SCALING-UP SUCCESSFUL PRACTICES
ON SUSTAINABLE PRO-POOR SMALL RUMINANT DEVELOPMENT

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International Goat Association
12709 Grassy Drive Little Rock AR 72210 United States

Heifer International
1 World Avenue Little Rock AR 72202 United States

International Fund for
Agricultural Development
Via Paolo di Dono, 44 00142 Rome, Italy

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ON SUSTAINABLE PRO-POOR SMALL RUMINANT DEVELOPMENT

A study undertaken by the International Goat Association
and financed by the International Fund for Agricultural Development

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ANOC – National Sheep and Goat Association (Morocco)
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INRA – French National Institute for Agricultural Research (INRA France- INRA Morocco)
MDGs -- Millennium Development Goals
NGO -- Non-Governmental Organization
SWOT -- Strong and weak internal points, external opportunities or threats

Goat raising is considered by many governments, developing agencies, non-governmental organizations (NGOs) and research centers an effective pathway out of poverty for smallholder farmers in developing countries and many projects have been implemented to develop the sector. After decades of investment projects, there are now evidences that goats could be instrumental in improving the livelihood of the rural poor, mainly because goat production systems are based on the utilization of natural resources, local knowledge and require limited financial investments.

Smallholder producers, particularly women and youth, are currently facing some urgent challenges and global changes, goats can help them build a sustainable future (e.g. food security, increasing demand for high quality protein, climate change, etc.). Goat development represents a valuable low inputs solution contributing to the achievement of the Millennium Development Goals (MDG). Unfortunately, references to good practices and lessons learned in scaling up successful projects are still very scarce and many projects experienced unsuccessful results.

In this study, a comparative analysis of several significant cases worldwide has been undertaken to identify successful factors and practices leading to sustainable pro-poor small ruminant development projects, including dairy, meat and fiber commodities.

A number of case studies have been prepared by using the "Knowledge Harvesting" methodology, exchanges and interactions with sector's experts and stakeholders involved in the several projects, the context of each case and the actors system have been described as well as the main production systems. For each case study, strong and weak internal points, external opportunities or threats (SWOT analysis) have been identified and discussed during a workshop organized in the context of the International Conference on Goats held in Las Palmas de Gran Canaria (Spain) in September 2012.

In a dedicated section of this study, a detailed description of "how to design" projects for goat development has been presented. Different scenarios have been analyzed giving specific recommendations building on good practices and lessons learnt, to respond to different social and economic situations; emphasis is given to appropriate methodologies for monitoring and evaluating the proposed models.

In order to respond to the growing demand from governments, developing agencies, NGOs, etc. to design Goat Value Chain development projects, the study includes a Goat Value Chain Toolkit which has been prepared on the basis of field experiences to support operationally the project leaders. The importance of designing business planning has been recognized and a cost–benefits analysis has been prepared for each case study from FAO Investment Center.

The authors are confident that the study provides insightful steps and tools for project designers and implementers, which will allow the design of more targeted, inclusive, gender balanced, economically viable, sustainable projects by minimizing risks of failures.

This study revealed that wherever goat production is a viable opportunity, investing in this sector could be very profitable even with minimum but targeted interventions and many rural households could realistically get out of poverty. In fact, with well-designed and monitored projects, the economic analysis has shown that an investment return of more than 40 % would not be rare.

An Overview of the Context of the Study and the Socio-economic Importance of the Goat Sector

All quoted references have been reported in "Additional resources" at the end of the report of the study.

1 The development of goats and poverty reduction: Economic and political perspectives regarding general issues on the livestock sector

1.1 General world development issues for poverty reduction and the Millennium Development Goals

The United Nations Secretary-General Ban Ki-moon has perfectly summarized the ambition and challenges of the Millennium Development Goals (MDGs) to alleviate extreme poverty by 2015. *"Eradicating extreme poverty continues to be one of the main challenges of our time, and is a major concern of the international community. Ending this scourge will require the combined efforts of all, governments, civil society organizations and the private sector, in the context of a stronger and more effective global partnership for development. The Millennium Development Goals set time bound targets, by which progress in reducing income poverty, hunger, disease, lack of adequate shelter and exclusion — while promoting gender equality, health, education and environmental sustainability — can be measured. They also embody basic human rights — the rights of each person on the planet to health, education, shelter and security. The Goals are ambitious but feasible and, together with the comprehensive United Nations development agenda, set the course for the world's efforts to alleviate extreme poverty by 2015 ".*

Eight main MDGs have been acknowledged internationally during the Millennium Summit in September 2000 and their progresses reported during the 2010 MDGs conference:

Eradicating extreme poverty and hunger,
Achieving universal primary education,
Promoting gender equality and empowering women,
Reducing child mortality rates,
Improving maternal health,
Combating HIV/AIDS, malaria, and other diseases,
Ensuring environmental sustainability
Developing a global partnership for development

Many progresses have been achieved between 1990 and today. For example, the number of people facing extreme poverty (with less than USD 1.25/day) has decreased from 1.8 billion in 1990 to 1.5 billion in 2005. The objective to halve the 1990 number in 2015 (less than 900 million people and 15 % of the human population) is still possible to reach. The economic and financial crisis that began in North America and Europe in 2008 sparked declines in commodity prices and investment. The result is a slower growth at the world level.

As the global growth cannot be sufficient to make possible to reach nearly mechanically these objectives, other ways have to be developed through efficient and diversified local, regional and national projects.
Until recently, agriculture has been neglected in the investments for development. There is today more and more awareness that small-scale farming has to be promoted both to fight extreme poverty and hunger ensuring environmental sustainability but also several other MDGs.

In a time when intensive and commercial animal production is more and more considered as a major cause of degradation of natural resources and emissions of greenhouse gases, smallholders raising small livestock could contribute significantly in protein supplies by using renewable natural resources such as forests, rangelands or sub products. The hypothesis we develop in this study is that MDGs could be achieved thanks to this small livestock and particularly goats. This hypothesis is based on the clear evidence that although the goat sector is still less important than other animal production sectors it has significantly grown more than the other animal production sectors. It is easy to show that this growth has been particularly evident in smallholder systems in developing countries, particularly the poorer.

(FAOSTAT, 2013)

		World		*Difference (%)*
		1990	*2011*	
Livestock numbers (million head)	*Goats*	*589*	*924*	*+ 57*
	Cattle	*1 296*	*1 426*	*+ 10*
Milk (million tons)	*Goats*	*10*	*17*	*+ 68*
	Cows	*479*	*614*	*+ 28*
Meat (million tons)	*Goats*	*2.6*	*5.2*	*+ 97*
	Cattle	*53*	*62*	*+ 18*

Our hypothesis is that goats can contribute in main MDGs such as eradicating extreme poverty and hunger (by developing the income of goat keepers), reducing child mortality (by improving hygiene), promoting gender equality and empowering women (by promoting the women's activities with goats and marketing milk meat or fibers), ensuring environmental sustainability (with production systems based on renewable resources) and developing a global partnership for development. At a lower stage goat development can help combating HIV/AIDS and improving maternal health (thanks to the specific qualities of goat milk).

The objectives of this publication are to scale up success factors for projects involving goat raising and related activities these activities and propose tools to help the project planners and institutions in preparing their business planning to get more chances of success.

1.2 To reinvest in agriculture: What development strategies and investment to promote?

The FAO report on poverty underlines that *"a key challenge to the development of agriculture in areas dominated by smallholder farmers is the establishment of coordination systems involving combinations of government agencies, civil society, farmers and other professional organizations, and agribusiness firms. The prevailing policy paradigms in developing countries, where a systematic bias towards industrialization and concentration favors large- over small-scale operators is the under provision of local public goods and services, the consequences of which affect the poor disproportionately".*

This statement suggests that a main danger of the public policies (to answer the global need for food)

would be to encourage investment on productivity that would favor more the wealthier actors than the smallholders. Besides, when market mechanisms fail to deliver private initiatives, agency and public leadership are needed, in particular to favor primary investments. In many cases, although public services are often in bad conditions, they are the only one that could really impulse development in cooperation with local agencies to secure risks and create confidence. As agriculture and animal production are highly risky activities, some pilot projects, with modest but targeted interventions, and continuous learning from the results are more likely to lead to the desired outcome of poverty eradication. Investment in extension services and collective capacity is in all cases a key factor. A good example is why many technologies to increase the nutritive value of straws for feeding ruminants, especially urea–ammonia treatment failed to be adopted by farmers. The major reasons, identified during an e-conference organized by FAO (2012) and also relevant to many of the other technologies, were weakness of extension services in developing countries, failure of scientists to involve farmers when developing new technologies and failure to demonstrate convincing benefit/cost ratios.

1.3 Agro-ecology and livestock for poverty reduction

More and more economists such as Tim Jackson have enhanced the limits of the global worldwide present development model of economy including agriculture (Jackson, 2009). They emphasize that new paradigms are necessary to find the way of a new prosperity in agriculture. The United Nations, with Olivier De Schutter's report on the right to food (2010), has estimated that this investment has to be made mainly through agro-ecology or ecological intensification.[1] Many people still think that agro-ecological agriculture cannot be competitive with the "modern" agriculture using high inputs and techniques based on a large use of chemical fertilizers, improved plants, and mechanization. But agro-ecology is not seen here as a marginal mode of agricultural development but as a real other necessary structural orientation which has proven results for fast progress in productivity as well as in the concretization of this human right for food for many vulnerable groups in various countries and environments.

In other words, agro-ecology could be fully compatible with the fight against poverty but is also an answer to the environmental problems and climate change, one of the MDGs and challenges the world has to face. And it is the most suited alternative for poor families.

Agro-ecology promotes an integrated management of nutrients with an important utilization of human labor and less external high energy inputs. Its priorities are:

Investments in public goods

Investment in knowledge and training

Investment to increase productivity by valorizing labor forces

Social cohesion by co –building of solutions rather than by "participation" only

Making the farms more autonomous at several levels that meaning smaller family farms;

Organize the markets.

1 Ecological intensification means that productivity/ha could be increased thanks to ecological processes and function. Agro ecology is more a whole-systems approach to agriculture and food systems development based on traditional knowledge, alternative agriculture, and local food system experiences.

All these points are clearly linked to the objective of ecological intensification based on an alternative trend to agriculture mechanization, use of fossil energy and artificial conditions of production by manufactured inputs (e.g. mineral fertilizers, feed stuffs), and use of highly productive improved breeds.

The priority is to foster families to reach more economical independency through « a sustainable management of fertility (thanks to complementarities between agriculture and animal production), more resilience to develop the capacity to resist hazards, and use of more adapted resources like legumes and by-products.

The empowerment of local farmers is a major issue of agro-ecology, it is perfectly convergent with the objectives to fight poverty. In other words, it is the only way to fight poverty in a sustainable way. Goats (and sheep) would be in many cases well adapted to answer these issues.

For instance, pastoral systems are a major issue and a major complex problem for development (Sidahmed, 2011). Correctly managed, without overgrazing, pastoralism and pastures on rangelands can improve soil fertility, preserve biodiversity in forest plantation, and sink carbon in improved savannahs. But by lack of local governance, control and services, we observe often overgrazing that can favor soil erosion and compaction, and loss of nutrients. To manage these questions, public institutions and financial bodies (although often in weak situations) must become also learning spaces and exceed their routines to think strategically of ways to globally improve a situation. In other words, although it is often suggested that conditions to maintain pastoralism are too difficult, any answer has to carefully analyze the local situation. This approach can be extended to other types of systems.

We have to be aware that in many ways agro-ecological innovation and ecological intensification are a systemic and rather revolutionary way of thinking that can disturb the representations and the technical models of many actors including many scientists and technicians.[2] These representations which are mobilized for instance in public policies are a major constraint to develop ecologically intensified solutions.

2 General considerations on goat production systems and commodities for goat sectors all around the world

2.1 Goat production systems are generally multipurpose systems with still few connections to the organized markets.

The goat sector has not followed the same way of development and intensification as other livestock production sectors (such as cattle, poultry, pigs, etc.). Goat activities have been largely excluded from organized markets. To face new development issues, this reality could be an advantage.

Goat production systems were mainly multi-purposes systems oriented on milk and meat and in some special areas (as Central Western Asia or China) on meat, milk, fiber and skin (Dubeuf et al., 2004, Morand-Fehr et al., 2002).

Goat development projects generally take into account these multifunctional characteristics: multi-functionality is largely specific to small ruminant systems and make them well adapted to agro-ecological orientations. Strategic options to improve small ruminant production are not related mainly to

2 The concept of " lock in" (16) has been introduced to explain why several actors keep on supporting a model although many evidence show it is no more efficient and has many negative externalities.

one commodity and must prioritize on social capital and the access to services (training or veterinary services and vaccination) (Pollott et al., 2009). The low level of specialization was seen as a weakness but it could also be seen as strength for rural development in the sense that the pro-poor rural development projects have to take into account all the global production system with a balanced integration of animal production and agriculture.

But many solutions are also related to the special constraints of each commodity (without promoting specialization as the way of development). It is the reason why it seems logical to specifically analyze the situation of each commodity. The analysis will be based on the diversity and converging points of the compared cases met all over the world. Analyzing each commodity separately does not mean we do not consider these multipurpose characteristics.

2.2 A still depreciated image of the goat activities by many stakeholders

Another important characteristic is related to the representation of many stakeholders regarding goats. Although the situation is slightly changing, goat activities are still largely not seen as socially and economically valorizing the related populations.

In other words, many stakeholders still think that goat projects do not help people climb the ladder out of poverty. For breeders themselves, goats could be seen as a transitory activity before a more attractive reconversion. Even in the successful cases studied, such as Brazil, people may think that goat keepers would not choose other goats if they would have the choice and would prefer to train their children for other jobs. To change this vision is also a major issue and there are some examples in developed countries that have shown it is possible. In Provence (France), an old pastoral Mediterranean region, many goat keepers with recent college degrees have developed farmstead goat cheeses and have radically changed the perception of the activity by society.

Considering the role of goats to support poor people would not need to be simplistic. At the territory level, statistics are often scarce and indicators that are too global (as means) do not adequately describe the diversity of situations. The quoted bibliography gives clear assessments on these points:

- Goats are well adapted to arid areas. It is true that investments needed to develop goat production are lower than for cattle and could provide livelihoods in difficult environments; but goats cannot be proposed everywhere, as a way to fight poverty, when the socio-economic local conditions are not present to develop it (when there is a lack of infrastructure to market the products or because people are not used to raise goats).

- The market conditions should be considered. It is important to consider this factor to decide to implement goat projects or not but an open minded approach of the market is necessary (including local and household consumption, social and governmental acceptance, etc.).

- The objectives of the project have to be defined according to the initial situation (in terms of education, infrastructure, etc.), funding invested and returns expected but sufficient time has to be considered to get sustainable results.

- The local public services are an important factor of success but informal economy and local organization have to be taken into consideration.

- Developing technical improvement is important but not always the solution to solve the problems that could be linked more to political, administrative, cultural or economical aspects.

- It can be often relevant to focus projects simultaneously on several objectives but too many co-objectives could reduce efficiency (e.g. gender conditions, market structuring and productivity, etc.)

The present development of goat farming is more generally related on the growing demand for animal products in developing countries and to the increase of individual incomes for a larger part of the population.

There are other consequences of the negative image of authorities on goats. The public authorities have generally a very similar vision and it is very difficult to convince them to invest in goats for instance on extension services, training, etc. When the demand of small ruminant products is high (as it is the case in Turkey with sheep and goat cheeses), the public authorities generally prefer to support rather wealthy investors to develop intensive well structured production systems and cheese making units rather than investing on the organization of poor rural populations (cf. Knowledge Harvesting report on Turkey). The projects are often short-term with little sustainability or impact.

Therefore, the goat oriented projects must participate in re-qualifying professional goat production, favoring the empowerment of rural populations and producing a true long term social capital (organization of associations, training centers and extension) and supported by the development of infrastructures (e.g. water, roads, access to energy, Information and communication technologies, slaughter houses, local dairy processing units, creation of breeding centers).

3 Which smallholders to focus on for reducing poverty by livestock development?

Small-scale farmers are more and more often considered as an opportunity for the problems faced by livestock activities (Hall et al., 2004). FAO and the World Bank have discussed the conditions for pro-poor livestock sector development in a recent report (Otte et al., 2012). These conditions are general and have to be discussed and applied to each sector. They underline that market-oriented livestock production could be engaged with smallholders but more easily by better-off smallholder livestock keepers – who have the minimum asset base for engaging sustainably in market-oriented livestock production, rather than focusing on marginal livestock keepers, who have insufficient assets to produce a regular surplus from their livestock.

The main issue is that increased labor productivity is essential for linking smallholder production to poverty reduction and requires minimum farm/herd sizes, some investment in mechanization, and diversification into higher-value products. However, unstable food prices with higher margins for marketing than for production encourage poor producers to prioritize staple food production for own consumption before diversifying into higher-value commodities for sale (Poulton et al., 2006). Increasing smallholder productivity involves the development of supply chains that would serve small-scale farmers and provide them with the necessary links to suppliers and consumers (Thurlow et al., 2010). The need to improve herd management is not limited to market-oriented projects. To improve household food security and local consumption would generally also require improving herd management.

The goat sector is less organized than other livestock activities and very often the herds have few heads. To reach a minimum herd size for improving herd management could be an objective for many projects (15 to 30 heads or more according to the area). But not all the households will become entrepreneurs and

the herds are not always owned by families. Considering the community level and the returns of a village herd (for instance of more than 200 heads) could be relevant

4 In what rural areas promote livestock and goats?

In developing countries, goats are raised in peri-urban, "rural" and remote rural areas. We have not included in our study peri-urban cases because most of the projects regarding goats are for rural populations but these systems exist. It has been underlined that poverty incidence tends to be highest in sparsely populated remote areas. But the proven development strategies other than outright transfer are very scarce, they are often very costly and poor countries can ill afford them. Does that mean that these remote areas should be abandoned and their population condemned to emigration in already overpopulated areas? Although the pastoral systems are considered to be well adapted to harsh conditions, they are threatened by the lack of infrastructure. The pastoral systems are present in remote areas and often facing drought and climate change. The goats can be an opportunity if the projects could gather people in villages near wells to practice agriculture and near main roads to get supplies and services. Strategies regarding the future of these pastoral systems are very urgent. Policy emphasis here should be directed to reduce vulnerability, for example by protecting livestock assets. In addition, pastoral areas are less populated than rural areas surrounding urban and small town areas. Consequently, the majority of poor people live in these areas and this fact suggests that a strategy for poverty reduction should be built on urban-rural growth linkages and promoting market access incrementally, radiating outwards from urban areas into the rural areas.

5 Characteristics and diversity of the goat milk and cheese commodities

Somehow, the organizations promoting goat production at local, regional, national or international levels such as NGOs have also integrated the usual image about goats. The solutions proposed are often based on positive and rather simplistic hypotheses. An analysis of the presentations and objectives of each project would let one believe that all the poor would be born - managers if they had facilities and if they would receive technical information and resources (Abhijit and Duflo, 2012); they generally surmise that they would form homogenous groups (the poor, the villagers, the goat keepers, etc.) ignoring the internal competitions, relations of power within each community or with more wealthy social groups (bigger farmers), their motivations and initial skills and the consequences of these possible tensions or weak points on the possible failures of the projects.

Consequently, the projects are often built on a global model, largely ignoring local constraints and without previous analysis of the farmers' expectations and those from other actors. Arguing on the generally low capacities of poorly educated people, the projects are not often built on a genuine shared and discussed vision. Participative approaches, now nearly always enhanced, generally ignore the differences and social situations of the beneficiaries, which can introduce bias in the debates.

Conversely, in spite of this, several decades of presence in a region (Farm Africa in Kenya, HPI in India) can give a good empirical expertise and largely make up methodological aspects.

The goat productions systems are very diverse. The typology built on 3 major types by Sidi Ahmed (2011) for IFAD (pastoral and agro-pastoral systems, mixed crop/livestock systems, intensified commercial systems) is global and will be used in the following analysis. The characteristics of goat milk, meat and fiber commodities will be analyzed successively.

6 Markets and value chains

According to FAOSTAT (2013), world goat milk production is significant (17'091,225 tons in 2011) and constantly growing. The interest for goat milk is steadily increasing, including in regions where until now the production is marginal (i.e. South – East Asia , Latin America, Eastern Africa) when the traditional pastoral systems are often disappearing or in way of marginalization (e.g. Middle-East, Mediterranean basin).

Nevertheless, probably less than 10% of the goat milk produced in the world is integrated in an organized sector and the volumes sold are very limited except in very specific regions of developed countries (Western Europe, France, The Netherlands, Spain) or in micro sectors (Southern Brazil, USA, Israel, some parts of Mexico, etc.) with very specialized systems. Consequently, the world goat milk market does not exist and most of the goat milk markets are niche markets. To identify and quantify the market is a priority before deciding to implement any project focused on goat milk. According to the several cases identified, we can propose the following typology of the several markets:

Market	Products	Examples
(Local (Auto-consumption Villages	Raw milk	Eastern Africa
Regional collecting	Raw and UHT milk.; often supported by public funding for social purposes	North–Eastern Brazil
National and regional market	Local specific products	Mexico (dulce de leche) Tajikistan ("khurut", salty dried bowls of yogurts of several sizes) Venezuela (cheeses) Senegal (Acid milk) Cabo Verde, Lebanon (cheeses)
Regional products for expatriated and richer populations population	Innovation products-	- farmstead cheeses (Mexico, Senegal, North of Morocco, Vietnam)

The main threat to successful goat development projects is to quickly saturate the market. The success of a project can lead to over production if not anticipated and lead to the non-sustainability of the activity. This threat is higher for untraditional goat cheeses (for instance French acid type) as they require high technical skills and investments. Only local medium-size farmers could meet these conditions and easily capture the market with few actors, very quickly eliminating the smaller and less trained producers.

The main issues to develop dairy goat value chains are:

-Organization of village shops to market the local milk;
-Organization of milk collection (possibly with the support of dairy cow pre-existing companies)
-Technology and knowledge in milk collection and processing
-Organization of packaging and product identification associated to quality control and pasteurization

6 Genetics and selection issues

Most of the goat population in the world belongs to multi-purpose breeds. The number of specialized dairy breeds with a significant organization of selection is very limited. The main dairy goat breeds are Saanen, Toggenburg, Alpine, Damascus, Murciana Granadina, Malaguena, Maltese.

Due to the characteristics of the dairy markets mentioned previously, a dairy goat oriented project often has to improve the dairy productivity of the herds. This improvement can be achieved in several ways:

Within herd selection, if the existing animals already have a decent dairy productivity (for instance at least ≥ 1.5 L/day/animal).

Inclusion in the herd of animals with dairy potential.

Import of high yielding selected animals. This solution generally requires very high investments and has high risks. Sources of risk include: adaptation of the imported animals, nutritional management of high-yielding dairy animals, and access to high quality feed resources, and their possible competition with human resources.

Organization of breeding centers to offer local farmers selected animals. The difficulties are related to the capacity and training of local professionals and the implementation of a sustainable organization.

7 Goat forage systems and milk production

7.1 The pastoral and agro-pastoral systems

The pastoral and agro-pastoral systems are the most frequent, especially in arid and semi–arid areas. They are based on the free management of natural resources on more or less large spaces. Transhumance is the most common way to manage these systems as the shepherds lead the herds to the present resources. Nomadic systems are the more extreme type of pastoral systems as all communities move with the herds. The pastoral herds are generally composed by different livestock species (sheep, cattle, camels and goats). Pastoralism has had a very good resilience until now and has been the origin of strong and old cultures. Thanks to these characteristics, the animals have developed abilities of resistance and adaptations to several stressors (drought, forage shortages, heat) at the expense of productivity. The pastoral systems have different outputs and the animals are milked for household consumption. But they are often not adapted to modern dairy production. The requirements of an organized improved dairy production do not mesh easily with pastoral systems. Animals have to keep enough reserves to be able to feed their kids and produce a certain amount of milk. A minimum forage quantity and quality is necessary and complementation has a direct positive effect on milk production with generally good economical added value.

Pastoral areas associated with cultivated crops and by-products could be a solution to associate goat milk improvement and pastoralism but before implementing such a strategy, the project actors and funders have to be aware they would always modify the existing systems, thus often limiting the time spent on range lands and the mobility of the herds. Elsewhere, they always lead to augment settling the herds. The consequences of these changes on the communities and their level of acceptance have to be anticipated and discussed to reach a compromise and limit the risks of failure.

7.2 The mixed crop-livestock systems

They are based on the use of crops and by-products associated with grazing. Such systems are generally compatible with goat milk production if the animals have suitable genetic abilities even in semi-arid areas ; there are generally developed to satisfy household consumption needs and their improvement could lead to more intensified systems. The systems are most suited to pro-poor multipurpose projects including dairy when local populations have no prevention against the consumption of milk (like in Eastern Africa).

7.3 Intensive commercial systems

These systems are more suited to intensified goat milk production systems with higher performance animals, improved nutrition and management. It generally requires higher investments and good professional capacities. Examples of these systems are often the models developed successfully in developed countries (France, Spain, and The Netherlands) with improved animals. Any project based on these systems has to carefully evaluate the capability of the farmers to develop them in a sustainable manner at the end of the funding phase. These intensive systems requires reliable access to input and output markets; human, organizational and technical resources; and services (e.g. training, health, vaccination, credit).

The projects based on these systems are generally consumer-funded because they require often heavy investments on genetics, nutrition, and commodities . Due to these characteristics, the final beneficiaries of projects based on intensified systems could often be middle – size breeders desiring to improve their individual market and with little impact on the global poverty level of their community. Some projects have tried to develop intensification for very small herds such as in Kenya. The validity of this approach about the prospects of such systems should be questioned.

8 Gender issues

Gender aspects are generally important in goat milk production as women generally take care of the animals and milk or process the milk. Training the women could be a way to implement projects (as in Eastern Africa) but each local social situation regarding women has to be studied carefully so as to not deeply affect local traditions.

9 Characteristics of the goat meat commodity

The world meat sector has been growing dramatically and continuously for several decades. This increasing demand has been mainly in favor of the cattle and poultry sectors. The consequences of this increase in livestock production on the environment were brought to light by a well-known FAO report called Livestock's Long Shadow (Jutzi and al., 2006).

Compared to beef production (more than 60 million tons), goat meat is marginal (around 5.23 million tons in 2011) but the demand is growing faster and production is probably under estimated due to the high level of household consumption. In some areas like India, Pakistan, Middle-East, Mexico and USA there is a real boom for goat meat and even in areas such as Morocco where people were preferring sheep meat, urban consumers are increasingly appreciating goat meat for its dietary qualities. The international market is still not developed (0.5 - 1%) but is growing. Australia and South Africa developed the export of goats (mainly feral goats in very extensive systems). Although the internal demand is high,

India exports more and more goat meat to the Middle-East, a trend that could endanger its food safety in the middle term.

The main characteristics and issues of the goat meat market are the following:
• Predominance of traditional marketing channels (local markets and butchers, souks in Maghreb, "dibiteries" in Western Africa),
• Importance of consumption related to religious festivals (mainly Muslim ones but not only),
• The functions of traders and other intermediaries to market the animals,
• The animals are often seen as a capital and not a product. So they are often sold when cash is needed, particularly in pastoral areas,
• Goat meat is not always well differentiated from sheep meat and is therefore sometimes considered as low quality meat,
• There is a lack of knowledge on packaging, cutting and preparing meat for urban markets.

The main equipment and infrastructure needed to improve goat meat marketing are:
• Investment in local slaughter houses (or urban ones if transport of live animals is possible),
• Investment in well identified market places for live animals,
• Processing technologies,
• Transportation facilities,
• Weighing equipment to control the weight of animals,
• Sanitary and veterinary controls.

Organization of trading by improvement of the negotiating capacity of the farmers is a major issue. One objective would be to keep most added-value to the farmers.

Certification of goat meat for instance by geographical indication (as in Morocco or Argentina) could be a way to identify and promote better goat meat products. It is not only a way to increase prices but also to better organize the sector and involve the government bodies and public services to increase their awareness of these questions.

10 Genetic selection and herd management

Although the census of goats has increased by 66 % in 20 years (against "only" 20% for cattle), a large majority of animals are composed of non-specialized animals and neither selected nor defined local breeds (Dubeuf and Boyazoglu, 2009).

Selection of goats is nearly limited to dairy goats in Europe and America with the exception of the case of the Boer breed with well organized selection schemes in South Africa or China. The initiatives are mainly to characterize meat goat breeds than really improving the breeds (case of Atlas goat in Morocco, Indian goat breeds, etc.). For this reason, organizing breeding centers seems to be very premature but a special effort has to be done to improve the breeding management and local selection within the herds.

Very often, and especially in mixed-sex herds, all the animals are together without separating male from female kids, thus with no control on ascendance as male kids are not castrated). One objective within development projects would be to develop extension education materials/courses on herd management. A minimum size of the herds would be necessary to properly manage selection. In addition, there is

generally little preparation before mating (e.g. flushing) and reproduction is not organized regarding the market expectations.

Furthermore, more acute than for dairy goats, the lack of veterinary services and vaccination is a high cause of low productivity and mortality.

11 Goat meat oriented production systems

The herd size is generally larger than for dairy goats and it seems that the gender aspects are lower than for dairy goats The herds are often held by men with the support of women and children, as in it has been seen in Morocco or Senegal (see the Knowledge Harvesting form about these two situations). The production systems are often pastoral and agro-pastoralism because they are well adapted to meat goat production. Pastoralism needs less input and less infrastructure is needed for goat meat.

One difficulty is that in many pastoral situations the herds are composed of cattle, sheep, camels and goats, thus increasing the level of difficulty to improve their management.

Mixed crop-livestock systems would ease the use of crop residues and by-products to complement the animals.

Innovations (e.g. mineral supplementation, complementation before mating, fattening the kids before slaughtering) will have to be shared with farmers and new techniques (pasture calendars, management practices) associated with local know-how. Extension services and grazing regulations would require the involvement of public authorities. However, intensified production systems would generally not be dedicated to meat goat production.

12 Characteristics of the goat mohair, cashmere and skins commodities

12.1 The mohair and cashmere markets

The fiber goat sector consists mainly of two different products, Angora Mohair wool and Cashmere hair plus the goat skins. Information on this sector is still scarcer than for other commodities.

The cashmere sector:

During the last 10 years, the cashmere industry developed very quickly (Dubeuf et al., 2004) mainly in China (2/3 of the total production) but also in Mongolia, Central Asia Republics of the Ex-USSR. In China, Wuhai, a town has been developed to house the workers of the cashmere industry and goat farming for cashmere leads to overgrazing in the pastoral areas of Central China. The cashmere industry is considered a major contributor to climate change, drought in Central China and the always increasing sand winds in the Beijing region.

Due to the strong demand, there are development opportunities for even poor farmers but the major issue is to separate high quality fibers from medium or low quality ones to sell them at a better price. Another issue is to organize farmers' associations so that they could negotiate with international traders or intermediaries for the international markets. Here again, the functions of public authorities are key factors to succeed.

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The mohair sector:

50 % of the total production of Mohair is produced in South Africa for a small number of buyers (the biggest is in the UK). The opportunities to develop mohair production are limited for small goat keepers for the international market. Some local niche markets related to the development of tourism could be explored (see the example of Argentina) where such a production has always been present.

Goat skin:

The goat skin sector is not very developed but goat skin could be an interesting complementary resource when there are industries ready to invest and develop this growing market to produce generally high quality leather. In the last years in India (that is one of the major producers) goat skin production has significantly increased due to an investment policy promoted by the Government

12.2 Genetic selection, herd management and production systems

The issues for goat fiber are very close to those of goat meat (and very often) fiber is sold with meat.

The main issues are:

• Pasture management to avoid over grazing (see the "Goat law" to manage the common pastures in the Knowledge Harvesting report on the Neuquen Criollo Goat, Argentina),

• Feedstuff, vitamin and mineral complementation to improve the fiber quality and productivity of the animals,

• Use of selected animals. Angora goat breeds are among the improved goat breeds with breed herd books in USA, Australia, South Africa or China. Incorporation of improved angora blood should always be considered very carefully before any crossing with local breeds (see the case of Tajikistan) and to ascertain it will not affect the other products,

• Control of reproduction to improve the planning of kidding.

Goat development as a tool for poverty alleviation

an IFAD perspective

Antonio Rota, Senior Technical Adviser, Policy and Technical Division (PTA), IFAD, Rome, Italy

Goat development as a tool for poverty alleviation: an IFAD perspective

Antonio Rota, Senior Technical Adviser, Livestock and Farming systems, IFAD, Rome, Italy

Global human population is rapidly growing, creating a significant and increasing demand for food derived from animal protein. The livestock sub-sector accounts for 30 % of the agricultural Gross Domestic Product (GDP) in developing countries and grows faster than most other agricultural sub-sectors. It is fundamental to the livelihoods of about one billion of the world's poorest inhabitants. Small livestock in particular, is vital for the livelihood of many rural resource-poor farmers often being the only asset they possess. Sheep and goats, poultry, pigs, rabbits, etc. significantly contribute to improving human nutrition, providing food with high quality nutrients and micronutrients; generate small income and savings, especially for women, enhancing the capacity to cope with shocks and reducing economic vulnerability (e.g. for HIV/AIDS affected households), and in times of crises (i.e. droughts, floods, conflicts), play an important role as 'mobile' food asset. Finally, small livestock are often the "sacrificial" animal during religious festivals and social ceremonies.

IFAD has recognized the importance of investing in small livestock development as a tool for poverty alleviation and various development projects include components focussing on improving goat production. The main reasons for investing in the rearing of this species are:

- Goats are often the animal of the resource-poor rural households and goat keeping proved to be instrumental in achieving the Millennium Development Goals (MDG) (see above issues related to nutrition and income generation).

- The diversity of goat production: meat, milk, skin, quality fibres (e.g. mohair and cashmere) and manure, coupled with the opportunity to add value to such products at household or cottage level.

- The capacity of goats to adapt and cope with different environmental and climatic conditions. In particular, goats can be productive in arid and semi-arid areas characterized by extended dry lands or rangelands, located in deserts, savannahs, highlands or mountainous areas where other livestock species cannot survive.

- The rather significant and quick return in financial and non-financial terms of a relatively low investment per project's "beneficiary". Moreover, the practice of bartering 6-8 goats against one head of dairy cattle is quite frequent, allowing rural farmers to: (i) climb the "development ladder" in socio-economic terms and (ii) mitigate risks (e.g. insurance against crop failures) and diversify/enhance mixed crop-livestock production systems.

IFAD has several on-going projects supporting goat development characterized by two defined approaches: 1. Supporting resource-poor farmers in improving the productivity of their goat herds through "appropriate" and targeted interventions such as vaccination (e.g. against Peste des Petit Ruminants - PPR) and deworming, improved nutrition, better access to water, good quality breeding stock and better

sheltering of animals; and 2. Value chain development projects of goat products (see above) aiming at facilitating associated small producers and "market makers" (e.g. traders) to better access services (credit, vet services, inputs, etc.) and markets. It is quite impressive to observe that despite the socio-economic and cultural differences among various countries and regions of the developing world, the key constraints (but also opportunities) for resource-poor farmers keeping goats (and livestock in general) are essentially the same:

- inadequate nutrition and feeding management,
- high mortality due to diseases (especially in young stock) and no access to veterinary services,
- low genetic potential and lack of access to quality breeding stock,
- lack of adequate sheltering and watering facilities,
- limited market outlets and processing facilities for livestock and their products, and
- lack of incentives to produce quality animals or increase off-take from overused pastures.

After decades of investments in development projects aiming at alleviating poverty by enhancing goat production systems, several "lessons learnt" and "good practices" have been documented (e.g. http://sapplpp.org/thematicfocus/small-ruminant-rearing). Development projects adopting such lessons learnt and good practices have demonstrated their effectiveness in securing more food and income for pastoralists and rural households. With the support of national and international institutions, IFAD felt that it was important to further document ("Knowledge Harvesting") models and practices that "work" on goat production development and share such knowledge with decision makers and project designers. In a general situation where development aid is shrinking because of the global financial crisis, it is rather discouraging to see that some projects are still designed proposing approaches and models that have demonstrated of being ineffective and not addressing the real needs and constraints of resource-poor producers but rather transferring unsustainable "one size fits all" approaches, technologies and models that may work under different conditions. In some worst case scenarios, funding opportunities are not seized because of the lack of data, appropriate information and field-evidences of the effectiveness of goat development as a tool for poverty alleviation.

There are a number of stakeholders involved in the development of the goat sub-sector at national and/or regional levels such as government institutions, the private sector (from traders to input suppliers, from processors/butchers to financial institutions and business centres), national and international development agencies (including NGOs), etc. Unfortunately, often there is not a common sector development strategy among the main stakeholders to reach a systematic and integrated plan of investments. As a consequence, each actor pursues its own agenda with very little sharing with other relevant players in view of a collaborative effort. This leads to duplication of efforts and ultimately limited impact being achieved. If international donors wish to make a real impact on poverty reduction to contribute to achieving the MDGs, it is necessary to switch from such an unarticulated approach to a coordinated effort within a country or region leading to large investments with a broader programmatic approach and covering various aspects of goat value chain development (e.g. CGIAR's innovative platform approach for goat development: http://www.icrisat.org/locations/esa/esa-publications/Innovation-platform.pdf) with an

appropriate implementing period. Such investment programmes should be well phased, involve regular participatory monitoring and evaluation of undertaken actions by involved stakeholders, promote holistic approaches and facilitate the development of an enabling framework as follows:

- Raising awareness of decision-makers in national governments and donor agencies about the effectiveness of goat development (or more broadly, small livestock development) as a tool for poverty reduction and building their capacity to develop effective policies, incentives and development programmes,

- Developing and enforcing consistent national pro-poor policies, which are crucial to capitalise on the opportunities offered by the increasing demand for meat (and livestock products in general),

- Including smallholder livestock development in the curriculum of technical education institutions to train a new generation of advisors/researchers,

- Supporting the creation of livestock farmers institutions that can help their members to voice their needs and facilitate the provision of services and inputs to the farming communities, especially farmers' access to appropriate extension and technical support services,

- Funding participatory adaptive research to identify appropriate technologies/models that are pro-poor, sustainable, economically viable and environmentally sound (this includes sharing knowledge generated by farmers),

- Identifying market-led approaches supported by effective, accessible, qualitative services (breeding, veterinary services, credit, processing, marketing, extension, training, etc.) and infrastructure,

- Implementing effective smallholder livestock development activities with potential to generate further knowledge and data, capitalize on relevant learning generated and facilitate up-scaling of appropriate innovations in other projects,

- Supporting knowledge sharing platforms and networks through which innovative "field tested" technologies, good practices and lessons learnt are made available, and where new knowledge and mutual learning through peer-to-peer exchange are promoted.

Objectives of the study and methodology

All quoted references have been reported in "Additional resources" at the end of the report of the study

1. General presentation: the several steps for implementing the study

The IGA/IFAD small grant agreement regarding the implementation of the "Scaling-Up Successful Practices on Sustainable Pro-Poor Small Ruminant Development Projects" study was signed in July 2011. All phases had to be realized between this date and December 31st, 2012.

During these 16 months, the following activities were carried out:

- Constitution of the steering and referee committees,
- Constitution of documentary references,
- Choice of the studied cases,
- Implementation of the Knowledge Harvesting process for each case: 6 field missions[1], 2 expert consultancies[2], and 2 expert reports[3]
- Organization of 2 steering committee meetings: the first one in Rome in June 2012, the second one in Las Palmas, Gran Canaria, Spain, September 25, 2012,
- Organization of a seminar during the XI International Conference on Goats in Las Palmas, Gran Canaria, Spain, September 25, 2012,
- Business planning and cost-benefits analysis by Dr. Dino Francescutti, FAO expert, FAO, Investment Center,
- Organization of a write shop with Heifer Project International experts to undertake a Goat Value Chain toolkit.

