry. PPR virus (PPRV) infection leads to an acute contagious disease resulting in high morbidity and mortality, thereby causing huge economic losses. For understanding the virus evolution, this study was planned to estimate substitution rates and selection pressure among all four genetic lineages of the PPRV. A Bayesian maximum clade credibility (MCC) phylogenetic tree was constructed where it was observed that the youngest sequence (Indian origin) started drifting 8 years ago. The dN/dS ratio was estimated to be 1.2794 which implies that there has been more non-synonymous changes than synonymous thereby evolutionary pressure has caused virus to escape from the ancestral state. Among non-synonymous changes in amino acids, the most prominent across all lineages was Serine to Proline. Among the limited morbillivirus sequences available in the public domain, one of the recently isolated Indian PPRV strain appears to drift towards rinderpest virus (maximum likelihood approach).

GH-34

The Pattern of System Wise Morbidity in Malpura Sheep of Field Flocks

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Keywords: Malpura sheep, Farm field, Morbidity

ABSTRACT

Malpura is the one of the important sheep breed of Rajasthan, found mainly in Tonk, Sawai-Madhopur and Jaipur districts of Rajasthan. A study on incidence of common infectious and metabolic disease in Malpura sheep was conducted in 21 villages that covered 63 adopted farmer's flocks of Malpura unit under the mega sheep seed project (MSSP). The study period was 1 year starting from 01 April 2017 to 31 March 2018. The total number of animal covered was 5080 and the average flock size was 81 animals per flock. Health records for various age groups were recorded in field treatment registers maintained under project. The analysis of the data is based on treatment of 17164 cases. The major health problem in sheep across the year was pneumonia, diarrhea, footrot and lamb tympani. It was observed that across the coverage of adopted flocks, incidence of disease had a common trend. During the winter season (December to March), major health hazard was pneumonia. This occurred mainly due to infection in neonatal phase. Newborns are generally affected in winter season due to low temperatures, which causes hypothermia and later gets converted to pneumonia. Adult animals were also prone to pneumonia during this season. In summer (April to July), Diarrhea and Tympani were common. Lambs which were found with symptoms of pica usually lead to entry of infectious agents in the digestive system. The suckling lambs having calcium and phosphorus deficiency licks the soil, resulting in tympani. During rainy (August to November) season maximum incidence of footrot and diarrhea was observed. The stagnated water in villages usually lead to occurrence of these conditions. In rainy season hooves gets soft and lead to infection of *Fuzobacterium necrophorium* The seasonal diarrhea (Green diarrhea) occurs in rainy season due to increased water content in vegetation (> 80%), which is temporary in nature. The system wise morbidity pattern was, digestive system (64.36 %), respiratory system (17.99%), reproductive system (0.33%) and circulatory system (0.32%).

GH-35

Comprehensive Survey on Worm Management Practices Adopted by Goat Farmers in Kerala

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Keywords: Goat farmers, Gastrointestinal parasitism, Awareness

ABSTRACT

Gastrointestinal parasitism is a major impediment of goat farming in Kerala. The declining efficacy of anthelmintics due to exponential rise in anthelmintic resistance is a threat for goat husbandry. A questionnaire survey was conducted among 100 goat farmers span over 13 agro-climatic zones of Kerala. The objectives of the study were (i) to study worm management practices adopted by the goat farmers and (ii) to understand the lacunae in awareness among the goat farmers regarding the parasite control. Most of farmers(76%)solely dependedeither on their own experience or the advice of the chemist for the selection of anthelmintic. Generally farmers (73%) adopted anthelmintic treatment as a main remedy for all ailments. The criteria used for dose determination were found defective (84%). Goat farmers who were enrolled in ICAR-AICRP on goat improvement (Malabari) scheme had significantly higher (85%) knowledge level regardingparasitic control compared to other farmers (26.2%). Present study indicated lack of awareness among goat farmers with respect to novel parasite management strategies. There is an urgent need to disseminate awareness among goat farmers on parasitic control.

GH-36

Evaluation of a Multiplex PCR for Simultaneous Detection of *Bibersteinia trehalosi*, *Mannheimia Haemolytica* and *Pasteurella Multocida* from Culture and Tissues

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Keywords: *Bibersteinia trehalosi*, *Mannheimia haemolytica*, Multiplex PCR, Sheep, *Pasteurella multocida*,

ABSTRACT

Bibersteinia trehalosi, *Mannheimia haemolytica* and *Pasteurella multocida*, are three bacterial pathogens closely associated with the pasteurellosis in small ruminants including sheep and goats. In the current study, a multiplex PCR for the simultaneous detection of these three bacteria in cultures was established. The superoxide dismutase (*sodA*) gene of *B. trehalosi*, O-sialo glycoprotein endopeptidase (*gcp*) gene of *M. haemolytica* and *KMT1* gene of *P. multocida* were chosen as the targets of the multiplex PCR established in the current study. After serial optimisation, the detection limit of the method for the genomic DNA of the three bacteria was around 10 pg of genomic DNA. The method could detect the genomic DNA of these three bacteria but not the genomic DNA of several other bacterial strains. The multiplex PCR could precisely detect bacteria from artificially contaminated ovine tissues, which suggested the practicability and efficiency of the method in detecting the three bacteria from clinical specimens. The specificity of the PCR products was confirmed by sequencing of the amplified products that showed 98–100 % homology with the published sequences available in the NCBI database. The developed assay significantly improves rapid detection of bacterial pathogen involved and could supersede bacteriological culture for microbiological and epidemiological diagnosis of pasteurellosis. In conclusion, this optimized multiplex PCR assay could specifically and sensitively detect and differentiate *B. trehalosi*, *M. haemolytica* and *P. multocida* in cultures and could also be used for detecting these three bacteria in clinical samples.

GH-37

Uterine Torsion in Goat: A Discussion

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Keywords: Uterine torsion. Goats, Dystocia

ABSTRACT

A case of goat of 25 months of age in her second parity was reported in VCC, PGIVER, jaipur with the history of full term gestation with continuous straining without any progression of birth. There was no appearance of the water bag or vaginal discharge. Clinical and per-vaginal examination revealed that there was right side uterine torsion of approximately 180°. The cervix could not be palpable through vaginal examination. The case was diagnosed as right side post cervical uterine torsion. The torsion was detorted by rolling of the dam after the medicinal correction of the dehydration status of the animal. After two successful rolling the relieving of the torsion was confirmed by per-vaginal examination the fully dilated cervix could be palpated and two dead fetuses were extacted out with little obstetrical traction with small blunt eye hook. Animal was recovered uneventfully with the treatment of antibiotics, anti-inflammatory, anti-histaminic and ecobolic drugs within three days of treatment.

GH-38

Bacteriological Quality of Raw Chevron of Black Bengal Goat Retailed in Different Markets in Tripura

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Keywords: Chevron, Contamination, TVC, E. coli, Public health, Antibiogram, Resistance.

ABSTRACT

The Black Bengal goat is highly prolific, resistant to diseases and famous for its high quality meat. There is a great demand for chevon in Tripura as the majority of the population consumes meat. Retailing unprocessed raw meat in the street or in public places is common in Tripura. In Tripura, the meat sector is one of the poorly organized sectors and meats are mainly processed by traditional methods as there is no organized slaughter house. Traditional methods of processing of chevon under poor personal hygiene and sanitation results in microbial as well as gross contamination of chevon. The unhygienic methods of slaughtering and processing of chevon often make the surrounding environment favorable to the growth of many hazardous microorganisms thereby reducing its quality. A preliminary study has been undertaken to reveal the bacterial load and antibiotic sensitivity pattern of isolated organisms from chevon in Tripura. A total of 120 raw chevon samples of Black Bengal goats were collected from different retail markets of Tripura and were subjected to Total Viable Count, Coliform Count, isolation and identification, and antibiogram of the isolated microbes. The overall mean Total Viable Count was $6.842 \pm 0.032 \log_{10} \text{ cfu/g}$ and coliform count was $4.975 \pm 0.023 \log_{10} \text{ cfu/g}$. The chevon samples were predominantly contaminated with *E. coli* (37.28%), followed by *Bacillus cereus* (29.75%) and *Proteus* spp (17.67%). All the isolates were resistant to Oxytetracycline, Amoxycillin, Enrofloxacin, Ampicillin, and Metronidazole. The present study emphasized that the microbial quality of raw chevon was poor and may act as a potential source of public health hazards in near future in Tripura.