1 Brazil, Turkey, Rajasthan, Senegal, Morocco, Nepal
2 Latin America and Morocco
3 For Tajikistan and Kenya

2. Objectives and methodology of the IFAD/IGA study: presentation of the studied cases; mapping development projects on goats and scalability of the success factors; a business planning approach based on value chain analysis and livelihood expectations

2.1. General objectives of the IGA/IFAD study

The focus of the agreement between IGA and IFAD was directed to the following specific objectives:

- Undertaking a global Knowledge Harvesting® [4] on resource-poor small ruminant farming systems that were effective in reducing poverty according to MDGs criteria so that others can apply this know-how,

- Based on the harvested knowledge, develop a business-like approach to prioritize processes/ strategies and sensitize national policy, decision makers and donors about the effectiveness of small ruminants' development to reduce poverty.

2.2. Mapping of goat development projects and approaches and scalability of the success factors; a business planning approach based on value chain analysis and livelihood expectations

This document has been based on the information collected in these projects. We have begun by presenting the relation between the development of goat activities and poverty reduction through the general issues of livestock. Then, general considerations on goat production systems and commodities for goat sectors worldwide have been introduced. The characteristics of the goat production systems and commodities for goat sectors worldwide have been then presented. In a last part, we have formulated proposals to build business plans for pro-poor development projects involving goats.

Many publications and reports have given an overview of the main factors to consider and the methodology to build, implement and evaluate a development project in agriculture (Dufumier, 2000). A development project in agriculture is always a set of more or less coordinated actions to reach one or several objectives.

By using the global Knowledge Harvesting on resource-poor small ruminant farming systems and the several studied cases above, the main successful strategies have been identified to sensitize the decision makers and donors on how to invest in goats to effectively reduce poverty through small ruminant development.

4 Knowledge Harvesting® is a rigorous, results-driven process for bringing out and transferring tacit and technical knowledge. With facilitated conversations between diverse participants, it captures knowledge and, through a built-in process, brokers what was learned converting the know-how into knowledge assets that can be used to dramatically improve effectiveness, efficiency and relevance of poverty reduction projects.

2.3 Analysis of the Initial situation; the SWOT approach

For each case studied, the initial situation has been analyzed by answering the following questions:

- Who is at the origin of the initiative? In general, a collective development project is initiated more or less formally by the governmental or regional bodies or municipalities but also by private donors, foundations, cooperation agencies or NGO's. What will be the consequences of this identification?
- What is the initial economic, social situation and what are the possible alternatives?
- What is the problem and what are the objectives to be reached? Without too many details, the problems have nevertheless to be clearly identified.
- What is the diversity within the area? Mean values are not sufficient to evaluate a situation
- Will the project be integrated in a regional or national policy or not and how? Is the activity integrated in the local economy and at what extent?

For each case, a SWOT analysis has been implemented to formalize the initial situations. It has enabled the specification of the internal strong and weak points and the external opportunities and threats.

This first step allowed the characterization of each key element and particularly the main constraints of power or culture as the relationship between stake holders.

2.4 The value chain analysis and livelihood approach

Poverty alleviation and development are generally linked with the practice of micro and small enterprises (MSE) development. It is particularly the case for goat activities. Market systems and organization are generally extremely weak and focusing on value chain development is highly challenging. Goat activities have often little access to markets, whether at the local, regional, national, or international levels. It means that goat keepers and enterprises require access to quality input supplies, technology, finance, and market information. We defined a value chain as one or several products (milk, meat, fibers, manure), reaching the end users (the farmer himself – if auto consumption - the villagers, the local markets, international markets, etc.). The question is "how to identify which value chain, what combined inputs provide the best market opportunity for the largest number of MSE's".

To identify competitive and successful value chains, the following elements were considered:

- Access to resources,
- End market opportunities,
- National, regional, global environment,

- Inter actors cooperation,
- Infrastructures (transportation, storage, slaughtering, power, processing, etc.),
- Access to farm upgrading: technical and market information and technology.

In most cases as seen in the several significant situations studied, the goat farm performances are constrained by:

- Limited resources (feed, genetics, skills and capital) and high production risks,
- High transaction costs,
- Little access to technological or market information and isolation.

The value chain analysis must be combined with a livelihood approach, also considering:

- What are the household expectations (food security, wealth accumulation, risk avoidance, food sales, etc.)?
- Which technology the households choose (traditional versus modern), is it available, suitable and does it work?
- What are the technical versus economic issues?

2.5 Presentation of the studied cases

For each case, we used the same approach to implement the Knowledge Harvesting process:

- General social and economic elements of each local situation
- Presentation of the goat sector in the region and/or the country
- The pro-poor projects on goats in the area
- The main actors and stakeholders involved and the actors' system
- A SWOT analysis on goat projects in the studied areas and main issues.

Each case was documented by local experts involved in each project, by written documentation and improved by interviews, field visits and collective meetings when possible. The discussion within the steering committee was a part of the Knowledge Harvesting process.

The several cases were located in the following countries:

- Argentina – Neuquen Province (presented by Luis Iniguez, ex- ICARDA and ex FAO expert),
- Brazil – North Eastern projects (presented by Vinicius Pereira Guimaraes, EMBRAPA with Jean-Paul Dubeuf, INRA for the comparative analysis during a field visit),
- India – Rajasthan (imGoats projects presented by Ramkumar Bendapudi, ILRI, with Jean-Paul

Dubeuf, INRA for the comparative analysis during a field visit; HPI projects presented by Dilip Bhandari and Abhinav Gaurav, HPI),

- Kenya – Meru Central and South Districts (FARM Africa projects presented by Christie Peacock, SIDAI and ex- Farm Africa),
- Mexico – Comarca Lagunera (presented by Luis Iniguez, ex- ICARDA and ex FAO expert),
- Nepal – HPI projects in Nepal; goat value chain in Nepal,
- Morocco – Argane tree area Essaouira Agadir (a study by Abdelilah Arraba, Abdelaali El Hadi - IAV Hassan II Morocco, Nicolas Lacombe, Jean-Paul Dubeuf ,INRA France),
- Senegal - Gan Africa and Tragsa NW project (presented by Juan Capote, ICIA, project coordinator , and Jean-Paul Dubeuf, INRA,),
- Tajikistan - Sugd, and Gorno-Badakhshan, projects (presented by Barbara Richkowsky, ICARDA),
- Turkey –Turkey Kilis and Sarikeçili nomadic tribe projects (presented by Irfan Daskiran, Ministry of Agriculture and Nazan Koluman, Professor, University of Adana,
- Venezuela – Lara and Falcon areas (presented by Luis Iniguez, ex- ICARDA and ex FAO expert).

Some other cases were considered on specific points analyzed through bibliography (Cabo Verde and Java, Indonesia) or as parts of more general projects (Jarkhland in India and Mozambique imGoats projects). The several studied projects and cases give a large and significant range of the existing situations.

The general localization of the studied cases is presented on the map below:

Map 1 – localization of the several cases

I. The development of goats and poverty reduction: Economic and political perspectives regarding general issues on livestock sector

a. What small holders to focus on for reducing poverty by livestock development?

The small scale farmers are more and more often considered as an opportunity for the problems faced by livestock activities (18). FAO and World Bank have discussed the conditions for pro-poor livestock sector development in a recent report (5).These conditions are general and have to be discussed and applied for each sector. They underline that market oriented livestock production could be engaged with small holders but more easily by "upper" smallholder livestock keepers – who have the minimum asset base for engaging sustainably in market oriented livestock production, rather than focusing on marginal livestock keepers, who have insufficient assets to produce a regular surplus from their livestock.

The main issue is that increased labor productivity is essential for linking smallholder production to poverty reduction and requires minimum farm/herd sizes, some investment in mechanization, and diversification into higher-value products. But instable food prices with higher margins for marketing than for production encourage poor producers to prioritize staple food production for own consumption before diversifying into higher-value commodities for sale (22). Increasing smallholder productivity involves the development of supply chains that would serve small-scale farmers and provide them with the necessary links to suppliers and consumers (23). The need to organize better the herd management is not limited to market oriented project but also to improve self sufficiency and local consumption.

The goat sector is less structured than other livestock activities and very often the herds have few heads. The herd size will se reports suggest to define a minimum herd size before implementing a project (between 20 to 50 according to the area). In the case of communities where the collective approach is strong, it could be defined at the village level (for instance village herds of more than 200 heads).

b. In what rural areas promote livestock and goats?

The rural areas can be categorized as "peri-urban", "middle countryside" and "remote". We have not studied peri-urban cases because goats are not really adapted to these situations. It has been underlined that poverty incidence tends to be highest in sparsely populated remote areas. But the proven development strategies other than outright transfers are very scarce, they are often very costly what poor countries can ill afford. Does it mean that these remote areas must be abandoned and their population condemned to emigration in already overpopulated areas? The pastoral systems are generally present in these remote areas facing often drought and climate changing where the goats can be an opportunity if the projects could gather people in sustainably acceptable villages near the main roads. The questions about the resilience of these pastoral systems keep very pregnant. Policy emphasis here should be directed to reducing vulnerability, for example by protecting livestock assets.

The majority of the rural poor people live in the middle countryside where the numbers of poor people are usually much higher and not very far from urban areas/small towns. This evidence suggests that a strategy for poverty reduction should be built on urban-rural growth linkages and promoting market access incrementally, radiating outwards from urban areas into the middle countryside.

c. What development strategies and investment to promote?

To reinvest in agriculture

The FAO report on poverty underlines that "a key challenge to the development of agriculture in areas dominated by smallholder farmers is the establishment of coordination systems involving combinations of government agencies, civil society, farmers' and other professional organizations, and agribusiness firms. The prevailing policy paradigms in developing countries, where a systematic bias towards industrialization and concentration favors large- over small-scale operators; and the under provision of local public goods and services, the consequences of which affect the poor disproportionately."

These comments suggest that a main danger of the public policies (to answer the global need of food) would be to encourage investment on productivity that would favor more the more wealthy actors than the small holders. Besides when market mechanisms fail to deliver private initiatives, agency and public leadership are needed, in particular to favor priming investments. In many cases although public services are often in bad conditions, they are the only one that could really impulse development in cooperation with local agencies to secure risks and create confidence. As agriculture and animal production are highly risky activities, some experimental projects, with modest but targeted interventions, and continuous learning from the results are more likely to lead to the desired outcome of poverty eradication. Investment in extension services and collective capacity is in all cases a key factor. A good example is why many technologies to increase the nutritive value of straws for feeding ruminants, especially urea–ammonia treatment failed to be adopted by farmers. The major reasons, identified during an @-Conference organized by FAO (19) and also relevant to many of the other technologies were weakness of extension services in developing countries, failure of scientists to involve farmers when developing new technologies and failure to demonstrate convincing benefit/cost ratios.

Agro-ecology and livestock for poverty reduction

More and more economists such as Tim Jackson have enhanced the limits of the global world wide present development model of economy including Agriculture (14). They emphasize that new paradigms are necessary to find the way of a new prosperity in Agriculture. United Nations through the "Olivier de Schutter Special report on the right to food" (13) has estimated that this investment has to be made mainly through agro – ecology and ecological intensification. Many people still think that agro ecological agriculture cannot be competitive with the "modern" agriculture using high inputs and techniques based on a large use of chemical fertilizers, selected plants, development of mechanization[5]. But agro ecology is not seen here as a marginal mode of agricultural development but a real other necessary structural orientation which has proven results for fast progress in productivity as well as in the concretization of this human right for food for many vulnerable groups in various countries and environments.

In other words agro ecology is not only fully compatible with the fight against poverty but is also an answer to the environmental problems and climate changing one of the main MDG goals and challenges the world has to face. And it is the most adapted for poor families.

5 With the well known successes during the "Green Revolution" but also with many negative social and environmental externalities

Agro ecology promotes an integrated management of nutriments with an important utilization of human labor and less external high energy inputs. Its priorities are:

1- Investments in public goods

2- Investment in knowledge and training

3- Investment to increase productivity by valorizing labor forces

4- Social cohesion by co –building of solution rather than by only "participation"

5- Make the farms more autonomous at several levels what means smaller family farms,

6- Organizing the markets.

All these points are clearly linked to the objective of ecological intensification based on a trend alternative to agriculture based on mechanization, use of fossil energy and artificial conditions of production by manufactured inputs (mineral fertilizers, feed stuffs), and use of highly productive selected breeds

The priority is to foster families to reach more economical independency through « a sustainable management of fertility (thanks to complementarities between agriculture and animal production), more resilience to develop the capacity to resist hazards, and use of more adapted resources like legumes and by-products.

The empowerment of local farmers is a major issue of agro-ecology and that it is perfectly convergent with the objectives to fight poverty. In other words, it is the only way to fight poverty in a sustainable way. Goats and small ruminants would be in many cases well adapted to answer these issues.

For instance, pastoral systems are a major issue and a major complex problem for development (12). Correctly managed, without overgrazing, pastoralism and pastures on rangelands can improve soil fertility, preserve biodiversity in forest plantation, sink carbon in improved savannahs. But by lack of local governance, control and services, we observe often overgrazing that could favor soil erosion compacting and loss of nutrients. To manage these questions, the public institutions, financial bodies (although often in weak situations) must become also learning spaces and exceed their routines to think strategically the way to improve globally a situation. In other words, although it is often suggested that conditions to maintain pastoralism are too difficult, any answer has to analyze carefully the local situation. This approach can be extended to other types of systems.

We have to be aware that in many ways agro-ecological innovation and ecological Intensification are a systemic and rather revolutionary way of thinking that can disturb the representations and the technical models of many actors including many scientists and technicians[6].

6 The concept of" lock in" (16) has been introduced to explain why several actors keep on supporting a model although many evidence show it is no more efficient and has many negative externalities.

II. General considerations on goat production systems and commodities for goat sectors all around the world

a. Goat production systems are generally multipurpose systems with still few connections to the organized markets.

The goat sectors have not followed the same ways of development and specialization than the other animal productions (like cattle, poultry, pig, etc…). Goat activities have been largely excluded until now from organized markets. To face new development issues, this realty could be an advantage.

Goat production systems were mainly multi-purposes systems oriented on milk and meat and in some special areas (as Central Western Asia or China) on meat, milk, fiber and skin (India) (10, 11.).

The goat development projects take in account generally these multifunctional characteristics; multi-functionality is largely specific to SR systems and make them well adapted to agro-ecological orientations. Strategic options to improve small ruminant are mainly not related to one commodity and must prioritize on social capital and the access to services (training or Veterinary Services and vaccination) (15). The low level of specialization was seen as a weakness but it could be also as strength for rural development in the sense that the pro-poor rural development projects have to take in account all the global production system with a balanced integration of animal production and agriculture.

But many solutions are also related to the special constraints of each commodity (without promoting specialization as the way of development). It is the reason why it seems logical to analyze the situation of each commodity specifically. The analysis will be based on the diversity and converging points of the compared cases met all over the world. To analyze separately each commodity is not opposite to keeping these multipurpose characteristics.

b. A still depreciated image of the goat activities by the several stake holders

One other important characteristic is related to the representation of the several stake – holders regarding goats. Although the situation is slightly changing, goat activities are still largely not seen as socially and economically valorizing the related populations.

In other words, there is still a threat that the goat projects would keep people in their lower social situation due to this image. For the breeders themselves, goats could be seen as a transitory activity before a more attractive reconversion. Even in the successful case studied, as in Brazil, people met think that the goat keepers would choose another activity if they would have the choice and would prefer to train their children on other activities. To change this vision is also a major issue and there are some examples in developed countries that have shown it is possible. In Provence in France, an old pastoral Mediterranean region, many graduated new goat keepers have developed farm made goat cheeses and have radically changed the perception of the activity by the Society.

The role of goats to support poor people would need to avoid any simplification or pre-defined idea. At the territorial levels, statistics are often scarce and too global values for indicators (means) do not give an exact view of the diversity of situations. For instance, bibliography gives clear assessments on these points :

a. Yes, goats are well adapted in arid areas; the investment to develop goat production is lower than cattle but the social, economical local conditions are not always filled to develop it and make it a way to fight poverty

b. Yes, the market conditions are an important factor to decide implementing goat projects or not but an open minded approach of the market is necessary (including auto-consumption, social governmental distribution, etc.)

c. Yes, the objectives of the project have to be defined according to the initial situation (in terms of education, infrastructure,…), funding invested and returns expected but time is always needed to get sustainable results.

d. Yes, the public services in the area are an important factor of success but informal economy and local organization have a role to play

e. Yes, developing technical improvement is important but not always the solution to solve the problems that could be linked more to political, administrative, cultural or economical aspects.

f. Yes, projects can focus simultaneously on several objectives and it can be relevant but too many co-objectives could be not efficient (for instance, gender conditions and market structuring and productivity…)

The present development of goat farming is related more generally on the growing demand for animal products in emerging countries and to the increase of individual incomes for a larger part of the population.

There are other consequences of these representations. The public authorities are generally on a very similar position and it is very difficult to convince them to invest on goats for instance on extension services, training, etc… When the demand on SR products is high (as it is the case in Turkey with sheep and goat cheeses), the public authorities prefer generally to support rather wealthy investors to develop intensive well structured production systems and cheese making units rather than on the organization of poor rural populations. The projects could be so often short terms ones with few sustainability or impact.

Therefore, the goat oriented projects must participate in re qualify professionally goat production, favor the empowerment of rural populations and produce a true long term Social Capital (organization of Associations, training Centers and extension) supporting and supported by the development of infrastructures (water infrastructures, roads, access to energy, Information and Communication Technologies, slaughter houses, local dairy processing units, creation of breeding Centers) as sum up in the following table.

Knowledge Harvest Reports

KNOWLEDGE HARVESTING: THE NEUQUÉN CRIOLLO GOAT

Potential for development investment focusing on kid and fiber production[1]

By Luis Iniguez

Maps 1 and 2: The area of the Neuquén Criollo goat

1. Political and Social Context

The Neuquén Criollo (NC) is produced by about 1,500 resource-poor families and subsistence producers in need of improving their livelihoods (Lanari et al., 2007). Local government past attempts to ban goats from the Province of Neuquén for supposed environmental reasons were reverted in view of the social and economic significance of goat production and the decision of NC goat producers to keep their production systems as these are the most important source of income they count on. Since 1997 the local and national governments supported goat production through different research and extension initiatives.

The NC goat production systems are based on transhumance (Pérez Centeno, 2001), a practice that has been affected by land privatization, forest encroachment, land degradation and other work opportunities attracting the youth. Notwithstanding these effects that affected the transhumance mobility, leading to different degrees of settlement, the NC goat production remains as the basis of rural livelihoods in the province.

This case describes an interesting example of well-targeted research that influenced the goat production context to a condition that could accommodate investment for development to fight poverty and improve the living conditions of the poor in rural areas. Research successfully engaged goat producers and other stakeholders (local and national government agencies and traders) to jointly undertake a plan of action centered on the evaluation of this breed and its associated production systems, as a strategy towards

1 This summary has been possible thanks to interactions with Dr. Maria Rosa Lanari and Dr. Joaquin Mueller, both leading scientists at the Bariloche Research Center under the National Agricultural Technology Institute of Argentina (INTA-Bariloche), who were involved in the described processes and the documentation available and compiled by INTA-Bariloche.

productivity improvement and income enhancement. This plan involved: 1) the characterization of the NC goat and associated production systems, identifying prospective attributes for income improvement, specifically kid and cashmere production, 2) raising awareness of local and national governments that are now more responsive to support goat production, and 3) the attainment of the Denomination of Origin (DO) status for the meat of the NC kids (INTA, 2010; TodoAgro, 2010). In parallel, the government recently issued the Goat Law (MAGP, 2006), a legal mechanism to ensure an enabling environment for development and technological change. Along with a good market demand for kid meat that holds a high recognition in regional markets and cashmere, these developments constitute important ingredients for investment to improve the living condition of the NC goat producers and fight rural poverty.

There is a need to improve the NC goat production systems reducing the constraints to production, developing value chains and improving the marketing of products. Options that make the systems more stable, without losing traditional practices and context, have been already worked out by research; they are ready for scaling up (Mueller, 2011). Activities leading to the conservation and genetic improvement of this peculiar breed have already been initiated with the participation of producers.

2 Production Context

2.1 Area characterization

According to Lanari et al. (2005), the NC goat is found in a rugged territory covering more than 30,000 km2 in northern Neuquén (71°-69'W and 36°-38'S). This area limits with the Andean range in the west along the border with Chile and the Province of Mendoza in the north. The southern boundary is defined by the Mandolegüe range in the departments of Ñorquin, and part of the departments of Loncopue and Añelo, whereas the eastern boundary by the Sierra Negra in the department of Pehuenches and part of Añelo. It is estimated that the NC goat population amounts to 360,000 head, almost half of the total goat population of the Province of Neuquén (640,000 animals), which are produced by nearly 1,500 families of aboriginal (Pehuenche) and European origins (Lanari et al., 2007).

Three ecological regions in the north of this province are populated by the NC goat (Bran et al., 2002). Two of them involve the cold northern mountains (2000-3000 masl; 750-1000 mm rainfall) where accumulation of snow occurs from April to December, and the dry to semiarid and cold northern sierras and high plateaus (≥ 1000 masl ≤ 300 mm rainfall) with predominant shrubby steppe vegetation. The third region in the east is occupied by the dry monte austral (≤ 900 masl; ≤ 200 mm rainfall), where steppes prevail with mid-size shrubs as predominant vegetation.
The region's economy relies on tourism and on the expansion of oil and gas production that promoted urban development with its concomitant demand for agricultural products. The province of Neuquén is well connected to a network of roads.

Neuquén is the base of the North Patagonia Regional Center of the National Agricultural Technology Institute (INTA), assisted by INTA Bariloche, a multidisciplinary research and extension center focusing on small ruminant production that has significantly influenced fine sheep wool and Angora goat production in all Patagonia. INTA Bariloche developed successful and long-standing links with small ruminant smallholders in the region. Thus, it is the most suitable candidate for scaling up efforts by development investment. The Comahue University centered in Neuquén City, through its Faculty of Agricultural Sciences located in Rio Negro, offers advanced degrees (MSc) as well as technical education in agricultural production with focus on the Patagonia environments and small and medium scale operations. Both INTA and the University are engaged in training farmers to improve their technical skills, in addition to influence local governments to promote goat production, as a means to improve the livelihoods of rural people.

2.2 Characterization of the Neuquén goat production systems

NC goat producers raise their animals under traditional practices, largely based on transhumance on government land. The herds are mixed, in average involving 240 goats, 30 sheep, 18 cattle and 11 horses (Lanari et al., 2007).

Transhumance follows seasonal changes and pasture availability in the range. Summer pastures abound in the northern mountains (above 1400 amsl) and constitute the main grazing grounds. The vegetation consists of graminaceous plants and low and mid shrubs. These areas surround valleys with swampy depressions rich in water sources (mallines) where vegetation is of high nutritional value. Winter pastures occupy the northern sierras and high plateaus (750- 1400 amsl) and the monte austral, with lower productivity and signs of degradation due to overgrazing. Production of winter pastures is low (≤ 100 kg/ha of dry matter [DM]/yr), except in malline areas where yearly production could be as high as 2 ton/ha of DM, these areas can be significantly improved by technologies already developed and tested by research. Summer pastures are richer than winter pastures and edible biomass in mallines in these areas could be ≥ 2.5 ton/ha of DM/yr (Lanari et al., 2007).

The movement of animals towards the highlands starts at the end of spring, in November-December. The herds progressively move from higher to lower ranges as the summer progresses, to then return in autumn in early April to the winter pastures, near to the producers' settlements, where they remain until the end of winter. Some producers with access to irrigation supplement their animals in winter but this is not a generalized practice.

Estrous activity in the NC goat is not completely arrested by seasonality, thus kidding could occur out-of-season. However, farmers developed an interesting system to avoid a seasonal kidding, through the isolation of bucks at the end of the breeding season in sites away from female herds (castronerias) (Lanari et al., 2007). Bucks will be then joined to females in April at the start of the following breeding season. This strategy prompts estrus synchronization due to the male effect with a clear benefit to producers: high fertility rates (≥ 80%) and concentration of kidding in a short period of time (Lanari et al., 2007). This remarkable strategy evolved as a feature of the local knowledge.

The average birth rate is 1.4 kids/doe. Kids are born during spring (September-October) and weaning does not occur at a fixed time. The first kids are sold at the age of 60 days after kidding before the herd moves to summer pastures and the second batch when kids return from these areas. A rapid pre-weaning growth has been observed with an average weight gain of 150 g/d (Lanari, 2004). Kidding percentage after weaning ranges 60% -130%, according to the weather conditions during kidding (Lanari et al., 2000).

Perinatal mortality is lower than 10%, reflecting a good adaptation to the prevailing harsh environment (Lanari, 2004). Epidemiological studies showed that the NC goat is free of brucellosis and arthritis-encephalitis (Robles et al., 1999). In general the NC goat is free of diseases though some levels of infestation with fasciola hepatica were found. Most losses are caused by harsh winters and the transhumance in particular in the case of kids and weak animals. Foxes and pumas are main predators of this goat (Lanari et al., 2000; 2005).

The NC goat is a mid-size animal: adult males and females average 63.5±9.4 kg (n=122) and 39.2±6.8 kg (n=737), respectively (Lanari et al., 2000). The main product of these animals is the kid, sold or consumed at the age of 60-180 days of age with an average carcass weight of 5.5 kg for 3-month old kids at the start

of transhumance and 7.2 kg for 6-month old kids when animals return from summer pastures (Lanari et al., 2000; Domingo et al., 2005). Domingo et al. (2003) reported that a group of average 94day old NC kids (ranging in age from 48-140 days) raised on-station and averaging 16.7 kg live weight (LW), yielded a 7.92±0.23 mean carcass weight. Due to degraded winter pastures, the condition of kids produced shows high variability that affects their marketability. This conflicts with producers' preference of selling if possible all their kids before moving their animals to summer pastures.

The NC goat is typically a criollo animal derived from goats introduced during the Spanish colonization. Some crosses have occurred with Angora goats from 1920 onwards and modern European breeds (especially Anglo-Nubian) during the 1990s. This backcrossing did not affect the criollo population much, nor progressed it further. Conversely, the crosses with goats of Asian origin that occurred in the mid-nineteenth century (Lanari, 2004) might have determined the potential for fine fiber production as 89% of NC goats produce cashmere (Scaraffia, 1993, cited by Lanari et al., 2007). Two goat ecotypes with distinct fiber production characteristics as the result of different selection criteria applied by farmers were identified by characterization studies (Lanari, 2004): 1) the short-haired goat with colored coats, known as pelada, mainly distributed in the north; and 2) the long-haired goat predominantly white, known as Chilluda, mainly located in the southeast. The fleece of both goats includes medullated outer fiber shafts and a non-medullated down (undercoat).

Cashmere production has received special attention in the process of characterization and definition of the NC goat that started in 1997, as this feature could significantly add value to its production. From 2004 onwards cashmere production was promoted by INTA. Combs were introduced for fiber collection and research work targeted technologies for productivity improvement. Fiber production yields per animal per year were estimated at 15%, averaging 130 g (range 70-420 g) of white, beige and gray fibers. Fiber length ranges 3.5-4.0 cm and average diameter ranges from 17-19 microns (Lanari, 2008).

The number of NC goat producers interested in producing cashmere as a complement to the production of kids is increasing; nevertheless, the cashmere value chain is still in a developing phase (Lanari, 2008; Mueller, 2011).
Infrastructure is minimal mainly consisting of rustic corrals near settlements in the winter grazing areas. Some shelters are now being built by farmers to avoid kid losses due to extremes in cold weather during winter. As settlement process has progressed (see below pastoral issues), it is expected that basic infrastructure for sheltering and feeding will develop accordingly (Lanari et al., 2007).

In general productivity of these systems is low and could be improved by due management, in particular through adequate pasture management, appropriate feeding systems, appropriate breeding schemes, and market insertion that effectively benefit the goat producers.

2.3 Environmental issues

Range productivity is in decline due to continuous overgrazing, more so in winter pastures which are fragile environments subjected to acute degradation, exacerbated by increased recurrence of droughts. Furthermore, the mobility of herds has been affected by privatization of government land for forest encroachment. This translated in a net reduction of grazing areas, modification of migratory routes and intensification of overgrazing.

Management of ranges has been identified as a priority for the sustainable use of natural resources. Technologies developed by INTA and successfully tested by farmers to recover and manage mallines

and ranges, along with other management options that make the systems more stable, need to be scaled up (Ormaechea et al., 2007; Navedo, 2011). Jointly proposed/developed by researchers and policy makers the Goat Law recently issued by the Argentinean Government (MAGP, 2006), provides a policy frame to implement range improvement technologies through appropriate development plans (Mueller, 2011). This law is unique in its nature and context in the whole Latin American region and addresses with pertinence sustainable solutions to unrestricted communal grazing and range degradation.

2.4 Stakeholders, gender and pastoral issues

Transhumance practices have substantially changed in the last few decades due to the factors listed previously. It used to involve the entire family; however other employment opportunities for youth impacted the critical family mass needed to move animals to distances >100 km away from the settlements. As a consequence, most producers underwent different degrees of sedentarization and settlement, though the movement of animals is still performed by some members of the family on a more restricted manner. This condition has been accounted by research while looking at optimal management options towards a more stable transhumance system.

Though bartering by middlemen still remains an important trade feature, new forms of marketing are evolving considering that now the NC kid is an emblematic product protected by the DO legislation. Trading by bartering could display levels of inequity but also has an important social role that could not be ignored.

2.5 Stakes, constraints and conflicts (SWOT analysis)

Factors/Effects	Helpful (to achieve objective)	Harmful (to achieve objective)
Internal origin Peculiarities of) (the organization	Strengths • Sound local knowledge that allow maximum use of natural resources and low risks • Lack of diseases that affect marketability • Availability of an adapted genotype preferred by producers	Weaknesses • Less interest among the youth in transhumance • Lack of land for grazing • Poverty and lack of resources • Poor production-marketing chain integration • Underdeveloped cashmere value chain • Poor organization of farmers

External origin Peculiarities of) (the environment	Opportunities	Threats
	• Policy available (the Goat Law) that support investment for development towards technological change and income improvement • Local government is aware and supportive to pro-poor initiatives, goat production and natural resource management • Available research& extension organization (INTA), bringing research closer to and into farmers' fields with a long-term projection • Great market demand for kids • Niche for cashmere production to complement kid production for income enhancement (recently the provincial government acquired machinery to remove medullated fiber) • Valued NC kid as product with DO • Niche for value addition, through artisanal elaboration that could benefit women • Possibilities to link with the province's growing tourism industry • Available technologies for range recovery and management, and flock productivity improvement to impact land use and production sustainability	• Transhumance constraints that reduce mobility: fencing, land privatization, forestry encroachment • Range degradation • Availability of other employment sources attracting the youth • Development is not reaching the marginalized producers and is not helping them to move from poverty circles and tap on available opportunities for income enhancement • Other working opportunities for the youth • School education is not conducive to integrate the local knowledge and raise the values of the transhumance system (though this situation is changing)

The following matrix shows the strengths, weaknesses, opportunities and threats concerning the NC goat production system. An objective has been targeted in developing the matrix below: improvement of the livelihoods of goat producers through adequate investment in its development.

The matrix reveals a good environment of opportunities, nevertheless these will not benefit farmers unless due investment for development will match the local and national governments interest in developing this sector. It also identifies a research and extension organization (INTA) with close ties to producers as a potential partner for scaling up available technologies.

3. Precursor Projects

There were no formal development projects in the area that benefitted NC goat producers. However, in a precursor action that set the basis for development investment, the government supported NC goat producers since 1997 through research and extension initiatives. Three projects were implemented in parallel by INTA-Bariloche with the support of the Neuquén government, as part of an innovative strategy centered on the valuation of the NC goat and production systems towards improving the livelihoods of producers. These involved:

3.1 Characterization of the Neuquén goat and associated production systems (1997-2005)

The central objective was to identify prospective attributes of the NC Criollo goat and production system to evaluate this breed to enhance the producers' income.

Intense community-based research work led researchers and farmers to identify production potentials of this goat, in particular:

- Its capacity to produce high quality kid meat (the main product thus far exploited) and the potential to produce cashmere, a potential unknown to producers, traders and researchers.
- Peculiar adaptive traits which allow the NC goat to thrive and produce under the harsh environments exploited by the transhumance, a reason why farmers prefer this goat over other breeds that have proved to be unsuitable.
- The very nature of the production system comprising a local knowledge with features that could raise the producers' self-esteem, confer a symbolic regional production brand and lead to the improvement of rural livelihoods if the system is improved,
- A precise assessment of production and natural resource aspects that need improvement given the current constraints to production.

3.2 Development of breeding programs for both NC goat ecotypes (from 2001 onwards)

The objective was to implement a problem-solving plan to allow retention of the adaptive values and valuable attributes of the NC goat, while improving its productivity.

From 2000 to 2004, INTA implemented a breeding program that targets most relevant traits that value this breed: the capacity to produce kids of good quality and cashmere, and adaptive characteristics (Pérez Centeno, 2007). In parallel INTA devoted work on-station accompanied by pilot on-farm work which led to identify and test suitable technologies that make the system more stable, these involve:

- Range recovery and improvement options (e.g. improvement of mallines),
- Flock productivity improvement options (throughout due adjustments to the health, reproduction and flock management),
- Feeding options suitable for different degrees of production stabilization.

3.3 Community – and stakeholder-based work to raise awareness, secure support to the NC goat production and develop the DO status (2005-2006)

The objective was to influence policy development to support and promote sustainable NC goat production systems and improve rural livelihoods. Intense community-based and stakeholder work was displayed:

- To engage goat producers in a process leading to the evaluation of their products and production systems and to organize them to channel their demands and aspirations,
- To raise awareness of local and national governments which are now more responsive to support goat production,
- To involve key stakeholders (government and traders) to influence legislation towards the valuation of the NC goat products.

An inter-institutional body involving NC goat producers, NC goat marketers/traders, INTA-Bariloche, INTA's Rural Extension Agency of Chos Malal, the Government of Neuquén and its northern municipalities, the Ministry of Agriculture, Livestock and Fisheries, and the Ministry of Territorial Development (INTA, 2010) followed the process of breed evaluation. This resulted in the creation of a Regulatory Council for the Denomination of Origin of the Neuquén Kid (Consejo Regulador de la Denominación de Origen, CRDO).

3.4 Impacts of precursor projects

The indicated process was able to produce the following tangible impacts:

- Widening the possibilities for income improvement after revealing that NC goats have the potential to produce cashmere, a highly valued product in the market. Progress has also been achieved in the marketing of this fiber, with sales to Japan and Italy in 2005 and 2006, respectively. Artisanal production making use of natural and attractive colors and textures of this fiber has also been initiated.
- A breeding plan considering the attributes that add value to the NC goat.
- Increased productivity in on-farm tests by about 25% or more through the application of technology packages for natural resource and productivity improvement, directed to attain a more stabilized and less fragile system. These packages are ready to be scaled up.
- Achievement of the DO status for the meat of the NC kid, a product now protected under the 25380 Law that delegates its enforcement to the Ministry of Agriculture, Livestock and Fisheries. This was the first product with DO in Argentina achieved by seven years of intense work of CRDO. The DO covers all production systems that practice transhumance and use summer grazing areas in the officially designed "Homogeneous Agro ecological Area 8" of the Northern range in Neuquén.
- Responsiveness at the local and national governments to promote and support the NC goat production.
- Farmers' responsiveness to improve their production systems.

4. Critical issues to be considered by an investment development plan

- Development of the cashmere value chain. The medium term projections suggest a potential production of 5 tons of good quality cashmere that will provide a significant return to the production systems of northern Neuquén.
- Direct adherence to the Goat Law, which provides the framework for natural resource management, productivity and marketing improvement. Under this context some normative should be developed that, on a legal basis, defines grazing areas to be dedicated in the province to transhumance and the degrees of production stabilization required.
- Strengthening of the organizations already promoted by INTA and the local government, in particular in relation to marketing improvement of the NC kid.
- Engagement of INTA-Bariloche, its extension agencies and local government agencies to implement the scaling up of technologies, considering also point 2 above. INTA has a multidisciplinary set of specialists, including economist and social scientists that could be instrumental in scaling up processes. Special and immediate support should be given to the community-based breeding plans for the NC goat led by INTA so that sustained improvement of key production traits is projected.
- Further promotion of the NC goat kid, already with a DO, taking as example the successful development of the Patagonia lamb, now marketed as a recognized quality product all over the world.
- Exploration of possibilities to benefit from and link to the province's growing tourism industry.

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KNOWLEDGE HARVESTING NORTH EASTERN BRASIL

Written by Jean-Paul Dubeuf

Based on interviews in 2007 in the Cariri Region (Paraiba State) and in 2011 during the 5th SINCORTE Symposium in Joao Pessoa (Paraiba State) followed by a field visit in Rio Grande do Norte State near the capital Natal.

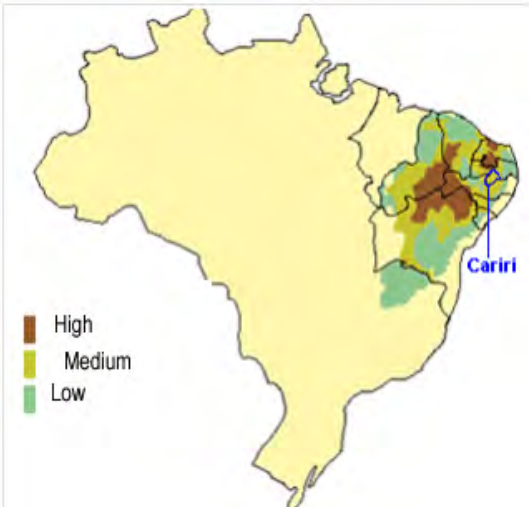
Representatives of several agencies and institutions from six Northeastern States have been interviewed to give a short presentation and information on development programs involving goats in the area according to the opened inquiry form.

1. Report of the interviews during the SINCORTE seminar in Paraiba and a field visit in the Rio Grande do Norte State

General considerations: The North Eastern Brazilian states have in common the same geographical configuration: a narrow coast with better good climatic condition than inner areas (cooler temperatures and higher average rainfalls of 700 to 1000 mm); a medium zone where agriculture has generally good potentialities (e.g. Sugar cane, arboriculture, horticulture) and an inner semi-arid area, Sertaõ, characterized by a short wet season (3 to 5 months for 400 to 500 mm/year)) and a specific vegetation, known as Caatinga. Caatinga is a unique ecosystem found in the northeastern backlands. It is formed by shrubs. The plants are xeric and are adapted to conditions in semi-arid climate that prevails in the northeastern backlands. Average daily temperatures are above 25 °C yearly. And the rainfalls are not only scarce but also irregularly shaped throughout the year and between the years as it may not rain for several years. The word Caatinga is of indigenous Tupi origin and means “white forest”, “forest thinning” or “thorny bush”. It was named by the Indians who inhabited the region because during the dry season the vegetation is whitish, almost leafless. Caatinga is the only exclusively Brazilian biome, occupying an area of about 734,478 km² (11% of the country) comprising of the states of Maranhao, Piaui, Ceara, Rio Grande do Norte, Paraiba, Pernambuco, Alagoas, Sergipe, Bahia and part of the North of Minas Gerais. Caatinga is very complex, with diverse ecotypes and characterized by its ability of adaptation to extreme droughts. The system relies almost exclusively on forage grazing goats daily in Caatinga. Cattle eat the plants not eaten by goats and sheep.

The agricultural potentialities are generally low with often superficial or acid soils; they depend also of the existing infrastructures of irrigation. The Brazilian semi-arid Northeastern region characterized by hot and dry climate is called Sertão. Although the word Sertão usually appears related to the northeast of Brazil, its original meaning refers to a region remote from urban centers, distant of “civilization” (the name is derived from the phrase “desertão” was used in colonial times to refer to the interior of the country). The Portuguese called the semi-arid climatic conditions Desertão, and thus, with the repetition of “of” that came to be called just “Sertão”! All the area is deeply affected by climate change.

In all reports the prices are expressed in Brazilian Real (and USD). The formal reports of the interviews are presented for each state.



Map 1 - Level of desertification in the NE Brazil and position of Paraiba Cariri

1.1 Rio grande do norte

Population: 3 003 087 hab. Total area: 52 797 km²
Main economic activities: Oil, fishing, , horticulture (e.g. mango and cashew)

Information from Vamberto Torres de Almeida (SEBRAE), Gustavo Cosmi (SEBRAE), Claudio Adriano Correia de Lima (EMATER-RN), Valdir de Lima Jr UFRN,
Jose Geraldo Medeiros da Silva, Présidente EMPARN, César Augusto de Medeiros Martins, Farmer and President ACOSC et Rural Union Lajes Cabugi, Marconi, Angicao, President APASA, Angicos do Sertaõ dairy Unit, Idelacio Pineirho de Figuerido, breeder, retired officer, past - President ACOCC, " Zuzu", farmer, Lajes

Two interviews took place during SINCORTE and a field trip was organized during one day around Lajes and Angicos do Sertaõ

1.1.1 An efficient organization of dairy collection during 12 years but a present political and administrative blocking and a real crisis of confidence

The dairy sector has begun to be structured in Sertaõ of Rio Grande do Norte State in 1998 with an agreement between the Federal Government and the state government to purchase milk to fight hunger and infant mortality. Banco do Brasil Foundation has supported the program. Several associations have been created and a real dynamics was boosted with a development of goat milk production particularly by small farmers.

Five dairy plants to package and pasteurize milk have been built in the State. Most of them are cooperatives and were generally auto financed with the financial support of NGOs, the Bank of Brazil Foundation or International Organizations (such as World Bank). We visited the "Angicos do Sertaõ" Cooperative that processes usually 7,500 liter cow milk and 4,200 liter of goat milk per day. The cooperative has 600

members (350 for goat milk and 250 for cow milk).

The milk is collected in cooling (tanks) points every 3 or 4 days and processed as fresh milk. The packaged milk is distributed in schools or families in two or three places of each sector. The dairy has a policy of integration and services offering: a unit of concentrated feeds and a veterinary pharmacy has been built with the financial support of the World Bank. To build it an association (ACMLA) has been specially created. This unit is an investment of R$ 640,000 and has generated 48 direct jobs, the dairy unit extension having generated more than 50 direct jobs for an investment of more than one million R$.

The goat development project is a part of the regional dairy project for both goat and cow milk. 12,000 liters of cow and goat milk have been processed yearly, and redistributed to families and schools. 98% of producers are small producers who deliver in average 20 liters per day. A very small part of the milk is homemade processed in "dolce de leite", cheese, yogurt, and butter. Most of these marketed products are made from cow milk. The social program of the federal government, buys 5,000 L / day and the surplus is normally paid by the State Government. This program provides a payment of 1.30 R$ (USD 0.55) per liter of goat milk and R$ 0.80 (USD 0.34) per liter of cow milk (+0.52 R$/liter paid to the dairy for packaging and marketing).

Since May 2011, following the change of the State governor now an opponent to the Federal Government (FG), administrative problems led the FG to suspend the agreement with the Government of Rio Grande do Norte State. The two sides have set aside the payments to farmers. This situation has weakened the smaller ones, without any cash and the people met declared that at least 40% of them have abandoned the production of goat milk for sale and sold an important part of their herd. For example, the association "Associação dos Criadores de Ovinos e Caprinos do Sertão do Cabugi" (ACOSC) has real difficulties to develop activities and motivate members to pay their Subscription (R$ 35 per year, USD 14.90). But this administrative blocking had a disastrous impact. And all people met are today extremely pessimistic about the situation.

This crisis will be probably resolved, because there is no alternative livestock production in this environment and for these smallholders, and because the program has shown its efficiency, for instance by reducing significantly child mortality in the region.

The kids are generally slaughtered as "cabrito mamaõ ' (milk kids) at a live weight of 10 kg sold 15 R$ / kg (USD 6.4). There is no organization to collect the kids until 90 days.

1.1.2 The organization of research and development

As farmers have had always very few resources, fatalism and Defeatism has prevailed. In spite of recent initiatives to develop the region, a majority of them is still equipped only with hoes without animal traction. Generally, young people (18-35 years old) from rural areas leave the region once reached a certain level of Education

Two organizations EMATER-RN and EMPA-RN are depending of the Government of Rio Grande do Norte State. The President of EMPA-RN stresses the importance of technology transfer and the difficulty to motivate the breeders. The French example of "Maisons familiales rurales[1]" (rural family schools) is highlighted as a possible model for developing training in rural areas.

These institutes work with EMBRAPA and the Federal University of RN and UFRSA, the Federal University of semi-arid regions.

1 The « Maisons familiales rurales » are small technical schools created all over the French rural areas in the 50's by Agricultural Unions and Associations and managed by the farmers themselves.

1.1.3 Animal production systems based on the use of natural local resources

The ruminant production systems are based on complementary grazing (mainly sheep and goats and some cattle) to use the biome “Caatinga.” The description is based on interviews of farmers and visits.

The first breeder met, “Zuzu” Ribeiro, has a larger farm than most of the farmers of the area although it keeps a family farmer. He has two sites, one for goats and the other one for cattle and sheep.

He owns about 80 has and a herd of 120 local goats defined as SPRD (without known racial origin), 70 cattle and 100 sheep. The goats are milked once a day. Their basic forage is pasture complemented with maize, palm and 300 to 500 g of concentrated mixture of protein for each female milked. The herd is grazing around the farm so the farmer can look after his herd from his herd; he has no shepherd and the goats come back the farm every day for feeding without shepherd. The production is in average 1 to 1.2 liters/day during 8 months of lactation (lactation milk yield: 200 L). The strategy of the farmer is not to intensify too much his goats as he thinks it is better not to boost too much milk production with high quantities of concentrates. He considers that his goats are more - healthy than more intensive ones.

Idelicio Pineirho de Figuerido is a retired officer of the Armed Forces (his pension giving him financial autonomy). He has a herd of 350 more productive “Saanen breed type” (300 L / lactation) goats. He owns 100 ha. His main problem is that the all herd got agalactia. He has vaccinated nearly all the herd against this disease but he has not yet results. The goats are usually milked twice a day. Feeding on pasture is supplemented also with palm and corn.

The two farmers have water reserves in a pool they use to irrigate palms but also fruit and vegetable crops. Gradually, as the reserve dries up, they grow corn on these always wetlands. Maize can be cut as forage for grazing goats. When the soil gets dry, the goats are sent for grazing the last plants. During hard droughts, farmers burn cacti in outdoor fireplaces and retrieve the needles that are distributed to the animals.

The palms are planted at a density of 10 plants per linear meter (about 30,000 feet per ha). The value of culture, irrigation is that it is very water intensive (20 L/m/days). The production of palm can reach 500 t per ha. Palms are a good source of energy for goats. Goat droppings are applied to the culture. Both farms do not use any chemical fertilizer. The coherence of the system in ecological terms looks high.

The Director of the dairy Co-operative considers that the Associations are often created to allow easier access to financing (according to the Brazilian law, the minimum number of members is 21 which does not mean all the members are really involved). They think that besides social projects for very small farmers, there is also an interest in developing animal production for medium scale investors with a higher level of education and the visited farms were rather medium-sized farms. On the other side, the big units do not seem to be a solution as an entrepreneur has launched a major project of confinement, slaughtering and food for goats in the region but it was a failure due to a bad management.

1.2 Paraiba

Population: 3 595 886 hab ; Total area: 56 440 km²
Main economic activities: Agriculture (sugar cane, pineapples, cassava, corn, black beans), livestock, industry (food, cotton, sugar and spirits), fishing (lobster) and tourism

Information from Wandrick Hauss de Souza (Technique Manager EMEPA) and Antonio Felito Neto (SEBRAE)

The general situation of the goat programs in the Paraiba state

The programs on dairy goats in Paraiba involve mainly two regions, mainly Cariri and Curimataù.

The project in Cariri Region is part of the CARIRI PACT that includes several institutions as SEBRAE, EMEPA-PB, the Paraiba government, the Secretariat of Agriculture and Cooperatives. EMBRAPA is associated in the engineering of these programs. Only one International NGO, GTZ from Germany, was identified as financing a program to process and market the goat skins. There is an experimental EMEPA-PB station in Cariri region focusing on genetic and a very small scale production of homemade cheese.

Most goat producers are smallholders with up to 30 goats, a low level of technical knowledge and on very important points of management production as food hygiene for example.

The literacy rate in the Cariri is about 37%. Their investment capacity is very low. Historically this region was the agricultural frontier in the 17th and 18th centuries. The population is mainly composed by white descendants of Portuguese and Spanish (the Gallegos) arrived during the Portuguese colonization. The rural exodus is high and many immigrants in the Amazon region come from this area for example. The Cariri region has 65,000 inhabitants and a density of 14 inhabitants per km2.

The goat milk quota purchased by the federal government and the state is around 15,000 liters which is not enough to cover the production potential expected to reach 30,000 L / year according to our informers. Diversification is another way (“dolce de leite”, fresh or ripened cheeses “queijos frescos” and “queijos curados”) to sell the production and experiences have been initiated for at least 4 years (for example, we visited the Monteiro region in 2007 and the cooperative initiated this type of valorization).

But although people used to raise goats in the area and there is a goat “culture”, cheese making and consumption are not developed. During interviews, all insisted that programs need time to be implemented and to impact: it takes at least two years to build a program and much more to develop (at least 10 years).

The dairy experience could be extended to the marketing of goat meat. The kids are sold within 30 days at a weight of about 5 kg carcass paid R$ 15 per kg. Slaughterhouses are disorganized and it would be useful to make a collection center where the kids could be fattened where heavier kids could be sold at 90 days (“Cabritos”).

Meanwhile a project of electronic identification for sheep and goats has being implemented in three States (Paraíba, Ceará and Bahia) in coordination with Sebrae-PB and the participation of EMEPA-PB and Embrapa. Such innovation would help the management of the herds and have benefits even for small farmers.

The establishment of training programs is another priority for example through the Aprisco Northeast Program. The financing of technical assistance is now debated. Currently funded by SEBRAE-PB, it should be supported by local development associations with the support of city councils but only some “municipios” gave their agreement for this funding.

Some of them have financed purchases of supplement feeding (50 tons of millet or sorghum). But EMEPA-PB tries to promote the distribution of blocks to complement grazing.

We observe also that there are some projects that had at least partial success and for instance, a project of dairy unit failed in Cariri, (R$ 59,000, USD 25,120) mainly due to management problems.

1.3 Bahia Population: 13 815 334 hab Total area: 564 692 km²
Main economic activities: Agrarian Economy (Sugar cane, cassava, coco) and industrial

Information from Washington Serafim Da Silva (SENAR)
There are two programs on goats in the Bahia State: CabraUne and Cabra Corte both “umbrellas programs” for the entire sector.

12 municipalities are involved and five of them, Juazeiro (270,000 heads), Casa Nova (199,000 heads), Uauá, Curaçá, and Remanso are among those with the largest number of sheep and goats in Brazil.
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CABRAUNE - ARASO territory of Sisal

The program is based on 32 groups of 20 farmers supported by a technician in animal production working for the breeders associations and their members. The program is structured in groups (“Condominio”) of about 10 farmers, with a total herd of about 200 mothers producing 160 liters of milk purchased by the Government (for a total of 51,32 l purchased by the government).

SENAR (technical assistance) and SEBRAE (technology transfer and management support) drive these projects. These two organizations are public funded but under private law. Our informer considers that governmental programs have been discredited by the actions of handouts (distribution of animals) and excessive media coverage and small farmers had no more confidence because many of them did not receive enough technical support. 400 farms and 2,000 people are affected by these programs. Officially 400,000 farmers are supported by the official governmental services but with few real services). The idea of the program is that these groups could become models for other farmers. To give them responsibility, each technical visit is charged R$ 170 (USD 64) to farmers who receive assistance in nutrition and herd management. 60% of farmers have less than 100 heads and many producers have low yields. During the rainy season, a few farmers make cheese. 1 / 3 goat's milk in Brazil would come from Bahia State.

According to SENAR Bahia eighty producers were currently supported by extension services but the program is planning to support three hundred twenty and to build four dairies. It is planning to inject a capital of R$ 160,000 (USD 68,085) monthly and R$ 1,920,000 (USD 817,021) annually .

The CAPRICORTE program (In the municipalities of Medio Rio de Contas, Pintadas Polo, Polo Juazeiro)

The program is based on the same principle for meat production. The project aims to follow 400 smallholders and install 4 slaughter houses to achieve an integrated system.

1.4 Piaui

Population: 3,006,885 hab., Total area: 250,934 km2
Semi-arid climate - vegetation of caatinga
Main economic activities: animal production, palms, subsistence farming.

Information gathered by Fabiano Chaves (SEBRAE) and Paulo Alfonso Ricardo Teixera (a leading farmer, and a member of the cooperative and the municipality of Esperancina).

The State of Piaui is the poorest of Brazil. It has not an important goat tradition and no important projects have been developed until recently. Nevertheless a pioneer group has been created for 4 years with the support of the town council of Esperantina. An association has been created in 2007, transformed as a cooperative (only the cooperatives can have a commercial activity in Brazil). There are now 22 members as the minimum number of members is 21 to create a cooperative, according to the Brazilian law. The total number of goats is 600, a majority without identified known breed (SPRD). For these reasons this program is considered as experimental.

The starting points of the project are curiously the presence of an American lady who built an exchange program with Maranhão State and a not achieved project on renewable energy that led people to think and question on their future activities. It gave people the desire to change.

The “Banco do Brasil” Foundation with the assistance of SEBRAE decided to support 10 projects among them a goat project. SEBRAE has set up a teaching and support program.
The support program has funded the acquisition of 90 crossbred goats with %90 Saanen (chosen for their dairy aptitude and responsiveness to intensification) and %10 local blood in neighboring states to improve the dairy value of the herd. Breeders are small and medium farming families (10 to 100 ha).

Local conditions:
The rainfalls are important, 1200 mm, but only during over 5 months. The region is quite favorable to culture and aquaculture (Caju, Bapran, Meo + fish). The forage system is half extensive (with caatinga + cassava + sabia).There is no irrigation.

The milk is sold through the town council, the “Prefeitura” that buys it R$ 1.30 to farmers for their social programs without any quotas. But people are aware they are dependent and they would like to develop their own sales to feel free.

1.5 Alagoas

3,015,912 hab., Total area: 27,731 km²
Tropical diversified climate: In Mata, near the coast rainfall reach 1500 mm, only 10% of the state is in the Sertaõ with 500 to 600 mm rainfall; 90% is in the intermediate zone with 800 mm.
Diversified activities: 400,000 ha of sugar cane, 1 million cattle, 150,000 sheep, 20,000 goats.
The state has a good ability for forage (millet, sorghum, sunflower, peas, and palm oil).
Only half of the inner lands are arid.

Information gathered by Francisco Edilson Maia (President of the Breeders Federation).

The programs on goats

With the support of SEBRAE, an incentive program for the production of goat milk was initiated in 2007. The incentive for goat's milk should promote the transformation from an activity of subsistence in economic activity. Currently many small producers are not in a position to make this transition. This would require avoiding "handouts" by developing courses to favor specialization. Everyone wants to improve his own condition but cannot take risks. In addition, the projects lack of interaction between the producers, SEBRAE and the regional institutions. Francisco Edilson underlines that Alagoas State has a rather high literacy rate of 60% and a low full illiteracy one by 18%.

The objective of the incentive program was to improve the condition of each breeder from 20 goats per farmer producing about 20 L per day to 40, (thanks to a better management of the goats and distribution of goats). Thanks to these changes, a couple would earn at least R $1,500 (USD 638) more per year. The model is based on the production of 5,000 L milk per year per farm sold 35 R $/L (USD 14.9) and would be a viable economic model for the region.

Some breeders breed their herds on savannas only for meat. The problems of lack of infrastructure and incentives are the main ones. Associations are the lever to get the necessary aids necessary for the viability of sectors, but many of them are associations "on paper" only. A private slaughter unit was created by a private investor but it was a failure due to the lack of organization to collect the animals and mismanagement. So slaughter facilities should be organized on a collective base.

1.6 Ceara

8,097,276 hab., Total area: 146,348.3 km²
Average rain falls are 775 mm in Ceara in 3 to 4 months with a semi-arid climate in SERTAO

Information from Vinicius Pereira Guimaraes – Embrapa

In Ceara, the programs for meat production are the majority and mainly for sheep. The "Rota do Cordeiro" (the lamb road) in seven North Eastern regions has planned to build 5 or 6 centers for collecting and fattening (center of confinement) the animals before sending them in slaughterhouses. This type of center could be used also for goat meat.

The "Cordeiro do Cariri" (the Cariri lamb project incorporates a coordinated action on forage, the organization of slaughtering, feed mill concentrates, genetic improvement and harmonization of breeds. The goal is to help 720 families with ongoing technical assistance.

In the Cariri do Ceará, 40 small producers and two municipalities are concerned with the establishment of a center of confinement. The objective is to increase the final weight of the lambs from 22kgs to 32kgs in six months.

The motivation of producers is difficult especially as the slaughterhouse, a private society, has closed. It is envisaged that a contractor will re-open the structure.

Two programs are goat milk oriented:

- "Cabra Nossa" was established by Embrapa in partnership with the Catholic Church. This project aims to distribute goats to poor families with little land around urban areas under the influence of a priest, Padre Joao who was able to obtain financial support. Milk is for home consumption but the surplus is sold. The NGO "Caritas" realizes the technical support of the project. 5,000 L/day could be bought by the Government but until now, only 2,500 are produced.
- The Quixadá program in Central Sertaõ has involved the International Center of Agricultural Research in Dry Areas (ICARDA) and IFAD since 2009. It is planning to develop dairy goats in an area where there were only cows. Embrapa has shown that cows were less easy to drive as goats, more adapted animals in the environment of Caatinga. Milk could be used to make cheese from pasteurized milk. 20 families begin to produce milk (based on 20 goats), while in the beginning, most of the projects were involved in sheep production, goat milk projects are now developing and 2,500 L of milk are purchased by the government. Embrapa was mainly involved in the engineering and monitoring of the project. The animals graze in Caatinga with a complement of 200 to 500 g / day concentrate (cotton seed meal). Today the technical assistance is supported by the local Government. In this region the number of private investors in goat production is not significant.

2 Analysis of the actors' system.

2.1 Public institutions of Research and Development involved in goat development

These public institutions could be described as "half –governmental" at Federal or State levels (such as EMBRAPA and EPAGRI)

Activities: experimental, research, innovation, engineering development activities

Federal funding and jurisdiction:

EMPRAPA "Ovinos, Caprinos" - One of the 45 departments of the EMBRAPA Brazilian Agricultural Research system: 142 employees including administrative staff; the Head office is in the Northeast at Sobral (EC), but they have two cores in the center and south. They have some links with other departments (SEMI ARIDO EMPRAPA), settled in Pernambuco.

State funding and jurisdiction:
States with livestock activities have generally their own research and development agency.

For example in the states of North East are involved:
EMEPA -PB (Agricultural Research Organization of Paraiba State)
68 researchers in all sectors, 270 support staff in research and development: training, testing, artificial insemination, dissemination
EMATER-RN (organization of technical assistance and extension; Rio Grande do Norte State)
Development projects of family agriculture .
EMPA-RN - Research and experimentation Rio Grande do Norte State
EPABA (Agency for Agricultural Research in the State of Bahia)
EMATER-AL (organization of technical assistance and extension of Rio Grande do Norte State)
EMATER-PI (organization of technical assistance and extension Piauí State)
Projects in partnership with IFAD
EMATER-EEC (organization of technical assistance and extension CEARA); no stat research agency on livestock in Ceara State(Presence of EMBRAPA)

2.2 Para public assistance and technology transfer agencies

SENAR (learning areas), SENAI (Industrial Training) SENAC (Commerce), SENAT (Transport), SEBRAE (Small and Medium Enterprises) are agencies with a private status but a public funding. They are financed by a para-tax contribution of 0.38% of payroll to a set of agencies:

Among all these agencies, SEBRAE is more present in the sheep and goat sector for management support and collective organization (creation of cooperatives and associations) in almost all states.

2.3 The Universities

Federal Universities are present in every state. Among them the following have specific degrees for Animal production and small ruminants:

- Federal University of Paraiba (UFPB) Rural Federal University of Pernambuco (UFRPE),
- Rural Federal University of Ceara (UFR-CE),
- Rural Federal University of Rio Grande do Norte (UFR-RN),
- Federal University of Campina Grande (UFCG).

2.4 The Civil Society is organized in 4 different parts.

The Unions and Local Community organizations linked or not to national or regional organizations (associations)
The cooperatives (supply or production units)
The private, Non-Governmental Organizations (among them the "Banco do Brazil" Foundation).

2.5 The international NGOs and institutions, whose role as project booster was already high within the initiative of many programs.

They often have rethought their objectives and methodology of action to become promoters of now seen as a territorial and / or sustainable. Among them, the German agency Gesellschaft für technische Zusammenarbeit (GTZ) has been involved for a longtime. An involvement of the Spanish Cooperation in NE Brazil has been observed recently for research (on local breeds and local cheese products) and training. FIDA, World Bank and other International Institutions have also financed many projects.

2.6 Cooperation between the actors,

The conditions for an inter-actors dialogue have increased at all levels gaining recognition and a better awareness from Federal and State governments. There are presently many debates and questions on transfer methodologies to improve the impact of these projects. The opinion is general to acknowledge and regret that interagency collaboration is difficult to state. Meanwhile, the interpersonal collaborations seem good. The lack of guaranteed continuity in the programs of social of aid in the long run (problem of Rio Grande do Norte State, for example) is emphasized by all speakers. There is currently no institutional body consists of coordination of these devices (inter, joint commissions, etc.).

3. Strong and Weak Points – Opportunities – Threats : A SWOT approach on Goat and Small Ruminant systems in North Eastern Brazil

Strong points:

- The presence of a dense and organized network of Research-Development, Extension, training and Innovation transfer in all Brazil although it is less strong in NE than in other Brazilian regions. A political global strategy and will to solve poverty at a national level (program "fome zero," for instance).

- Commercial security: An operational decision applied in most of the NE states to buy goat milk for social programs.

- Regarding goats a half extensive model has been defined and developed to go out poverty (20 goats per worker to produce 1 L/goat per day; goat milk is sold at a fixed price of

1.35R$/L (USD 0.57).

• A rather environmentally sustainable activity: A production system based on natural resources (local breeds with some crossing, pasture on Caatinga, few irrigation, few complementation) with few environmental negative effects.

• Many initiatives to promote the sheep and goat products (meat gastronomy, "dolce do leite," European type cheeses, flavored milks, cosmetics and soap, etc.).

Weak points:

• Low level of education of population mainly rural people,

• A lack of coordination between the several agencies and institutions,

• The bureaucratic governance of the Brazilian administration,

• The lack of greater participation and leadership of the meat industries,

• The lack of confidence of breeders for Governmental programs,

• The lack of alternatives for milk surplus of government social programs,

• The lack of private investment (except some medium size breeders),

• The lack of available cash by the breeders,

• The lack of operational extension services (number of extension agents/ number of breeders),

• The absence of a real market for sheep and goat products,

• The still rather negative representation of goats ("when there is a problem, the farmers sell their goats rather than their cows").

Opportunities:

• The improving good economic situation of Brazil,

• The absence of alternatives to small ruminant production and goats for developing many areas in Sertaõ,

• Climatic changes and its consequences on more frequent droughts: the advantage of goats and their adaptability to an harsh environment,

• The emergence of goat products for middle classes in Southern Brazil, the richest region of the country with more consumers.

Threats:

• The danger of political and administrative temporary or definitive cuts in financing social purchases of milk,

• The capture of the development of the market of goat products by more wealthy sou-

thern sectors,

• Rural exodus: when trained, the attraction of more wealthy regions for potential young farmers.

4 Global evaluation and indicators of success and sustainability

Developing goats is not the only miracle solution to solve or improve all poverty problems. Goats have to be incorporated or reinforced in the local production systems by taking in account the involvement and awareness of public actors, complementarities with other livestock species, natural resources, market' s conditions. The chosen indicators must give a systemic evaluation of the factors of success.

The investment in goat production programs can have a significant impact once secured the mid and long term conditions of purchasing milk; The payment of milk must be guaranteed independently of political and administrative decisions (for instance through an agreement with the Bank of Brazil).

The investment in "Pioneer Groups" of 20 to 40 breeders can be efficient and can disseminate because there are regional and federal infrastructures to support it.

The main investments to compensate the lack of infrastructures could be in dairy units, milk tanks, slaughter houses and parks to gather kids ("centros de contencaõ"). Purchasing goats could be an useful investment in some cases if other infrastructures are existing or planned
The development of training has to be evaluated with clear indicators (programs of trainings, number of breeders trained).

KNOWLEDGE HARVESTING KENYA

"Community-Based Goat Enterprise and Market Development Program"

Contact information: *Dr Christie Peacock, FARM-Africa, Clifford's Inn, Fetter Lane, London EC4A 1BZ, UK. Tel: +44 (0) 20 7067 1231 Fax: +44 (0) 20 7430 0460 email:* christiep@farmafrica.org.uk

Partner institutions: FARM-Africa, International Livestock Research Institute (ILRI); National Government Departments responsible for livestock production in Kenya, Uganda and Tanzania; minimum of 6 local NGOs/CBOs; AU-IBAR and the East African Community.

Description: This project will improve the wellbeing of thousands of smallholder farmers in East Africa by significantly increasing the productivity and economic returns of goats. Our innovative approach will ensure the sustainability and scalability of activities, as all the necessary support services and ongoing inputs – veterinary care, breed improvement and training – are managed by farmer groups, private providers trained from the community, and local Community-Based Organizations (CBOs). These new entrepreneurs will be linked to local markets to sell the cross-bred goats and milk. Other benefits include improved nutrition through consumption of goat milk; improved soil fertility through access to manure; and soil conservation.

Duration: 48 months
Approximate budget: 39 million USD

1. Background and Rationale

The problems facing smallholder farmers in Africa are manifold. Farms in the densely populated areas of East Africa are decreasing in size and are becoming increasingly fragmented. In Kenya, 44% of farms are less than 1 hectare, 57% in Uganda, 70% in Ethiopia, and over 75% in Rwanda (Jayne et al, 2003). The decline in farm size with each generation inheriting land further narrows available household options. Intensification of crop production may be an option for some farmers but many farm plots used for generations are experiencing declining yields from over use, and if not protected, loss of soil through erosion. Farmers are increasingly being pushed to farm land unsuitable for cultivation - at lower altitudes under lower and less reliable rainfall or on steeper slopes unsuitable for cultivation. This cultivation on the margins leaves more and more families increasingly vulnerable to the vagaries of the weather. The impact of climate change is only likely to make a difficult situation worse. Livestock play a critical role in supporting families in most parts of rural Africa however it is becoming difficult to keep cattle on these small farms and farmers are looking for other options. The role of goats in supporting the poor in Africa is well-known and options for using goats to improve the lives of farmers and pastoralists have been considered by Peacock (1996, 2005).

Past dairy goat research and development activities have been reviewed by Peacock (2008) and fall into two main categories – publicly-funded research by the SR-CRSP, ILRI and NARs and grassroots development by mainly international (FARM-Africa, Heifer International) and local NGOs and donor-funded initiatives by DFID, GTZ and IFAD, implemented through Ministries of Livestock. FARM-Africa has been implementing community-based goat development projects since 1988 and initiated the East African Goat Development Network (EAGODEN) in 1997. FARM-Africa has been at the forefront of knowledge creation and networking amongst relevant R&D organizations and has tested and refined a viable model of goat improvement in 5 locations in 4 countries over 20 years, that has raised incomes from goat farming from USD100 /flock/year to $1,000 flock /year and is ready, with some modification, to

be taken to scale through replication. At the heart of the model is a set of key components for improving the productivity and economic returns of goats kept by families on small farms. The model sets up small intensive dairy goat enterprises with housed goats, on-farm fodder development and conservation, feed cut and carried, and local goats upgraded by cross-breeding with an improver dairy breed. Replacement bucks are bred locally at group-managed breeding units. This has increased mean lactation length from 70 days in local goats to 193 in cross-bred goats, and milk yields from an average of 14 Liters to 536 Liters per annum. A small goat milk processing plant has been established in Kenya and is now selling goat milk and yoghurt locally and into supermarkets in Nairobi.

The uniqueness of FARM-Africa's approach is that all the necessary support services and inputs – veterinary care, breed improvement and training – are managed by farmer groups, private providers trained from the community and local NGOs. Farmer-managed organizations are established to co-ordinate and extend services during and after the intervention period. A very attractive feature of the goat model is this internal self-replication with little or no external intervention, with community ownership and management of goat development being a major driver of scale-up. In addition to the technical elements of the model additional activities can be added to enhance the model such as adult literacy training, support for savings and credit funds or small enterprise development. FARM-Africa has written a highly participatory Goat Model Training Course and Manual. This project has the potential to complement and link with other initiatives such as the BMGF/GALVmed Protecting Livestock, Saving Human Life project and the East Africa Dairy Development Project, as well as supporting other ongoing small community-based goat initiatives, many of whom are currently requesting help from FARM-Africa. The vision of success of this project is that 120,000 households in East Africa will have doubled their incomes within 4 years. Furthermore farmers will be accessing community managed, or financially viable private sector, breed and veterinary services within a targeted dairy goat scale-up domain.

FARM-Africa's Meru Dairy Goat Project in Kenya increased household income ten-fold over a 10 year period, with exponential income growth in the second 5-year period. The model has generated sufficient economic benefits to enable families to invest in new on- and off-farm enterprises. The goat model is suitable to be applied in situations where goat milk is culturally acceptable and in areas with rainfall of 500mm or above. However, the model is not a quick-fix solution, but takes between two and five years to yield the full range of substantial benefits.

This project will use community-defined poverty indicators to target the 'poorest of the poor' beneficiaries, focusing on the needs of women-headed households, AIDS-affected families, landless households as well as other households in particular need. FARM-Africa has a lot of experience in designing training interventions appropriate to the needs of different community members including those who are illiterate and innumerate. If required, entry into goat keeping for families who do not own livestock can be achieved through goat credit programs managed by farmer groups, repaying the credit in kind by returning a goat kid to the group for on-lending to other families, further multiplying benefits. The primary beneficiaries would be categorized as 'group beneficiaries.'

A FARM-Africa study into the potential contribution that goat milk can make to the prevention of Mother-to-Child transmission of HIV in the Mbale Region of Uganda, found that goat's milk is culturally acceptable as an infant feeding option and is in demand for its superior nutritional benefits compared to cow's milk. However, access to goat milk is currently a major constraint (Scrutton et al; 2007). Vitamin A deficiency is a widespread problem among the poorest families in Africa. In a joint research project with the International Centre for Research on Women in Ethiopia, FARM-Africa found that the incidence of night blindness was 17% among women and 8% among children (Workneh et al, 1999). The consumption

of goat milk can reduce the incidence of night blindness and goat manure can support the growing of vitamin A-rich vegetables on small plots.

While there will be a strong poverty-focus in the selection of scale-up domains and the group beneficiaries, the breeding and veterinary services will also be targeted at what might be termed 'service-level beneficiaries' in the wider community. Buck keepers use their bucks to service females belonging to families outside the groups and charge a larger fee for this service. In some cases the ratio of project: non-project beneficiaries can be 1:3-5. Animal Health Workers also offer veterinary services to all livestock species owned by the wider community as well as targeted beneficiaries and the ratio can be 1:10-20. This additional benefit was not anticipated in the original design of the model but has proven to be a powerful means of multiplying benefits and creating a concentration of skills and interest in dairy goats at the community-level (Davis, 2005; Kaberia, 2008). It is intended to use this to achieve the scale-up envisaged. FARM-Africa has also established a three-tiered financially viable private veterinary service delivery model that enables access by poor goat keepers to veterinary services at prices they can afford. The model links a qualified veterinarian with Animal Health Assistants running rural drug shops and farmers trained as Community Animal Health Workers (see GALVmed's BMGF application Protecting Livestock Saving Human Life for more details).

2. Project Objectives

The overall objective is to transform the lives of 120,000 of the poorest families (720,000 people) in East Africa in 10 years' time through the improved management and marketing of goats, and to build support services and institutions that they have the capacity to provide continuity of support as well as initiate further expansion.

2.1 Specific objectives and outputs

2.1.1 120,000 profitable, viable and sustainable small goat enterprises established, predominantly managed by women.

- 6 local NGOs identified and, with their counterpart government extension staff, trained and resourced to implement the model and monitor its performance.
- Basic Necessities Survey www.mande.co.uk/special-issues/the-basic-necessities-survey and other baseline studies, carried out to aide poverty-targeting and subsequent project impact assessment.
- 1600 groups formed, 1600 buck keepers and 1600 CAHWs identified, trained and incentives agreed.
- 40,000 farmers trained in goat management, fodder production, group management, participatory monitoring.

2.1.2 Goat and goat product markets strengthened and market access improved.

- Markets mapped in each scale-up domain and market opportunities identified, farmers trained and access to market information improved through SMS alerts etc.; market standards improved, e.g. prices set per kg live weight weighed.
- Private goat milk processing plants established in strategic locations as required, infrastructure improved and goat milk advertised and promoted as a wholesome product locally and nationally.
- Marketing of certified breeding stock coordinated and managed.

2.1.3 Financially viable support services and appropriate national and regional institutions developed for the goat sector.

- Farmer-managed associations trained in business management skills and resourced to co-

ordinate activities, breed resources and marketing

- National goat breeder and marketing association established and supported to develop and implement business plan
- Regional coordinating body established to register pure bred stock, organize policymaker briefings, carry out risk assessments and explore new market opportunities (regionally and internationally), share key lessons and promote the goat model within the region.

2.1.4 Skills and capacity of local NGOs and CBOs built to implement poverty-focused agricultural programs.

- Training and mentoring in NGO management, business planning, financial management, HR planning, monitoring, impact assessment, reporting, sustainable financing and partnership-building.

2.2 Some measurable outcomes

- Incomes from goats increased by 200%-400% within 4 years,
- Improve child/maternal/invalid protein and vitamin consumption,
- Livestock assets of the poorest 40,000 households increased by 50-100% and protected through improved veterinary services,
- Livestock mortality among another 80,000 reduced by 50%,
- Minimum of 6 breed and marketing associations able to rotate bucks on time within a 6 month time band, the numbers of pure stock increased by 10-20%/year and crossbreds by 20-30%/year,
- Farmers have improved market access,
- 20% of farmers marketing goat milk by year 4,
- Farmer groups able to solve problems and initiate improvements without outside intervention,
- 3 national breed and market associations effectively overseeing the increase in the number of pure and crossbred stock, keeping accurate records and supporting the development of new scale-up domains and expansion of dairy goat production and marketing.

3 Project Design and Implementation Plan

FARM-Africa believes that to achieve cost-effective scale-up of any model it is best to achieve the desired scale through replication of the model at the scale at which the model was originally successful and which has proven to be practical and manageable. FARM-Africa has learned a great deal from its 20 years experiences and has incorporated this learning into the program design. Enhancing the skills and role of the farmer extension workers is a key feature of the proposed program.

FARM-Africa will therefore implement the program by supporting six local NGOs to establish the FARM-Africa goat model, in partnership with extension staff of relevant government departments. Each partner will take responsibility for a scale-up domain in order to focus program resources and build both the supply side and value chain within a concentrated area to ensure the necessary forward and backward linkages are in place at a critical mass. FARM-Africa will provide technical and managerial support to partners as well as source and co-ordinate any additional technical advice required. FARM-Africa has experience of supporting local NGOs through its Maendeleo Agricultural Technology Fund grant making. ILRI will provide specific technical support on the regional co-ordination of breed improvement and support to national farmer associations and the regional stud book. The AU-IBAR and the East African Community will support regional coordination and harmonization of relevant animal health regulations and breeding standards.

The key to achieving the desired scale will be to ensure there is a focus on marketing from the start; training and incentivizing a cadre of farmers and government agricultural extension workers and ensuring that all the necessary resources are in place from the start – breeding bucks, local goats, fodder planting materials, artificial insemination equipment, training materials etc. – so that farmer groups can become self-sufficient in the first year and from then on take responsibility for replicating the model and starting new groups nearby. Buck keepers and community animal health workers will be trained to be farmer extension workers and given responsibility and incentives to promote the goat model in their location. The model is designed to be replicable, so through social marketing with farmer-to-farmer contact promoting goat enterprises, the model can become extremely scalable.

The Community-Based Goat Enterprise and Market Development Program will also link with the veterinary service franchise business that will start operating in East Africa in 2009. Milk processing plants will be set up in strategic locations where required or link with the BMGF-funded East African Dairy Development Project, if in the right location.

The program will seek to establish a critical mass of goat enterprises, breeding stock, expertise and organizations in each scale-up domain that will ensure continuity within that domain and surplus breeding stock for sale. The demand for improved breeds of goats is massive at present. The Meru Goat Breeders Association, for example, has a waiting list for over 3,000 pure Toggenburg goats and turns away buyers regularly. The contracting of private commercial breeders of pure dairy breeds will also be explored.

4. Potential Risks

Internally a potential risk is the poor performance of partners. External risks are animal health regulations inhibiting the supply of breeding stock; epidemic disease outbreak; disease outbreak in Europe that block export of breeding stock and civil unrest. Unintended consequences of the project could be that it raises demand for goat milk and increasing milk production cannot meet this. Similarly as the project markets goats as a viable economic activity, demand for cross-bred goats may exceed the available supply of improved breeds. FARM-Africa has faced and managed these risks previously and will employ a risk assessment and mitigation procedures.

5. Monitoring and Evaluation

FARM-Africa's goat model has an implementation timeline which identifies key milestones, and this will be utilized across the project as a monitoring and evaluation framework. Training will be given to ensure that staff members have the right skills and practical tools to carry out a baseline assessment and monitoring of change and evaluation of the range of expected outcomes. The project will make strategic use of ILRI's role in the East Africa Dairy Development Project to support the development of M&E indicators. Performance management systems will underpin all aspects of the contract management and the management of all sub-grants.

6.Organizational Capacity and Management Plan

FARM-Africa transforms lives. It was founded in Kenya in 1985, and for over 20 years we have helped to improve the standard of living for almost two million people in Eastern and South Africa. Our vision is of a prosperous rural Africa, and our mission is to reduce poverty by enabling marginal African farmers and herders to make sustainable improvements to their wellbeing through more effective management of their renewable natural resources.

Members of FARM-Africa, appointed because they have demonstrated their commitment to the organization, exercise ultimate control over the charity and elect the Board of Trustees at the Annual General Meeting. The Board is the governing body of FARM-Africa and meets with the Chief Executive and senior staff every quarter. Our Finance Remuneration and Audit Committee and Program Advisory Committee also meet regularly with membership drawn from Trustees, staff and technical consultants. FARM-Africa is currently managing and implementing 28 projects which address our key themes of smallholder development, pastoralist development and community forest management. FARM-Africa has an international head office in London with 24 staff, as well as more than 200 employees in Africa structured around a Regional Office in Nairobi (managing our projects in Kenya, Uganda, Tanzania and Sudan) and an Ethiopian Country Office in Addis Ababa. In 2007 we generated over $12m in income, from a range of sources including institutional funders, foundations and corporate donors and individual supporters.

FARM-Africa pioneered new approaches to goat development and has extensive in-house experience and competence. FARM-Africa has tested its approach in Kenya, Tanzania, Uganda and Ethiopia and across the whole value chain from setting up women's goat groups to establishing a milk processing plant and selling goat milk in major supermarkets. The major measure of success of our goat model is that it can increase household income by up to ten times. By building the capacity of farmers and CBOs to manage their own development FARM-Africa ensures that the benefits remain with the community for the long-term.

7.Budget

The major cost drivers for the program are critical inputs - breeding goats, local goats to give on 'credit' to the poorest, fodder planting material, and veterinary drugs; together with developing the capacity of 6 CBOs to deliver training and support group formation and appropriate national and regional goat marketing associations.

Through an initial major investment in breeding stock, and building the capacity of 6 CBOs the budget is geared to ensure both the sustainability and scalability of the activities through ongoing replication of activities. It would be hard to find a single donor, apart from the BMGF, to fund an extensive program of this nature. There are donors expressing interest in the goat model, most notably IFAD in Kenya. It might be possible to secure an element of match-funding from IFAD, this could be explored.