GH-39

Development and Standardization of visual onsite Loop Mediated Isothermal Amplification (vLAMP) for specific Diagnosis of Johne's Disease

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Keywords: *Mycobacterium avium* subspecies *paratuberculosis* (MAP), vLAMPPCR, Johne's disease (JD)

ABSTRACT

Mycobacterium avium subspecies *paratuberculosis* (MAP), causative agent of Johne's disease (JD) is a chronic granulomatous enteritis affecting domestic and wild ruminants. Since, MAP is not killed by pasteurization hence, it has been isolated from commercially pasteurized milk and milk products resulting exposure of human population to this pathogen through milk. Control and eradication of JD is considered difficult because of its insidious nature and lack of early, rapid and accurate diagnostic tests. Therefore in our study, a visual loop-mediated isothermal amplification (vLAMP) assay, a new gene amplification method has been developed which is specific, simple to perform and easy to be read by naked eyes and does not require sophisticated laboratory support. A total of six primers including 2 outer (F3 and B3), 2 inner (FIP and BIP) and 2 loop (LF and LB) primers specific for MAP were commercially procured to standardize the test primers first time on 'S 5' strain of *Mycobacterium avium* subsp. *paratuberculosis* 'Indian Bison type' biotype. After laboratory standardization, final optimized reaction performed at 65°C for 45 min was achieved after titration of incubation time, temperature conditions and the reporter dye calcein. To optimize the sensitivity and specificity of the vLAMP assay, the results of vLAMP assay were compared to traditional IS900PCR. The sensitivity of vLAMP assay was 10 fg and the specificity was 100% with respect to traditional IS900 PCR. The amplification was visualized by the presence of visible orange colour in MAP positive samples which reduced the performance time and need of sophisticated equipment for electrophoresis. vLAMP assay has high sensitivity & specificity over traditional PCR methods. Hence, we conclude that the vLAMP assay is user friendly, cost effective, rapid, simple, and can be performed in field by non-skilled persons in low facility laboratory settings where resources are limited mainly in developing countries like India.

GH-40

**Bio-Load and Bio-Type Profile of *Mycobacterium avium* Subspecies
Paratuberculosis in Raw Milk Samples of Goats Endemically Infected with
Johne's Disease**

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Keywords: *Mycobacterium avium* subspecies *paratuberculosis*, Milk, Indigenous plate ELISA kit, Dot- ELISA, Latex Agglutination test, Indirect Fluorescent Antibody test, IS900 PCR, Genotyping

ABSTRACT

Raw milk samples of 465 lactating goats from farm and farmer's herds located in North India were screened to estimate bio-load of *Mycobacterium avium* subspecies *paratuberculosis* (MAP) using six tests. Of 465 milk samples screened, bio-load of MAP ranged from 13.9 to 48.8% using 3 antigen detection tests (48.8% in i_FAT, 46.6% in microscopy and 13.9% in IS900 PCR). Bio-load was 39.1, 57.4 and 55.6% in i_ELISA, d_ELISA and LAT (antibody detection tests), respectively. Results showed that of six tests, five (d_ELISA, LAT, i_ELISA, microscopy, i_FAT) were comparable. Bio-typing of representative IS900 PCR positive milk samples using IS1311 PCR_REA, 72.3% (47/65) were bio-typed as 'Indian Bison Type' and rest of the samples could not be typed. Results indicated that minus IS900 PCR, five tests were comparable, bio-load of MAP was high (39.1 to 57.4%), and 'Indian Bison Type' was major bio-type of MAP in lactating goats. Similar findings have also been reported from other livestock species, in this region of the country. Milk was convenient sample to collect and process in. First time in our studies whole milk was used directly as 'test sample'. Presence of live bacilli on representative milk samples pose major threat to human health. Alarming high bio-load of MAP in milk samples of goatherds located in North India calls for urgent initiatives for the control of Johne's disease so as to prevent human infection. This is first study wherein six tests were used to estimate bio-load of MAP in the country.

GH-41

Immuno-proteomic analysis of secretory proteins of novel 'Indian Bison Type' biotype strain 'S 5' of *Mycobacterium avium* subspecies *paratuberculosis* and significance in diagnosis of Caprine Johne's Disease

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Keywords: *Mycobacterium avium* subspecies *paratuberculosis*, Secretory proteins, SDS-PAGE, Immunoblotting, Indirect ELISA.

ABSTRACT

Johne's disease caused by *Mycobacterium avium* subspecies *paratuberculosis* has negative impact on livestock productivity world-wide and is responsible for huge economic losses to the farmers, in terms of reduced milk and meat production, early culling and persistence of infection in animal herds. Despite global research efforts to control this disease, diagnosis is still a major challenge world wide. Due to chronic nature and four different stages of disease (silent to advance stages). Diagnostic potential of imported commercial ELISA kits using antigens not based on or related to our native strains, is uncertain and poorly sensitive.

Study uses naturally secreted proteins of indigenous strain ('S 5') as 'potential biomarker' for the diagnosis of Johne's disease in goats. Harvested secretory proteins were analysed by SDS gel electrophoresis. 1D and 2D Immuno-blotting, showed reactivity in six secretory proteins (28, 31, 34, 38, 45 and 56 kDa) were consistently recognized using polyclonal rabbit anti-sera in the MAP growth harvested at 4-12 weeks. In addition, four secretory proteins (17, 19, 47 and 65 kDa) appeared only in early growth period of MAP (4 to 6 weeks). Diagnostic sensitivity and specificity of secretory proteins were evaluated by Indirect ELISA and compared with fecal culture and/or PCR and i-ELISA in the 132 goat serum samples. Using 4 to 6 weeks secretory proteins as antigens, there was 8.5 to 13.5% increase in specificity as compared with whole cell sonicated semi-purified protoplasmic antigen (sPPA). We concluded that indigenously developed ELISA using early secretory proteins of novel native strain ('S 5') being more specific may serve as the backbone of future control programs in the country, instead of traditionally used i_ELISA test. Besides, indigenous ELISA are sensitive and cost effective as compared to imported commercial ELISA kits.

GH-42

Isolation and Biochemical Characterization of Antibiotic Resistant Microorganisms From Fecal Samples of Goats in Rajasthan Region

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Keywords: Goat, Antibiotics resistance, Biochemical characterization.

ABSTRACT

Goats have been associated with humans since ages and are a source of living for a large group of people as they are food-producing animals or food of animal origin. Hence, their health conditions directly affect the people around them. In India the infectious disease burden is among the highest in the cattle and recent report showed the inappropriate and irrational use of antimicrobial agents against these diseases, which led to increase in development of antimicrobial resistance.

The aim of the study was to isolate and enumerate antibiotic resistant colonies from different fecal samples, to identify antibiotic-resistant bacterial strains and to determine the most effective antibiotic amongst those under consideration. For the isolation of bacteria, approximately 60 fecal samples were collected from different regions of Rajasthan. Seven antibiotics were taken with different working concentration under consideration namely: Nalidixic acid, Streptomycin, Vancomycin, Erythromycin, Chloramphenicol, Ampicillin and Kanamycin. The antibiotic resistant bacterial colonies were isolated by agar pour plating method. For characterization of resistance bacterial species gram staining, colony characterization and IMVIC biochemical tests were performed. Bacterial species have shown variable susceptibility and resistance in response to above antibiotics under consideration.

GH-43

A comprehensive review of herbal and medicinal plants as futuristic model for the therapeutic management of mycobacterial infections with special reference to paraTB infection of caprine populations and human beings

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Keywords: Mycobacterial infections, MAP, Caprine

ABSTRACT

Mycobacterial infections have been associated with several peripheral and central nervous system disorders and complications both in animals and human beings such as Johne's disease (JD), Crohn's disease (CD), Diabetes type I & II, Thyroiditis, Rheumatoid arthritis, Parkinson's disease, etc. One such mycobacterium species is *Mycobacterium avium subsp. paratuberculosis* (MAP) which causes Johne's disease (JD) in ruminants and can also be transmitted to human beings through consumption of milk and milk products made from pasteurized milk of the infected animals. MAP has been reported to be incurable in both animals and human beings. Several drugs have been developed and are in use especially in case of TB, however, their effect is limited due to the emergence of multi, extremely and totally drug resistant cases of TB. Traditionally, several plants and their products are known to possess antimycobacterial activity and have been found useful in the management of mycobacterial associated infections in clinical and preclinical studies/practice. Herbal medicines: contain different functional groups, have limited or no bacterial resistance against these compounds, do not have any side effects and besides humans can be used in animals too as they do not pose any risk of entering food chain.