Item	Total USD	Item	Total USD
A. Personnel	3,912,677	G. Sub-grants to other organisations	12,942,017
B. Fringe benefits	1,212,185	H. Consultants	221,997
C. Travel	523,247	(Monitoring and evaluation (10%	3,100,511
D. Equipment	658,601	Total direct costs	34,105,618
E. Supplies	10,318,341	(Indirect costs (15%	5,115,843
F. Contracted services	1,216,041	Total project costs	39,221,461

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KNOWLEDGE HARVESTING: MEXICO AND THE COMARCA LAGUNERA GOAT

The potential for investment in dairy goat development and a pro-poor value chain

Report and analysis edited by Jean-Paul Dubeuf and Beth Miller from the document prepared by Luis Iñiguez, consultant, for the IGA/IFAD study and thanks to the cooperation of Dr. Homero Salinas, Director of the Northern-central Regional Center of the National Forestry, Agriculture and Livestock Research Institute (INIFAP)

1. Geographical, social and political context

Mexico has more than 120 million inhabitants and is an intermediate economic country with a GDP of USD 9741 per capita in 2012 (World Bank, 2014). The absolute poverty rate (below USD 1,25/day) is low, 0.7% but 52.3% of Mexicans live on less than USD 5 per day, and this percentage has slowly increasing.

The gap between rich and poor is high, as is regional diversity. For instance, the southern state of Chiapas has a very high poverty rate of 78.5%, but it is only 51.6% in the state of Durango; the state of Coahuila, where Comarca Lagunera is located, has a poverty rate of only 27.8%. This state has a dynamic industrial sector, particularly the agro food industry.

The Comarca Lagunera (the CL) region includes the ninth largest Mexican metropolitan area, encompassing the cities of Torreón, Gómez Palacio, Ciudad Lerdo, and 17 others in the states of Cohuila and Durango states (see map 1). It is located in the southern part of Chihuahua desert, in North-Central Mexico (24° 22' - 26° 23" N and 102° 22"-104° 47' W). It occupies about 4.8 million ha of land at an altitude of 1050-1300 meters above sea level. Rainfalls is scarce (100-300 mm/year.), occurring from April to August with little rain falling from November to March. Average temperatures range from 20 to 22oC. The climate is cold in winter (0oC) and hot in the summer (up to 40oC). It is classified as an arid desert.

During the 19th century, the "Laguna de Mayrán" at the mouth of the Nazas River was created, replacing 13 naturally occurring lakes. Later, two dams were built upstream for irrigation and drinking water for Ciudad Lerdo. The change in water usage and management, and the loss of the lake ecosystem caused the expansion of the desert (like the Aral Sea in Central Asia). In 2008, a new canal partly refilled the lake area.

The region is one of the largest and most intensively irrigated in Mexico. Agriculture uses 89% of the water, especially for crops (cotton, musk melon and pecans) and forages (alfalfa, corn and sorghum for silage, and also oats for feed). Animal feed is essential to sustain the dynamic dairy cattle sector, dominated by big companies such as Lala Inc., (the biggest dairy company in Latin America), and Chilchota Inc. They produce all types of dairy products (milk, cream, desserts, cheeses, yoghurt and butter) and have invested in large intensive dairy farms. The Comarca Lagunera area has a good communication network and is strategically located for commercial, industrial and mining development that attracts labor from other parts of the country. But because these advantages, corruption and smuggling are high and the CL is also one of the major Mexican crimes zones.

However, the majority of the region is outside the irrigated zone, with a population characterized by marginalization and poverty. Goat production is a common livelihood for smallholders who have no access to irrigation.

The CL has good infrastructure for agricultural research. The Northern-Central Regional Center of the National Forestry, Agriculture and Livestock Research Institute (INIFAP) has its base in the city of Matamoros (Cohauila State) at La Laguna Experiment Station, with specialists in animal production, rural sociology and agricultural economics. Currently, this Center is active in sustainable livestock development, and is using participatory research methods to work with goat-producing smallholders. It also cooperates with the local universities through advanced degree research programs. There are several technical and advanced academic agricultural institutions, including the Antonio Narro Agrarian University, the Bermejillo Regional Unit for Dry Areas of Durango, (part of the Chapingo Autonomous University), and the Agriculture and Animal Science Faculty of the Juarez University of Durango. These technical and academic units focus on the particular environmental and management conditions that prevail in the region under both irrigated and non-irrigated conditions.

2. Goat production in the Comarca Lagunera

2.1. The goat milk sector in the CL

The 8,000 goat producing households are poor and have little irrigated land, but they do have access to the public arid rangelands, which is 74% of the total CL area. Livestock are the main source of income for 77% of them, and 20% rely on integrated crop-livestock production (Escareño et al., 2011). Most smallholders have dairy goats, selling the milk to industrial dairy processors to produce "dulce de leche," a prized candy made specifically from goat milk (Meza, 2011).

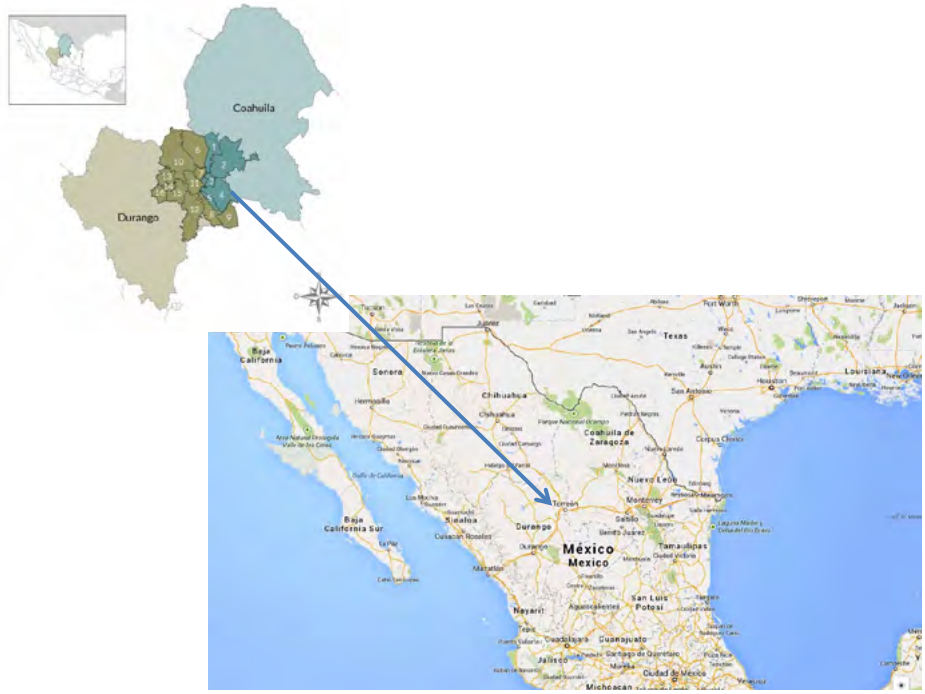
There are about 450,000 goats in the CL (Meza, 2011). The average herd size is 57 (ranging from 14-190 goats), with an average of 83% milking does in each herd (Escareño et al., 2011). The large land owners have invested in big dairy cow farms because they are more profitable, and require sizeable investments. Very few have invested in intensive goat production as seen in other Mexican regions with strong niche markets, for instance around Queretaro and other countries.

This case study describes a unique situation in which smallholders sell goat milk to wealthy dairy processors like Chilchota, resulting in mutual dependency, although the companies retain the power to set low prices. This type of integration is not common in other developing countries, and has resulted in the fast expansion of goat production by smallholders. Most countries with a large dairy industry rely on industrial large scale farms for raw milk. The Comarca Lagunera has become Mexico's most productive goat milk region and one of the most important in the world. However, this commercial expansion has not yet alleviated the poverty of the producers. The social and economic situation, and challenges in organizing farmers to negotiate for better pricing offer important lessons for successful development using goats.

It is important to observe that this production and processing integration was achieved without government intervention or support from research institutions or donors. It is an example of market driven development, which results in rapid growth, but is rarely pro-poor due to unequal power relations between poor farmers and large processers. Past government goat based projects were few and non-systematic, mainly through the indiscriminate distribution of high producing breeds, but with no monitoring and negligible impact. Recently, research has started to support several goat based initiatives of the National Forestry, Agriculture and Livestock Research Institute (INIFAP) a federal agency and local universities.

The expanding demand for "dulce de leche" and other goat milk products presents a remarkable opportunity to develop the dairy goat sector and improve small holders' livelihoods. Increasing productivity, adding value through processing and marketing, and developing policies for fair pricing

based on milk quality and animal health will bring benefits to the rural population. An association of farmers is already organized around improving productivity and marketing. Governmental organizations such as the Product Foundation and the National Council for Science and Technology (CONACYT) want to support this sector, and there is increased research into goat production.



Map 1. Mexico and the location of the "Comarca Lagunera" area

2.2. The goat production system in the CL

Salinas first characterized the goat production systems for North –Central Mexico in 1995. In the CL, goat production is semi-extensive, engaging family labor when possible and making use of public rangeland and feed supplementation. Although this system operates traditionally, making little use of new technology or purchased inputs, the costs are low so that farmers perceive goat farming as attractive. Because of the secure market, producers receive a steady year-round income. Production is very low, but has great potential to increase with appropriate technology and good public policies.

It is expected that goat production in the CL will expand despite serious challenges to farmers. Rural migration is high, particularly towards the USA, depriving the region of its most ambitious and talented youth. The rangeland has suffered severe degradation from uncontrolled grazing, climate change, and water mismanagement. Breeding is mostly random, research support is still weak, and the pricing system is exploitative, especially during peak production.

	Agro-eco system	Commodities	Main limiting factors
Milk -Kids	•Annual rain falls 200-600 mm •Use of Natural range lands and crops residues	•fresh raw milk; •Sales of kids; • Sale of adults when cash is needed	•Feed shortages from February to April; •Uncontrolled mating can result in kidding season during feed shortages, limiting dairy production; •Fluctuation in the price of milk and kids •Poor genetic potential of criollo (mixed breed) animals •Parasitism and high mortality rate

Figure 1. Characteristic of the milk and meat goat production system in North Western and Central Mexico (Salinas, 1995)

The herds graze large areas of arid rangelands (about 3. 5 million ha). This steppe is composed of low to medium size xerophytes and thorny shrubs (e.g. Euphorbia, Agave, Opuntia and Acacia species) and a spare herbaceous stratum of grasses (Semarnat, 1996). Carrying capacity is low. For instance in the eastern range, the biomass yield is only 137 kg of edible DM/ha which limits grazing to 35 ha/animal unit to avoid overgrazing (Mazcorro et al., 1991).

During the night, goats are kept in rudimentary corrals, often with shelter, contiguous to the home. They are taken to graze from 10:00 to 18:00, and then supplemented upon returning to the corrals for the night. Some smallholders own land that is cultivated with oats for feed. Nearly all producers arrange for their goats to graze crop residues if these are available near the household or grazing areas (Escareño et al. 2011). This is a significant source of feed, and also contributes to maintaining soil fertility.

The animals are also supplemented with oat hay, acquired locally. They receive a small quantity of concentrates (0, 5 kg/animal/day according to Meza et al., 2014). Water is transported to the corrals and grazing areas in trucks owned by the goat producers. Bucks are kept with the females throughout the year which results in an extended kidding season which is not adapted to the forage availability. To avoid it, a minority of farmers run their bucks with aprons to prevent out-of-season mating. Newborn kids are kept in the corral all day, and nurse when their mothers return from grazing. They go out to graze with the herd only after they reach 2.5 months of age. Does average 1.5 kids/kidding although farmers prefer single kids, as opposed to twins, because of faster growth.

The producers milk the does by hand in the corral, because few have parlors with milking machines. The lack of hygiene decreases the quality and marketability of milk. Raw fresh milk is sold directly to the dairy processors, which collect it at the farm gate. Live animal traders visit the areas with their own trucks, to buy kids, but at very low prices. Farmers accept these prices because no other market is available. Because processors pay the same price for milk no matter the quality, farmers do not have an incentive to improve hygiene. The processors pay less for milk during peak periods of production.

Lactation averages 7.4 months with 1.5 liters per day, per doe, and 56.9 ± 5.5 L per herd/day (333 L/ lactation per goat, 12630 L/herd). The income obtained by selling milk at USD 0.30 per L would be 4.7 times the minimum salary in the area, which highlights the importance of milk production as the main livelihood strategy for the small holders.

Although the dominant goat type is the Criollo type, a locally adapted mixed breed, the influence of highly productive dairy breeds such as the Anglo Nubian, Alpine and Saanen, can be observed, due to past distribution programs by the government or the dairies, (Mellado, 2008; Escareño et al., 2011). Contrary to their expectations, farmers claim that crossbreeding has exacerbated their production problems, because of increased vulnerability to disease in the harsh desert environment. Although farmers agree that milk production of crossbred goats is enhanced, they note that these animals are weaker and more prone to sickness than the rugged Criollo goats, when managed semi-extensively (Salinas et al., 1999).

2.3 Environmental issues

All producers have unrestricted access to public rangelands resulting in overgrazing (Echavarría et al., 2006). The degradation is increasing because of the growth of the goat sector. Access to rangeland generates conflicts within the communities, especially when large herds of cattle, sheep or goats are grazed. There is no specific legislation for management of rangeland, although new sheep and goat laws in Argentina (MAGP, 2001, SENASA, 2012) provide a useful model. Pro-poor policies to promote goat milk production and marketing in northeast Brazil offer additional models for Mexico. There is no strong local tradition or organization to manage public pasture, as seen in the Moroccan area near Essaouira. Very often, politicians see the rangeland problem as a technical matter, when it needs a strategic government policy with fair and enforced regulations. Improved management of rangelands is possible, and would have a clear positive impact on the farmers' livelihoods and well-being.

Water is a limiting factor for goat production. It has been resolved by the use of cisterns to store water from canals for irrigated areas. So far this practice has not impacted water reserves.

2.4 Social Issues

The small-scale goat producers in CL are poor and socially marginalized. Although they have created a breeders' association, it is still weak with a limited capacity to negotiate better prices or to develop a sustainable grazing system. The dairy companies dominate the market, creating unfavorable conditions for the producers. They are the only buyers for the milk and they do not offer any incentives for a richer or cleaner product. The kids are sold to traders without considering their weight or body condition which results in low prices and again no incentive for improved production. None of the value added during processing or marketing accrues to the producers. It was not possible to identify from this survey the role of women or the ethnicity of the farmers.

3. Goat projects in the CL and in Mexico

Initially, goat production in the CL was not been supported by development programs or specific research and extension projects. This is now changing.

"The participatory research program in dry areas of Latin America"

From 2004-2010, this participatory action research project strengthened research and development to improve marketing of small ruminant products and income generation in dry areas in Zacatecas and San

Luis Potosi States. It was implemented by the International Center for Agricultural Research in the Dry Areas (ICARDA), INIFAP and the Autonomous University of San Luis Potosi. The research results had to be linked to development projects financed by IFAD.

The project assessed the constraints to small ruminant production, and then had farmers test technical interventions for rangeland recovery, forage production, herd productivity improvement and value addition through milk processing. (Iñiguez –Rojas, 2013)

CL goat production system and the implementation of a community-based breeding plan (2005-2011)

This project set up a breeding plan in response to farmers' request for improved animals. It was supported by IFAD and the "participatory research program in dry areas of Latin America," and the Austrian Development Agency (ADA), and was implemented by INIFAP, ICARDA and the Austrian University of Natural Resources and Life Sciences (BOKU). The project characterized the goats from the Comarca Lagunera and implemented an on-going community breeding plan addressing farmers' needs.

4. Stakes, constraints and conflicts (SWOT analysis) for the development of the goat sector in the CL

The matrix below shows the beliefs of goat producers on the potential of dairy goats to improve their livelihoods.

Factors/Effects	(Helpful (to achieve objective	Harmful (to achieve objective)
Internal origin **(Peculiarities of the producers' organization)**	• Strengths: • Local knowledge and ability to manage semi-extensive dairy goat production • Both positive and negative experience with industry • Clear interest in the community to produce milk, to improve productivity, and increase the added value of their products	• Dependency on unrestricted communal grazing of rangeland • Poverty and lack of resources • Lack of negotiating power • Poor organization of farmers • Lack of access to improved breeding animals

External origin (Peculiarities of the producers' organization)	• Opportunities • Expanding demand for goat milk products • Expanding market demand for suckling kids • Industry is in need of smallholder production • A secured outlet for cheese produced with goat milk • Opportunities for value addition through milk processing (into cheese and condensed milk) • Available technologies tested by research for range recovery and management, and flock productivity improvement, with potential to impact land use and production sustainability • Growing support from local and national government, and research institutions • Climate change leading to more land available (from agricultural areas under arid processes) for increasing goat production	• Threats • Lack of policies to manage and protect communal rangeland, • Lack of regulation on pricing of milk and kids • Rangeland degradation • Migration (in particular to the USA) for other employment opportunities • Development is not reaching the marginalized producers and is not helping them benefit • The general opinion is that the growth of the demand for goat milk and goat milk products (dulce de leche) would be limited because the national standards of living.

5. Lessons learned from the CL case and projects

Several important lessons can be learned from this case to inform dairy goat project planning in other regions.

5.1 At the technical level

Pasture-based dairy goat production can be productive in arid areas if crop by-products or residues are available at a low cost. In the CL, it is a sustainable and desirable strategy, because goats are allowed to graze the crop residues on irrigated land, when feed is limited in the rangelands. Public pastures provide a cheap feed resource if well managed, and if the breeds are well adapted. For example, the local Criollo goats are adapted to the harsh desert conditions, unlike the more productive exotic breeds. Complementarities between livestock and agriculture increases smallholder resiliency through diversification.

The CL case study shows that goats can produce milk under hot and harsh better than cattle, which is relevant due to global warming. Open grazing on dry range is only possible if producers have additional forage resources (forage crops, crop residues, by-products) during peak lactation when the herds have high nutritional requirements. Feeding high quantities of concentrates does not work well for dairy goats, nor would it be profitable to the small-scale goat producers.

5.2 The dairy goat value chain

The integration of the CL dairy goat producers into the strong agro – industry resulted in its expansion. It can be compared with the development of the dairy goat sector in Central Western France. It will be

interesting to observe how the power imbalance between the industry and the farmers gets resolved, and the role of the goat producers' organization.

But this link between industry and farmers is a threat also, because the goat producers are completely dependent on the dairy processors. In the Zacatecas state, an alternative strategy developed using small goat cheese producing units for smallholders, but it has experienced difficulties with logistics and markets (Salinas González et al., 2013).

5.3 Next steps

The CL dairy goat farmers association is a critical first step for sustainable and pro-poor development. The research institutions appear interested in and familiar with community- based participatory research, leading to suitable technologies to improve the productivity of small ruminant production systems. The producers need training in rangeland management, feeding systems, and forage production under conditions of water scarcity. They also need to develop their organizational capacity, and include women in decision-making processes, which may require additional development partners. The dairy industry must become a partner and not an adversary because it is to everyone's advantage to improve the goat milk value chain. Extension and training for farmers will require their support, either directly or indirectly through government services. Public policies must be developed to regulate pricing based on quality (for milk and meat), management of rangeland, and services for the small-scale farmers. Scaling out of community-based breeding plans has been initiated at pilot sites, but will require planning and funding to continue, and improve. Investments in infrastructures (wells, roads, animal housing) will require public involvement and reliable funding. The CL is an excellent place to pilot an "Innovation Platform" where the actors can develop mutually beneficial strategies to develop the value chain. Given the strong demand, and existing farmers' group, the CL could be a model of dairy goat development that brings benefits to farm families, traders, processors and consumers.

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KNOWLEDGE HARVESTING: MOROCCO

"Goat Kid Meat from the Argan Forest Project, South West Morocco"

Written by Jean-Paul Dubeuf and Beth A. Miller

1. Introduction

The development project, "goat meat from the Argan forest" (PMVA, "projet de développement et de valorisation du chevreau de l'arganeraie") is coordinated by the Moroccan Ministry of Agriculture in the Essaouira Province, and is financed under the general umbrella of the Pillar 2 of the "Maroc Vert" ("Green Morocco") project with the contributions of the Moroccan government, the World Bank, EU and several other international donors.

This report introduces Morocco and its goat sector. Additional projects like the Chefchaouen dairy goat project and other initiatives will be discussed to understand the potential for goat-based development to reduce rural poverty, and to build upon complex yet sustainable local production systems. The Argan Forest has biological and climatic characteristics which have influenced the local culture, including their practice of integrated goat/argan oil production. The PMVA project will be assessed using the following tools: description of the actors and the production systems; SWOT analysis of the components of the project; and results from discussions and round tables with local participants.

2.Rural Poverty in Morocco

Morocco is located in the North Western part of Africa. It is an intermediate income country, with a GDP of $ 2940 per capita in 2012 and an extreme poverty index of only 2,5 % but with high differences between the rural and urban areas (UNICEF Stats, 2012). The national poverty level decreased from 16% in 1999 to 9% in 2013 (World Bank, 2013) but remains much higher in the rural areas. The mountainous Atlas and Rif areas and the southern desert have significantly higher rates of poverty.

The objective of "Maroc Vert" is to develop the agricultural sector to face the present global challenges (MARDPM, 2009). The first Pillar of the Maroc Vert Plan is to develop the competitiveness of agriculture in the central irrigated main plain (crops, dairy, vegetables, fruit trees, etc…).

Source : Google Map

Map 1. Morocco and location of the main goat projects

The official objective of the second Pillar is to lift 3 million rural smallholders out of poverty through agricultural training. The strategy is to favor more progressive farmers who would act drivers and integrators. They are the first beneficiaries of the subsidies, technical training and investments; as they progress, they could be a model for other more poor farmers and could boost local development. Several public agencies have been created (ORMVA Tafilalet[1] , ANZOA[2] , etc…) to coordinate their actions, which are financed by the national government, international organizations, and bilateral donors, EU, NGOs, etc…). The total amount available for this second Pillar is USD 1.8 billon.

3.The Moroccan goat sector

The small ruminant sector has been dominated by powerful owners of large herds of sheep raised for the meat market, while the goat population is much smaller.
Although the statistics are not precise due to the lack of identification and census of the animals, (especially in the mountainous areas where most of the goats are located), the total goat population is estimated at about 5 million head held by around 1 million households. Most of the herds are small, and about 71 % of the goat keepers are considered as poor by ANOC, based on the size of the farms and their technical efficiency (2010). Nearly all the production systems are pastoral, agri-pastoral or half extensive, with some supplemental feeding or grazing by-products like stubble after grain harvests. Most of the goats are multipurpose (milk for self-consumption and sale of kids). Although 20,000 tons of goat meat (7% of the total production of meat), are produced in Morocco, it has a more negative image and lower price than sheep meat, particularly in urban areas. Only a small part (about 33% of red meat and probably less for goat meat) of the meat processed is controlled by Veterinary Services in official slaughter houses.

The main regions for goat meat consumption are the southern areas (Ouarzazate, Haouz, Tafilalet, Goulimine) and mountainous ones (Al Hoceima and Chefaouenne), which are the traditional goat producing areas. Goat meat is generally marketed in traditional value chains (souks). Small pockets of intensive dairy goat production are found around the cities and in Southern tourist areas (Agadir), but the production and consumption of goat cheeses are very small. Most goat herds are small, and managed without supplemental feed, or controlled breeding. The notion of breed is poorly defined, compared to the many sheep breeds in the country, but recently some populations have been identified according to phenotypic characteristics; however selection based on production has yet to begin. The following breeds are found:

- The mountain Yahiaouia and Attaoua goats are now recognized within the Barsa or the Atlas Black goat breed
- The very prolific black Drâa goat of the oasis
- Some exotic dairy breeds (Alpine and Murciana Granadina), have been imported for crossing in the Northern (Mediterranean) region near Chefchaouen.

At the global level, goat numbers have grown significantly more quickly (25%) than cattle (13%) for the last 10 years, mainly in emerging countries according to FAO (2013). In Morocco, this growth has been more moderate (5. 6 million head in 2012 versus 5. 1 million in 2002, which is a 9% increase (FAO, 2013). Some producers believe that middle class urban consumers, who are increasingly are concerned about nutrition and fat content, could become interested in goat meat because of its fatty acid profile, but it

1 Regional Development Office of Tafilalet
2 National Agency of Oasis and Arid Areas

would need to be marketed to them. There is also an emerging small niche market for goat milk cheeses near cities and in tourist areas. Environmental degradation has been blamed on overgrazing by goats, leading to a negative image by consumers and government officials, but newer research has refuted this, which must be communicated to the public.

4.The breeders' organizations and the role of ANOC

The only national association for goat producers is ANOC (National Sheep and Goat Association), since goats were not highly valued in the past. ANOC is supported by the government, which considers it the only organization for the sheep and goat sector. ANOC's main activity is to create and mobilize groups of modernized breeders, which they consider drivers of the future for the sector. Each member pays fees to the group which hires a technical expert to improve management through controlled breeding, nutritional supplementation, vaccination and improved health care. Some groups receive a subsidy to hire their ANOC technician. Groups organize marketing to attract larger-scale traders. The growth of its activity has been steady since its creation in 1981 and the number of its members is now significant. Most members have large numbers of animals, but very few have goats.

A group of dairy goat breeders has been created in Chefchaouen (Rif region) and two others in the Argan tree area. Their priority is animal selection and improved management and productivity. The governance of ANOC is modeled on the organization of French breeders' associations and technical training is to develop the economic position of participating farmers, not to reduce poverty.

	1981	1989	1999	2007
Number of groups	1	9	35	54
Number of members	106	425	2225	3552
Number of heads (female)	63133	252533	924452	1172515
Employees (officers)	(28000)	(112000)	(410 000)	(520000)
Heads/farmer	1	19	63	85
Producers/group	595	(5)	(9)	(9)
	106	594	415	330
		47	63	65

Table 1. Development of ANOC since its creation (Source: ANOC)

The Chefchouen goat cheese project

Consequently, few projects to develop goats were undertaken except several time- limited projects to develop investments by small scale goat cheese farmers for niche markets. The most significant is the Chefchaouen Dairy goat project in the Northern Rif mountain range.
This project was started by ANOC in 2000. It followed a pre-project assessment initiated by the Provincial Directorate of Agriculture with the support of FAO, and resulted in the creation of an artisanal cheese unit in Chefchouen (Ajbane Chjefchaouen) in 1995 (Dubeuf and Thomas, 1996).

The main objective of this integrated project was to develop the goat cheese market by collecting goat milk from the local producers, and helping them to improve their productivity and income.

A goat breeding centre for Alpine goats (to cross with local goats) was created in Bellota near the cheese unit (MADRPM/DERD; 2000). The Chefchaouen goat cheese received an official Geographical Protected Indication in 2004 and can be produced throughout the province of Chefchaouen. According to ANOC, the unit collected 155,347 liters/year milk in 2010 from 40 producers (3900 liters/farm), and generated DH 2000/farm (USD $500). ANOC views the Chefchaouen project as a model for future goat cheese activities in Morocco. These activities are complemented by other initiatives (honey, agro-tourism, etc…) to diversify the economy in the Province, which is still highly dependent on the illegal production of cannabis. Nevertheless, the number of farmers involved has not grown significantly, the production per farm is low, the market sales are low, and the Ajbane Cheese unit needs to diversify its production now with gouda type cheese made with goat milk (Diversité et Développement, 2011). Meanwhile most goat farmers in the area market fresh traditional cheeses in the local "souks". These farmers do not belong to the ANOC group and do not have access to any technical support. ANOC's plan to create other such cheese units in other areas has not been undertaken.

Other projects on goats

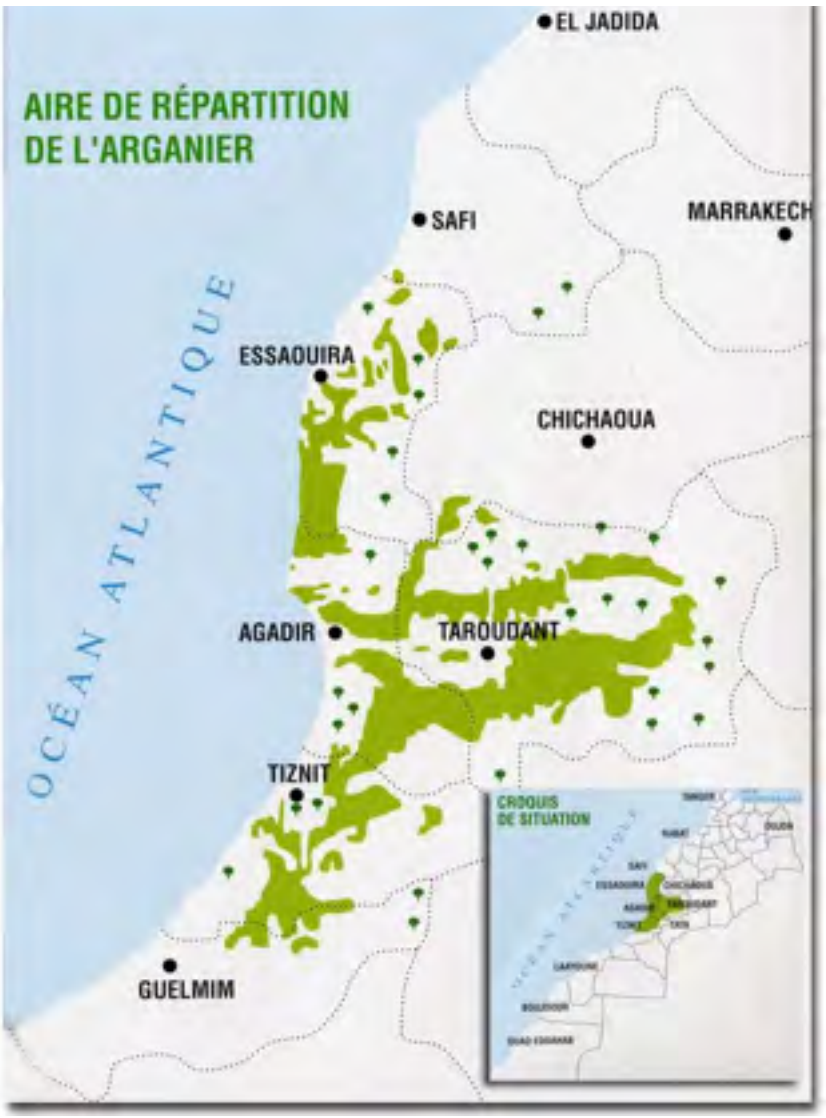
Other local dairy goat projects were developed in the oasis of Ourzazate area with the support of the NGO "Elevages Sans Frontières" and the ROSA Association, which is a local grassroots NGO. One cheese unit was created in Tamassinte near Ouarzazate. ROSA distributes dairy goats to very poor women, who agree to "pass on" offspring to other poor women in the group. Volunteer staff train farmers in goat production, and group development. Although the annual quantity of milk processed at Tamassinte is less than 1000 liters, the children in participating households are healthier, and women are recognized for their skills and success. About 55 families are involved in the 3 goat projects, which are based on the principles of Heifer International (which has no official ties to the groups). Although the demand is very strong for more groups, training and goats, expansion is limited due to lack of funding. The regional impact of these projects is low due to the small size. All of the cheese produced is purchased quickly by hotels and restaurants, although local populations continue to buy simple fresh cheese in the souks.

5. The Argan forest and the meat goat production system

The Argan forest is a large area in South Western Morocco located between the towns of Essaouira, Taroudant and Tiznit. The Argan Forest World Reserve Biosphere (RBA) was established by UNESCO in 1998. The reserve covers 2.5 million ha [3] , and is dominated by the oil-producing Argan tree (Argania spinosa, L.), and other xeric and thermophylic species found only in this area. Argania spinosa totals 1000 subspecies, of which 140 are endemic to Morocco; among them are those producing fruits for oil. The trees are generally associated with other species such as the dragon tree (Dracaena draco subsp. Ajgall) or yew so the forest has high biodiversity. The objective of the Reserve is to manage and preserve this complex ecological and economic forest system while developing the economy to benefit the 1.3 million people living there.

Since its creation the main focus of the RBA has been to preserve the endangered Argan trees from degradation, mismanagement, climate change, and destruction (for industry, infrastructures, tourism and intensified agriculture). Although the official data states that the forest covers 800,000 ha, it has lost at least 4,300 ha in 10 years, due to drought, irrigated agriculture, tourism, and over harvesting. According to many scientists (during the International Argan Tree Congress in 2013) the real area would be much lower with also a lower density and a lower productivity of trees.

3 Provinces of Agadir, Ida Outanane, Inzeguane Aït Melloul, Chtouka Aït Baha, Taroudant, Tiznit and Essaouira



Map 2. Location of the argan tree area (Source: RBA)

The cosmetic and nutritional qualities of Argan oil have been promoted and the RBA has favored the commercialization of argane oil production and export. Until recently, Argan oil was used mainly by the local population, but now the price has risen beyond their means. Both industrial and small scale value chains have been developed to provide the cosmetics industry with argan oil. New cooperatives employ a large number of poor women to pound and crush the Argan seeds. It has improved their condition and given them a monetary income, but the pay is low and work is tedious.

Traditionally, the Argan forest was managed to provide livelihoods through goat and sheep production, collection and processing of Argan seeds to extract the oil, crops in the flat low areas, and wood collection. Goats and other ruminants used to graze under the trees. They would also climb up the trees to consume leaves and seeds. When they returned home in the evening, they would excrete the seeds which could be gathered by the women. The seeds would be softened from passage through the goats' digestive tract, and could be processed to make oil.

Grazing by goats has several positive effects on the trees. They removed some of the young leaves, which weaken the trees; they fertilize the trees naturally through their manure, and favor the biodiversity of pasture by the dissemination of seeds. The traditional system was very complex and managed at the

village or “douar” level (Bourbouze and El Aïch, 2005). All the land was owned by the Forest Service, but was shared between ”melk”, (private cultivated area), “mouchaa” , (collective land including grazing but without restrictions), and the “agdal” area which was used individually for grazing goats except during critical flowering periods in spring (this exclusion from grazing is called “agdal”).

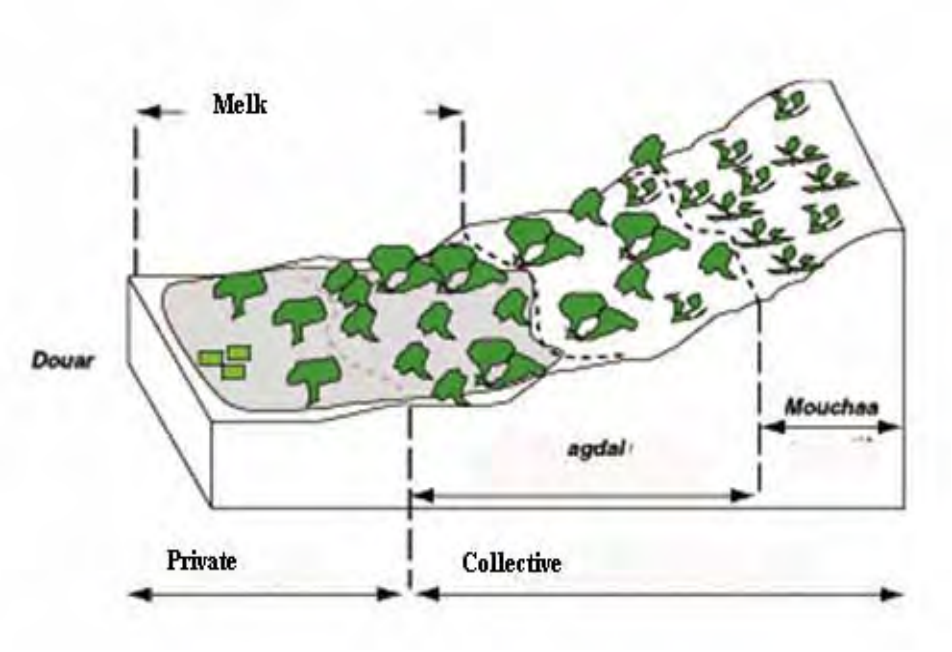


Figure 1. The model of land organization in the Argan forest (from Bourbouze and El Aïch, 2005)

Agriculture, livestock production, wood collection, and Argan oil production have coexisted for centuries and goats were a necessary part of the system. Goats were raised for meat and the kids were marketed locally in traditional markets (souks) with informal slaughter houses. Their live weight and conformations was low, but the cost of production was also low.

In January 2010, the Argan oil received the Protected Geographical Indication (PGI) label, and the AMIGHA Association was created in 2003 to manage and control the label. Unfortunately, the PGI prohibits the traditional practice of collecting the softened excreted seeds. Further the Forest Service restricts goat grazing in the forest, because it considers goat overgrazing the cause of forest degradation. Social, political and economic conditions have broken down the traditional land management system. In fact, overgrazing is due to the collapse of the traditional system and its authority, allowing uncontrolled grazing of foreign herds coming from the Far South Regions of the country (ANZOA, 2013).

6. The “Argane Forest Goat Kid Meat” Project

The Argane Forest Goat Kid Meat” project was initiated in 2012 by the Regional Directorate of Agriculture of Essaouira and with funding from the 2nd Pillar of the “Maroc Vert” Plan.

The project is implemented in 28 Berber villages in the southern part of Essaouira province. The Berbers are the indigenous inhabitants of Morocco, who converted to Islam at the time of the Arab conquest in the 7th century, but who retain their own language, customs and culture. Although poverty is high, Berber women enjoy greater independence and fewer restrictions on their activities outside the home, compared to the Arabic speaking populations in the north. The inhabitants of these villages belong to the same Haha tribe, which has an existing organizational structure. This area has 22,740 goat keeping households with an average of 6 people each, who would be targeted.
Most of the herds are small ones; 70% have less than 50 head. In this Province there are 350,000 goats (7% of the national goat herd). It produces 500 tons of goat meat yearly, (26% of the red meat in the Province) in the local and provincial slaughter houses near , the souks.

The poverty rate of the area is high (probably more than 25%) and the objective of the project is to improve household income, by improving meat production, marketing, and functioning of the entire value chain by 2020. ANOC is the main partner, and is seeking the "Geographical Protected Denomination" label for the meat from goats that graze the Argan forest, to help develop the urban market. Other coordinated actions have been planned and some have begun.

- Creation of 2 producers associations (2 ANOC groups)
- Improvement of livestock management (watering, livestock breeding and nutrition , health care)
- Development of a model market, with a slaughter house and cutting room , and acquisition of a refrigerated truck)
- Improvement of the farmer's technical capacity

Map 3. The Essaouira Province, (in green, the project area)

Budget of the project and expected impact

The total cost of the project is DH 17 million (USD 2 millions). Its expected impact according to the Regional Directorate of Agriculture is:

- Additional annual production : 634 tons of goat meat
- Additional added value (turn over and higher price): DH 34 Million (USD 4.1 million)
- Additional number of working days/year : 50.000
- Certification and labeling of Argan goat meat to improve marketing
- Contribution to the preservation of the Argan tree forest by specializing the goat meat activity (according to the project managers)

The budget of each operation is developed in the table below (from the DPA document, 2012)

Type of operation	Indicators	Budget (Dh /USD)
1- Organization of breeders		
* ANOC Association of breeders	2 groups (12000 h)	1 000 000 /129 000
2- Improvement of farmers conditions		7 010 000/904290
* Animal health	-	810 000
* buried water tanks (100 m3)	30	3 000 000
* Tank truck for water	2	1 200 000
* Pilot goat farms	20	2 000 000
3- Marketing of goat meat		4 600 000/593400
* slaughter house		2 000 000
* Organization and equipment of a pilot market (souk)	1	500 000
* equipment for a meat cutting room	1	1 200 000
* Refrigerated truck for transporting goat meat	1	700 000
* Commercial organization	1	200 000
4- Strategy for Labeling and Certification of goat meat from the Argan Forest (official "geographical Indication")	1	500 000 /124500
* Market research	-	
* Administrative procedures for labeling		
* Communication		600 000/174000
5- Training and technology transfer		3290 000
6-Other operations		
Total		17 million/ 2 million

Table 2. Budget of the PMVA project

Each expense is scheduled during each year. A cost benefits analysis has been implemented by Dino Francescutti (FAO). It shows that even with small technical improvement and a better management of the herds, such a project could be profitable (see the separate special document in the final IGA/IFAD study completion report

The main stakeholders of the goat sector in the argan tree area

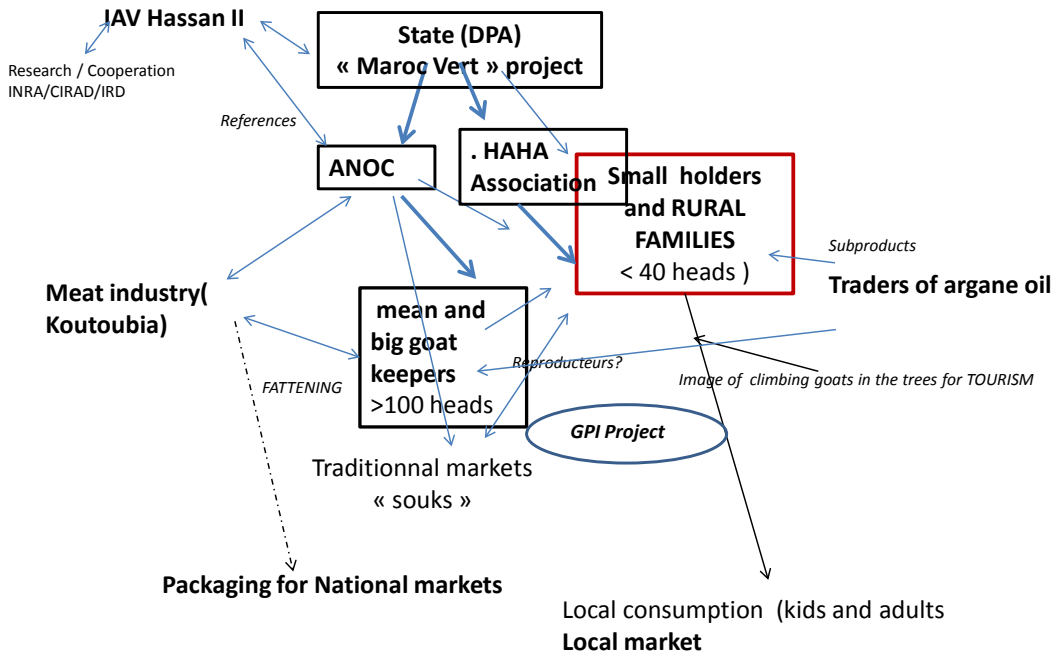


Figure 2a

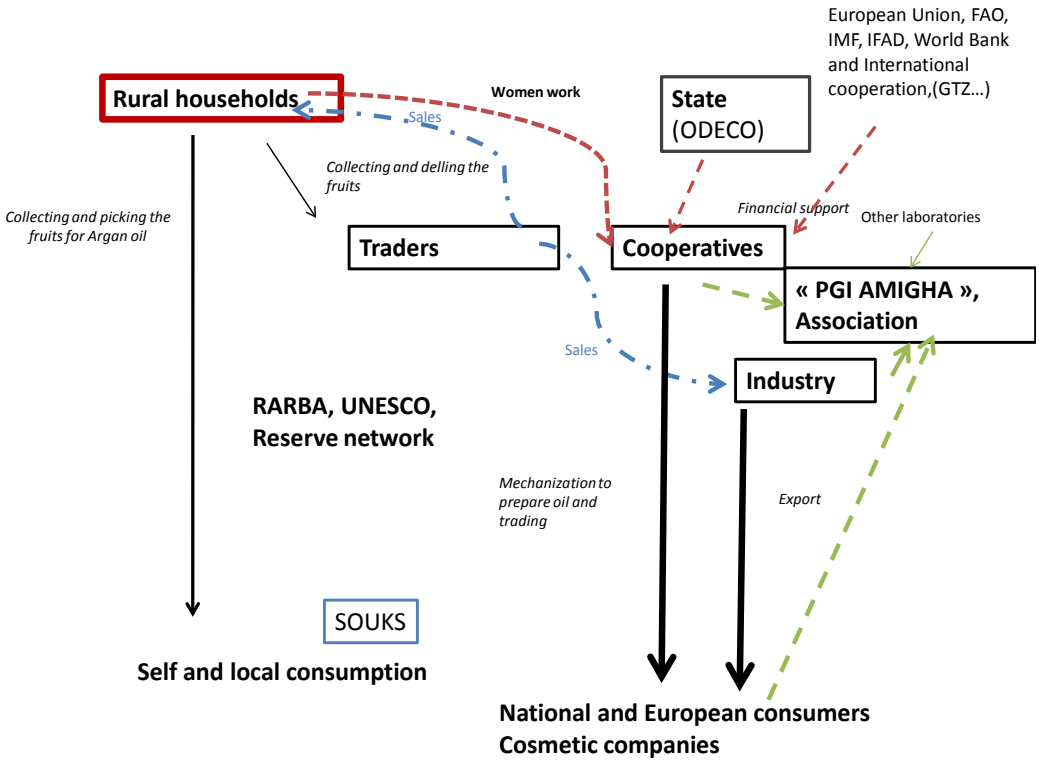


Figure 2b

Figure 2 a and b. Organization of the actors' systems for goats (a) and oil (b) in the Argan forest (Source: Dubeuf, J-P., et al., 2014)

The actors of the goat sector in the Argan trees area are mainly linked the rural families and the traditional village or "douar" organizations ("jmaa"). The relations between the actors have been identified during interviews completed in 2011.

SWOT analysis of the project and its success factors in terms of impacts, proposals and suggestions:

Strong points of the planned project, according to participants:
• Populations with good know–how and skills to manage the natural resources, which must become formalized to adapt to the commercialized and industrialized economy,
• A strong local image promoted by the boom of Argan oil, tourism and by the creation of the UNESCO Biosphere reserve,
•Strong commitment from the state institutions («Maroc vert») to promote and certify the local kid meat with the support of international organizations, NGOs, research and local administration,
• A tradition of local solidarity and the ability to work together in groups for mutual benefit.

Weak points:
• An up – down or erratic strategy to develop goat meat, with few successful examples in Morocco
• The participation of poor goat keepers is low,
• The development project does not take in account the traditional system and complementarities between oil, goats and crops,
• The forestry services, in charge of the management of the area have a vision of "pure nature" which does not include goat grazing in the forest,
• Lack of information about markets ,
• Low productivity of the goats and low weight of the carcasses of kids,
• No expansion of technical assistance and extension to other producers beyond the members of the groups, which could be seen as a club for medium to high income producers.

Opportunities:
• The 2nd pillar of the «Maroc vert», Green Morocco project has financial and operational means to develop the goat sector by focusing on poverty reduction,
• The changes in urban consumption patterns with preference for healthier meat,
• Public administration, butchers, technicians are aware of this potential urban market for goat meat.

Threats:
• Over grazing in collective uncontrolled areas («mouchäa»), because "Agdal" (prohibited grazing) are no longer applied very strictly. Revival of the traditional management system is one solution.
• The proposed technical model encourages dependence on external inputs
• Degradation of the Argan forest tree area and loss of biodiversity due to goat and tree production managed separately rather than integrated, and
• Loss of goat grazing privileges in Argan forest decided by Forest Service Authority

7. Discussion of the PMVA project and conclusions about scaling up the project

This project is well structured to sustainably develop the goat meat value chain at a regional level. The project has been discussed during two seminars in 2012 and 2013.

The main concerns of the local leaders were that the creation of ANOC groups was not from a local initiative. It confirms the observations of a mission in 2007 that the project focus was mainly technical and did not take in account the local practices and the complementarities between oil and goats. Despite ANOC's strong technical capacity in modern goat production, it is not an « anti-poverty, » organization and therefore not a « model » for development. ANOC can deliver its technical package to a group of small holders, but without addressing the social context and causes of poverty, its ability to reduce poverty through technology alone is limited.

Morocco as in many other developing countries does not have a generalized training and extension system for the majority of farmers. Extension is so weak that public authorities use ANOC, a private organization, for technical training, without a coherent understanding of the culture and motivations of the poor. Officials become frustrated and angry that the poor « don't want to modernize»" because development is done "to' the poor, and not "with" them. The dominant perception of progress is still that modernization alone could solve all the problems. This vision destroys the social capital that allows small poor holders to survive and to stay on their land. Also, the "modernization" focus does not consider the goat/forest interaction, which would contribute to preserving the Argan forest. Dissociating the goat and oil activities endangers this unique ecosystem with its complex multifunctional and complementary activities which has provided human livelihoods and forest habitats for centuries.

We can identify useful lessons from the goat projects in Morocco. Recent meetings and events on the goat meat projects allowed the local actors to evaluate the plan so far.

• The development of the goat meat value chain as proposed by the project is relevant. Moroccan people consume a great deal of sheep meat (mutton) so developing a market for goat meat is logical. It could be scaled up for medium or large scale projects in other similar situations. Conversely dairy goat projects have fewer opportunities to develop their market and therefore should be limited to niche situations.

• Investments in a modern slaughter house and improved markets will help organize and develop the goat meat value chain. These investments must be linked to technical training, access to inputs and financial services for all producers, to improve the live weight of kids and their carcass qualities.

• The Geographical Indications (GI) is a good strategy for marketing. The project faced strong opposition from the Forest Services and the actors of the oil sectors (Amigha). It was first proposed in 2013 and was rejected initially by the Ministry of Agriculture. Recently, the Regional Directorate of Agriculture has become more open to the opinion of the main actors. The Association of Haha people has been formed which will actively participate in the new PGI project proposal. The Haha tribe owns the rights to use the Argan forest in Essaouira, so their preferences and priorities must be considered.

• A new proposal has to be rewritten. It will manage grazing in the area and prevent overgrazing by reactivating the "Agdal" system of land management. ANOC will be still involved as a technical partner to help the goat keepers to improve their management. Other goat projects pursuing a GI should include the people impacted, because a top down initiative often ignores local conditions necessary for success.

• There is a gap between the expected beneficiaries and the technical organization of the project. Technical assistance has been limited to only 200 producers belonging to the ANOC groups. These producers have the largest herds (from 30 to 150 head) while the majority of the local households have only 10 head, and the poorest have only 3 to 4), (Bejbouj and al., 2011, El Hadj, 2012). In order to meet the anti-poverty objective of Pillar 2 of Maroc Vert, more intentional outreach to the poor must be organized. Morocco has a multitude of strong and active grassroots antipoverty NGOs, but the official livestock sector does not engage with them. Many of these community based groups are with women, who are active in goat management, and home processing. Future activities using goats could partner with organizations which may not have a livestock focus yet, but have organized small scale producers for other reasons. Once a group of poor producers has been organized, it is much easier for them to learn

and accept improved goat management.
• Also, extension has to be organized for the entire village or "douar" with field technicians involved with the goat keepers on a daily basis. The management of community land cannot be accomplished with the participation of only a few of the village families.
• The accountability system for the project must include operational objectives and monitoring in addition to the formal financial assessment. This situation is often seen in development projects, and limits success and the ability to learn from experience.
• An additional lesson learned is the need to increase the awareness of the actors in the Argon oil sector that goats are not the enemies of the trees if they are correctly managed.

This report is based mainly on meetings from several missions in 2011/2012/2013 and a Master's thesis written by a student in 2012 to characterize the production systems (full text available in French). In addition, several external bibliographical references and documents including the PMVA official project document to develop the kid of the argan forest have been used. A cost – benefit and business planning analysis of this project has been prepared and included in the "Business assessment and cost–benefits analysis for pro-poor small ruminant development" report in the IGA/IFAD study. These studies and the missions were supported financially by the French research project ANR MOUVE (ANR2010 STRA 005)

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KNOWLEDGE HARVESTING NEPAL

Submitted to Heifer Project International, Nepal, Hattiban, Lalitpur
By Braja Kishore, Prasad Shaha, Kamal Raj Gautam, Krishna Prasad Paudel, July 2012

The report, "A Study on Goat Value Chain, Nepal" is a very thorough work created by Heifer Project International to support and develop goat value chains in Nepal. Due to the high quality of this work, which has also been used to prepare the Goat Value Chain Toolkit, we decided to utilize this as the base of the Knowledge Harvesting done in Nepal with the full agreement of HPI.

Table Of Contents:

Executive Summary

In January 2012, Heifer Nepal launched its project "Strengthening Smallholder Enterprises of Livestock Value Chain for Poverty Reduction and Economic Growth in Nepal (SLVC)". One of the major objectives of this project is to reduce goat importation by 30% by the end of the project in 2017. To develop a strategic work plan for meeting this objective, Heifer Nepal conducted a comprehensive study on goat value chain in Nepal. The objectives of the study were to document current goat value chains, develop implementation strategies and identify key intervention areas for enhancing the stake/role of the smallholders and their institutions in the goat value chain enterprises. The study was undertaken by a team of consultants during March to June 2012.

Nepal has a goat population of 9.19 million with an annual growth of just above 2%. About 49.8 % of households (2.79 million of the 5.6 million) keep goats, with average holdings of 3.3/household. The country's national gross domestic product (GDP) at current price (FY 2010/11) is NPR 1,261,210 million (USD 14,171 million; 1USD = NPR 89.0). The agriculture sector contributed 36% to this National GDP in fiscal year 2011. The contribution of livestock to total agricultural GDP (AGDP) remained about 27.66 %. Goat contributes 20% in national meat production and has a share of about 12% in total Livestock GDP.

The study area was comprised of eight randomly selected districts from the 28 SLVC districts: Banke, Bardiya, Surkhet, Baglung, Nawalparasi, Chitwan, Mahottari and Jhapa. Approaches undertaken to accomplish the study included review, collection of primary data and qualitative and quantitative analysis of both primary and secondary data using the Value Chain framework for drawing inferences. This framework consists of the goat value chain network/structure, value additions/losses across the vertical chain and governance.

The goat meat demand and supply analysis is based on domestic production plus import. The current total supply of goat meat is 61,375 MT from domestic production and import, with the domestic production contributing 52,809 MT (86%) and import 8,566 MT. A crude estimate based on income elasticity reveals that the total demand for goat meat in the country is about 70,307 MT with a gap of 8,932 MT. This equals 565,300 additional goats annually. The demand for goat meat is growing at a higher rate than its in-country production and is majorly associated with increase in income of the urban population. To meet the increasing demand for goat meat, there is increasing import of live goats from India and occasionally from Tibet. Compilation of goat import data available at Animal Health quarantine offices revealed that 429,802 live goats were imported from India in the last 12 months (mid April 2011 to mid-April 2012). The highest numbers of goats are imported from Krishnanagar followed by Nepalgunj, Belahiya, Manang, and Rani Biratnagar. Further disaggregation of imported animals reveals that the number of goats imported for breeding was about 2,250, equaling just about 0.5 percent of the total import. In the domestic market, there is also export of Nepalese nannies with kids (15,000 /annum) from Kakarbhitha Quarantine Check post. No evidence of goat export was available from other customs points.

There is wide variation in cost of production of goat meat across systems and regions. The mean cost of production of dressed meat was NPR 283.74/Kg in the SLVC districts. Case studies reveal that Heifer SHG members trained in IGM had cost of production as low as NPR 150.0/Kg. This efficiency is achieved through improved feeding, flushing, management and breed selection, and can be seen in the achievement of an above-90% twinning rate and attainment of market weight before 12 months of age.

The estimated off-take rate of goat is about 36.3%, which indicates that nearly 3.34 million of the national flock of 9.19 million goats is annually disposed of for meat purposes. About 75% of the total

off-take is consumed at the villages and the remaining 25% is supplied to formal market places. There is no organized live goat marketing system in the country, except scheduled weekly live animal markets in the Narayani-east sector. The study team observed that domestic goat marketing at the producer level is totally at the individual contact basis in both regions (Narayani-east and Narayani-west). The number of goats gathered in a particular Haatbazar is too small to attract larger traders, particularly importers. This situation clearly indicates that the inflow of goats into the various Haatbazars does not meet the economic scale; therefore, the domestic goat meat value chain is ineffective in supplying goats to major end markets. Among the markets studied, the highest number of imported goats was traded in Kathmandu, followed by Biratnagar, Pokhara, Bharatpur, Barhatwa, Sanischare and Sakhuwa bazar. A total of 969,789 goats were traded from these markets, including both imports and domestic production. Out of this total, 567,049 were from domestic production and 402,740 from import. Among the visited markets, the highest percentage of shortfall in domestic production was found in Pokhara (83.61) followed by Butwal (79.85), Bharatpur (67.96), Nepalganj (67.46), Kathmandu (58.7), Baglung (46.97), Biratnagar (11.38) and Surkhet (2.98).

The import value chain of goat meat from India is well established and efficient. There are about 11 traders in the whole import value chain. These traders have at least one local partner in their business and are operating through registered firms in Kathmandu and Pokhara. They also have satellite branches at Belahiya, Krishnanagar and Nepalganj. The private sector import trade is running as a formal system. Value chain analysis (VCA) of the import chain reveals that the freight on board or *FOB price (NPR 355.0 /Kg meat) is 59 per cent of the end market consumer price of NPR* 600.0/Kg *meat and value additions on FOB include importer's/trader's cost (13%), importer's profit (12%), meat processor's cost (4%) and meat processor's profit (12%). In the entire* import value chain, about two kg body weight loss per goat was observed, while in the domestic value chain, weight loss was nearly 3 kilo per goat depending upon the mode of transportation, distance of the end market, rest provided and feeding/ watering provisions in transit.

Despite the better carcass yield of Indian goats (65%) over Nepalese goats (62%) with skin intact, the competitiveness of the Nepalese goat appears better due to the higher farm gate prices (NPR 376/kg meat) Nepalese farmers are receiving against the estimated FOB cost (NPR 355.56/kg of meat) of the import VC. The farm gate prices (except in the Eastern development region where the terminal market is nearby and regional traders are absent from the value chain) are fairly at par with FOB the price of imports. Import-associated hidden costs in India and inflation in prices indicates even higher FOB prices in the future. There is a huge difference between efficient and non-efficient goat farms in the study area (CoP as low as NRs. 150.0/kg of meat), implying that there is room for improvement in production and productivity. Thus the Nepalese goat meat sector could be competitive against India in terms production and productivity if cost of production could be reduced as in the model farms mentioned..

Examples from these model farms show that region-specific goat production technologies can be compiled to target a cost of production below NPR200.0/Kg meat output. Similarly, encouraging the local government and private sector to organize and develop market places for goats in a public/private partnership (PPP) model is possible, and such market entity could sustain as an enterprise even with less than the present octroi rate/animal. The scale of operation has to be increased with adequate facilities for animals and traders.

Several production and marketing strategies are suggested for the SLVC project. Heifer needs to focus on meeting the demand of local and district headquarters first to ultimately substitute the currently imported goats being supplied there. Meat entrepreneurs' associations of each district and municipality can play a vital role as partners of the project in linking producers and traders/butchers.

Abbreviations

ABPSD: Agri-business Promotion and Statistical Division, MOAD
AGDP. Agricultural Gross Domestic Product
CBS: Central Bureau of Statistics
CDR: Central Development Region
CoP. Cost of Production
CPR: Common Property Resources
DFTQC: Department of Food Technology and Quality Control
DHQ: District Headquarters
DLMP. Directorate of Livestock Market Promotion
DLS: Department of Livestock Services
DLSO: District Livestock Service Office
EDR: Eastern Development Region
FDR: Far-Western Development Region
FNSPA: Food and Nutrition Security Plan of Action
FOB: Freight on Board
GCC: Goat Collection Centers
GDP. Gross Domestic Product
GO: Government Organization
GVC: Goat Value Chain
HH: Households
HPIN: Heifer Project International Nepal
INGO: International Non- Governmental Organization
Kg.: Kilogram
LSC: Livestock Services Center
MDGs: Millennium Development goals
MoAD: Ministry of Agriculture and Cooperative (Ministry of Agriculture Development)
MoF. Ministry of Finance
MT.: Metric Ton
MWDR: Mid -Western Development Region
NARC: Nepal Agriculture Research Council
N-E Sector. Narayani- East Sector
NGO: Non-Governmental Organization
NLSS: Nepal Living Standard Survey
NPR: Nepalese Rupee
No: Number
NVC: Nepal Veterinary Council
N-W Sector. Narayani - West Sector
PMCA: Participatory Market Chain Approach
PPP. Public Private Partnership
SO: Strength & Opportunity
ST: Strength & Threat
SWOT: Strength, Weakness, Opportunity and Threat
TADs: Transboundary Animal Diseases
TYIP. Three Year Interim Plan
VC: Value Chain
WDR: Western Development Region
WO: Weakness & Opportunity

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The study team extends its sincere thanks to Heifer Nepal management for entrusting its members to carry out this important study. The study team is highly grateful to all the participant farmers, entrepreneurs/traders/processors and staff from Regional Directorate of Livestock Services, Animal Quarantine Offices, Heifer Nepal Regional offices and District Livestock Service Offices for their cooperation and active engagement in providing useful information, sharing facts and figures and for their cordial accompaniment during the study. The study team received appreciable and timely involvement and cooperation of stakeholders, enumerators, partner NGOs officials and Heifer group and cooperative members. The team duly acknowledges their contribution and extends its sincere thanks to all of them.

This study was accomplished with the help and support of several organizations, institutions, and individuals. The list is rather impossible to elaborate; the study team therefore thanks them with a high level of appreciation for their contribution to the completion of this study. We would like to extend our sincere thanks to all those who directly or indirectly helped in gathering secondary information and supported in the study process, and also took strong participation in the validation workshop, interactions, and discussion.

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Lastly but not the least, special thanks to Mr. Suman Thapa for his safe driving skills and for exceptionally long days during the field movement.

1. Introduction

Heifer Nepal has been implementing the project "Strengthening Smallholder Enterprises of Livestock Value Chain for Poverty Reduction and Economic Growth in Nepal (SLVC)" since January 2012. One of the major objectives of this project is to reduce goat importation by 30% by the end of the project in 2017. To develop a strategic work plan for meeting this objective, Heifer Nepal conducted a comprehensive study on goat value chain in Nepal. The objectives of the study were to document current goat value chains, develop implementation strategies and identify key intervention areas for enhancing the stake/role of the smallholders and their institutions in the goat value chain enterprises. The study was undertaken by a team of consultants during March to June 2012. The detailed scope of the study is presented in Annex I.

This report documents the present goat value chains, identifies gaps between end market demand and supply, and suggests how smallholder goat producers can be engaged in the goat supply chain to meet the market demand and contribute to import reduction. *The focus remains on* increasing the economic scale of operation and *building trust* among consumers, traders and producers *along* vertically linked actors. Additional focus is given to convergence of the actors' common interests for building/reinforcing the horizontal relationships, envisaging that SLVC can facilitate development of a formal trading alliance. The study describes various interventions to expand and strengthen mutually-beneficial, vertically-linked goat value chain enterprises from smallholder production farms to end market consumers.

2. Goats Sub-sector in Nepal

Goat (Capra hircus) in recent years has been recognized as one of the most important livestock commodities that have widely been adopted in programs for poverty reduction, livelihood enhancement, and food and nutrition security in Nepal. Goats form an integral part of the mixed crop/livestock farming system and contribute substantially to farmers income, thus to the national economy. They provide meat, manure, leather, and even draft power as pack animals. Furthermore, they are a valuable source of income for small resource-poor farmers, particularly women, and act as a safety net referred to as a "living bank" that they can liquidate when needed.

Nepal had a goat population of 6.9 million in 2001 which now has increased to 9.19 million (ABPSD, 2011) with an annual growth of just above 2%. About 49.8 % of the households (2.79 million of the 5.6 million) of the country keep goats with an average holding of 3.3/household. Further disaggregation of households with goats reveals that about 32.2% of them keep 1-2, 42.2% keep 3-5, 18% keep 6-9 and the remaining 7.5% keep 10 or more goats (CBS, 2012).

The national gross domestic product (GDP) at current price for the year FY 2010/11 is NPR 1,261,210 million (USD 14,171 million; 1USD = NPR 89.0). The agriculture sector contributed 36% to this National GDP (ABPSD, 2011). The contribution of livestock to total agricultural GDP (AGDP) is about 27.66 %. Goat contributes 20% to the national meat production and has a share of 12% in the total Livestock GDP. A typical smallholder farmer earns NPR 15,000 – 20,000 annually from selling their goats (NLSS, 2012).

3 Methodologies and Approaches

Approaches undertaken to accomplish the study included review, collection of primary data and qualitative/ quantitative analysis of both primary and secondary data for drawing inferences using the Value Chain framework.

3.1 Framework of a Goat Value Chain Analysis

In this study, the goat value chain analysis framework views value chains as production and consumption networks in which business actors utilize competitive resources and operate within a formal or an informal institutional environment. The value chain is characterized by its network structure, its governance form and the way value is added.

Network structure: a value chain network structure has two dimensions/linkages: vertical and horizontal. The vertical dimension reflects the flow of live goats/meat and services from primary producer up to end-consumer. The vertical linkages indicate the relationships between the various value chain actors in the different tiers - relationship between farmers and collectors, collectors and larger trader, processors/retailers or even farmers and butchers etc. The horizontal dimension reflects relationships between actors in the same chain link, such as relationships among farmers, among SHGs, among collectors, traders, processors/retailers. The horizontal relationship becomes crucial in expanding the scale of operation. The study looked into relationships among farmers, farmers' cooperatives, traders' associations, processors' associations, and any existing collaborative agreements between small and medium sized processors.

Value addition: value addition is created at different stages and by different actors throughout the value chain. Value addition considers quality, transportation and transitional stocking, transaction costs, delivery times, delivery flexibility, and even associated losses if any. The size of value addition by different actors in the vertical chain is driven and decided by the end-customer's willingness to pay.

Governance form/structure: governance in the goat value chain refers to the authority and power relationships that determine how financial, material and human resources are allocated and flow within the goat value chain. Factors influencing the business relationships are subject to many uncertainties caused by poor physical infrastructures (markets, transitional stocking facilities, transport means, roads, communication facilities etc.), weak institutional infrastructures (government support, sanction systems, etc.), unbalanced trade relationships (dependencies, opportunistic buyer behavior) and unfavorable social and political conditions, all leading to uncertainties and risks for producers.

Based on the three value chain characteristics mentioned above, opportunities/constraints have been identified along the chain. The study has also inspected the status of business and extension services and input providers that support the market chain's operations. It has further examined the enabling business environment factors (i.e. infrastructure, institutions, policies and processes) that shape and influence the market system. Based on the study/analysis, strengths, weakness, opportunities and threats (SWOT) in the value chain have been identified, and key areas for intervention to develop/ strengthen the goat value chain have been recommended.

The following schematic diagram represents the framework for the goat value chain analysis used in this study:

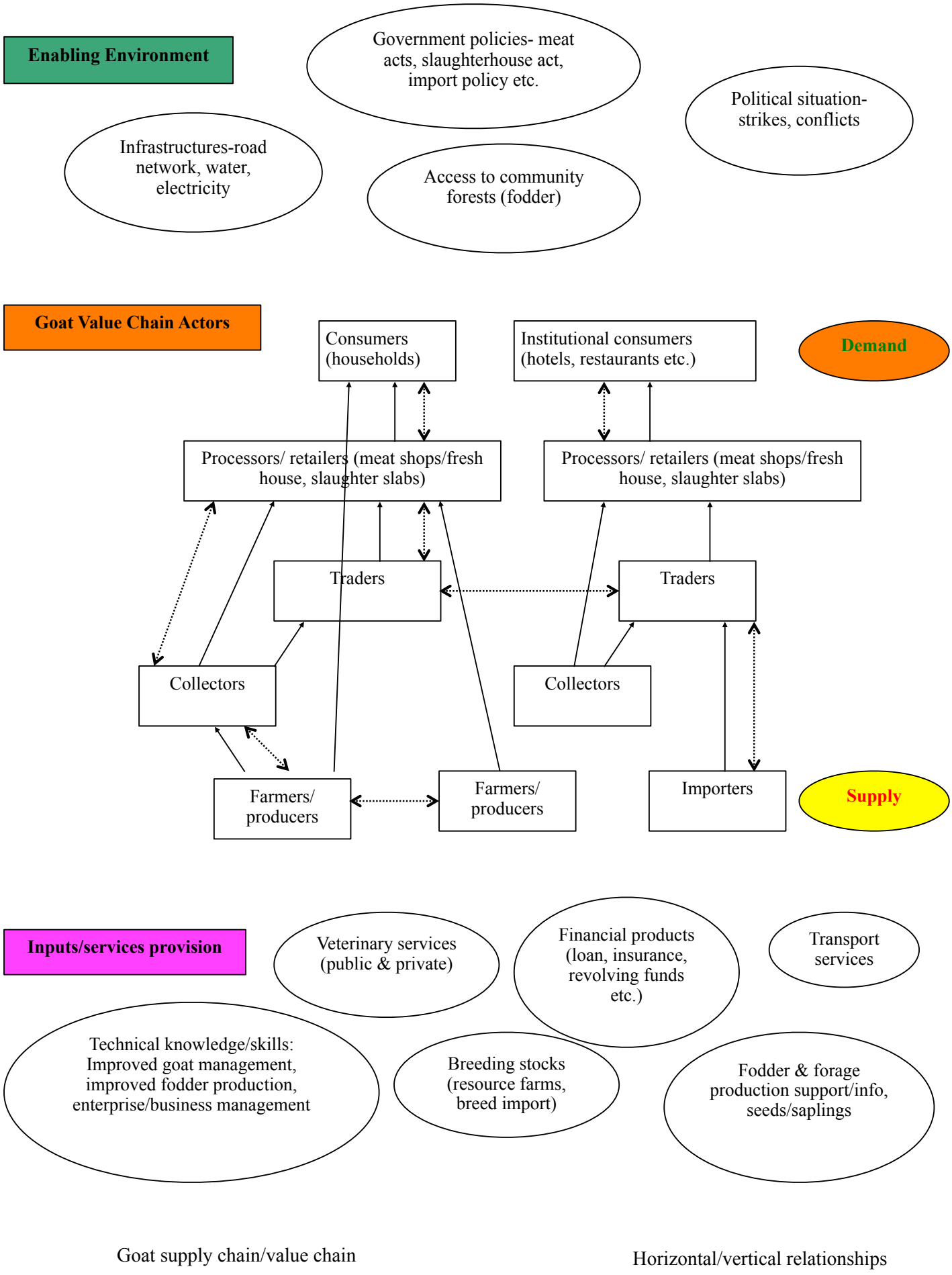


Figure 1. Goat Value Chain Framework

The study includes in the analysis three goat production systems (intensive, semi intensive and grazing), and the existing and desirable goat marketing channels to the end markets. The study collated primary and secondary data and derived through SWOT analysis strategies to enable smallholders to become one of the important actors engaged in goat VC. The following approaches and methodologies were administered to collate, analyze and derive the study outputs.

3.2 Review of Secondary information

The published literature, reports and technical documents relevant to goat production, meat trade and consumption were collected from concerned agencies and reviewed. The data from secondary information sources such as goat population, off-take rate, export and import figures, demand and supply of goat meat, markets/trading places were critically reviewed to establish the information gap. Similarly policy and programs were also reviewed. Thus, collected data were collated, tabulated and analyzed to establish the data deficiencies. Crosscutting issues such as policy and programs, gender empowerment, environmental aspects, investment opportunities, security, various trans-boundary epidemics associated with goat movement and direct/indirect support from GO's, INGO's and NGO's in relation with food security were also assessed and analyzed to establish significance of the study in the national perspective.

3.3 Survey and Collection of Primary data

To meet the specific objectives of the study, value chain specific information identified as gaps from review was collected through primary sources through household survey, key informant survey, focus group discussions (FGD), stakeholder meetings and workshops, direct observation and checklist surveys from farmers groups, traders of various levels, meat retailors, GO's, CBO's, concerned associations and consumers. The following questionnaires and checklists were administered at different levels to collect the information

HH survey questionnaire

Cost of production checklist(Annex II)

Collectors and traders checklist (Annex III)

Butchers checklist (Annex IV)

Consumers' checklist (Annex V)

The import figures were verified by reviewing retrospective records at the customs and veterinary quarantine offices of Nepalgunj, Krishnanagar and Belahiya and direct observations on the consignments delivered during the field visit.

3.4 Financial Analysis of goat Value Chain

To determine the economics of goat farming with special focus on cost of production (CoP) under various management practices, HH survey and purposive farmer's group discussions were administered by checklist. Similarly, collectors and traders were consulted to gather information on investment and return from value additions across the supply chain of live goats from production to butcher and of goat meat from butcher to consumer. Data was collected on all of the costs incurred at various stages of the vertical value chain - purchase price, holding costs, feeding and watering during transit, transportation,

local taxes, mortalities, weight losses, cost of vaccine and health certificates and unseen expenses. Sales prices were recorded and documented through focus group discussions at different market places across ecological belts and then verified by direct observations. Direct observations and interactions were made to record information on infrastructure, transport facilities, market operation and management system, communication system, price information and other amenities of the markets.

The study area was comprised of the following districts: Banke, Bardiya, Surkhet, Baglung, Nawalparasi from Narayani-west; and Chitwan, Mahottari and Jhapa from Narayani-east. The villages selected from the above districts for household survey were Fatepur, Bageshwari and Jamuni from Banke, Lekhaparajul and Chinchu from Surkhet, Bhakunde and Paiunphant of Baglung, Mainaghat and Dhaubadi of Nawalparasi, Shaktikhor of Chitwan, Khairmara of Mahottari and Khudanabari of Jhapa. Total 64 households' data were analyzed to derive CoP per kg. of goat meat. A total of 69 HH were surveyed for determining cost of production across various domains, 64 by trained enumerators and five by the study team for cross verification. Similarly, technical and financial parameters under intensive, semi- intensive and grazing system related with goat husbandry were collected and documented. Estimated CoP was derived under various domains through the gross margin analysis. A SWOT analysis has also been undertaken to document the existing situation of CoP and way forward for further enhancement, competitiveness and sustainability of the goat husbandry.

3.5 Mapping of Existing Goat Value Chain Framework

Using the VC framework described above, the existing goat value chains are mapped by two geographical regions based on differences in the marketing systems of live goats and their linkage to end markets. The analyses are made for Narayani- east sector where live animal markets (Haatbazars) are in operations and import is not significant, and Narayani –west sector where live animal haatbazars are not yet in operation and the marketing chain include import in the supply chain.

To estimate the value additions and profit margins at various vertical tiers of the goat meat value chain, a total of 69 producers, 36 Collectors, 15 traders, 3 processors, 2 importers, 10 market management committee, 36 butchers and 53 consumers were interviewed and their information analyzed. In the same way, various service providers such as animal health quarantine officials, Department of Livestock Services officials, veterinary drug suppliers, Nepal Agricultural Research Council (NARC), Co-operatives, Custom officials, private registered veterinary Service providers, traffic police, transporters and policy makers were also interviewed. Qualitative and quantitative information was collated, triangulated and analyzed.

3.6 SWOT Analysis:

A SWOT analysis for market, production and socio-economics was also undertaken to document the existing situation and way forward for further development in the national perspective.

3.7 Validation workshop

The preliminary findings of the study were shared in a validation workshop at the Heifer Nepal office in Kathmandu on June 26, 2012 with the participation of various central level stakeholders from the government, non-governmental organizations and VC actors. Also included were representatives from Consumers' Forum, a federation at the national level of consumers' forums, working mainly for rights, advocacy and consumer welfare. Major suggestions and comments received from the participants during the workshop were collected, reviewed and incorporated in the report.

3.8 Limitations of the Study

The most felt limitation of the study is the absence of farm recordings at the household level, which would give respondents a chance to make an instantaneous estimate in responding to questions on production and consumption. As no formal recorded information was available on inputs, production and sales, FGD agreed figures were determined for price, quantities sold in market, volume flow between inter and intra district movement, etc.

The findings of the study are representative of and specific to the SLVC study area. The coverage of high hills and Far-Western region of Nepal are not included, therefore, though trends may apply, the information is not representative of those regions.

The competitiveness of Nepalese goats vis a vis Indian goats is determined through comparison of cost of production of Nepalese goat and freight on board (FOB) price of imported Indian goats at the Nepalese border and their value additions during transport and trading in Nepal considering both quantity and quality. The study lacks primary information on Indian goat husbandry practices and their associated costs of production, value additions and marketing channels, therefore inference might have been compromised in terms of competitiveness of the producers of the two countries and India's price margins along the goat value chain.

4 Results and Discussions

4.1Demand and Supply Analysis of Goat Meat

The supply analysis of goat meat is based on domestic production plus import. The current total supply of goat meat is 61,375 MT from domestic production and import with domestic production contributing 52,809 MT (86%) and import 8,566 MT. A crude estimate based on income elasticity reveals that the total demand for goat meat in the country is about 70,307 MT, leaving a gap of 8,932 MT. This is equal to a national need of 565,300 additional goats annually.

Part of this gap is met by import of frozen lamb and mutton (6.3 MT) by institutional consumers (mainly big hotels). The demand for goat meat is growing at a higher rate than its in-country production and is majorly associated with increase in income of the urban population. To meet the increasing demand for goat meat, there is increasing import of live goats from India and occasionally from Tibet. Thus, the trend in production and consumption of goat meat is expected to increase in the future and its growth will be higher than the country's present human population annual growth rate of 1.4%.

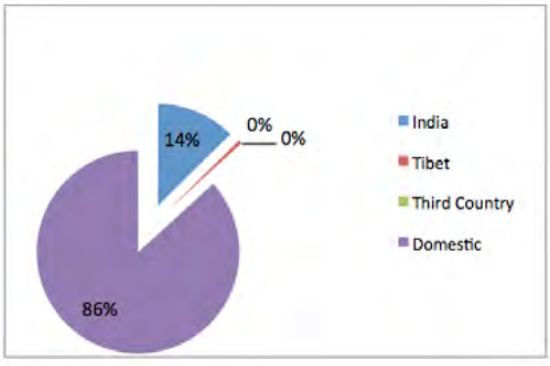


Figure: 2 Share different sources of total meat supply

4.1.1 Domestic production:

Goat meat production is following an increasing trend. The total domestic goat meat production in 2001-02 was estimated to be 38,584 MT, and increased to 52,809 MT in 2010 – 11 (ABPSD, 2011). From the total population of 9.186 million goats in Nepal (ABPSD, 2011), it is estimated that 3.35 million goats are slaughtered annually for meat and for sacrifice in religious events. This number yields about 52,809 MT of meat with an average carcass weight of 15.8 kg /goat. The distribution of the goat population and number of goats slaughtered by regions are illustrated in Figure 3 and 4 respectively. The highest population is in the Central Development Region (CDR) followed by Eastern (EDR), Western (WDR), Mid-western (MWDR) and Far-western Development Regions (FWDR). However, total meat production is highest in EDR followed by CDR, MWDR, WDR and FWDR, implying the importance of organized Haatbazars and higher off-take rates due to market access.

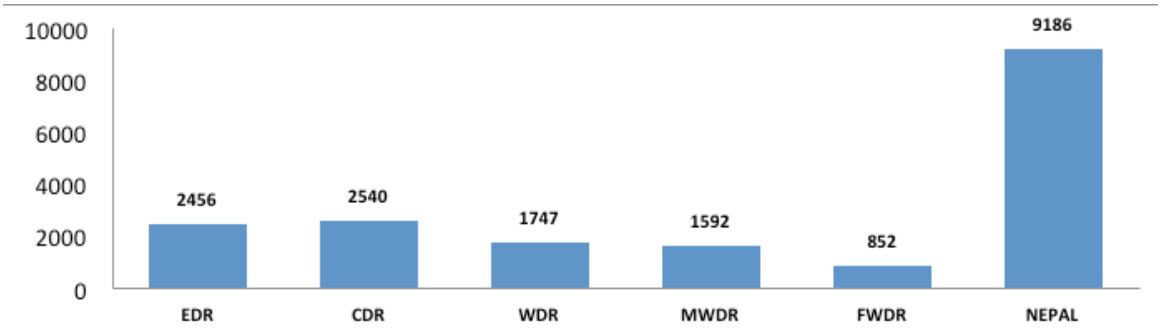


Figure 3. Goat Population (in 1,000 animals) by Regions (Adapted from ABPSD, 2011).