This concept paper proposes a comprehensive review on the applications of herbal medicines in the management of mycobacterial disorders especially with reference to MAP where no such study has been undertaken so far. We propose to identify anti-mycobacterial activity of plants and propose to use them in future. A systematic approach was made to search published manuscripts in Pubmed and Scopus upto August 2018 with key words "Mycobacteria" and "Plant". Traditionally, several plants have been reported to possess anti-mycobacterial activity e.g., *Aloevera*, *Ocimum sanctum*, *Withania somnifera*, *Azadirachta indica*, etc. Secondary metabolites of these plants can affect the microbial cell in several ways; the disruption of

membrane function and structure, interference with DNA replication, RNA transcription and protein synthesis, coagulation of cytoplasmic contents, interruption of quorum sensing, interference with metabolic processes, interference in gene regulation and inhibition of cell wall synthesis enzymes etc. Besides eradication of mycobacterial infections, it is imperative to have a medicine to mitigate the peripheral and central complications also. Herbal drugs provide not only an economical way to manage mycobacterial infections but could also target in specific XDR, MDR, NTMs (non-tuberculosis mycobacteria) and MAP infections where no anti-mycobacterial drug is available so far.

GH-44

Bacteriophages as Novel Arsenal to Combat *Escherichia coli* Infections in Goat

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Keywords: *Escherichia coli*; Enteropathogen, Goat, Bacteriophages, Anti Microbial Resistance

ABSTRACT

India ranks second across the globe with its Goat population touching nearly 199 million. Unfortunately these ruminants are threatened with various infectious microbial diseases which contribute to a considerable economic loss and may pose a threat to public health by spreading zoonotic diseases. These ruminants harbour one of the most important enteropathogenic *Escherichia coli* pathotypes causing gastrointestinal illness resulting in diarrhoea and mortality in Goat kids and lambs. In current scenario medical science is mainly dependent on antibiotics but due to emergence of AMR among enteric *E. coli*, side effects and lack of new antibiotics; the need for new therapeutic measures as an alternative to antibiotics is becoming vital. According to the National Institutes of Health (NIH, USA), Bacteriophages are innovative components which may be used to combat bacterial infections and AMR where hosts immune response and antimicrobial agents become inept.

- 1) To isolate and identify the bacteriophages against three enteropathogenic strains of *E. coli*
- 2) *In-vitro* assessment of phages for antibacterial activity against the strains of *E.coli*.

Naturally occurring Bacteriophages were isolated from river Ganga at Varanasi. Purification was done and plates were inspected for lysis i.e. clear zones after incubation for 24 hours at 37°C. Phages efficacy was tested on three enteropathogenic *E. coli* strains by inoculating them on

bacterial lawn cultures. Furthermore, phage antibacterial activity was compared with antibiotic susceptibility testing of the given strains. Bacteriophages were isolated against the three strains of *E. coli* which showed clear zoning plaques on *in vitro* testing thus exhibiting their potent antibacterial efficacy. Two lines of drugs i.e. 1st and 2nd were tested for all the three strains, out of which Ampicillin and Cefuroxime were resistant for the *E. coli strains*. Bacteriophages are highly specific hence will not disrupt the intestinal flora unlike antibiotics. The goats being used for dairy farming should not be administered antibiotics as they diffuse in its milk hence the Bacteriophages being economical, safe, target specific, with no or less side effects can be explored as an alternative to antibiotics and a potential therapeutic agent against bacterial diseases in the management of public, livestock and environmental health.

GH-45

Comparative Aetio-Pathological Investigations into Bronchopneumonia in Sheep and Goats and Determination of Antibiotic Sensitivity

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ABSTRACT

The study was undertaken to evaluate comparative pathology of bronchopneumonia in sheep and Goats associated with the infection of *Escherichia coli* and *Klebsiella* spp. and further phenotypic characterization and antibiotic sensitivity profiling was also carried out. Total 117 lungs (52 sheep and 66 goats) with gross lesions were employed in study. For analysis, retrospective comparison of randomly selected 25 cases of bronchopneumonia each from sheep and goats that were found associated either with *Klebsiella* or *E. coli* isolates were studied. Based on histopathological lesions, sheep (72%) and goat (84%) were affected with suppurative bronchopneumonia and 28% (sheep) and 16% (Goats) with fibrinous bronchopneumonia. In microbiological investigations, total of 36 isolates of *E. coli* (sheep-21 and goat-15) and 21 isolates of *Klebsiella* spp. (sheep-9 and goat-12) were isolated onto MacConkey and Simon Citrate agar with inositol for primary bacterial isolation. For antibiogram profiling, 28 available antibiotics recommended by CLSI were used. *E. coli* isolates from goats showed sensitivity towards streptomycin, cefixime, cefepime, quinolones oxytetracycline while those from sheep showed resistance to them. *Klebsiella* spp. isolates from goats showed sensitivity to chloramphenicol, quinolones, ampicillin/sulbactam and amoxyclav while those from sheep showed resistance pattern to most antibiotics except imipenim, nitrofurantoin, ampicillin/sulbactam and colistin. In conclusion, the sensitivity pattern of *E. coli* and *Klebsiella* spp. in both host animals (goat and sheep) are coming out to be different from each other therefore clinical correlations in terms of antibiotic sensitivity test must be carried out before starting antibacterial therapy for indications of bronchopneumonia.

GH-46

Goat Health Management

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Keywords: Health, Management, Goat, Vaccination

ABSTRACT

A healthy goat herd is essential for a successful goat operation. This goal can be achieved with proper management of the herd. Preventive medication is necessary in large flocks of goats. Vaccination, dipping, deworming regular screening are some of the routine health management practices which must be perform to keep flock healthy and viable. Goat health management depend on the animals age, health, nutrition and pregnancy status, as well as production needs the environment and the facilities. The young kid has needs for basic care very different from the older and mature goat. Goat health management system includes four subsystems, goat basic information management subsystem, goat individual health monitoring and evaluation subsystem, goat electronic medical records subsystem and goat disease prevention and control subsystem. Prevention is always better than cure, and it is therefore important that any goat introduced to an existing flock be disease-free and healthy. Before purchase of goat you should be aware of: any previous illness in the herd, drenching history, vaccination status, reason the goats are being sold, production records, scours incidence history, kidding percentage, and any veterinary examination results. Consult your veterinarian for any necessary testing, clean and disinfect the isolation area.

GH-47

UDDER EDEMA IN A DOE

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Keywords: Udder, Edema, Cattle

ABSTRACT

Edema of the udder at parturition is physiological but it may be sufficiently severe to cause edema of the belly, udder and teat .Udder edema is a periparturient disorder characterized by excessive accumulation of fluids in the intercellular tissue spaces of the mammary gland. The highly vascular nature of the Bovine mammary gland makes the tissue more prone to developing localized edema. The etiology of udder edema is unclear and may be associated with reduced mammary blood flow and increased intravenous pressure. Udder edema can become a chronic condition and persist throughout the lactation period. A 4 year old doe weighing about 35 kgs was presented at the outdoor village near Ajmer road, Jaipur for the treatment of udder swelling. Anamnesis revealed that the animal was pregnant and this swelling had developed two days before. The owner had treated the doe with some traditional medicine but no improvement was seen. Clinical examination revealed a normal rectal temperature, respiration rates and feeding and watering. A watery fluid was aspirated from the udder, showing the presence of edema. Udder edema was diagnosed by observation, palpating, pitting appearance of udder tissue and the aspirated watery fluid. Inj. Lasix (Frusemide @3 mg/kg bw) 4 ml was injected intramuscularly. Inj. Lasix was repeated for 3 days. Besides, B-complex along with liver extract (Beecom-L) 2 ml i/m, Corticosteroid (Isoflupredone) 3 ml I/m, an antihistaminic (Chlorpheniramine maleate) 2 ml i/m were also given. There was gradual reduction of edematous swelling just after the start of the therapy, until it was completely reduced after 3 days.

GH-48

Assessment of Erythrocytic Oxidative Stress Induced by Combined Nanoparticle Based Polymer Gel Mastitis Vaccine in Lactating Female Inbred Albino Mice

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Keywords: Erythrocytic, Stress, Lactating

ABSTRACT

Dairy sector succumb huge economic losses throughout world due to mastitis. These losses occur directly due to loss of milk production and indirectly by the loss of productive life, deterioration in milk quality and expenditure on treatment and management of animal. These can be prevented by using effective vaccination. All vaccine induces a certain level of oxidative stress to vaccinated animals. An optimum level of oxidative stress is expected for the effective immune response. The present study was planned to assess the level of oxidative stress induced by an indigenous nanoparticle based combined mastitis vaccine in lactating female inbred albino mice. The erythrocytes were collected from the vaccinated mice on 0th, 14th, 28th day of vaccination. All the vaccination mice were challenged on 28th day of vaccination and then 7th day post challenge (35th day of initial vaccination) erythrocytes were collected and used for the estimation of various oxidative stress biomarkers viz., Superoxide Dismutase (SOD), Lipid Peroxidation (LPO), reduced Glutathione (GSH), Glutathione-s-transferase (GST) and Catalase (CAT). The level of catalase in mice erythrocytes increased after vaccination and reduced significantly after challenge. The GST activity was maintained even after challenge. However, post challenge reduction in SOD activity was observed. The level of LPO showed significant increase on 14th day post vaccination but it was significantly lower than the post challenge level. The GSH level increased after vaccination and then declined after challenge. The analysis of these parameters suggested lower release of free radicals like peroxides (OH, H₂O₂) and superoxide anion and good immune response. The desired level of biomarkers revealed synergism in developing immune response and protection over challenge.