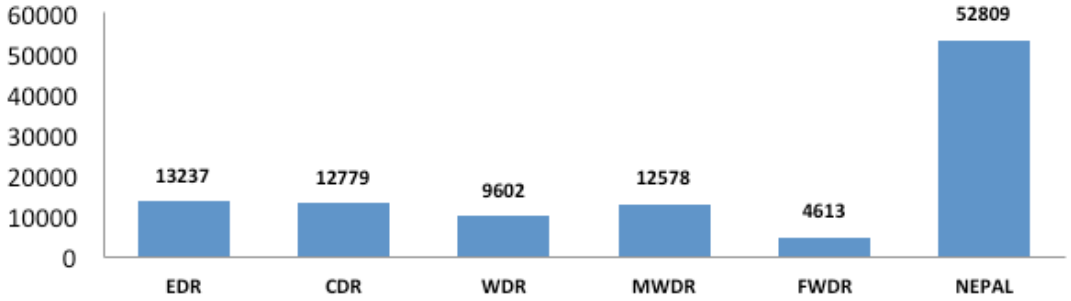


Figure 4. Meat Production (MT.) by Regions (Adapted from ABPSD, 2011)

4.1.2 Import

Government records reveal that the import figure for 2005/06 was 274,814 live goats which rose to 475,853 in 2010-11 (DLS, 2011). Compilation of goat import data available at animal health quarantine offices revealed that 429,802 live goats were imported from India in the last 12 months (mid April 2011 to mid- April 2012. The highest number of goats is imported from Krishnanagar custom point followed by Nepalgunj, Belahiya, Manang, and Rani Biratnagar (Figure 5). The estimated meat supply from the imported Indian goats during last 12 months (mid -April 2011 to mid-April 2012 is about 7,736 MT (with an average carcass weight of 18.0 kg /goat). About 30,000 hill goats (Chyangra) were also imported from the Tibetan region of China, which contributes about 360 MT in the goat meat market (Average carcass wt. 12kg/Chyangra).

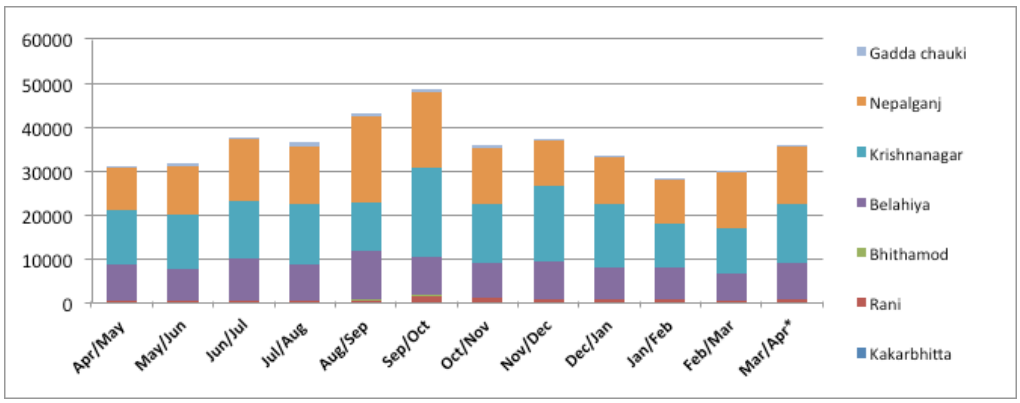


Figure 5. Goat import distribution by month : 2011-12.

Source: HPIN survey (unpublished data)

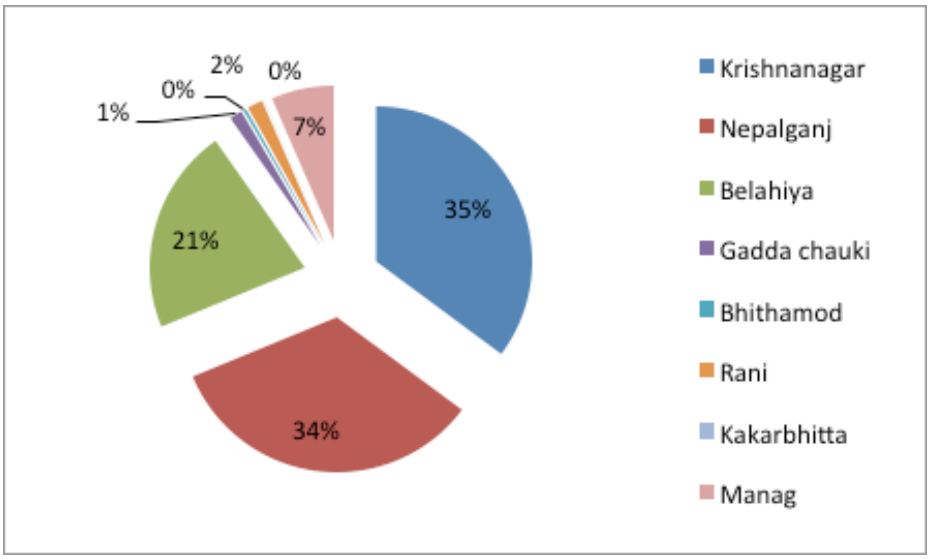


Figure 6. Share of Imported Goats from Various Customs

About 75% of the total imported goats from these border customs points is supplied to Kathmandu and the remaining 25% to Pokhara, Surkhet, Tulsipur, Bara, Nepalganj, Chitwan, Palpa, Butwal, Bhairahwa, Baglung and other smaller terminal markets and district headquarters. The import from Narayani east sector is nominal (mostly from neighboring Indian households along the border to the nearby haatbazar locations) and is consumed in the local markets, namely Kakarbhittha, Biratnagar, Janakpur and Mahendranagar. However, there is a recent trend in import of live goats from Biratnagar customs point in the EDR. About 8,000 goats were imported in the last 12 months though there was none in the preceding year. This is an alarming situation in which a new import-oriented value chain has commenced which might hinder the future growth of local goat production if a firm import oriented market emerges.. In this region, a similar number of goats are exported from Nepal's side in the haatbazars of the Indian side. It was impossible to estimate the number due to informal movements of the animals.

Further disaggregation of imported animals reveals that the total number of imported breeding animals is 2,250, equaling approximately 0.5 percent of the total import. In the domestic market, there is also the export of Nepalese nannies with kids (15,000 /annum) from Kakarbhitha Quarantine Check-post. Urlabari, Damak and Shanischare are the haatbazar locations for this export route. No evidence of formal goat export was available from other customs points in the Narayani-east sector and so is the case in NW sector.

4.1.3 Market Demand

The majority of the goat meat produced in villages is used for local consumption, irrespective of caste and religion. This study reveals that in a typical non-vegetarian family of 6, a sizable portion of goat meat (13.32 kg/annum or 2.22 kg per capita/annum) is consumed in rural areas. More than 90% households in rural areas are non-vegetarian. The mean goat meat consumption/family is lower in the Terai region (5.20 kilo) possibly due to availability and cheaper prices of poultry meat, whereas it is the highest in hilly region where goat consumption was found as high as 45.20 kilo/family/annum. There is a system of slaughtering a goat to supply meat to meet the demand for 8- 10 families at a time. Such groups slaughter a goat once or twice in a month depending on availability. Thus, most of the goats are consumed by the village communities collectively and only a few surplus goats are sold to collectors, mostly individually and in isolation depending on the pressing need for cash and irrespective of the age and weight of animals. Collectors supply goats to traders of nearby local markets. Therefore, major urban areas depend on import as very few goats are supplied to formal goat markets from in-country production pockets.

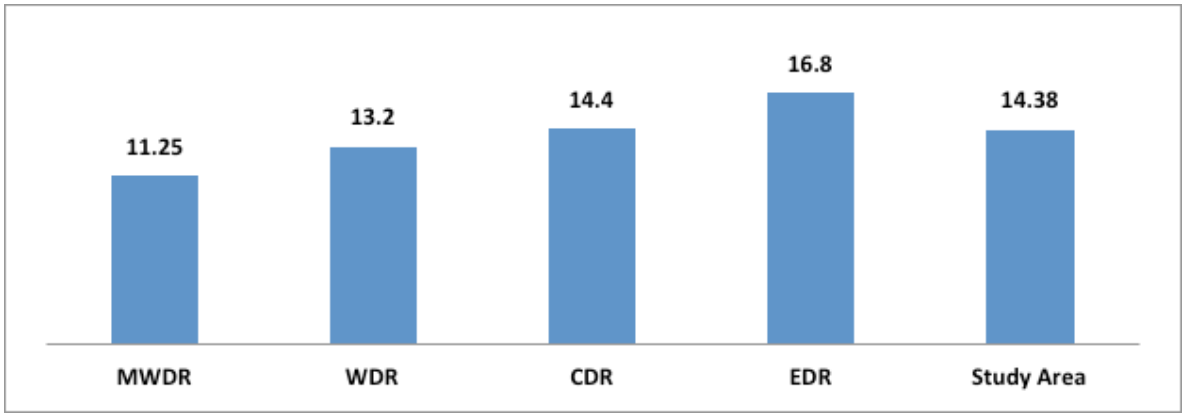


Figure 7. Urban Meat Consumption across Regions (kg /annum/HH). Source: Field Survey, 2012

The mean annual meat consumption among sampled households from SLVC districts is 14.38 kg/ annum/family. Further disaggregation by region revealed that the annual meat consumption was 16.8, 14.4, 13.2, 11.25 kg/family in EDR, CDR, WDR, MWDR respectively. Consumers' surveys reveal that on average an urban family consumes about a kg more of goat meat than does a rural one.
According to the supply utilization account prepared for the food balance sheet of the government study, the estimate of the goat meat supply per capita per year was 2.40 kg (MOAD- 2010). The findings of the present study further verify the government's survey. The study projected that since the goat meat is an income elastic commodity (CBS, 2011) the demand for goat meat will also increase accordingly.

Considering the demand and supply gap, it seems that both challenges and opportunities exist for this project to meet the project objective of import substitution in addition to creating avenues for poverty reduction, income generation, youth employment and food and nutrition security of the rural population. The most widely adopted goat husbandry practice in the country is the grazing system with the exception of some isolated clusters of crop/livestock integrated farms using intensive and semi-intensive systems. It was also observed that adjoining communities, leaseholds, state forest areas, wild life reserves and those in the Chure - Bhawar range (low hills) are most suitable and preferred for goat husbandry sites because of adequacy of common property resources (CPR) for goat farming and accessibility to the markets.

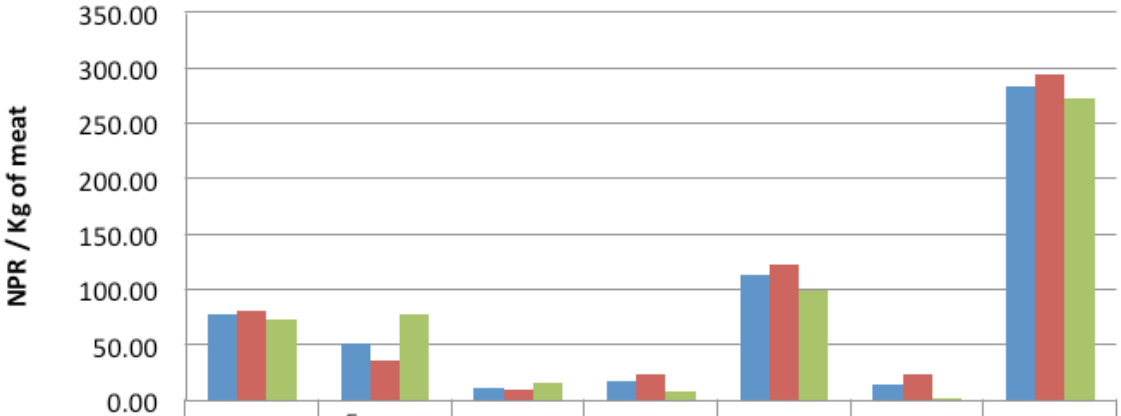
4.2 Goat production and marketing system

4.2.1 Goat Production Systems

Three goat production systems have been considered for the analysis purpose.
Intensive system: this system denotes goat farming under complete stall feeding practice irrespective of the flock size. Farmers adopt the cut and carry system and supplement grains and agricultural by-products as concentrate feed.
Semi-intensive system: farmers take their goats to graze for a few hours in and around their farmland or at a nearby Common Property Resource. Farmers also practice cut and carry system and supplement some concentrate feeds during enclosure in goat sheds.
Grazing system: Farmers adopt complete grazing practice and take their goats mostly to forests or community grazing lands (CPR).

4.2.2 Cost of Goat Meat Production

During the presentation of the field report there was a consensus to review production systems in two broad sectors i.e. Narayani-west sector and Narayani-east sector where marketing channels and VCAs are different in nature. Therefore, the summary of the estimated cost of production (CoP) for the overall of the study area, Narayani-west sector and Narayani-east sector are presented in Figure 8.
It is evident from the Figure 8 that the highest CoP was found in Narayani-west sector (NPR. 294.32) while Narayani-east sector is NPR 272.61. The overall CoP of the study area (pooled) is NPR 283.74. There is no significant variation in unit price of feed resources and labor costs across sectors. Whereas, there were significant differences in fodder and forage costs, expenses in vet services, investment in goat shed and its depreciation and other inputs. Lower costs and differences in forage and fodder costs and vet services in Narayani-east sector can be attributed to the common grazing practice at the CPR (a collective grazing system exists where a herder charges NPR 50.0/goat per month and makes his/her living) and increased awareness for disease control. The other major factor for this difference is attributed to type of housing material (bamboo, hard wood (Sal), mud and stone, etc.



	Feed	Forage andFodder	Vet Services	Depreciation	Labor	Other	Total cost
Study Area	77.01	51.37	11.04	17.30	112.43	14.60	283.74
NW Sector	80.87	35.63	8.84	23.92	121.92	23.13	294.32
NE Sector	72.44	76.97	14.68	7.26	99.72	1.53	272.61

Figure 8. Cost of Production of Goat Meat (NPR/kg), Source: Field Survey, 2012

The CoP under grazing, semi-intensive and intensive management systems considered cost incurred in supplementation feeding of grains and agri-byproducts as additional feeding practices. Apart from the household survey, CoP of goat meat production was also estimated separately as case studies from five intensive farm households. These households were from Tulshipur of Dang(2), Shaktikhor of Chitwan (2) and Khudnabari of Jhapa(1) representing MWDR, CDR and EDR respectively. It was found that under the grazing management system, the CoP per kg of meat was NPR166.43 at Shaktikhor and NPR 174.02 at Khudnabari; whereas, under intensive management system, the CoPs per kg of meat was NPR 298.19 and 297.79 at Tulshipur and Shaktikhor respectively, while that of the semi-intensive system was NPR 149.88 at Tulshipur due to adoption of flushing practices and a higher twinning percentage (Table 1).

There is wide variation in cost of goat meat production across, households, systems and regions. The mean cost of production was NPR 283.74/Kg in the SLVC districts. Case studies reveal that Heifer SHG members trained in IGM had cost of production as low as NPR 150.0/Kg of meat produced (Table 1), however, all farmers are not equally efficient as they do not monitor input, outputs and productivity. This efficiency is achieved through improved feeding, flushing, housing management and breed selection, and can be seen in the achievement of above 90% twinning rate and attainment of market-weight before 12 months of age. SLVC should aim for exploiting the full potential of smallholder farming at this level of production in terms of productivity/doe/annum.

Places	Shaktikhor	Khudnabari	Shaktikhor	Tulshipur	Tulshipur
Items/ System	Grazing A	Grazing B	Intensive A	Intensive B	Semi-Intensive
Feed cost	48.38	30.38	61.91	119.17	77.36
Forage and fodder cost	26.85	0.00	57.77	11.93	10.57
Vet. Services cost	17.59	4.97	18.92	7.59	3.61
Labor costs	59.07	122.34	130.22	147.31	51.26
Other Costs	1.23	1.10	2.70	1.68	0.73
Depreciation	13.31	15.22	26.67	10.11	6.34
Total costs	**166.43**	**174.021**	**298.19**	**297.79**	**149.88**

Table 1. Cost of production of Goat Meat (NPR /kg) Case studies in five farms Source: HPIN Field Survey 2012

4.2.3 Goat marketing system

The estimated off-take rate of goat is about 36.3 per cent which indicates that nearly 3.34 million of the national flock of 9.19 million goats is annually disposed of for meat purposes. About 75% of the total off-take is consumed at the villages and the remaining 25% is supplied to market places. There is no organized live goat marketing system in the country, except weekly live animal markets in the Narayani-east sector. The study team observed that domestic goat marketing at the producer level is totally at the individual contact basis in both regions (NE and NW). The locations of weekly Haatbazars are confined to NE regions only. Individual producers drive their animals to be sold to Haatbazars in NE sector while collectors travel to individual farmers' houses and bargain for purchase in the NW sector.

The total number goat markets in Nepal are 128, of which 69 are in EDR, 40 in CDR and 19 in the three remaining development regions. Regardless of development region most markets are located in terai (Premi, 2011). The number of goats gathered in a particular Haatbazar is too small to attract larger

traders, particularly importers. This situation clearly indicates that the inflow of goats into the various Haatbazars does not meet the economic scale; therefore, the domestic goat meat value chain is less effective in supplying goats to the major end markets mentioned above.

4.2.4 Marketing Volume at Major Terminal Markets

Major markets for domestic and imported goat meat are Kathmandu valley, followed by Pokhara, Biratnagar, Bharatpur, Janakpur and Butwal. These bigger end markets are live animal trade centers as well. From these bigger markets there is a further supply of live goats to smaller local markets, including district headquarters, which fulfill the gap in demand on top of the supply of goats from the surrounding goat production clusters of the respective districts. For example, the district headquarters of Baglung receives about 1,860 imported goats from Pokhara on top of 2,100 goats from its interior goat production. The highest number of imported goats was traded in Kathmandu, followed by Biratnagar, Pokhara, Bharatpur, Barhatwa, Sanischare and Sakhuwa bazar, whereas, the domestic goat consumption was found highest in Kathmandu followed by Biratnagar, Pokhara, Birtamod, Surkhet, Nepalgung, Tulsipur, Baglung and Bharatpur terminal markets respectively (Table 2).
In the study area, the 18 major markets were visited to estimate annual trading volume of goats. A total of 969,789 goats were traded from these markets, including both imports and domestic production. Out of this total, 567,049 were from domestic production and 402,740 from import. Among the visited markets, the highest percentage of shortfall in domestic production was found in Pokhara (83.61) followed by Butwal (79.85), Bharatpur (67.96), Nepalganj (67.46), Kathmandu (58.7), Baglung (46.97), Biratnagar (11.38) and Surkhet (2.98). The total gap in supply for the study area was 41.53 percent.

Places	Domestic	Import	Total	% Gap
Nepalganj	6579	13640	20219	-67.46
Surkhet+ Chhinchu	39030	1200	40230	-2.98
Tulshipur	3600	0	3600	0
Butwal	4400	17440	21840	-79.85
Baglung	2100	1860	3960	-46.97
Pokhara	12000	61200	73200	-83.61
Kathmandu	185760	264000	449760	-58.7
Bharatpur	16500	35000	51500	-67.96
Kalaiya	32000	0	32000	0
Barhathwa	48000	0	48000	0
Bardibas	1280	0	1280	0
Sakhuwa	38400	0	38400	0
Beltar	18000	0	18000	0
Biratnagar	65400	8400	73800	-11.38
Letang	18000	0	18000	0
Dhanran	24000	0	24000	0
Birtamod	12000	0	12000	0
Sanischre	40000	0	40000	0

Table 2. Estimated Marketing Volume of Goats in Major Terminal Markets Source: HPIN Field Survey, May 2012

From the Narayani-east sector there is export of female goats. Monthly outflow of goats from surveyed communities (10 Communities / Villages) for various terminal markets are presented in Figure 9. Seasonality in goat supply follows the same trend as that of import.

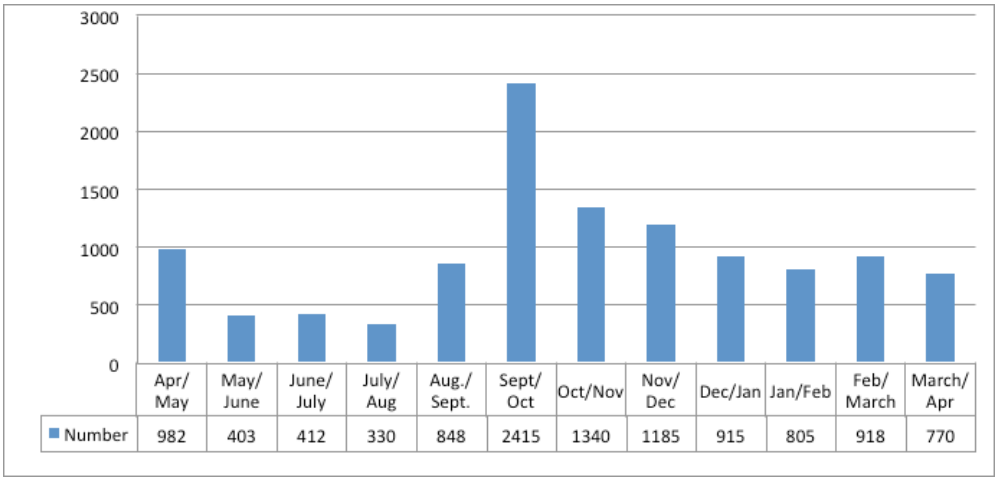


Figure 9. Monthly export of Goat from Narayani-east Area Source: HPN field survey, 2012.

Movement system of goat: Goat production areas and major consumption markets are distant despite improved accessibility due to opening of more road heads in rural areas. Barring few exceptions, the general mode of goat transportation is walking for local collectors to the collection points from where goats are transported either in buses or pickup trucks to the near and distant end markets. In the case of remote rural areas, individual collectors may have to make a week-long walk to the nearest road head. From here they use road transport systems to the nearest goat trading centres. In urban areas goats are transported in a small van from wholesale to retail markets or meat retailors' shops. Imported goats are transported from Indian markets to Nepalese customs offices and from there to urban areas in Nepalese trucks. The capacity of one full truck load is about 225-250 goats.

4.2.5 Status of goat market infrastructure

The present status of the visited market places with their facilities and operating management systems is assessed and presented in Annex VI. The market infrastructure and basic facilities are extremely poor. None of the visited places have ideal facilities for a goat marketing centres. The study team believes the management system and stake of the VC actors is the key factor for its improvement. Presently these markets are managed either by a local body or by a contractor. The existing market facilities are mostly developed from collaboration of government sectors. Most of the local government bodies are uninterested in developing market facilities possibly because they do not consider it as a long term business or profitable enterprise.

Different forms of goat market management exist. Regardless of who manages the market, the goat market is the major source of income for the local government and private institution (i.e. VDC, school or private land owner). However, part of the revenue collected is not utilized for improving market infrastructure. The management systems of different markets vary due to the nature of land ownership, mode of operation, bidding system and duration of contract, which generally is annual. In the case of tender process, the contractor is not motivated to invest in the improvement of the yard, because his term will be for one year and the next year a different contractor may win the contract. On the contrary, in Pokhara, private sector actors on long term leased land have initiated basic market infrastructural development with the support from Community Livestock Development Project (CLDP), anticipating better return from this enterprise (Pokhara). In addition to this, to minimize the transportation cost, Pokhara based Goat Market Entrepreneurs Committee is planning to initiate a private collection centre at Kohalpur in Banke district, one of the potential market places for SLVC. Their intention is to transport full truckloads of goats to ensure humane transportation of goats in long routes.

The trading fee is collected either from both parties (i.e. seller and buyer) or from buyers only. Despite lucrative earnings from goat trading (Table 3), the existing goat market infrastructures are at a minimal level and those present are in a miserable condition due to the absence of repair and maintenance. It assumed that even a small portion of their income is not spent for the improvement of the existing market yard. Such improvements should be advocated by the users (traders and producers) to force action by the local market management committee or the owner of the land.

Market	Trading fee per goat: NPRs					
	Qty. / Year	Goat	Buck	Doe	Kids	Annual Income
Chhinchu	39030	25	25	0	0	1,005,750
Dhakeri	556	75	50	50	25	40606
Butwal	4400	25	25	25	25	110,000
Pokhara	73200	20	20	20	20	1,464,000
Barhathwa	48000	100	100	100	50	2,500,000
Sakhuwa	38400	120	280	120	100	2,000,000
Dharan	24000	10	10	10	10	240,0000
Birtamod	12000	10	10	10	10	120,000
Sanischare	40000	20	20	20	10	700,000

Table 3. Octroi at Haat bazar Market and Annual Income. Source: Field Survey 2012

In the Narayani-east sector, existing haatbazars have played vital role in the establishment of collection centres. The existing facilities in Barhathawa-Sarlahi: Sanischre and Birtamod –Jhapa; and Kalaiya – Bara are in the process of rehabilitation with the help of local government bodies and development agencies under the public private partnership model of management. A similar weekly Haatbazar system with other essential facilities could be a desirable intervention to strengthen the regular goat collection system in potential production pocket areas of the Narayani-west sector – the area of SLVC focus. These weekly markets should also be supported by bigger wholesale goat markets at the centre point around weekly Haatbazars.

Table 4: Income of Pragatishil Coop

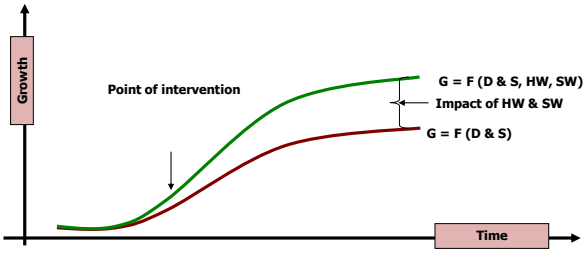
Pragatishil Multipurpose Co-operative Ltd. Dhakeri, Goat Resource Farm), Banke		
Income	**NRs**	**NRs**
Capital Share	147000	
Interest @ 15%		55000
.Goat sales Com		40606.5
Sub-Total		**95606.5**
Expenditure		
Salary @ 3500		42000
Rent @ 1200		14400
Sub-total		**56400**
Gross Income		**39206.5**

Source: Field Survey, 2012

Heifer Nepal has already initiated transformation of groups into multi-purpose cooperatives which can also serve as goat collection points for the collectors as in case of Pragatishil Multipurpose Co-operative Ltd. Dhakeri, Banke, a Department of Livestock Services promoted co-op. Sixty-five per cent of respondents across various domains opined that development of collection centres and formation of goat committees will enhance their price negotiation skills with further support for goat rearing in the production pockets. However, this model of collection centres needs more detailed study for generalised recommendation. The Participatory Market Chain Approach (PMCA) of Agribusiness Policy could be an option for the development, execution and management of goat collection centres (as in vegetable production, collection and trading in Harthok/Palpa and cooperatives as of Dharke). In the long run, each urban market should have at least one goat wholesale market with slaughter facility and meat retailor shops. These wholesale markets should be linked with rural goat collection centres (GCC)/haatbazars. While establishing the GCC, coverage area, production potentiality, goat population and off-take rate are to be given due consideration. Establishment of such centres will promote good marketing practices benefiting all the stakeholders of goat value chain.

The infrastructure development and management for goat collection and trading may be an enterprise in itself where the private sector can invest (Mr. Jhalak Shrestha of Shree Complex –Pokhara is an example), but for its promotion and support the public sector may provide unused land on a long term contract in the urban as well as rural areas along with soft loans from financial institutions.

Market establishment should be promoted in areas where goat trading is already taking place in some form and has potential for growth. The above scenario and World Bank's experience in the agriculture marketing system in Assam, India indicate that the potential for development of linkages between producers and market infrastructure and across time and growth (Figure 10). This creates rational and equitable distribution of margins among the various stakeholders in the value chain.



Based on discussion with Shakhuwa Contractor shows improvement in value of trade (per market day) which is also reflected in an increase in the value of annual contract fee.

Abbreviations

- F = Fction of …
- G = Growth of a haatbazar
- D = Demand
- S = Supply
- HW = Infrastructure like shed, raised platform, toilets etc (Hardware)

Figure 10. Relationship between Infrastructure and Producer's in VC

Price Information System: Price variation exists in the VC within the domains under the study. Prices received by the farmers at their farm gate overall for the study area were NPR 376 per kg of meat. The difference between Narayani -west sector and Narayani-east sector is NRs 64 per kg of meat. The major price determination factor for the producers and local traders at farm gate level is the ongoing retail prices of goat meat at the local market or nearby major consumer market, whereas, for the regional and central traders of Kathmandu, Pokhara and Bharatpur, terminal market prices are usually determined by the quantity of supply and demand in the market from various sources, including the festive season.

Despite the legal provision to slaughter unproductive female goats, there are no differences between the prices of he-goat and doe meat across various domains due to the practice of mixing of meats by the retailers for better profit margins. Exceptions were observed in Pokhara and Bharatpur where she-goat meat was also traded as a brand for a relatively cheaper price. The major season of increased price in the Nepalese market is generally during the Vijaya Dashami every year when public sector procurement (Nepal Food Corporation) interventions also play a positive role in price determination during festive months (Figure 11). National annual average consumer price of goat meat during 2000-2010 is presented in Figure 12 indicating a continuous rise in price of goat meat.

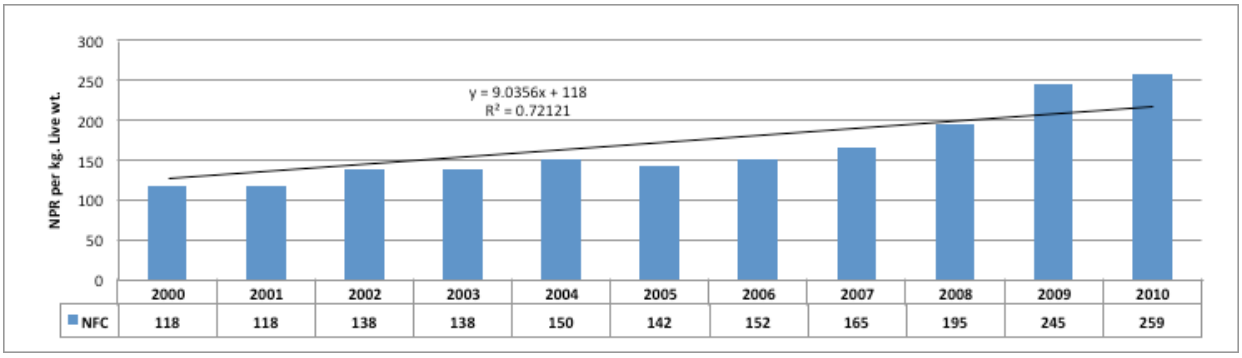


Figure 11. Nepal Food Corporation Sales Price of Live Goat. Source: NFC -2011

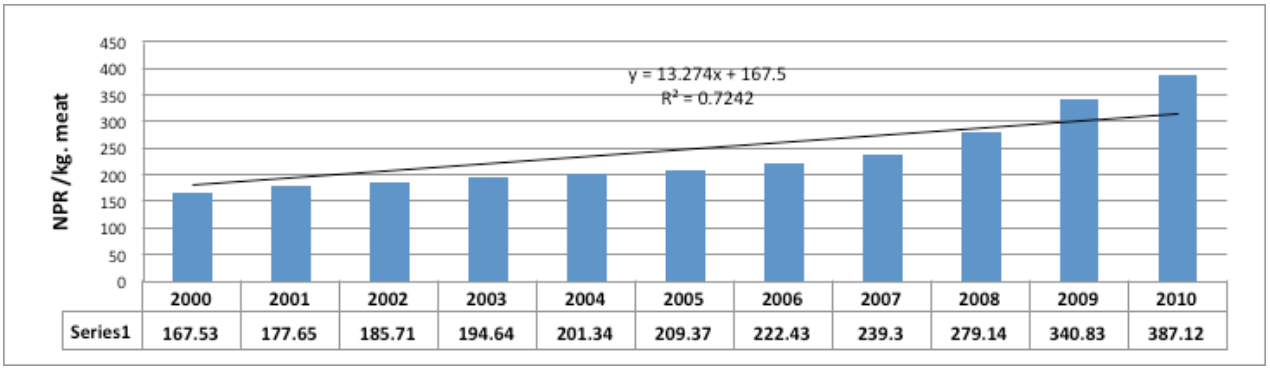


Figure 12. National Annual Average Consumer price. Source: MoAD -2011

4.3 Existing Goat value chains and their analysis

4.3.1 Major Actors in Goat Value Chain

The goat value chain engages various actors that include service providers, input suppliers, goat producers, traders, meat processors and retailers and consumers. When these actors are deliberately inter-linked and treated equitably, the entire goat value chain can be enhanced. Beside this, there are numerous organizations which provide support and services to the value chain actors and assist in the development and enhancement of the same. The value chain actors involved in study area in both domestic and import processes can broadly be categorized in four groups based on period, coverage of the area, nature of the service and objective of the participation (public sectors-institution, NGO's, CBO's, projects, vet services, private sector), which have shared the risks and opportunities along with linkages.

4.3.2 Horizontal/vertical linkages/relationship among the actors and the governance

From stakeholders meetings and group discussions, the horizontal value chain actors in the goat meat value chain with their respective roles are identified and are presented in Table 5

Table 5. Horizontal value Chain Relationships

Relationship	Roles
Among input and service providers	Their roles depend on objectives of the institution and the scope of the work. Community animal health workers (CAHW) and para-vets are providing services to farmers. However, DLSOs role in strengthening .CAHWs and private service providers is weak
Farmers to farmers	There is a wide range of farmers' groups and cooperatives. However, their network to ease and scale up input supply, production management and marketing of goats is not exploited. Each farmer is working at an individual level except for the use of breeding bucks in groups. No collective marketing efforts existed except in two cooperatives, Dhakeri in Banke .and Shaktikhor in Chitwan
SHGs to SHGs and Cooperatives	Social capital in terms of behavioral transformation is strong. However, ties and co-working between/among groups for expanding production and initiating collective marketing is lacking. There is a knowledge gap in advantages of timely and collective marketing, and selling takes place at the individual level with fewer opportunities for price transparency and bargaining. Networks of SHGs and cooperatives with a focus on goat .production and marketing is almost non-existent
Collectors to collectors	This is mostly seasonal self-employment enterprises with rapid turnover. This horizontal relationship is very weak and is the limiting factor for expanding trade volume from a particular location. However, the relationship is strong with regards to how they can exploit farmers for price bargaining. The usual practice is repeated visits to a farmer, offering less than what the first collector offered for the same animal with the intention of fatiguing the farmer and forcing him/her to sell for a lower price. All of the collectors usually prefer lump sum pricing instead of purchasing goats on a live weight basis. There is an informal allocation of villages among .collectors as well to ensure availability

Relationship	Roles
Traders to traders/transporters	This horizontal relationship is quite strong, mostly with engagement of persons of familial relations both at the collection point of supply and at the end market place. This familial relation ensures trust in transaction and payment. The efforts on expanding trade are not conspicuous, persons engaged in this trade are relatively stable, and no mistrust among traders is seen. They have a negotiated trade agreement with goat transporters (public bus transport and trucks). One such negotiated deal can be seen in bearing the mortality losses occurring during transportation. Traders and transporter will bear 50:50 losses in case a goat dies during transportation. This arrangement ensures proper care of goats by bus/truck staff. This signifies business acumen in practice – a valuable VC innovation for a .win-win situation
Among meat entrepreneurs	Most of the market places and district headquarters have a meat entrepreneurs association. This body is mostly for dealing meat selling issues with municipalities and local governments. There are examples of their involvement in improving the quality of meat retail shops collectively by approaching specific projects and municipalities. Entrepreneurial efforts to improve meat quality, reduce adulteration, and minimize malpractices .are lacking/weak
Among consumers	Consumers are interested in hygienic meat, however their understanding quality and preferences are different (e.g., many consider meat with skin intact better). Collective efforts for demanding regulatory mechanisms, supervision and even complaint mechanisms are not in existence. Consumers' forums are not effectively engaged in improving qualitative as-.pects of goat VC process

4.3.3 Vertical value chain linkages

From multi stakeholder meetings in Banke, Surkhet, Jhapa, Chitwan and focus group discussions in SHGs, the vertical actors in the goat meat value chain with their respective roles were identified. These are tabulated in Table 6

Table 6. Vertical relationships

SN	Actors	Type and Descriptions on Relationship
1	Input suppliers and farmers	Service provision on a payment basis exists in all SLVC districts and farmers are ready to pay service providers for the service they receive. However, transactions on credit have interrupted service frequency and quality. Extension service by service providers with intent to expand business is not yet established. In many areas, farmers still do not have access to veterinary health services. Supply of drug and vaccine and forage and fodder seed / sapling is still not adequate.
2	Farmers and collectors	Lack of trust, inconsistency, repeated visits for excessive bargaining, and even mishandling of animals with intent to pose internal injury (farmers from Banke reported that collectors approach and damage internal organs such as the kidney, causing the goat to get sick within a few days and then the same collectors visit a second time to purchase the same animal) are farmers concerns. No preferences for a long-term relationship appeared. Instantaneous benefits remained the intent from both parties in the deals. Collectors generally refuse to buy on a per unit live weight basis.
3	Collectors and Traders	Each collector has a preference to a trader for repeated business deals. Traders provide some float cash to collectors in advance and this is the strongest factor for this relationship and trust. However, as turnover is quite high among collectors, complaints of default in payment were also reported from both actors.
4	Traders and Meat entrepreneurs	Importers and traders have a trading place in end markets; therefore, a kind of sustainable business deal occurs in these places. Traders can make a good guess of how many animals to deliver in the next consignment. No defaulter or grievances appeared. Meat entrepreneurs of Butwal, Narayanghat, generally state their requirements in advance to ensure delivery. Such an arrangement was not required for Pokhara and Kathmandu, as demand is always higher than the supply. No complaints of payment failure were reported.
4	Meat entrepreneurs and institutional consumers	These entrepreneurs play the role of meat processors and also as a local collectors depending upon the situation and nearness to *haatbazar*. They procure, slaughter and sell goat meat to households or institutional consumers.
5	Meat retailers and consumers	Adulteration and quality issues faced by consumers are the major gaps.

The vertical value chain of goat import from India is well-established and efficient. There are about 11 traders in the whole import value chain. These traders have at least one local partner in their business and are operating through registered firms in Kathmandu and Pokhara. They also have satellite branches at Belahiya, Krishnanagar and Nepalganj. The private sector import trade is running as a formal sector and has no hindrance from any agencies, probably because an informal institutional arrangement is also set for its smooth operation. However, importers' have complaints on security and hindrances from Indian agencies.

Informal trade: Informal trade among traders exists in the Nepalese economy because of poor governance, poor entrepreneurship and the porous border. This is the carrier system across the Indo-Nepal border for male goat and breeding buck import and lactating doe and kid export. There is also a practice of unofficial Chyangra import on an ad hoc basis from Tibet during Vijaya Dashmi, the greatest Hindu festival in autumn. When they come back home to the mid-hill districts during the festive holidays, some school teachers employed in the mountainous region purchase goats (probably from their salary savings) and take them to sell in markets (mainly Pokhara) for supplemental income. It is necessary to incorporate and identify their roles and issues, to foresee an effective mechanism to streamline them in the formal trading system.

4.3.4 Value addition along the value chain

All linkages among the various service providers, producers, traders and consumers with their respective costs and margins across domestic and import VCs are estimated and analyzed from the data collected during the field visits.

Domestic Value Chain Analyses

The percentage shares of each stakeholder for the overall goat meat chain across the SLVC districts, Narayani -west and Narayani - east sectors are presented in Figures 13, 14 and 15 respectively. Based on questionnaire surveys and FGDs, investment and profit share is derived in percentage points of the end market meat price of NPR 600.0/Kg (Figure 13). Farmers' CoP is 53.18% and profit margin is 17.36 % of the end market price. The details of each actor's investment and profit are presented in figure 13 and by sectors in 14 and 15. This VCA indicates that there is little room for redistribution of profit margins; however, there is ample room for expanding the role of farmers' institutions in the marketing chain.