GH-49

Evaluation of newly formulated oil adjuvant combined mastitis vaccine in mice model

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Keywords: Mastitis Vaccine, Vaccine Animal

ABSTRACT

Multiple etiologies are responsible for mastitis in animals leading to severe economic losses to farmers and farming community. The involvement of multiple etiological agents makes its treatment difficult, costly and many time no recovery is observed. The majority of cases reveal involvement of bacterial pathogens like *Staphylococcus aureus*, *Escherichia coli*, *Streptococcus agalactiae*, *Streptococcus uberis* and *Streptococcus dysgalactiae*. Out of these first two are supposed to contribute almost 50% of total bacterial mastitis. Thus, a new vaccine indigenous oil adjuvant vaccine was formulated. The vaccine involved two local virulent strains of *Staphylococcus aureus* and *Escherichia coli*. The stability and safety of vaccine was tested prior to use in mice. The vaccine was found stable at room temperature, at incubator (37°C) and in refrigerator for 6, 9 and 12 months period, respectively. The stable vaccine was used to assess safety of vaccine in adult female albino mice and was found safe. The vaccination and challenge study was performed in 72 lactating female inbred albino mice divided in three groups (vaccination, adjuvant inoculation and control group of 24 mice in each group). The blood samples were collected to observe protective antibodies on 0th, 7th, 14th, 21st and 28th day post vaccination. The serum samples were used for slide agglutination test and indirect ELISA. All the vaccinated mice revealed positive agglutination reaction on 14th day post vaccination and it was maintained till 28th day. The ELISA being more sensitive revealed 33% positivity on 7th day post vaccination followed by 100% positivity on 14th day post vaccination. The challenge of vaccinated animals with homologous virulent strains produced no clinical disease, suggesting vaccine effective.

GH-50

Transmission of PPR in Goat in UP

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Goat rearing is common practice in the Bundelkhand area of India. Marginal and landless farmers are dependent on goat rearing. In the past years goats were purchased from other regions which were affected from PPR and supplied to farmers of Bundelkhand region. Thus PPR is introduced to Bundelkhand region. Therefore, it is suggested to follow a strict quarantine policy before transportation and supply of goat to new region.

GH-51

**Development of Rapid, Inexpensive, Sensitive, Robust, and Point of Care
Diagnostics for Leptospirosis Serovars in Small Ruminants**

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Keywords: Diagnostic, Leptospirosis, Serovarsm Ruminants

ABSTRACT

Leptospirosis is a Zoonotic disease and causes clinical as well as subclinical infections in animals resulting in mortality. There are several different serovars of *Leptospira* that mainly infect livestock and human populations. In all, 19 serovars that are recognized and infect small ruminants like sheep and goats. Most of the available diagnostic tools are time consuming and laborious requiring experienced personnel. In the present study, we have developed a lateral flow and ELISA-based test kits using specific recombinant proteins against the specific serovars that mainly infect small ruminates and LPS from 19 different serovars of *Leptospira*. The LPS of these serovars were purified separately, mixed (1mg/ml concentration) and used for the development of lateral flow and ELISA test kits. One hundred and ninety samples of sheep and goats (positive = 114, negative = 76) were tested for *Leptospira* antigens with the gold standard method Microscopic Agglutination Test (MAT) using lateral flow assay and ELISA kit. Lateral flow assay showed a specificity and sensitivity of 93.13% and 91.23% respectively. The developed ELISA assay showed a specificity and sensitivity of 98.12% and 99.52% respectively. The developed lateral flow and ELISA kits are highly specific and sensitive in comparison with the gold standard method and with commercial test kits available in the market. The results obtained in the present study prove that the developed lateral flow and ELISA point of care diagnostics for detection of *Leptospira* in small ruminants are very useful for farmers and for resource-limited areas, and for proper and robust diagnosis especially in countries like India.

GH-52

Developing Simple, Rapid Diagnostic Test kits for Brucellosis Diagnosis in Small ruminants at Point of Care Areas

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Keywords: LFA, Penside, Brucellosis

ABSTRACT

Brucellosis is economically important zoonotic disease of livestock caused by bacteria belonging to the genus *Brucella*. Several species are identified within the genus, based up on the antigenic variation & primary host interaction and preference. Generally, Brucellosis is diagnosed by identification of specific antibodies present in serum or other body fluids of animals. The impact of disease on small ruminants like sheep and goats is more and it creating major damage to the country especially to the farmers and to the small ruminant dairy farms. At present, several of serological tests are available for Brucellosis diagnosis, but none of them are aimed at user friendly, easy to use reproducible fashion. Moreover, there is great demand and urgency for Brucellosis diagnostic kits to screen for disease prevalence, to help the farmers to identify infected small ruminant animals such as sheep and goats to control the disease.

In this study, we have developed simple, inexpensive, robust LFA based RDT and ELISA kits which can be used to test the small ruminant livestock at POC areas. Both the developed kits can be carried at the field level easily. LFA is developed to detect *Brucella* sLPS specific IgG Abs in small aliquots of whole blood or serum from wide range of live stocks especially for goats and sheep that can be used by a farmer. Protein G based indirect ELISA coupled with a handheld ELISA reader for pen side *Brucella* detection kit has been described. Both the kits were evaluated with 310 sera samples which are from small ruminant animals like sheep and goats. The results obtained suggested that the sensitivity of RDT and ELISA kits is 89% and 99% and specificity is 99% and 97% respectively. Finally, these kits are suitable for diagnostic purposes at POC areas where Brucellosis is endemic.

GH-53

Isothermal PCR Coupled Lateral flow Assay to detect nucleic acids for *Paratuberculosis* in Small Ruminants at Point of Care Resource Limited Areas

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Keywords: LFA-LAMP, Paratuberculosis, POCD

ABSTRACT

The *Mycobacterium avium* subspecies *Paratuberculosis* (MAP) causes a chronic granulomatous enteric disease in sheep and goats. The aim of the study is to identify the *Mycobacterium avium* subspecies *Paratuberculosis* infection in sheep and goat. The disease itself has a greater economic importance in the cattle and small ruminant industries but its control is hampered by the lack of rapid and accurate diagnostic tests. The present study was aimed to develop a simple, inexpensive, rapid and robust point of care Loop mediated isothermal amplification (LAMP) coupled with Lateral flow assay for the resource limited areas for the detection of MAP. Over all, six sets of specific oligo nucleotide primers were derived from the insertion sequence 900 (*IS900*) gene sequence were synthesized. The LAMP reaction conditions were optimized at 63°C for 60 min. The developed assay was evaluated with 173 fecal samples which are from small ruminants like sheep, goats and also from bovine environment. The results obtained suggested that the sensitivity of LAMP assay for detection of MAP was 99.0% and the specificity was 97.0% respectively. The LAMP assay coupled with LFA to detect MAP specific nucleic acids in clinical samples at point of care resource limited areas will facilitate to detect active pathogens and help the small ruminant livestock healthcare system. This assay was well suited for the early diagnosis of MAP in less equipped laboratories and in resource limited POC settings which are more suitable for Indian environment.

GH-54

Comparative Prevalence of Paratuberculosis and Tuberculosis in Small Ruminants of Herds of Jaipur (Rajasthan)

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Keywords: Johnin, tuberculin, Paratuberculosis, Tuberculosis

ABSTRACT

Paratuberculosis and tuberculosis are two major infections of ruminants that severely affect farm economy. Both diseases also have zoonotic concerns. We have recently initiated a screening program for both the diseases in our center. We are using johnin and tuberculin reagents (by IVRI, Izatnagar) for the on farm screening of animals. In the present study we screened one sheep farm and one goat farm. Both farms were on semi-intensive management and grazing our major practice. In total, we tested 101 animals (sheep- 56 & goat- 45). In the skin test, we found that goat herd was free of both infections. However, high prevalence of paratuberculosis infection was observed in sheep flock, 32 (57.1%) animals had strong skin reaction, also 4 (7.14%) reacted for tuberculin reagent. Also 4 (7.14%) sheep reacted for both johnin and tuberculin. High prevalence of infection reflects the poor hygienic maintenance of sheep flock.

GH-55

Antimicrobial Effect of Some Arid and Semi-Arid Medicinal Plants of Rajasthan Against Enteropathogenic Strains of *Escherichia coli* in Goat

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Keywords: *E.coli*, Enteropathogenic disease, Herbal Medicine, phytochemicals, antibiotic resistance

ABSTRACT

Goat is a basic requirement for survival of 60% farmers in India and is the second most vital livestock in India, which plays an important role in the rural economy. *Escherichia coli* enteritis produces enterotoxins which are invasive to cause inflammatory change within the intestine leading to diarrhoea in Goat. Despite improvement in managerial practices, its prevention and treatment strategies, bacterial enteritis remains the most common and costly disease affecting small ruminants. Drug resistance has also become an important issue in small ruminant husbandry because of repeated use of chemical antibiotics against enteritis. Moreover, growing interest in global organic food production primarily due to adverse impact of intensive farming on environment, animal health and consumers concern for food safety restricts the use of chemicals in animal feed. The current study aims to screen antimicrobial potential of plant extracts against enteropathogenic strains of *E. coli* causing gastrointestinal infection in Goat and their phytochemical analysis to identify bioactive groups present in the extracts. Sixteen plants from arid and semi- arid area were selected for the study. The results reveal the extracts of *Coriandrum sativum*(Coriander), *Commiphora wightii*(Guggul), *Tribulus terrestris*(Gokhru), *Desert guard*(*Citrullus colocynthis*), *Withania somnifera*(Ashwagandha), *Bombex ceiba*(Silk cotton) and *Asparagus racemosus*(Satavari) as the potent extracts against *E. coli* strains. The maximum inhibition zone was observed by ethanolic and chloroform extracts of Guggul (24mm), Citrullus (22mm), Silk cotton (20mm) and Satavari (19mm). Preliminary phytochemical analysis reveals the presence of tannins and flavonoids in the studied plant extracts which effect the growth performance and combating gastrointestinal diseases in goats.

These plants are also rich source of other nutrients. This study suggests the use of plants or their extracts as herbal medicine for the treatment of enteropathogenic diseases as an alternative to existing antibiotics.

GH-56

Antimycobacterial Effect of Some Arid and Semi-Arid Medicinal Plants of Rajasthan Against *Non-Tuberculosis Mycobacteria*

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Keywords: Nontuberculous Mycobacteria, Antimycobacterial effect, Plant Extract, Communicable Disease.

ABSTRACT

The recently notable increase in the number of Nontuberculous mycobacteria infections globally, has made it clinically important to rapidly and accurately identify Mycobacteria to the species level to facilitate prompt patient management. NTMs are generally free-living, ubiquitous organisms in the environment. These mycobacteria are widely distributed in nature and have been isolated from natural open bodies of Potable waters, biofilms, soil, tap water, waters used in showers and surgical solutions. This study was designed to screen the antimycobacterial effect of some arid and semi arid medicinal plants which have been used traditionally in Rajasthan, India. The medicinal plant extract for the treatment of different communicable diseases, such as Tuberculosis, Brucellosis, Botulism etc. The plants were collected in their natural habitats in our Rajasthan region. The results reveal the extracts of *Coriandrum sativum*(Coriander), *Commiphora wightii*(Guggul), *Tribulus terrestris*(Gokhru), *Citrullus colocynthis* (Desert guard), *Bombex ceiba* (Silk cotton) and *Asparagus racemosus*(Satavari) *Corbichonia decumbens* (Pathar chatta), *Jatropha curcas* (Physic nut), *Asphodelus tenuifolius* (Piazi), *Acacia nilotica* (Babool), as the potent extracts against *Mycobacterial strains*. Antimycobacterial activities were determined by Disc Diffusion (DD) methods against *M. smegmatis* and *M. phlei* and *M. szulgai*, *M. xenopi*.

In this study we have explored the antimycobacterial properties of 10 ethanolic and chloroform extracts from the different part of selected medicinal plant traditionally used in Rajasthan to treat infectious diseases.

GH-57

Evaluation of Topicure-SG for Oral Lesions in Sheep/Goats

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Sheep and goats with oral lesions (Ulcers, Blisters, Pustules and Scabs caused by infectious diseases) will lose condition and weight due to the inability to eat / reduced feed intake that results in severe dehydration, emaciation and ultimate significant losses in production through decreased growth rate. Thus, in the present study, investigational herbal aerosol spray “Topicure-SG” was chosen for treating the oral lesions wherein healing of oral lesions, mucus membrane of mouth, feed intake, activity level and number of days for complete healing were assessed in sheep and goats following oral application of Topicure-SG spray

Production
Systems &
Climate Changes
in Asia

PSCC01

Impact of the Climate change on Livestock

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Keywords: Heat stress, Animal genetic resource characterization, Adaptation strategies

ABSTRACT

Climate change is the misbalance, on the long term, of customary weather factors such as temperature, wind and rainfall characteristic of a specific region on Earth which is primarily due to an increase in temperature and atmospheric CO₂ concentration. Impact of the climate change on livestock is direct and indirect which include effects on health, reproduction, nutrition, production, livestock pastures, forage crop production, heat stress, biodiversity, disease resistance and immune system etc. The growth parameters like Body weight, feed intake, daily gain and body conditioning score tend to decrease. Milk production parameters include amount of milk production, concentration of lactose, fat and protein also decreases which is due to decrease feed intake and direct effect of heat stress. It affects the reproduction by reducing the estrous expression, conception rate, and secretion of estradiole and testosterone. Climate change also increases the chance of vector borne diseases like theileriosis, rift valley fever etc. These effects tend to reduce the production and hence economic losses occur. India could see economic losses of 8.7% of its GDP by 2100 if it fails to respond to climate change. Climate change is a major factor affecting the already highly dynamic livestock sector. Many existing technologies in animal genetic resource characterization, conservation and breeding will be crucial for climate change adaptation and mitigation. For the optimal utilization of the adaptation traits harbored in all breeds, research into genetic characterization and understanding adaptation in stressful environments needs to be strengthened. Climate change adaptation, biodiversity conservation and poverty alleviation are complementing each other. Adaptations Strategies thus need to be developed that strengthen livestock keepers.

PSCC02

Effect of Plastic Slatted Flooring on Growth Performance of Kids and Lambs Maintained under Stallfed Semiarid Conditions of India

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Keywords: Plastic slatted floors, Kids, Lambs, Growth

ABSTRACT

The present experiment investigated the effect of raised plastic slatted floor over soil floor on growth, ADG and physiological responses of kids and lambs under intensive stall feeding system in semiarid conditions. Forty eight young male kids and lambs at 6 months of age, 12 each of Jamunapari, Jakhrana, Barbari breed of goat kids and Muzaffarnagari sheep lambs were equally divided and allotted randomly in plastic and soil floor. They were reared up to 12 months of age through April to September months, fed *ad libitum* roughage, green fodder and concentrate to meet nutrient requirements for optimum growth. The body weight of animals was recorded fortnightly using digital weighing machine for two consecutive days and average values were considered. The physiological responses were also recorded once during May and September months to assess the welfare of goats on two floors. The analysis of body weight data on two floors revealed that the growth performance on plastic floor was similar as compared to soil floor. The body weight of Jamunapari, Barbari, Jakhrana kids and Muzaffarnagari lambs at the end of trial on plastic and soil floor were recorded to be 29.04 ± 2.35 and 30.20 ± 2.46 kg, 27.29 ± 0.99 and 26.90 ± 1.45 kg, 29.99 ± 2.24 and 30.54 ± 1.58 kg, and 42.89 ± 1.47 and 41.57 ± 1.74 kg, respectively at 12 months of age. The ADG of kids on plastic floor ranged from 67.47 ± 8.55 to 81.17 ± 9.51 g/day as compared to 56.22 ± 9.72 to 85.83 ± 3.83 g/day on soil floor. The respective daily gain in Muzaffarnagari lambs were 143.04 ± 7.77 and 153.67 ± 6.95 g/day. The physiological responses of kids and lambs were statistically similar on both the floor except the respiration rate during summer months on plastic floor was slightly higher than soil floor. Therefore, it shall be inferred that plastic floor shall be easily recommended for construction of goat shelters with raised floor in semi-arid regions of India for hygienic meat and milk production in goats.