On the other hand, the VCA results of Narayani-west sector (Figure 14) presents lower profit to producers (8.72 %) and higher benefits to regional traders (18.25 %) and meat retailers (12.57 %) as in comparison to that of overall and Narayani-east sector. The Narayani-east sector (Figure – 15) provides higher profit to producers (27.30 %) and lower profits to the local traders (6.45 %) and meat retailers (7.30 %) due to missing intermediary vertical actors (collectors/regional traders) in the value chain. It also indicates that while developing marketing channels in Narayani-west sector, a three vertical tier model of VC could be an appropriate market intervention in which the role of cooperatives can be expanded on either side (collection and trading).

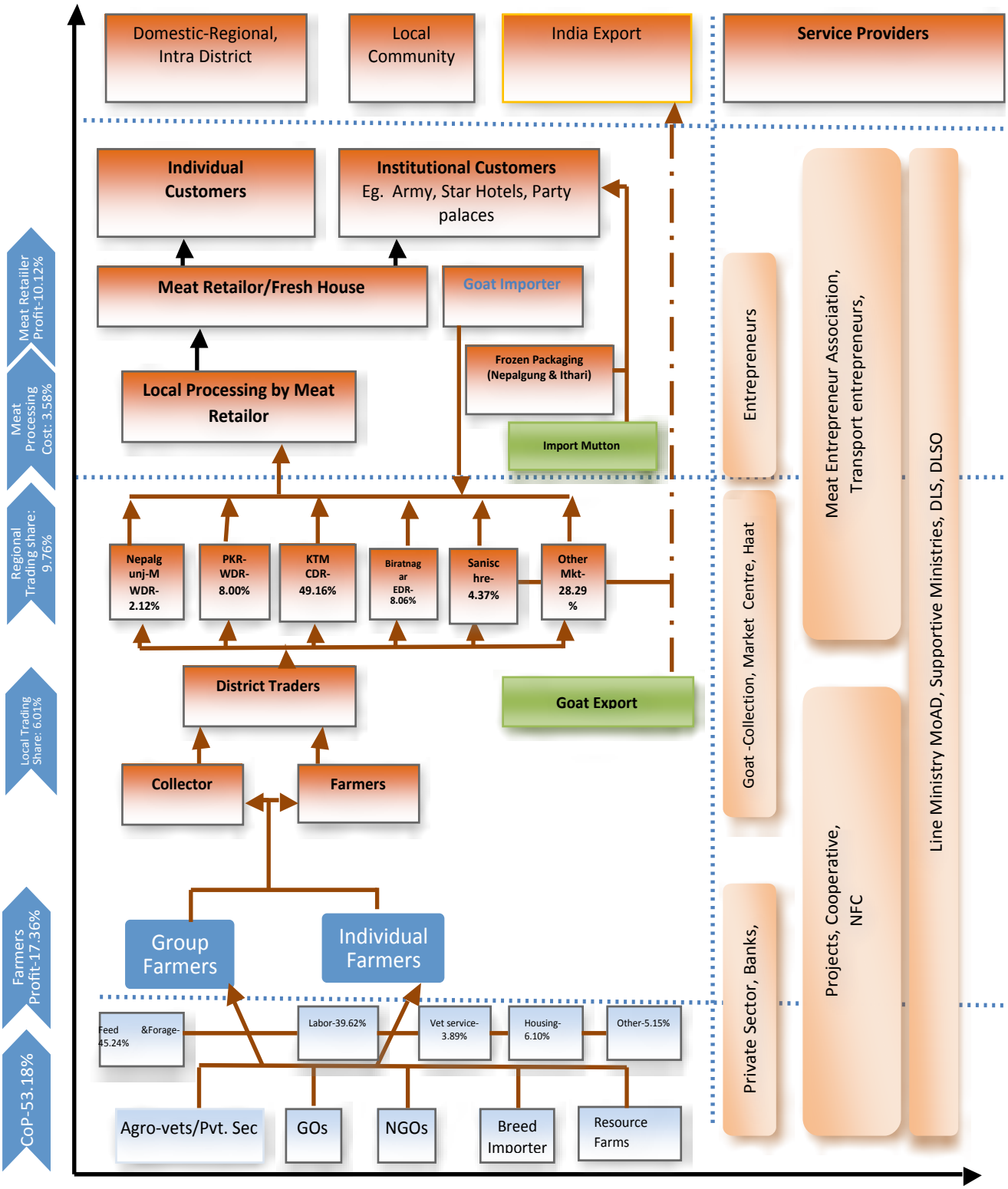


Figure 13. Goat Value Chain Map –Overall

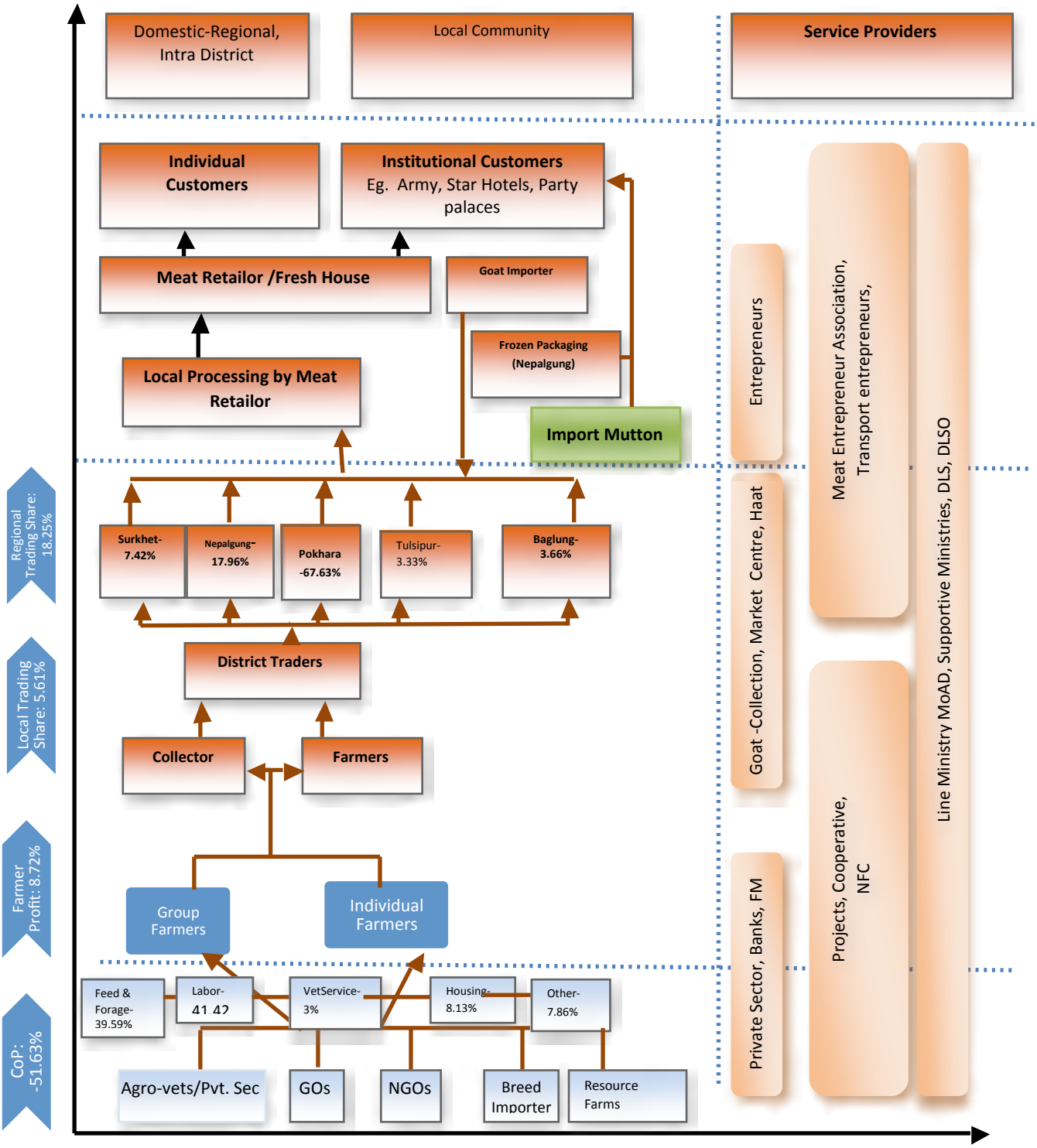


Figure 14. Goat Value Chain Map- N-W Sector NepalFigure 15. Goat Value Chain Map- N-E Sector Nepal

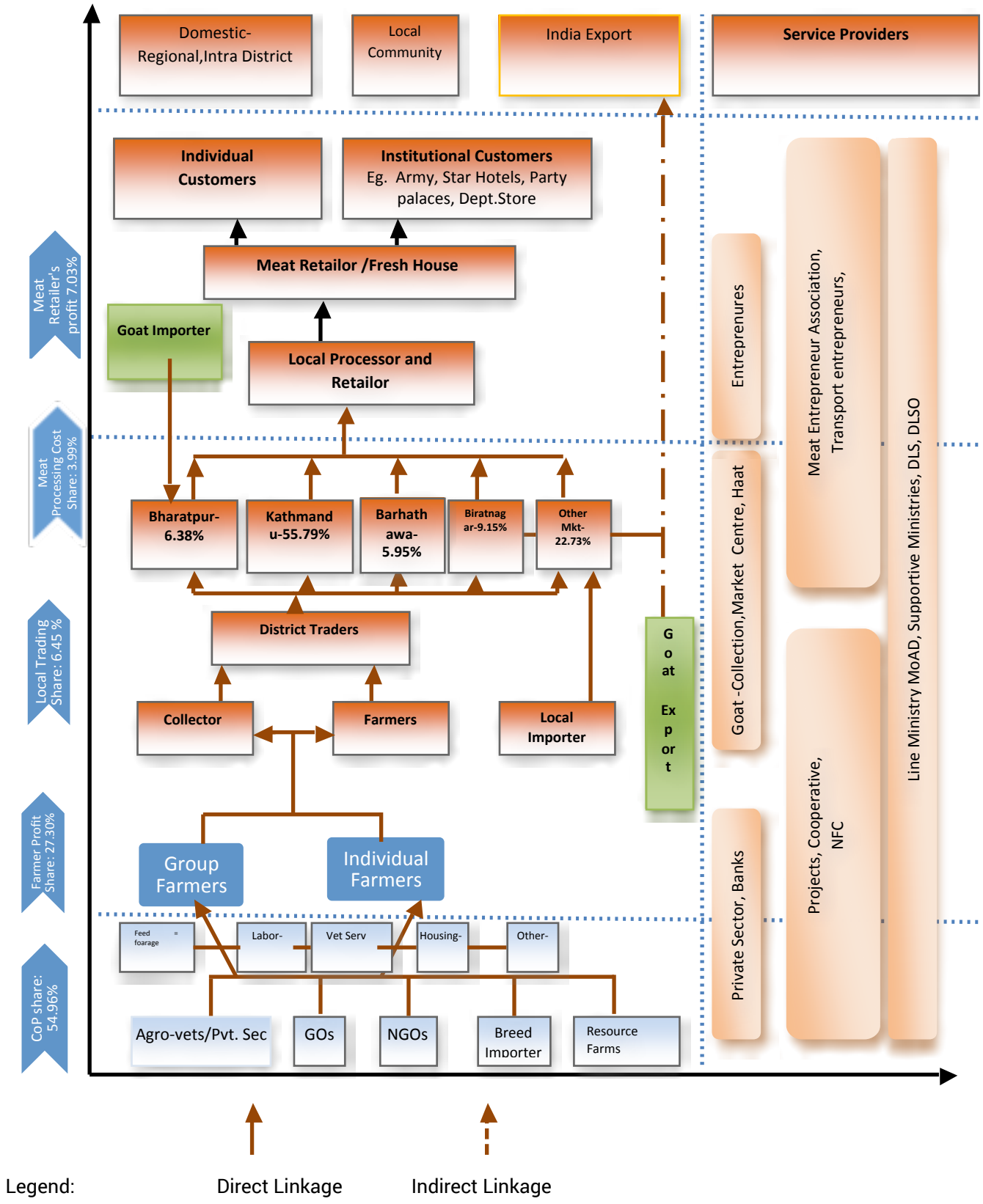


Figure 15. Goat Value Chain Map- N-E Sector Nepal. Source: Field survey 2012

Import Value chain

In terms of supply to end markets, the import value chain integrates into the Narayani –west value chain as it converges at the level of the traders who supply live goats to major urban areas (Kathmandu, Pokhara, Narayanghat, and Butwal). The costs of importers and meat processors and retailers are presented in Figure-16. Out of the total importers cost, live weight loss in transportation from India to Kathmandu accounts 40 per cent followed by transport (18 %), unseen expenses (15 %) such as black market currency exchange, customs (13 %), feeding (4 %), interest on capital (3 %) and labor (3 %). Similarly, out of the total cost of meat processors or retailers (Figure 17), shop rent shares (28 %); followed by depreciation (19 %), labor (18 %), holding (10 %), local transportation (9 %) and water and electricity (4 %). The costs related with weight loss in transportation and unseen expenses can be minimized through policy advocacy and market interventions such as establishment of holding stations at strategic locations. Establishment of holding yards at end markets with all required facilities shall reduce individual holding costs.

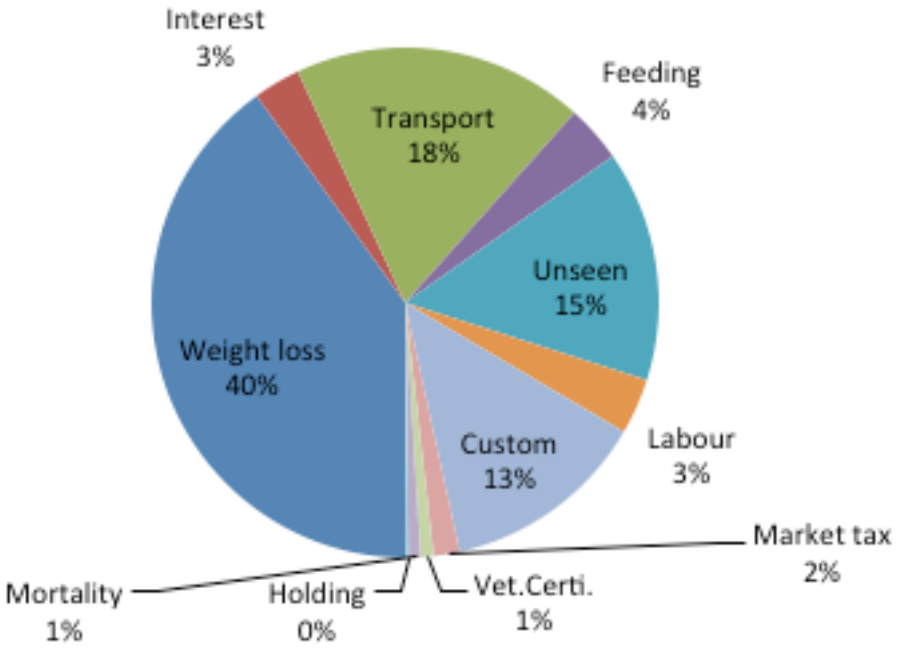


Figure 16. Areas of Importer Costs investment / kg of meat. Source: Field Survey, 2012

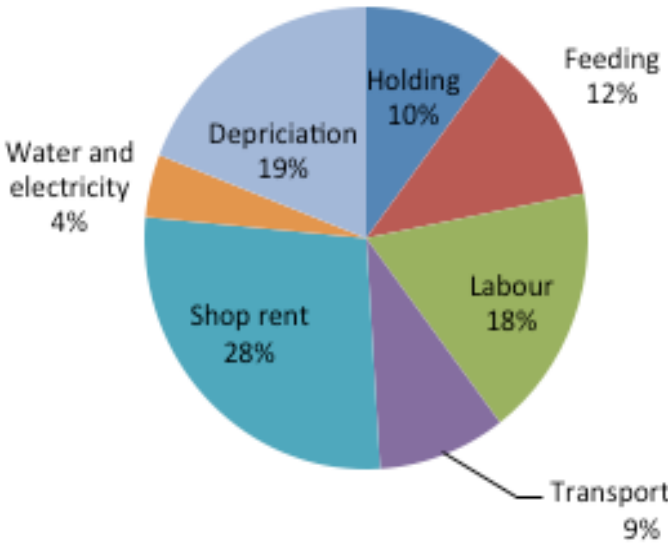


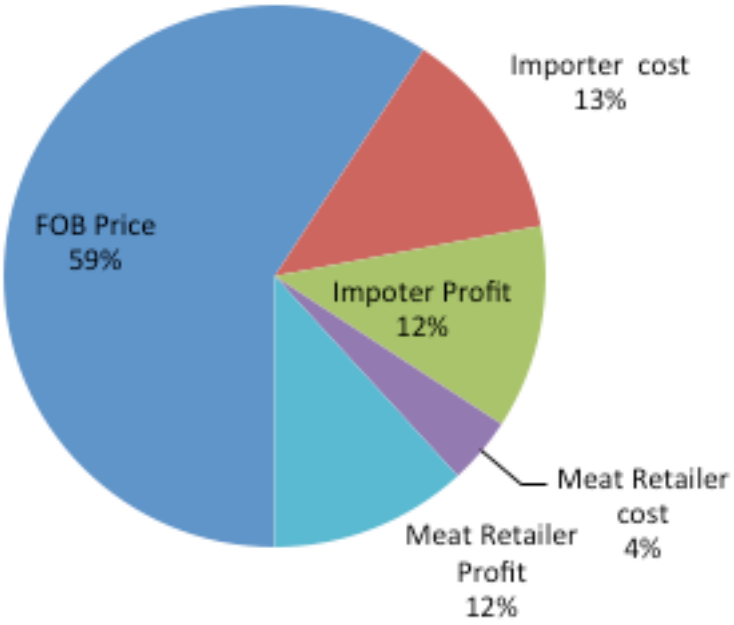
Figure 17. Meat Retailer costs/kg meat. Source: Field Survey, 2012

The value additions in imported goats are presented converting the truckload consignment into per unit meat in Kg. in table 7. It indicates that FOB share is 59 per cent of the total value chain followed by importer's cost (13 %), importer's profit (12 %), meat processor's cost (4 %) and meat processor's profit (12 %). As discussed in the earlier paragraph, desired interventions (holding yard establishment and currency exchange facilities) in the import value chain shall reduce importers costs whereas meat retailers' resettlement in organized meat markets shall reduce shop rent shares and consequently avail more profit margins to producers and great relief to consumers.

Table 7. Cost and profit Import (NPR per kg meat)

IMPORT Channel goat meat VCA NPR/Kg meat	
FOB price	355.56
Traders cost	76.60
Traders Margin	73.03
Butcher's purchasing prices	505.2
Butcher's cost	23.97
Butcher's Margin	70.85
End consumer price	600.0

Figure 18. Import VCA, costs incurred and profit margins among actors



4.3.5 Losses accounted in Entire Value Chain:

In the entire course of the domestic GVC, the major loss accounted is the body weight loss. Recording of body weight of 11 goats at Chhinchu at 15:00 hours and again at Pokhara upon delivery in the morning of the next day revealed that on average, 2.0 kilo per goat body weight loss was observed. Dehydration appears to be the major factor, followed by stressors associated with mode of transportation, distance of the end market, rest in transit (which was lacking in this case), and feeding and watering provisions. This may be attributed to the congestion and unhealthy practices of transportation. It has been observed that only a four hour rest is provided in transit at Chhinchu after collection from the villages and then the animals are transported in buses to Pokhara. The weight losses are higher in bus transportation (up to 3 kg from Chhinchu to Pokhara) as compared to the other means of transport, such as mini-truck or pickups where congestion is minimised. Out of this total weight loss, the share of the local collector is about one kg and that of the trader is about two kg. (The percentage share of the transportation loss accounts about 50 per cent of the traders cost). Out of which, one kilo is estimated to be a recoverable if enough rest, water and fodder and forage are provided to them at the end market holding yard.

In the entire import value chain as stated by the importers, about two kg live weight loss per goat occurs which is lower (though distance is longer), than that of the domestic value chain. The decreased body

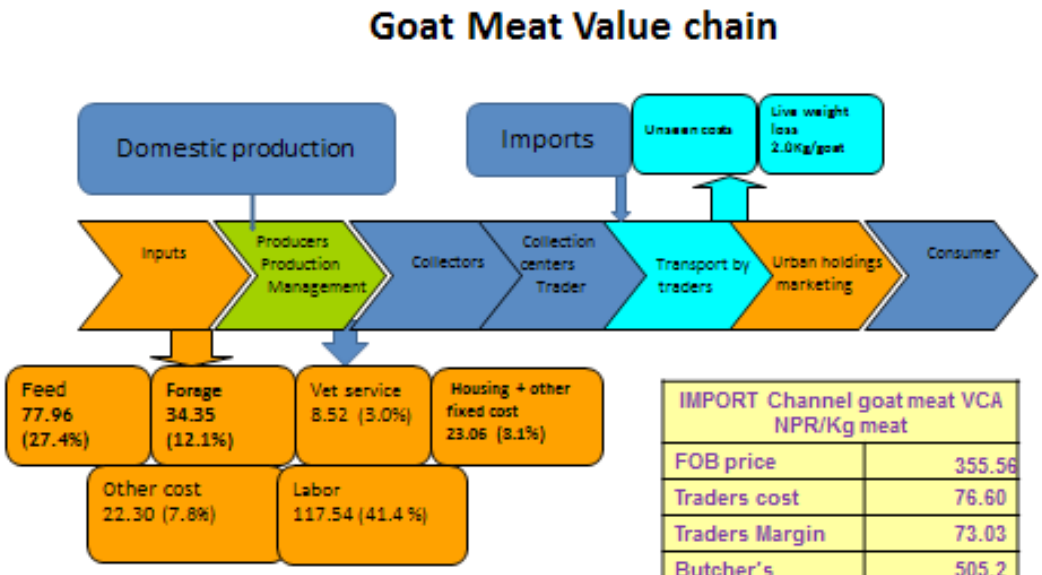
weight loss per goat may be due to enough rest (24 hours), feeding forage and fodder watering in transit. The percentage share of the transportation loss accounts for about 40 per cent of the traders cost (Figures 18).

According to the importers, apart from this direct transportation loss, there are indirect and hidden costs associated with vet certification and taxes imposed by various local authorities en- route including informal charges from police and customs officials. Such expenses are also included in the analysis.

4.3.6 Competitiveness of Nepalese Goat Meat Sector:

The CoP for a Kg of meat is higher for Narayani west sector (NPR 294.32) than that of Narayani –east (NPR. 272.61). The overall mean COP (when the data was pooled for both sectors) was NPR 283.74. It was also found that there was a huge differences in CoP across various domains, systems, and households; marketable age and productivity/doe/annum influencing CoP the most. The lowest CoP under semi-intensive system was NPR 149.88. This was achieved from regular flushing practices and the goats had a higher twining percentage. The overall average farm gate prices of the study area was NPR 376: 352 for the Narayani-west sector and 400 for Narayani -east sector. Similarly the mean farm gate price/Kg of meat by systems was similar for all the three systems considered.

Field survey information indicates that the consumers, as well as meat retailors, prefer local goats over imported ones when available. Despite better carcass yield of Indian goats (65 %) over Nepalese goats (62 %) with skin intact, this preference is apparent. The competitiveness of the Nepalese goat over Indian goat is also evident from the fact that Nepalese farmers are receiving higher farm gate prices (NPR 376 /kg meat) than the FOB cost (NPR 355.56 / kg of meat) of import.



Farmers profitability /kg of meat	
Cost of production / kg meat	283.74
Farm gate Selling/kg	376.00
Profit/Kg	93.00

IMPORT Channel goat meat VCA NPR/Kg meat	
FOB price	355.56
Traders cost	76.60
Traders Margin	73.03
Butcher's purchasing prices	505.2
Butcher's cost	23.97
Butcher's Margin	70.85
End consumer price	600.0

Figure 19.

Interactions with various stakeholders revealed that the import factor for Indian goats is not due to

price difference but the availability of goats in required quantities at one place with similar age and weight. Traders are willing to opt for domestic business if an assured supply at one place in the required quantity and time is available within Nepal. In addition to this, harassment imposed by Indian regulators and associated unseen costs provide an opportunity to promote a domestic production program with development of proper linkages among goat meat stakeholders and value chain service providers. Further discussion with the import traders indicates that if the trading volume is increased, there is an opportunity to export goats to nearby Indian urban markets as meat prices in these adjoining Indian towns are NPR 50.00 higher than the nearby local Nepalese markets.

The comparison between farm gate prices of Nepalese farmers to that of Indian FOB price of goat meat are comparable (statistically insignificant). Import associated hidden costs in India and inflation in prices indicates even higher FOB prices in future. Since there is a huge difference between efficient and non-efficient goat farms in the study area (one efficient example has CoP of NPR 150.0 /kg of meat) there is ample room for reducing cost of production through improvement in production and productivity. Thus the competitiveness of the Nepalese goat meat sector against India in terms production and productivity will be favorable if further remedial measures to reduce CoP are undertaken in non-efficient farms.

4.3.7 Employment Situation

The number of persons presently employed in GVC enterprises is estimated to be 2000 collectors, 133 traders, 882 meat retailers, 59 transporters and 937 private sector service providers (Table 8). These figures are based on the 1,000,000 live goats traded in formal sector only. Production level employment is still a part time activity with just about 0.2 million HH engaged in goat farming of more than 10 goats/ HH. The persons engaged in collection, trading, and butchering are estimated based on the mean scale of operation/person /annum recorded during the field survey. From these findings it can be inferred that in every 1,000 goats traded, there is an additional engagement of 150 - 200 farmers (increased in hour/day engagement), 2 collectors, and one butcher in the chain. Similarly, there is an addition of two traders, and one transporter in the turnover of every 15,000 – 20,000 goats. This employment scenario will remain true even in cooperative trading as these cooperatives will be employing managers and assistants for facilitation in trading and record keeping.

Table 8. Estimated persons employed in goat VC enterprises Adapted from MoAD 2o11; NLSS 2011 and field survey 2012.

SN	Particulars	Estimated number of persons employed	Basis for calculations and Remarks
2	Farmers engaged (part (time employment	million 2.8	CBS records
3	Goat farmers with (>10 (goats	212,000	NLSS records
4	Collectors	2,000	goat per year/collector, with 500 10 *10^6 live goats in formal VC
5	Traders	133	goat per year/trader 7,500
6	Meat retailers	882	MT meat sale per year/retailer 17 (About 50 kg/day)
7	Transporters	59	goat per year/transporter 17,000
8	Private vet service providers	937	One person /in area with 10,000 goat population

4.4 Perceptions / Attitudes

Farmers' perceptions towards goat farming and hygienic meat production were assessed regarding their reasons for opting for goat farming. Sale-ability as liquid assets, utilization of kitchen refuse and part-time employment for a supplemental income were the major reasons for keeping goats. So far, goat farming as a main vocation is not their preference.

4.4.1 Producers/ Farmers

The attitudes and perceptions of producers towards safe and hygienic meat production from goat husbandry were varied. The majority of the producers considered it as a subsidiary enterprise to utilize unspent time for attaining additional income. Some farmers have also reported that native collectors (one of the members of the community) are more reliable and faithful in their dealings than that of outsiders. In addition to these reasons, some producers also pointed out that goat husbandry had also enabled environmental conservation through plantation of fodder trees around homestead; additional labour for fire wood collection was minimized due to fodder collection, and this also facilitated in organic vegetable production and their fencing. Farmers appear unaware of their role in production of hygienic meat production. For example, they sell their sick animals rather than procuring veterinary services. No farmers followed a drug withdrawal period before selling after veterinary drugs were administered.

It was also observed in the study area that as income from other sources increases, producers have a tendency to either leave this enterprise or switch over to the other livestock husbandry such as cattle and buffalo. Once they attain a certain level of income, there is also tendency to migrate to urban areas. Some of the producers have also migrated to urban centres for their children's schooling. However, some people returning from overseas employment are adopting commercial ventures in goat meat production and processing. Most of the goat farmers have been confused about choice of breeds. They have mixed perceptions about improved and imported goat breeds versus local goat breed (less than 25 per cent raise

exotic breeds). More adaptive trials/studies are needed to identify highly productive breeds considering introduction of exotic germplasm of goats (e.g. Boer breed).

4.4.2 Local Traders and Collectors

Mostly, meat goats are either collected by local traders known as collectors or by local meat retailers from nearby end markets. The majority of the collectors are local residents of the area and each collects and sells about 10-15 goats per week. Some of them are family members and school teachers while others are professional collectors with many years of experience in the goat trading business. It was also observed that the sizable presence of female collectors in the Narayani–east sector is a positive indication for strengthened gender equity whereas female collectors were absent in the Narayani-west sector.

The common attitudes and perceptions of the primary goat collectors towards producers were that farmers demand unjustifiably high prices, too many visits were required to buy a goat, misleading price information by FM radio lack of good faith by producers and not allowing collector cum meat retailor to examine their goats.

4.4.3 Traders (District, Regional and National)

In the study area, the number of goat traders is directly related to the quantity of supply and demand. During the study period, it was noted that the district, regional and national level traders are the partners with the same trading company or family business entities sharing risks and profits together. However, there is a clear cut division of work such as purchasing at the district and regional level and selling at the end market.

Thus the traders were interviewed regarding their attitudes and perception towards various proxy indicators such as price information dissemination, holding facilities, transportation means, feeding practices, weight losses in transportation, veterinary certification, hassles in transportation by police and casualty during transportation. All these factors have contributed to health and meat quality of the animal being slaughtered. The results of above indicators were found as: wrongly perceived market price information aired by local FM (price of meat per kg. is aired while producers understood it as ongoing live weight price). As a consequence, these producers start bargaining with meat price as live weight price. Other findings were crowded holding yard(only 3sq.ft. per goat); congested transportation system (36 goats in a small cabin of a bus); unhealthy feeding practices for the weight loss recovery (whole grain with salt and water); mal-practice in issuing of vet certificate for goat movement by Livestock Service Centers (LSCs) paraprofessionals (authorized persons are mostly located at district headquarters). Police harassment during transportation was noted from transporters (asking to offload the goat to count numbers as per certification) and mortality in transportation was managed in an equal sharing basis between transporters and traders. All these issues have set back the domestic VC development. Project interventions should facilitate building trust among stakeholders.

Among the visited goat trading places, it was observed that none of the trading places other than a few regular haatbazars (Mahendranagar, Sakhuwa and Shanischare) have large enough scale enough for a truck load. For this reason, all traders are forced to use the bus transportation system to distant markets.

The most important concern of traders also relates to security. The majority of the traders were reluctant to do their business at public sector prescribed / developed venues because of financial security concerns and other infrastructural facilities.

4.4.4 Transporters

In the absence of an organized goat transport mechanism and with a lack of platforms for loading and unloading facilities, mostly night buses for long distance and day buses for short distance were the most preferred means of transportation to the end markets. Local transportation of goats in small quantities (30-40 goats) is also done by jeep. Recently, one of the traders from Pokhara had bought two tier medium and small trucks for goat transportation (mainly from Surkhet/Kohalpur to Pokhara and Kathmandu) but he has faced threat from bus owners. One of owners in Surkhet had removed two back seats (8 seats) of his bus and had made a three-tier closed compartment for transportation of 36 goats because of the higher fare he receives from transporting goats. Bus passengers had objections to this system, but have little say as no regulatory mechanisms exist.

It was noted that goat transportation by bus is not a humane practice as it lacks sufficient space to rest compared to designed modes of transportation (three tier trucks used by importers). Over feeding of whole grain with salt was also observed as a malpractice to reduce transportation weight losses, thereby trading off meat quality. Acidosis from excessive grain feeding is known to increase lactic acid content in meat. The loading and unloading practice of goats from the bus cabins where goats were kept was also not humane. Transportation of goats to the distant market by such practices is observed as compulsion of the trader due to the unavailability of a sufficient number of goats to hire a separate vehicle. Too much stress during transportation is known to deteriorate meat quality due to biochemical changes that stress-related hormones bring about in animals.

4.4.5 Importers

Eleven import traders reported no other issues except lack of facilities for holding and feeding goats in transit. However, they prefer to buy goats in Nepal and strongly recommended for a weekly or bi-weekly Haatbazar system similar to those organized in India where they can buy 500 to 1000 goats at a time so that they can meet the domestic end market consignment as planned and also for full scale operation of a truckloads along with security arrangements. These importers have also raised serious concerns over ongoing shortages of Indian currency and additional surcharge they have to pay to get it (they have to pay 4 per cents extra per transaction) which could otherwise have been possibly saved for consumers' benefits.

4.4.6 Meat Processors cum retailors

Most of the slaughter slabs are unacceptable from meat hygiene viewpoint. During our visit, only two slaughter slabs with tiled floors and walls were observed in Surkhet and Tulshipur Municipalities. These were established under DLS, PPP program. These facilities had congested space, complaints from neighbors that they polluted nearby water-wells, blocked drainage system by offal and so on. This signifies the importance of multiple stakeholder engagement before installation. According to the management committee of the slaughter houses, major constraints were faulty design associated with pit overflow and leaking, resistance of meat retailors to bring animals to the slaughter slab, distant location, deviation from traditional practices, lack of efficient dressing, additional transport expenses to carry carcasses to the shop and high levy charges (NPR. 100/ goat) in such slaughter slabs. These conditions have again contributed to unhygienic meat production and sale.

In other areas, most of the Slaughter slabs were either placed in the front or back of the meat shop itself with disposal of ingesta being a consistent problem. Out of the total meat retailors sampled, fly

screen control was observed in only 60 % of the shops and the remaining (40%) were without them. Overall sanitary conditions of the shops and slaughter places were fair (70%) to good (14%) and a few in excellent (16%) conditions with regards to hygiene. Holding yard space per goat was found to be 3.5 sq. ft. Offal management and water sanitation were found to be fair or poor. Meat inspection by agencies is almost non- existent. The Indian goat has better carcass yield (2 kg per goat) over Nepali goat and hence is preferred by majority of the meat processors and retailers.

To attain safe and hygienic meat for consumers, it is quite evident from the above findings that slaughter place and shop improvements are still an important intervention to be continued in the future until at least moderate coverage is achieved and minimum standards of a slaughter slabs/meat shops are set and practiced. Similarly, awareness with training programs for meat retailors to adopt removal of skin from the carcass is required. On the other hand, consumers need to be made aware of the benefits of skin free meat. Utilization of offal from slaughter slabs has to be managed either with biogas generation or organic composting. Another approach to administer ante-mortem and post-mortem inspection at the community slaughter slabs may be provisioned through inclusion in the Terms of Reference of state veterinarians serving at the district headquarters.

4.4.7 Consumers

Consumers were interviewed at places where meat retailors were located. The majority of the consumers were from urban areas. Some rural consumers were also interviewed. Rural and urban consumers differed in their attitudes / perceptions. Rural consumers – many of whom were also producers - were less bothered by mixing practices of the meat retailors. However, urban consumers had this concern in mind and therefore want to observe the slaughter and carcass dressing process. Urban consumers' concerns centered on improvement in hygiene and sanitation of meat retailer's shop, and preferred slaughtering in front because of fears of possible adulteration. The willingness to pay more for improved hygiene and sanitation conditions was not observed as only 11% of the respondents would be willing pay more. About 80 % of consumers were in favor of fresh meat and meat with skin, whereas 20 % favored skinless, frozen meat. These consumer attitudes / perceptions are mainly arising from on-going traditional habits and from concerns that retailers mix she-goat meat in the bulk. Only 25 % of consumers expressed their willingness to pay more for choice cuts of meat. Nepalese goats were preferred over Indian goats by most of the consumers due to lean meat and flavor of the former.

To overcome the perceptions of meat with skin vs. skinless, and fresh vs. frozen among consumers, integrated mass awareness interventions are necessary. Regular price information and weighing systems in live goat trading are a desirable intervention to this end.

4.5 Enabling policy and Programs

In Nepal there is no government policy specifically related to goats, but the policy related to livestock development and agribusiness promotion covers some goat development policy issues. Under the APP guidelines and periodic plans (TYIP), goat has been recognized as a potential income generating activity for rural people, and provisions are in place for its promotion. At present, Agriculture Development Strategy for the next 20 years and the Food and Nutrition Security Plan of Action (FNSPA) for 10 years are underway to accommodate goat development and marketing strategies.
The two most important policy issues related to transportation and marketing are 1) hurdles and double taxation by local governance and other service providers and 2) difficulties with obtaining a health certificate from a veterinarian at market places and during off hours.

Policy issues related to production systems appear adequate except for the higher interest farmers must pay for the loans they borrow for goat farming. Interest on loans for goat farming is subsidized in India.

4.6 SWOT Analysis of Goat sector:

To facilitate better understanding of the entire goat meat value chain across all domains (market, production and socio-economic) internal strengths and weakness and external opportunities and threats were collected from various stakeholders and other sources. Findings are tabulated (Table 9) across all value chain domains.

Table 9. SWOT analysis for Nepal's Goat Sector

Internal strengths	**Internal weaknesses**
Markets related:	
• Domestic demand for goat meat is increasing • Huge gap between domestic demand and supply • Frozen meat trading is emerging • Organized and regular goat market is present in Narayani–east sector • Private sector investment is emerging • There are opportunities for increasing economic scale of production • Goat-specific transport trucks are slowly increasing • Sole involvement of private sector in trade • Private sector network for input supply exists • Large number of cooperatives exists in goat production areas. • Export potentials exist for goat meat in Gulf countries. • Entrepreneurs' associations are emerging	• Organized and regular goat market (Hatiya) is absent from Western, Mid-western and Far western regions • Selling on a live wt. basis is absent at the producer level and most of the other trading levels (even in end markets) • Price information linkages are poor • Inadequate facilities at regular market centers • Goat trading is based on bargaining • Slaughter houses / slabs are either absent or underutilized. • Market tax is too high in contracted out markets • Limited number of goats for completing a full truckload of goats • Collective holding places are absent or underutilized. • Role of cooperatives in goat trade is missing

Production related:	
• Forestry sector provides room for increased goat production. • Vast area of CPR (twice more than Ag. Land) • Favorable environment for forage and fodder production • Technologies for increasing production and productivity are available • Genetic potential exists to increase goat productivity. • Favorable environment to increase doe population • Preventive and strategic control measures are available • Commercial farming is slowly emerging • Low capital investment is required as compared to other livestock production.	• Inadequate control of diseases / predators • Lack of resource farms for desired goat breeds • Local breed selection program is inadequate • Goat productivity potential is not optimized • Vet. input supply is inadequate and untimely • Inadequate commercial farms • Lack of awareness about potentiality of locally stabilized breeds • Inadequacy of mass scale forage and fodder dev. programs • Aged male goat rearing and selling practice • Inadequacy of forage seed production • Inadequacy of fodder saplings production • Distant grazing movement causing lower growth

Socio-economics related:	
• Under employment of Ag. labor in rural areas • Availability of unemployed veterinary para-professionals in rural areas. • Manpower development institutions are present • Preference of consumers' for local breeds • Contribution towards food and nutrition security • Quick disposable assets and wealth of poor farmers • Transportation safety net provision is emerging • Health conscious /quality control issues emerging • Meat inspection act 2055 BS exists.	• Goat husbandry is not considered as an enterprise. • Lower hygienic conditions in trade and production • Demanded quantity of local breed is not available • Transportation safety-net provision is not enacted Low economic scale of production by small farmers • Inadequate goat specific training centers. • Meat inspection act is not enacted

External Opportunities	
Market • Export potential exists • Organic produce demand is high • Organized regular markets are there • Well-developed marketing channels • Oligopolistic market system • Well-developed price information system • Well-functioning goat meat transportation • Higher international price of goat meat **Production** • Continuous advancement in research and technology • Adoption of latest technologies **Socio – Economic** • Awareness about importance of organic meat	**Market** • Trans- boundary animal diseases • Dumping of imported meat in market • Illegal trade • Technical barriers for trade • Sanitary and phyto-sanitary requirements for trade **Production** • Low cost of Boer goat production • Increasing African commercial farm production • Certificate of origin and regular health inspection • Certificate of residue free status **Socio - Economic** • Goat meat is not accepted by certain races

5.0 Future Interventions

Given the internal strengths and opportunities for live goat marketing, the potential efficient options for interventions are as follows:

Establishment of weekly live goat haatbazar in existing market centres of production pocket areas in Narayani-west sector.