PSCC03

Effect of Temperature and Temperature Humidity Index on Growth Performance of Sangamneri Goat

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Keywords: Sangamneri goat, Temperature, THI

ABSTRACT

Data on body weights at birth, 3, 6, 9, 12 months of age of Sangamneri local kids born between 2008 to 2015 at All India Coordinated Research Project on Sangamneri goat, Mahatma Phule Krishi Vidyapeeth, Rahuri were collected and subjected to least squares analysis to determine the year and season of birth, Temperature and THI groups. The overall least squares means for birth weight in Sangamneri kids were 2.13 ± 0.014 kg, for three month 7.48 ± 0.07 kg, for six month 10.22 ± 0.08 kg, for nine month 12.44 ± 0.12 kg and for twelve month 14.74 ± 0.19 kg. The year and season of birth had significant effect on birth weight. The significantly highest birth weight 2.22 ± 0.03 kg was noticed in the kids born during the year 2013, however temperature and THI had non-significant effect on birth weight. Effects of year and season of birth was significant on 3, 6 and 9 months body weight while year of birth had significant and season of birth had non-significant effect on 12 months body weight. The maximum and minimum temperature showed non-significant influence on body weights at different ages under study, except 6-month body weight which was affected significantly by minimum temperature. The THI showed non-significant influence on body weights at different ages under study except 6-month body weight. The influence of THI on daily gain in body weight was non-significant except at 6 months age.

PSCC04

Effect of Alternative Bedding Materials during Winters on Growth Performance of Barbari kids

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Keywords: Bedding material, Growth Performance, Barbari goat kids, Winter season

ABSTRACT

Present study was undertaken in experimental shed of Central Institute for Research on Goats to analyze the effect of different bedding materials during winter on growth performance of Barbari kids. Thirty post-weaned Barbari kids of about three months age were selected from the institutional flock, which were divided into three groups viz. group I, II and III with ten kids in each group and were kept on plastic slats, soil and rubber mats, respectively. The parameters studied were dry matter intake (DMI), average daily weight gain (ADG), feed conversion efficiency (FCE) and body measurements like height at withers (HAW), body length (BL), heart girth (HG) and paunch girth (PG). During the 90 day trial, the average initial body weights (kg) of kids in groups I to III were 10.29, 10.24 and 10.24 kg, respectively, which changed to 16.30, 16.19 and 16.02 kg at the end of experimental period. The fortnightly DMI (gram/day) was similar in all groups. The FCE, ADG and total body weight gains were comparable ($P>0.05$) among all groups. The mean values of these parameters were found to be marginally higher in group I as compared to group II and III. The mean values of height at withers, body length, paunch girth and heart girth were found to be 51.39, 53.47, 53.08 and 53.89 in group I, 52.23, 53.21, 53.91 and 54.38 in group II and 50.53, 52.44, 53.23 and 52.99 in group III, respectively. The fortnightly comparison of body measurements of kids exhibited no significant difference ($P>0.05$) in different groups.

PSCC05

Growth of Kids Under Semi-Intensive Management System of Jakhrana Flock

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Keywords: Jakhrana goats, Feeding management, Body weight

ABSTRACT

Goats can play important role in the livelihood security of the small and marginal farmers and landless laborer's. It constitutes very important species of livestock, mainly because of their short generation interval, good number of breeds and population. A small unit of Jakhrana goats is maintained at CIRG, Makhdoom as Jakhrana breeding nucleus flock. Animals were kept separately according to their reproductive and productive status. These animals were maintained under semi intensive system of feeding management. Data were collected from 2013-14 to 2017-18. Up to 3 months of age, body weight of each kid was measured fortnightly in kg. After 3 months of age, body weight of each kid was taken monthly. Birth weight of kids was highest in 2017-18 (2.81 ± 0.06) followed by 2014-15 (2.59 ± 0.05), 2015-16 (2.55 ± 0.04), 2013-14 (2.49 ± 0.05) and 2016-17 (2.38 ± 0.04). Three month body weight was found highest in 2017-18 (11.46 ± 0.34) followed by 2013-14 (10.63 ± 0.20), 2015-16 (10.29 ± 0.19), 2014-15 (8.93 ± 0.19) and 2016-17 (8.51 ± 0.19). Six month body weight of kids was measured highest in 2017-18 (17.19 ± 0.44) followed by 2015-16 (16.24 ± 0.38), 2013-14 (14.97 ± 0.39), 2014-15 (13.87 ± 0.3) and 2016-17 (13.21 ± 0.52). Nine month body weight was highest in 2017-18 (24.99 ± 0.96) followed by 2013-14 (22.36 ± 0.70), 2015-16 (21.38 ± 0.67), 2014-15 (20.08 ± 0.65) and 2016-17 (16.91 ± 1.90). Twelve month body weight of kids was highest in 2017-18 (36.42 ± 0.90) followed by 2013-14 (28.20 ± 0.86), 2014-15 (24.97 ± 0.80), 2015-16 (24.72 ± 0.83) and 2016-17 (24.13 ± 2.23). It was observed that number of kids in the flock, feed quality and quantity provided to the kids and diseases like diarrhea were highly influenced the body growth of kids.

PSCC06

Housing management practices of goats followed by tribal farmers in Rajasthan

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Keywords: Floor space, Feeding and watering space, Tribal goat farmers

ABSTRACT

The aim of present study was to assess the floor space, feeding and watering space and other housing management practice of goats followed by tribal farmers in Rajasthan. A total of 120 tribal goat farmers were selected from 12 villages from 6 blocks in 3 tribal dominated districts viz., Banswara, Dungarpur and Udaipur. Ten farmers from each village were selected purposively based on the number of goats. The selected goat farmers were grouped into three categories based on flock size as small (<25 goats, N= 60), medium (26-50 goats, N = 36) and large (>50 goats, N = 24). The floor space and other housing practices at the farmers flocks were recorded on-farm. The average flock size as small, medium and large categories of farmer was 22.63 ± 0.210 , 33.72 ± 1.05 and 58.54 ± 1.28 respectively. The overall proportion of milking goats, dry goats, goatlings, kids and bucks were 12.52 ± 0.31 (32.63%), 8.62 ± 0.30 (22.50%), 6.64 ± 0.27 (17.33%), 9.52 ± 0.29 (24.85%) and 0.79 ± 0.06 respectively. Across flock size categories most of large farmers and a sizable majority of medium and small farmers (75, 66.67 and 60 per cent respectively) housed their goat in one shed, whereas rest of the farmers in all three categories housed their goats in different sheds. It was observed that a huge majority of farmers (82.50%) did not have separate mangers for the feeding of goats. The available mangers were made of either mud (11.6 %) or cement concrete (5.8%). The roof in case of a large majority of farmers across flock size categories was made of thatch (61.67 %) followed by iron sheet (21.66 %) and asbestos sheets (16.67 %). There was no major variation in type of roofing material among the three flock size categories of goat farmers. The average floor space available for milking goats, dry goats, goatlings, kids and breeding bucks were 1.68 ± 0.02 , 1.58 ± 0.06 , $0.97 \pm$

0.07, 0.50 ± 0.05 and 2.79 ± 0.39 sq meter respectively. The average floor space was significant ($p < 0.05$) higher in small flock size category of farmers followed by medium and large farmers among milking goats, dry goats and goatlings. Overall floor space available for milking goats, dry goats, goatlings, kids and breeding bucks were 1.68 ± 0.02 , 1.58 ± 0.06 , 0.97 ± 0.07 , 0.50 ± 0.05 and 2.79 ± 0.39 respectively. It was concluded that housing practices were mostly traditional without much regard to scientific recommendations. However, these management practices in general were better in case of small farmers as compared to medium and large farmers.

PSCC07

Impact of Ruminant's Methane Emission on Climate Change: Challenges and Mitigation Strategies

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Keywords: Achaea, carbon dioxide, nitrous oxide, hydrogen, methane, fermentation

ABSTRACT

The atmosphere is the fundamental to life on earth. The anthropogenic activities process along with livestock play major role in global warming by climate change and air pollution. Climate change, a resultant effect of green house gas emissions like carbon dioxide, methane and nitrous oxide, is a worldwide concern because its continuation is having significant and negative resources and economic conditions around the globe. It is observed that the agricultural sector emits the highest amount of methane. Enteric fermentation and manure by livestock represents some 80 % of agricultural methane emissions and about 35-40 % of the total global anthropogenic methane emissions. Methane is the second most important green house gas. Once it emitted, it remains in the atmosphere for approximately 9-15 years. Methane is about 21 times more effective in trapping heat in the environment than carbon dioxide. Ruminants and to a same extent also monogastrics emit methane as part of their digestive process, which involves microbial fermentation of fibrous feeds. Conversion of carbon dioxide and hydrogen to methane is accomplished by methanogenic Achaea and this is also responsible for methane synthesis in manure, effluent ponds and soil. Mitigation of methane emissions in ruminants can be controlled by dietary as well as microbial manipulation in rumen eco-system of ruminant. Therefore, inhibition of methane emission by the ruminant is essential to improve efficiency of feed utilisation and protecting the environment from its green house effect.

PSCC08

Ethology of Black Bengal Goats and Garole Sheep under Semi-intensive System of Management

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Keywords: Ethology, Behavior, Goat, Maintenance behavior, Eliminative behavior

ABSTRACT

The small ruminants are important species of animals in India which mainly depend on rangeland to meet their nutritional requirement. Due to gradual shrinkage of grazing land, farmers are forced to adopt other methods of rearing i.e. intensive, semi-intensive or tethered for rearing this animals. The present study was conducted on two recognized breeds of small ruminant viz. Black Bengal goats and Garole sheep under semi-intensive system of management during two years period starting from January 2013 to December 2014. Under this study a comprehensive understanding of time budget activities and seasonal effect on behaviour of these two breeds at different physiological stages i.e. lactating, pregnant, growing and adult breeding males were recorded in three seasons with the help of two video cameras. The entries for maintenance activities and eliminative behaviour were made on coding sheets and decoded as per maintenance activity in decoding sheets. Statistical analysis was performed using GLM (General Linear model) for equal subclass number according to SAS 9.3 (2012).

A distinct diurnal pattern of feeding was observed with both the species. Out of the 24 hrs period, Garole sheep and Black Bengal goats both spent on an average 5.1 % (72.15 min) time for eating fodder, 1.59 % (22.85 min) time for eating concentrate, 11.34 % (163.30 min) time for grazing, 47.88 % (289.48 min) time idling, 20.11 % (289.57 min) time ruminating, 2.08 % (40.39 min) time roaming, 1.51 % (21.72 min) time walking and 10.50 % (151.23 min) time sleeping. Overall feeding time (including eating fodder, concentrate and grazing) was more in lactating animals (262.60 min) followed by pregnant animals (259.94 min) adult breeding males (253.51 min) and growing females (253.51 min) in Garole sheep and Black Bengal goats.

Out of the total 24 hrs period, lactating animals spent 45.96 per cent of time for idling activity out of which 22.94 % in day time and 25.09 % in night. As age of the animals increases idling time is decreased and shifted towards feeding time. But idle time in Garole sheep and Black Bengal goats were significantly different from each other in all categories of animals. Standing idle time was observed more in adult males (14.72 %) and very less in lactating animals (12.68 %) during day out of 24 hrs. The overall time spent on rumination activity was 346.90 ± 6.17 min (24.09 %) in lactating animals, 288.57 ± 6.46 min (20.04 %) in pregnant animals, 232.85 ± 7.30 min (16.17 %) in growing animals and 289.65 ± 10.33 min (20.14 %) in adult males of 24 hrs period.

PSCC09

Kidding Pattern and Mortality Rate of Indigenous Local Goat Kids Reared Under Semi-intensive System in Andaman and Nicobar Islands

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Keywords: Andaman & Nicobar Islands, birth rate, kidding pattern, goat, season of birth, semi-intensive system

ABSTRACT

Sex ratio of new born animals is an essential factor of any goat flock in replacing low performing or non-potential animals in order to maintain proper flock strength and in achieving sustainable production and reproduction performance to increase profitability of livestock farming system. Therefore the present study was conducted to assess the effect of various factors on kidding pattern, mortality rate and sex ratio of kids reared under semi-intensive system in AN Islands. Data of 544 kids born during the year 2000-2017 maintained at ICAR-CIARI, Port Blair, AN Islands, India were retrospectively analyzed to study the factors affecting the sex ratio and mortality rate in Andaman local goat under semi-intensive system. Frequency and percentage of kidding and mortality rate under different years (2000 to 2017), months (January to December) and seasons (wet & dry season) were calculated. Relative female ratio (RFR) and secondary sex ratio (SSR) was also calculated to assess the sex ratio of the kids in organised goat farm. Result revealed birth rate, sex ratio, mortality rate, kidding pattern such as singles, twines and triplets were varied with months, seasons and years. Birth rate, mortality rate, single & twine birth showed significantly ($p < 0.05$) highest was in monsoon than dry season whereas triplets, quadruplet and sex ratio were significantly ($p < 0.05$) higher in dry than monsoon season. In conclusion, sex ratio, birth rate and mortality rate differed significantly ($p < 0.05$) between months/seasons/years and wet season/months were found to be most conducive for breeding of goat under semi-intensive system in A & N Islands.

PSCC010

Production System of Marwari Goat in Indian Arid Zone

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Keywords: Production, Marwari, Growth, Goat, Arid, System.

ABSTRACT

Marwari is a medium sized and dual-purpose goat breed of the North-Western Indian arid region, which constitutes about 35% of total goat population and 15% of total milk production in Rajasthan state. Total 250 records of animals maintained at Central Research Farm of CAZRI, Jodhpur were analyzed for present study. Average body weights at birth, 3, 6, 9, 12, 15, 18, 21 and 24 months were observed to be 2.24, 8.79, 13.02, 15.76, 18.50, 22.0, 25.1, 26.0 and 28.20 kg respectively. On an average 23.3% twinning was observed in Marwari goats and study revealed that twin birth kids might have higher reproductive efficiency trait. Under extensive system of arid region with no supplementation Marwari goats maintained higher body weight (31.0 ± 1.2 kg) than other breeds i.e. Jhakarana (23.4 ± 2.3 kg), Jamunapari (24.5 ± 2.10 kg), and Parbatsari (22.8 ± 1.71 kg). Kidding percentage ranged from single (83.8 to 92.9%), twinning (7.10 to 16.2%) to multiple (20%) in goats. Kids matured sexually at the age of 20 months and kidded first time at 25.5 months (778.4 ± 18.2 days). The gestation period and kidding interval of goats' ranged from 145 to 158 days and 254.0 ± 4.56 days respectively. The milk production varied from 83.10 to 101.50 ± 2.40 liter per lactation, while; lactation period ranged from 105.80 to 197.50 ± 2.70 days. Present study indicated that animals of elite group recorded more than 41 % higher milk yield than average group have a wide scope in improving milk yield trait in Marwari breed by using genotype of such elite animals.

PSCC11

Walking and Summer Stress on Physiological, Heamatological and Antioxidant Profiles in Andaman Local Goat under Island Tropical Ecosystem

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Keywords: Andaman local goat, walking stress, Summer season, Physiological, Heamatological profiles, Antioxidants, Andaman and Nicobar Islands

ABSTRACT

A study was conducted to evaluate the effect of walking stress on physiological, heamatological and antioxidant profiles in Andaman local goat. Twelve buck of adult age of 2 to 3 yrs of age with body condition score 5-6 were selected and divided into two groups, viz. group-I (n=6): control (not exposure to walking stress) and group-II (n=6): treatment (exposure to walking stress). The treatment group was allowed to walk 8 km to and fro from the farm without allowing grazing. The control animals were kept in the adjacent shed. The time of walking was from 0700 hrs to 1100 hrs. Immediately after stress, the animals were restrained and physiological parameters such as rectal temperature, respiration rate, pulse rate and skin temperature were measured. Meanwhile blood samples were collected to study the heamatological such as total red blood cells, haemoglobin, erythrocyte sedimentation rate, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration and antioxidant profiles such as glutathione, glutathione reductase, superoxide dismutase, catalase and total antioxidant capacity and lipid peroxide such as malondialdehyde. Result revealed physiological, heamatological profiles and malondialdehyde were significantly higher and antioxidant profiles were significantly lowered in stressed animals than in unstressed animal group. It is concluded that the walking stress and hot summer heat stress has significantly affected the performance of Andaman local goat. Moreover, it is advisable to feed more nutrients with high energy and suitable antioxidants to mithun to counteract the free radicals.

PSCC12

Endocrinological Profiles of Andaman Local Goat under Island Tropical Ecosystem

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Keywords: Andaman local goat, Rainy and dry seasons, Endocrinological profiles, Andaman and Nicobar Islands

ABSTRACT

Andaman local goat is primarily used as a meat animal in Andaman and Nicobar islands. The present study was conducted to measure the effect of seasons on testicular biometrics and endocrinological profiles at different seasons in Andaman local goat. A total of 12 bucks were selected from the goat-breeding farm, ICAR-CIARI, Port Blair, Andaman and Nicobar Islands, India. The seasons were grouped into dry (summer) and wet (rainy) seasons based on the rain fall, maximum and minimum temperature. Scrotal circumference (SC) & testicular biometrics and endocrinological profiles such as follicle stimulating hormone (FSH), luteinizing hormone/interstitial cell stimulating hormone (LH/ICSH), testosterone, thyroxin (T4), cortisol and insulin like growth factor 1 (IGF 1) were estimated during different seasons. Statistical results revealed that the SC & testicular biometrics and endocrinological profiles differed significantly ($p < 0.05$) between seasons. Significantly ($p < 0.05$) greater SC was observed in rainy and lowest was in summer season. The hormone profiles such as FSH, LH/ICSH, testosterone & thyroxin were significantly ($p < 0.05$) greater and IGF-1 & cortisol were significantly ($p < 0.05$) lower in rainy than in summer season. It was concluded that the rainy season has significantly greater beneficial effects than summer season on reproduction and artificial breeding Programme in semi-intensive management of Andaman local goat in the present location.

PSCC13

Effect of Solar Radiation Exposure on Physiological Response and Blood Biochemical of Malpura Sheep under Semi-arid Region

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Keywords: Malpura, sheep, solar radiation, semi-arid region, physiology

ABSTRACT

In the semi-arid agro-ecological zone, sheep are reared through the pastoral system, where they are exposed to solar radiation, which may affect their physiology. Therefore, the present study was initiated to estimate the effect of solar radiation exposure on physiological response and blood biochemical of native Malpura rams of the hot semi-arid region. For this, 16 Malpura rams were selected and equally divided into 2 groups, viz.; G1 as control and G2 as a solar radiation-exposed group. The present study was carried in March and April month and the G2 group was exposed to solar radiation from sunrise to sunset (7.00am to 6.00pm) in natural solar radiation. The rams of G1 were kept inside the all four sides open shed. All the rams were provided their maintenance requirement as per ICAR recommendation on their individual body weight basis. Body weight and physiological responses were recorded on a weekly basis. Blood samples were collected at weekly interval. It was found that the total feed and water intake and body weight did not vary significantly ($P>0.05$) after exposure to direct solar radiation. However, the water intake in daytime was significantly ($P<0.05$) higher in solar radiation exposed Malpura Rams. The respiration rate, pulse rate and rectal temperature did not vary significantly ($P>0.05$) in G2 however; they were numerically higher compared to G1. The hemoglobin and PCV were significantly ($P<0.05$) lower in G2 as compared to G1 but other biochemical parameters did not vary. Therefore, from this study, we can conclude that native Malpura breed of semi-arid region are able to cope up with solar radiation exposure in grazing condition without much physiological changes.

PSCC14

Contribution of Small Ruminants to Global warming through emission of GHGs

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Keywords: Ruminants, Emission, Ruminants

ABSTRACT

Ruminant animals are second among the source of methane emission, which 25 times more potent than carbon dioxide and first for nitrous oxide which is 298 times more potent in relation to warming potential. Indian Livestock mainly consist of large ruminants population was 529 million in 2007 and 512 million in 2012. Total population of Goat as well as sheep was 26.36, 13.3% and 26.4, 12.7% of total livestock in 2007 and 2012, respectively. There are only few states which have considerable number of sheep and goat. Percent population was Rajasthan (16), West Bengal (11), UP (11), Bihar (8), Maharashtra (7) and Andhra Pradesh (7) in 2007, however this was 16, 9, 12, 9, 6 and 7 respectively in 2012. An increase was showing in states like Mizoram (115), Assam (49), Meghalaya (32), Manipur (28) and Sikkim (23) while other states showed a decrease by 5-44% (Nagaland) in 2012. In UTs, Delhi and Chandigarh showed an increase of 23 and 46% while Andaman & Nicobar showed a minor increase of 1% in 2012 as compared to 2007. Total DMI as per the feed available in different states was 4.16 and 4.15% of DM taken by the total livestock in 2007 and 2012, respectively and consumption by sheep was 3.4 and 3.18% in 2007 and 2012.

Methane production by Goats was 221 and 246 Gg and by sheep it was 190 and 188.9 Gg in 2007 and 2012, respectively. Contribution of methane emission by goat and sheep to total emission was 2.34, 1.9 and 2.35, 1.8% in 2007 and 2012 respectively. Among goats, contribution by males had decreased by 2.27% and female goats showed an increase of 1.35% in 2012 as compared to 2007. A considerable increase was observed in lactating animals (0.29% in 2012), dry goats showed 1.81% increase and the goat not calved showed 3.69% increase as compared to 2007. There was decrease in methane emission from sheep in 2012; crossbred sheep showed an increase of 24.3% in 2012 while indigenous sheep showed a decrease of 6.9% in 2012.

Dung of the sheep and goat was spread out in pasture / road side. As per IPCC default factors methane and nitrous oxide was estimated. Nitrogen in faeces was calculated based on the values taken from literature. Total methane emission from dung of goat and sheep was 4.82 and 3.82 mega gram in 2007 and 4.85 and 3.61 mega gram (ton), respectively in 2012. Goat contributed 3.81 and 3.85% and sheep 3.02 and 2.87% in 2007 and 2012 respectively out of total dung methane. As compared to 2007, increase in goat was by 0.52% and in sheep there was decrease by 5.49%.

Total emission of nitrous oxide was 3.28, 2.60 in 2007 and 3.30, 2.46 in 2012 in goat and sheep respectively. Total green house emissions (CO₂ Eq) were 6.15, 5.0 in 2007 and 6.19, 4.67 in 2012 by goat and sheep in India.

PSCC15

Extreme Hot Environmental Temperature vis-à-vis Endogenous Oxidative Stress Biomarkers of Non-Descript Goat from Arid tracts in India

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Keywords: Environmental temperature period, biomarkers, hot, non-descript goat, malondialdehyde.

ABSTRACT

To investigate the extreme hot environmental temperature period associated alterations in endogenous oxidative stress biomarkers status of non-descript goat of arid tracts in India, blood samples were collected to harvest sera from male and female non-descript goats of 4-13 months of age groups during moderate and extreme hot environmental temperature periods. The endogenous biomarkers of oxidative stress viz. vitamin A, vitamin C, vitamin E, malondialdehyde and gamma c (GGT) were assessed in the serum samples. The moderate mean values ($\mu\text{mol L}^{-1}$) were 2.05 ± 0.12 , 23.00 ± 0.12 , 3.70 ± 0.10 , 2.85 ± 0.040 and $69.95 \pm 1.25 \text{ UL}^{-1}$, respectively whereas the values for hot environmental temperature period were ($\mu\text{mol L}^{-1}$) 1.74 ± 0.13 , 19.00 ± 0.13 , 2.70 ± 0.10 , 5.90 ± 0.041 and $204.00 \pm 1.33 \text{ UL}^{-1}$. The levels of vitamins playing role as an oxidative stress biomarkers found to be decreased significantly ($P < 0.05$) during extreme hot environmental temperature period as compared to moderate temperature except malondialdehyde and GGT which were increased. In each temperature period the effect of age and sex was significant ($P < 0.05$) on each oxidative stress biomarkers. It was concluded that extreme hot temperature produced oxidative stress in the animals by altering the levels of biomarkers. Therefore, from the study in order to improve the stress response in non-descript goats, ration of animals must be flourished with suitable antioxidants to strengthen the antioxidant status along with shielding the body from unusual influences of extreme hot temperature periods.

PSSC16

**Gross-anatomical Development of Certain Facial Bones in Prenatal Goat
(*Capra hircus*)**

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Key Words: Development, facial bone, prenatal goat

ABSTRACT

The study was conducted on heads of 10 goat embryo/ foeti of non-descript goat irrespective of sex from 50 days to 150 days of gestation. The material was collected from the embryos/ foeti of known weight and gestational age available at the department of Veterinary Anatomy (left from previous research work). The malar bone was ossified in the form of ridge at 50 days of gestation. The zygomatic process divided into two parts viz: frontal and temporal branch at 60 days of gestation. Almost half length of nasal bone was ossified, periphery was intense and centre poorly ossified at 60 days of gestation. The ossification percentage in bones increase as age advanced. The body of mandible had alveolus and unossified incisor teeth at 130 days of gestation. In Maxilla alveolus cheek teeth appeared but ossification in teeth were less marked at 130 days of gestation. Complete zygomatic arch was observed at 150 days of gestation. In body of mandible incisor teeth appeared, in horizontal part of ramus the ossification was more in extrimities than middle. In Maxilla the upper cheek teeth were appeared with intense ossification, caudal teeth were less ossified than cranial ones at 150 days of gestation.

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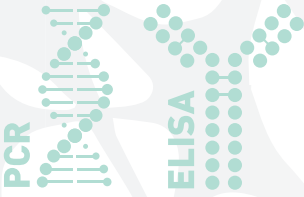
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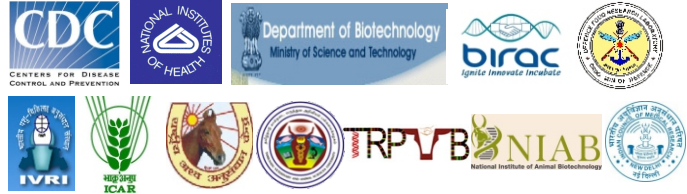
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