Strengthen facilities such as weighing scales, goat shade, drinking water, fodder trading, restrooms, guest house and canteens.

Banking facilities with security arrangements for financial transactions.

Collective transportation with identification markings for individual traders to minimize use of the bus transportation system.

Loan arrangements for transportation and financial assistance for infrastructural development

Enhance local traders' social and financial capital development to minimize the intermediaries between producers and consumers as in Narayani-east sector.

Options for year-round Marketing Strategies

In Nepal goats are traded year-round; the trend of its trade (i.e. market demand) depends upon the festival and social functions such as wedding season. In the same way, suppliers also need cash to celebrate these functions so they sell their goats in the same season.

Make provisions for obtaining the required number of goats at one place for distant markets

Partner with local government/development projects working on goats or private sector to organize and develop market places for goats

Development of market yards in PPP model or other

Development of linkages between various markets tiers, e.g., haat/collection centers, district market, regional market, national market.

Create market facility while developing large infrastructures like roads, irrigation, resettlement, etc.

Manage production program to cope with lean supply period

Breed selection or management

Management of off-take

Management of rearing practices

Management of age and weight for disposal

Awareness about goat sector's potential as a viable enterprise

Development of business schemes for various sizes of goat number and investment

Provide soft loan to goat entrepreneurs

Provide the facility of risk-bearing through insurance

Enhancement of the farmers bargaining capacity

Organizing either in groups or in cooperatives for enterprise linkages

Support for market information, regularly involving District Unions (DUs) in the system

Provide skills and techniques of entrepreneurship in farming and trading

Minimization of hindrance and double taxation from local governance and other service providers

Provide organized services of vet certification at market places

Area for Future Intervention:

Potential enterprises in the vertical and horizontal linkages are identified through SWOT analyses. Based on study findings, strategies are listed below for future interventions across all domains where smallholders can have the decisive role in establishment of active group marketing based on the Participatory Market Chain Approach model.

Strength and Opportunity (SO) Strategy:
SO Strategy for Market options
• Train and organize goat meat value chain actors
• Establish regular and organized markets in Western, Mid-western region
• Support facilities at regular market centers
• Reestablishment of price information system
• Establish regional slaughter houses
• Reform goat meat transportation regulation
• Implement import substitution program
SO Strategy for production options
• Increase goat production and productivity
• Increase supply of goat meat for domestic market and export
• Increase organic goat production and productivity
• Increase organic goat meat export
• Establishment of goat breeding farms in private sector
• Farmers Field School for goat selling practice
• Farmers Field School for doe flushing practice
SO Strategy for Socio-economic options
• Employment generation among goat VCA
• Promotional policy for goat husbandry and VCA
• Increase economics of scale in goat production

Weakness Opportunity (WO) Strategy: **WO for market options**
• Training goat VCAs for development
• Increase infrastructural investments
• Establish regional slaughter houses
• Promotional policy for investments
WO Strategy for production options
• Control goat diseases by state to reduce mortality losses
• Solar electric fencing for protection from predatory wildlife
• FFS for flushing, replacement of doe and off-take age limit
• FFS for optimal growth achievements for male
• Initiate recordings at farm level for better economics and selection
Strength and Threat (ST) Strategy for production options • Adopt measures to reduce cost of production by technological intervention • Control of trans-boundary animal diseases (TADs) by state through sanitary and phyto-sanitary measures • Resolve community forest conflicts for fodder production • Increase research and development activities for domestic breed selection and propagation.

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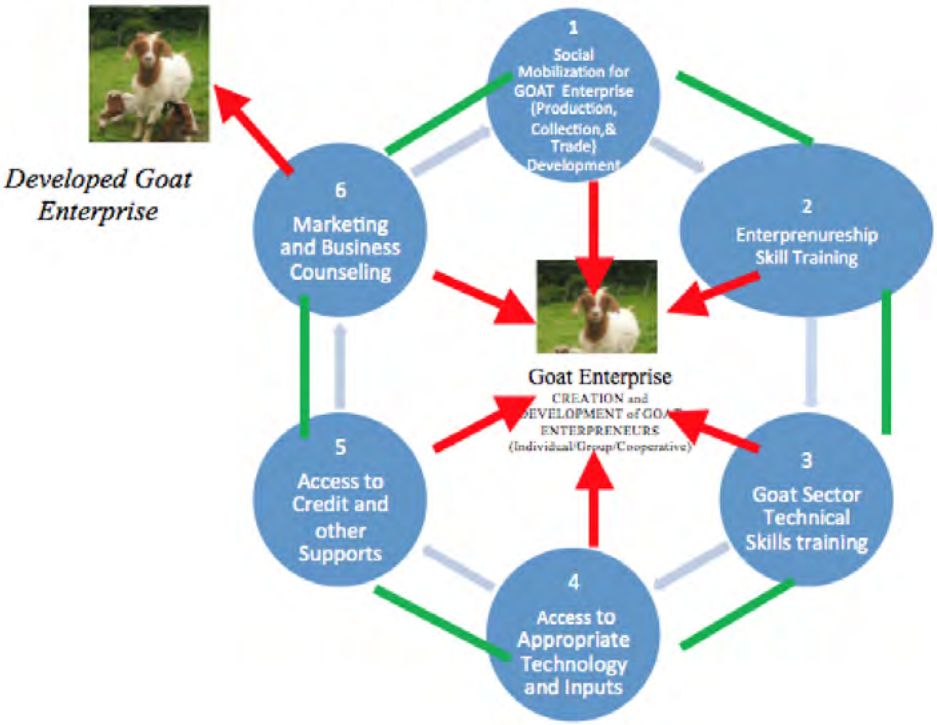
6.0 Summary of recommended SLVC interventions:



Rational-What Socio-Economic Benefits can be achieved by implementing this Goat Enterprise Model:

• Goat sub-sector is identified /recognized as a successful poverty-reduction instrument/program, which is being increasingly internalized by GoN and INGO's/NGO's for poverty reduction and MDGs,

• Nepal's high potential for utilization of local resources and skills for goat enterprise development and for the nation's economic growth,

• Goat entrepreneurship development for substantive economic changes,

• Goat sub-sector model approach is inclusive and follows good governance,

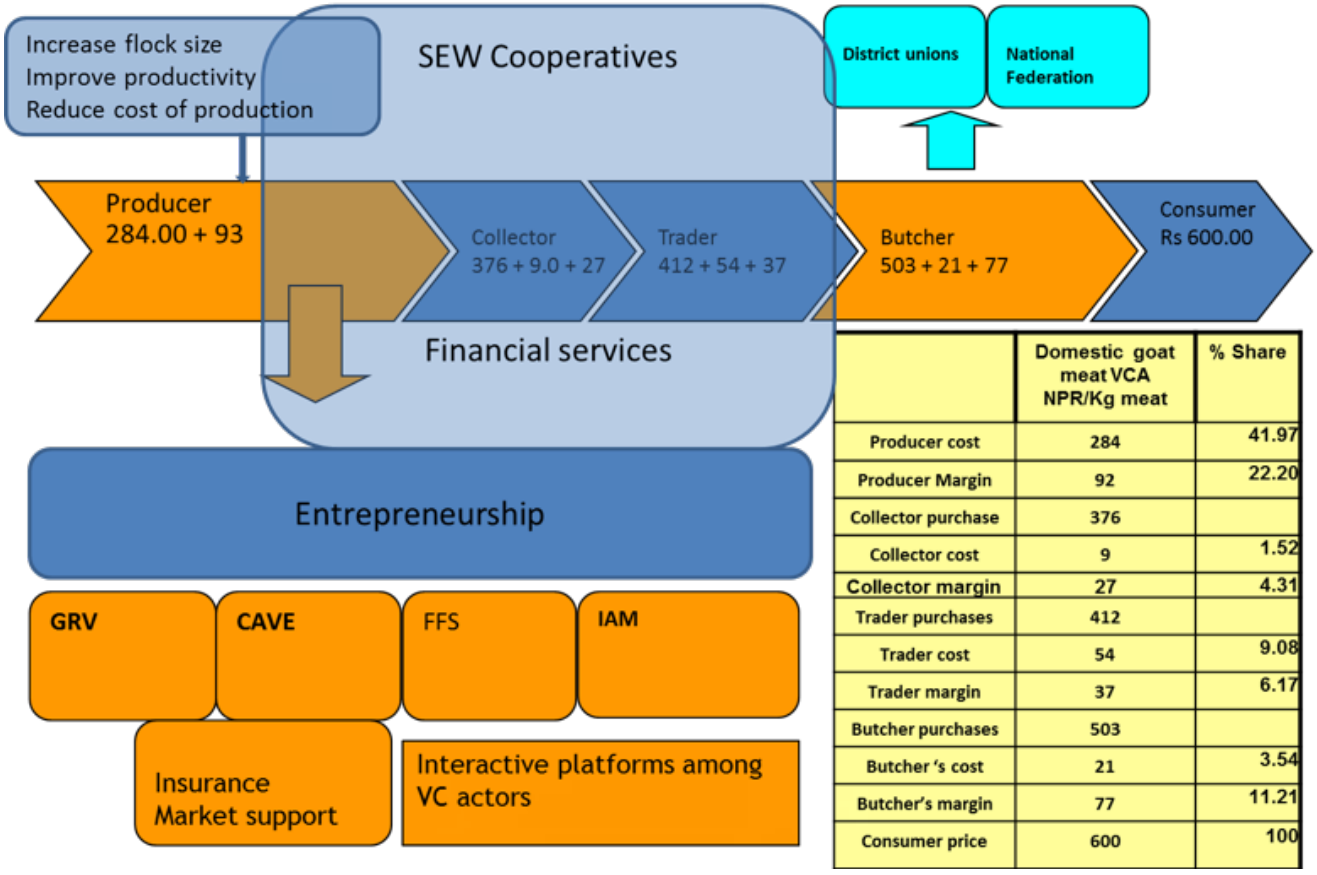
• Goat sub-sector will decrease other burdens to the nation (subsidy distribution),

• Goat sub-sector will create employment opportunities for youth,

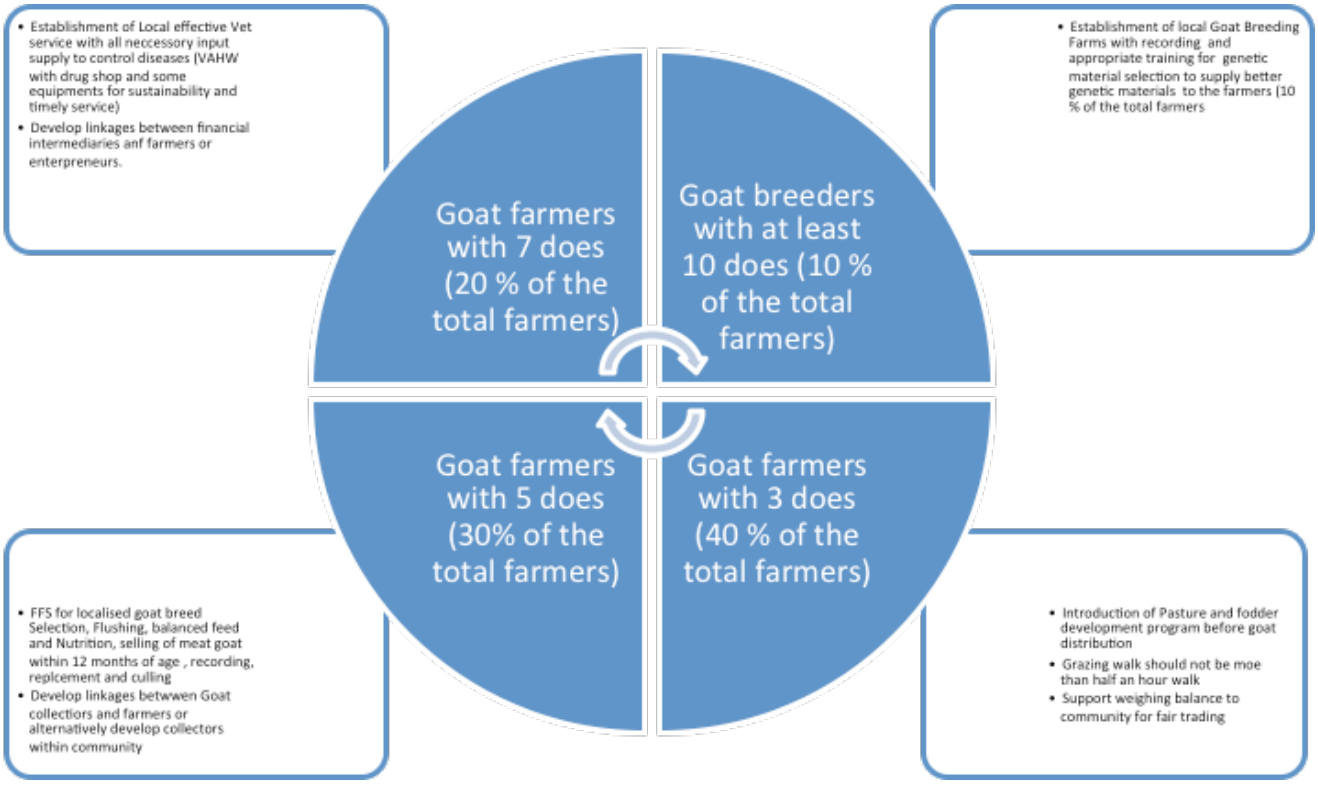
• Goat sub-sector contributes to one of Nepal's international commitments (MDG'S),

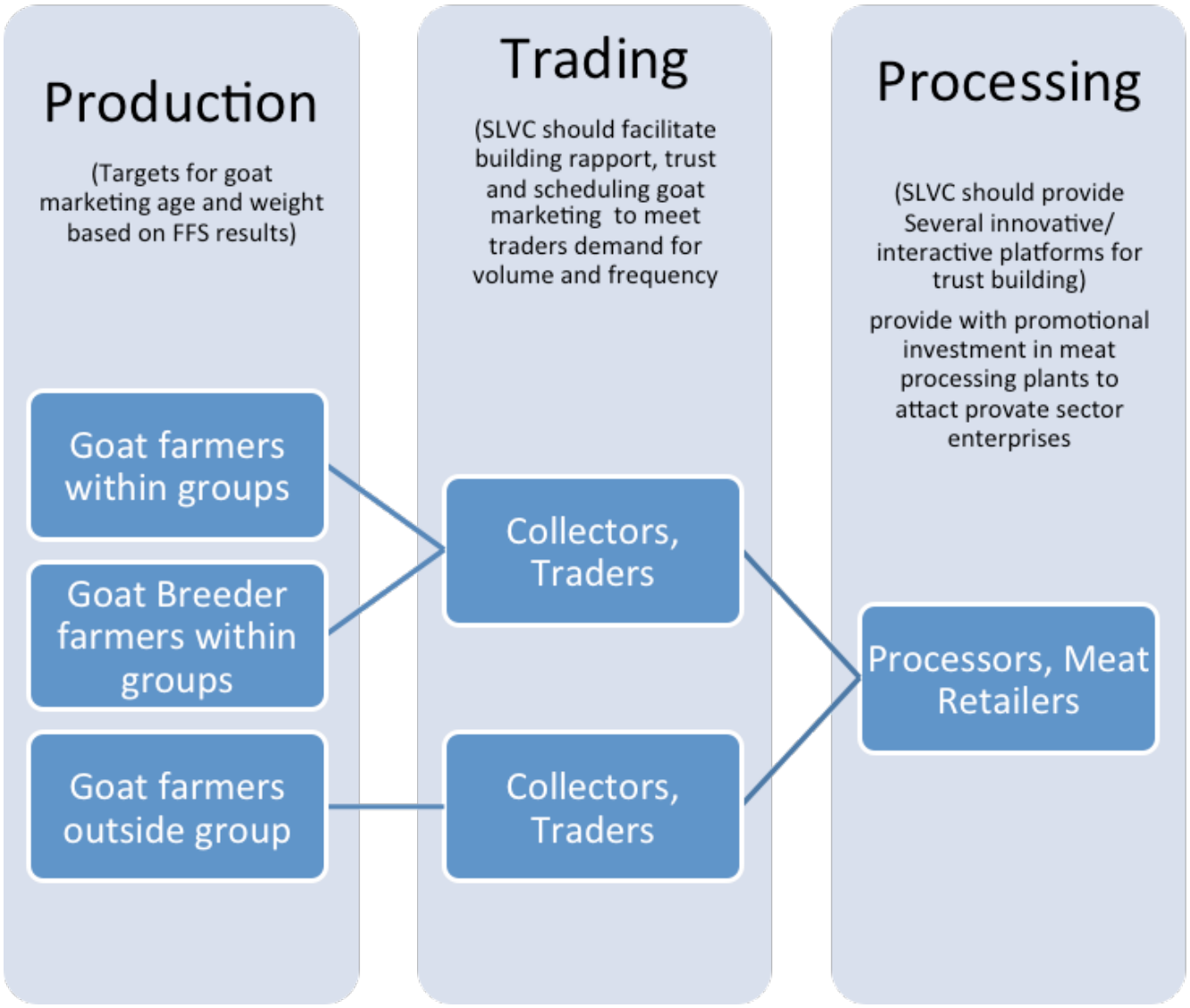
• Goat sub-sector will attract youth resources and skills from those who had previously chosen to migrate to the gulf.

Goat Meat Value chain – Intervention areas



	Domestic goat meat VCA NPR/Kg meat	% Share
Producer cost	284	41.97
Producer Margin	92	22.20
Collector purchase	376	
Collector cost	9	1.52
Collector margin	27	4.31
Trader purchases	412	
Trader cost	54	9.08
Trader margin	37	6.17
Butcher purchases	503	
Butcher 's cost	21	3.54
Butcher's margin	77	11.21
Consumer price	600	100




Production
(Targets for goat marketing age and weight based on FFS results)
Goat farmers within groups
Goat Breeder farmers within groups
Goat farmers outside group
Trading
(SLVC should facilitate building rapport, trust and scheduling goat marketing to meet traders demand for volume and frequency
Collectors, Traders
Collectors, Traders
Processing
(SLVC should provide Several innovative/ interactive platforms for trust building)
provide with promotional investment in meat processing plants to attact provate sector enterprises
Processors, Meat Retailers

LIST OF PROPOSED INTERVENTIONS IN GOAT MEAT VALUE CHAIN

Production Problems	Production Activities with Tools	Indicator	Desired Output	Responsibility	Purpose	Time- span
No Recording for enterprise evaluation	Goat Herd Recording	Enterprise Records	Updated records	PPs + Farmers	Baseline records established	Short-term
Low twining percentage	FFS- Doe Flushing	Twining percentage	% Flock Twining	PPs + Farmers	Productivity per doe	Short-term
Low birth wt. in twins	FFS- Pregnant Feeding	Kids Birth weight	.Birth wt	PPs + Farmers	Birth wt. of kids	Short-term
Mal-nutrition in Kids	FFS – Lactation, Feeding, selection of does with good mothering ability	Kids Growth rate	Kids Growth	PPs + Farmers	Growth rate in kids	Short-term
Mal-nutrition in Kids & Khasi	FFS–Kids Feeding	Kids growth rate	Kids Growth	PPs + Farmers	Weight gain within 12 m	Short-term
High prevalence of Parasitic infection	FFS- Strategic Drenching	Morbidity & mor- % tality	% Mortality	PPs + Farmers	Production losses	Short-term
High prevalence of PPR	FFS- Strategic vaccination	Morbidity & mor- % tality	% Mortality	PPs + Farmers	Production losses & K I	Short-term
Low herd performance	FFS- Selection of best doe	All above indicators	Best doe retained	PPs + Farmers	Productivity per doe	Short-term
Scarcity of feed & fodder	FFS- Culling practice Promotion of fodder and forage production	Unproductive goat sold	Production cost	PPs + Farmers	Availability of Feed to other	Short-term
Lack of forage in lean season	FFS- Forage conservation	Availability of forage	Feed requirement	PPs + Farmers	Production cost	Short-term
Lack of fodder in lean season	FFS- Fodder Development	Availability of fodder	Feed requirement	PPs + Farmers	Production cost	Short-term
Over aged Khasi sale practice	FFS- Sale under 12 months with targeted body wieght	Live wt. at sale	Live wt. at sale	PPs + Farmers	Return per goat sale	Short-term
Scarcity of breeding Doe and Buck	Establish goat breeder farms	Doe and Bucks available	Readily available	PPs + Farmers	Village herd performance	Short-term

Marketing Problems	Marketing Activities & Tools	Indicator	Desired Output	Responsibility	Purpose	Time- span
Lack of trust between farmers and collectors in price negotiation	Support weighing machine purchase and sell on unit live weight proce	Functional Weight Machine	Live wt. trading practice	PPs + Farmers=> Coo-operative	Fair trading practice introduced and sustained	Short-term
Inadequate price information	Support and establish MIS	Functional MIS	Regular flow of regional & National live wt. price	PP + Farmers => co-operatives	Trust & confidence among members	Short-term
Lack of trust between farmers and collectors in price negotiation	select and train support youth as goat collector	Collectors from community	Trust between farmers & collectors	PPs + Farmers + .collectors=> Coop	Reduce collectors margins and increase farmer margins	Short-term
Traders reap high profit	Establish, Train and Finance collectors Alliance	Alliance formed, equipped & functional	Live goat trading to major terminal markets	PPs + Alliance + Financial Institution	Reduce Trade margins and increase farmer margins ((Reduction in Mkt. tiers	Short-term Medi- + um-term
Marketing Problems	**Marketing Activities & Tools**	**Indicator**	**Desired Output**	**Responsibility**	**Purpose**	**Time- span**
Absence of HaatbBazar in WDR, MWDR and FWDR	Support and finance to establish weekly / Bi-weekly Haat (Bazar (PPP	Construction of infrastructure with facilities	Regular trading of goat from Haat Bazar	PPs + Local Body + Buyers and sellers	Fix days for goat sale for producers & Fair price trading	Short-term Medi- + um-term
Inadequate facilities in HaatbBazar of CDR and EDR	Support and finance to strengthen Haat Bazar (PPP) fa-.cilities & Mangt	Construction of infrastructure with other facilities	Increase trading volume of goat from Haat Bazar & .Mangt	PPs + Local Body + Buyers and sellers	To increase goat sale volume for producers & Fair price trading	Short-term Medi- + um-term
Poor state of goat transportation and high weight loss. Hence high costs	Support and finance to encourage specific goat transport	Transportation loss + trader Group transportation	Decreased transport wt. loss and costs	PPs + Transporters + Finance Institution + cooperatives	To reduce transportation weight losses and reduce (costs of traders (50% cost	Short-term Medi- + um-term
Absence of hygienic meat availability at DHQ. + daily Haat Bazar	Technical & Financial Support + Training	Establishment of slaughter slabs and Meat shop (PPP) at one place	Establishment & functioning of slabs and meat shops	PPs + Municipality + Financial Institution + meat retailers	To safe guard Consumers' health; one world one health	Short-term Medi- + um-term
Higher cost of live goat transportation (18.25 % share of TGVC in N_W sector	Support and facilitate Establishment of regional slaughter house and processing in private sector	Number of private slaughter houses with retail show room & functioning state	Hygeinic meat for institutional and private consumers in major terminal markets	PPs + Consultant + Private + Banks	To avail hygeinic meat supply to aware consumers at better price To reduce transportation cost and losses	Medium-term + Long-term

Socio-economic Problems	Socio-economic Activities & Tools	Indicator	Desired Output	Responsibility	Purpose	Time- span
Inadequate awareness among consumers about benefits of meat without skin	Support and facilitate creation of awareness among consumers	Increase demand for skin free hygienic meat	Increased number of shops selling skin free meat	Consumers + PPs +GoN + municipality +VDCs	Safe and hygeinic meat consumption Export of tanned skins	Short-term Med-term Long-term
Lack of meat Inspection for safe and hygienic meat processing	Support and facilitate GoN to amend and implement Slaughter Act	Enforcement of Slaughter Act visible	Safe & hygeinic meat One world one health Export earnings ((skins	GoN + Consumers + PPs + Local bodies	Safe and hygeinic meat Export of tanned skins	Short-term Med-term Long-term
Lack of entrepreneurship in goat farming and breeding	Implement trainings and facilitate goat enterprise for potential farmers as breeder farmer to achieve economies of scale	Number of person trained and adopted goat enterprise to economies of scale	Increase youth ;employment Reduced goat ;import Income genera- ;tion Rural Pov Red.; FNS	Farmers + PPs + Banks + GoN + private vet service providers	Rural employment genera- ;tion Youth retaintion in village for ;lucurative goat farming ;Import subsititution Export promotion	Short-term Med-term Long-term
Lack of goat sector development policy	Support and facilitates goat development policy	Goat development policy endorsed by Cabinet	Functional and implementable goat dev. Policy in place	PPs + GoN + Stakeholders	To promote conducive environment for goat production	Short-term

NB: Short-term = 3 years; Medium-term = 6 years; Long-term = 10 years

KNOWLEDGE HARVESTING RAJASTHAN

This knowledge harvesting realized for Rajasthan has several sources. It is an analysis of several projects and situations. These projects have implemented their methodology and pro-poor goats programs in Rajasthan but also in other Indian states or countries:

The imGoat's project. The program in Rajasthan is implemented in the Udaipur district , in the Jarkland state and in Mozambique; ;

The Heifer Project International Inc. (HPI) projects are located in Rajasthan near Jaipur and in the Bihar and Orissa states.

Sources of information:

The analysis of the general situation of the goat sector in India and Rajasthan is based on several bibliographical documents.

Information on the imGoat's project is based on interviews during the imGoat's National Advisory Committee (10-11 February 2012) and a field visit in the villages near Jahrol. It is completed by documents about goat value chains and the knowledge harvesting form prepared by Dr. Ramkumar Bendapudi (ILRI).

Information on the HPI projects is based on the knowledge harvesting form filled by Abhinav Gaurav (HPI Delhi) and Dilip Bhandari (HPI Little Rock) and a discussion with them.
All quoted references in this document are reported at the end of it. Report written by Jean-Paul Dubeuf

1 The Goat sector and production systems in India

1.1 A huge country with very diverse conditions

India is a very huge country with very contrasting climatic areas: mountainous in the North and North East (Himalaya and Cashmere), semi-arid in the North West (Rajasthan, Gujarat, and Punjab), tropical and humid in the South.

15% of the world's goat population is in India (124 million heads in 2009, DAHDF Source) but 70% of goats are found in seven states (West Bengal, Rajasthan, Uttar Pradesh, Maharashtra, Bihar, Tamil Nadu and Madhya Pradesh) when the sheep are mostly in only 4 more pastoral states in Andhra Pradesh, Rajasthan, Karnataka and Tamil Nadu (Mehta,, 2011).In spite of important recent progress, a significant part of the population suffers hunger and food sufficiency is a main national objective.

1.2 A high developing demand for goat meat

An important point to focus on is that, as India is one of the first cow milk producers in the world, goats are nearly only bred for meat. Goat milk is mainly used for family consumption or sold to dairies and mixed with cow milk without special qualification. Only few specialized dairy goat milk farms have been settled near the city for very narrow niche markets. Conversely, goat meat is highly appreciated and between 1990 and 2009 India's production of goat and sheep meat increased by 17.5 million tons (from FAOSTAT, 2012 and Kumar, 2007). The data are rather contradictory in the sense that most of the goat market is for meat but only 40% of the goats are culled for the meat commercial market indicating the importance of goats for auto subsistence of poor populations.

The total meat consumption is low (5.5 kg/inhabitant/year), 50% of the recommendations and about 30% of the population is vegetarian mainly for religious reasons (Mehta, 2011). But goat meat is highly appreciated; beef is only consumed by Muslims and lower castes for religious reasons; In the Indus religion, slaughtering cows is forbidden and many die naturally. The demand and prices of cow meat are much lower than goat meat. The average goat meat price is high (around IRs 220/kg – USD 4,65/ kg) when it is 50% less for chicken The demand is higher than the offer but India exports goat meat in Saudi Arabia, Egypt, Iraq, Kuwait and Malaysia, in spite of restrictions on the export of carcasses. This situation is mainly caused by the lack of national market organization. The sheep and goat leather industry has a significant importance in the country, employing around 2.5 million people and producing 72 million of goat skins and 33 millions of sheep skins. But the potential offer of goat skins available (by considering slaughtered animals) is about 92,3 million pieces, (Kumar, 2007) which means that a large part of them are not sold nor processed including the skin taken from dead animals. The price of a skin could vary much from an animal type to another: a Sirohi breed skin could be sold IRs 100-150 (USD 2.10-3.00), when a West Bengal one until IRs 300, (USD 6.25). More than 5 million people are employed by the goat sector (butchers, traders, skin processing workers, etc…) without considering the goat keepers who are much more numerous (Kumar, 2007).

1.3 A sector mainly hold by small and marginal farmers and landless workers

In all of India, 48% of goat keepers are smallholders with less than 1 ha cultivated land and 38% with no cultivated land and scrubs) and this percentage can reach more than 80% in many states. Consequently, the number of goats by household is small with less than 10 goats (Kumar, 2007).

Many goat keepers have only one or two goats. Unfortunately, no studies exist on the importance of medium size and large size breeders (3 big goat farms have been identified by the author on web sites). The lack of investors is underlined in all bibliography by most of the people involved but the interviews with Dr. Singh and Dr. Bendapudi have suggested that more structured farms of 20 to 100 goats exist in some districts.

1.4 A production system based on sideways grazing, byproducts and fodder trees

A main problem for India and a priority is food safety to feed an always growing population. More and more land is used for cultivation or for house holdings and crops have to be used for human food. Animal husbandry has been often seen as in competition with human food. Goats can be an opportunity to use marginal and not cultivated areas and planting and use of cultivated fodder trees. Planting adapted fodder trees (as those of leucaena, sesbania, gliricidia, prosopis cinenaria, acacia and stylo species) at field boundaries and backyards is recommended by many advisers to improve the quantity and quality of forage available. Protein supplementation is not possible except those from legumes crop residues. Mineral only can be distributed regularly to the herds. The use of natural pasture is limited as the long period without rainfall in semi-arid areas shortens their productivity and the forestry services are reluctant to enable goat grazing to prevent the risk of overgrazing and forest degradation.

Goat

keepers have few abilities to control and improve their systems and they are generally poorly trained and aware of basic innovation. The health and sanitary conditions are very bad: there is no generalized vaccination practice, nor parasitological treatments. Most of the goats are local breeds but in each state breeds adapted to the local environment have been identified. 33 breeds have been identified by the official services who aim to promote pure breeding. But the lack of purebred bucks makes their promotion difficult and we would attend strong genetic erosion.

1.5 Extension and support of goat production

The priority of the Indian government is food security and animal production has often been seen against this objective because livestock is always thought to be in competition with humans for food. To improve the condition of poor people is also other major objective.

The governmental policy is defined every 5 years through a plan to be applied in all India and goat production is one of the national priorities. Officially each district has veterinary services and the governmental services are in charge of breeding and to provide bucks. But all people met have confirmed that they have not enough financial means to generalize these services. The veterinary officers confirmed that only 22,000 veterinarians are engaged when 68,000 would be needed ; vaccines are lacking and training is not generalized.

Many local NGOs are compensating by acting with private or international funding. They generally implement development projects with several methodologies. Although there is neither real coordination between projects, nor necessary collaboration with governmental services and the competition for funding exists, the collaboration between these NGOs is generally good.

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2.Presentation of the imGoat's project

The imGoat's project in Rajasthan is presented respecting to the global situation in INDIA and to the two other cases of the project in the Jharkhand state in Eastern India and in Mozambique. The IM Goat's project has been chosen to be analyzed because of its specific approach that has been supported both by the European Union and IFAD with the scientific and operational support of ILRI.

The prices are expressed in Indian Rupees (1IR$ = USD 47). The summary reports of the interviews about this project are presented in annex 1.

The conditions seemed to be a priori good to evaluate the impact of the projects and better understand goat husbandry practices, and to identify constraints, potential opportunities, goat keeper needs and priorities.

2.1 General presentation of the project

This project was officially launched in June 2010 with a Project Launching Workshop held on Sept. 22 to 24, 2010 in Udaipur. It was planned to last 3 years, but was actually only operational for 2 years.

The local situation and the characterization of the project have been usefully and precisely described by Ramkumar Bendapudi (ILRI) in charge of its scientific coordination (see annex 3).

The BAIF Development Research foundation is the organization in charge of implementing the project. It has been established in 1967 from the ethical principles of Dr. Manibhai Desai, a disciple of Mahatma Gandhi, who worked on diverse aspects of rural development . He focused on the urge for innovative approach and the link between research and development. BAIF is present in 16 states through various associate organizations based on development pattern. In Rajasthan, where BAIF has been present since 1979, it led to the registration of Rajasthan Rural Institute of Development Management (RRIDMA) in 1993 in Udaipur.

The ImGoat's project in Rajasthan has been implemented in the Udaipur District. Udaipur district is situated in southern Rajasthan with a geographical spread of 13419 sq. km. This is a semi-arid eco-region in the Northern Plain (and central highlands) that includes the Aravalli hills range. The average rainfall is about 600 mm and temperatures vary from 11.6-28.3 °C in winter to 22-44 °C in summer. The available water capacity is medium and the length of growing season ranges from 90 to 120 days. (Bendapudi, 2011)

District	Udaipur
Blocks	Jhadol and Sarada
No. of Villages	44 villages selected
Project Officer	Udaipur
Goat keeping families target	3000
Existing goat population	15000
No. of goat keepers' groups (12-15 families /group)	240

Table 1- Source: imGoats, 2012F

The goat development project has been implemented during 3 years in the two blocks (district subdivision) of Jhadol and Sarada and 2990 goat rearing families in 44 villages with around 9000 goats (of 15000 total in the area) are proposed to be beneficiaries. The target groups are the goat keepers: The main target groups are poor small ruminant, mainly goat keepers, especially women, in arid and semi-arid areas, belonging to weaker sections of the society. This includes small-scale agro-pastoralists who cultivate small plots of land, as well as the landless. The approach is to gather stakeholders such as goat keepers, scientists, service providers and marketing agencies for exchange in a common innovation platform.

Rajasthan has the second rank in goat population (21.5 million), of which, 1.1 million in Udaipur district (Bundapudi et al., 2011). The main target of the project being the poorer people, this district has also the highest Scheduled Tribes (ST) called also "Dalit" population in the state (48%). The goat population in the 2 chosen blocks (Jadhol and Sarada) is 130,000 for each of them (idem).

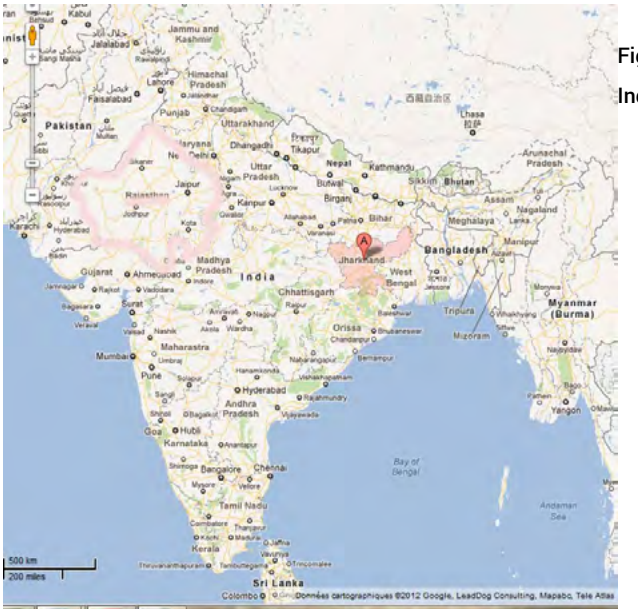

Figure 1. Map of India and localization of the imGoat project in India (Source: imGoats, 2011)

Figure 2: Map of the localization of the project in Udaipur (Source: imGoats, 2011)

2.2 Methodology and main activities

The main general objectives of the project are twice:

> Pilot sustainable and replicable organizational and technical models to strengthen goat value chains in India, that increase incomes, reduce vulnerability and enhance welfare amongst marginalized groups, including women,
>
> To document, communicate and promote appropriate evidence-based models for sustainable, pro-poor goat value chains.

The direct impact on the populations involved in the project is only one aspect of its implementation. A main issue is to improve the interactions with the local, state and Union officials and stakeholders.

The main activities included in the project are focus group meeting, entry point activity, participant selection, group formation, field guide training, identification of buck keepers, distribution of breeding bucks, buck keepers' training, identification of vulnerability and capacity assessment, establishment of innovation platforms.

Many activities are dedicated to project organization and logistics more than to direct field activities. It means that most time was for the administration of the project and meetings with all the partners. Involving the other stakeholders (chemists and official vets, traders and butchers) to improve their awareness is another important characteristic of the project. The main services provided to goat keepers are: training, deworming, vaccination, castration, feed supplements for bucks, primary treatment, feeding demonstration, and marketing linkages. The sanitary interventions, breeding and buck distribution, weighing the sold animals to increase the villagers' capacity to bargain with the trader or butcher are the main actions for goat keepers.

The duration of the project seems to be too short to have a sustained impact if there is not a further development. The challenges of the project are: for production, lack of motivation for adopting of good management practices, non-availability of superior quality bucks, non-availability of improved pastures, poor co-ordination between service providers; for marketing, minimize distress sale by organizing finance through their group, trading goats on live weight, through legislation if required , good marketing facilities such as shed, ramp, drinking water, strong relationship between goat keepers, bulk suppliers and processors, promotion of semi-urban slaughter houses and utilization of by-products.

The project is based on a strong field structuring with the training of local field guides (FG) (1/ 100 farms), the presence of local supervisors (1/5 FG), the creation of local groups, trainings focus group meetings with goat keepers (33 meetings) and organization of innovation platform meetings with the identification of three groups of stakeholders and problems.

The 3 groups during the innovation platform meetings have identified the following main problems:

Producers

- Prevalence of goat pox, contagious "ecthyma" and other ectoparasites,
- Lack of timely access to veterinary care,
- Shrinkage of grazing land leading to fodder scarcity,
- Genetic erosion of breeds,
- Exploitation of goat keepers and need for trading on live weight basis,
- Need of finance to avoid distress sale.

Input service providers

- Timing of treatment of illness, awareness about diseases,
- Gap between producers and researchers/AHD,
- Problems in insurance practice,
- Capacity building of field guides.

Traders

- Unable to meet existing market demand,
- Need of infrastructure such as market places,
- Modern techniques and knowledge to the butchers.

Sl. No.	Project Details	Rajasthan
6	Household level Facilitation	
	-by each supervisor	500
	-By each field guide	100
7	Staffing	
	Program Coordinator	
	Project Manager	1
	Project Officer-Field operating	1
	Project Officer –Marketing	1
	Supervisors	6
	Field guides. (to supervise 8 groups)	30

Table 2 - Source: imGoats, BAIF, 2012

The project has clearly identified the main challenges on:

- Animal husbandry: Lack of motivation for adopting good management practices, non-availability of superior quality bucks, non-availability of improved pastures, poor co-ordination between service providers.
- Marketing: Minimize distress sale by organizing finance through their group, trading goats on live weight, through legislation if required, good marketing facilities such as shed, ramp, drinking water, strong relationship between goat keepers, bulk suppliers and processers, promotion of semi urban slaughter houses and utilization of by-products.

These participatory meetings are very operational; they are based on a strong relation and contact with all the actors. The main question is the level of dynamism of the field guides, all local goat keepers with a basic education level. What about their implication after the end of the project? The baseline analysis has given clear and precise information on the production system and its global efficiency. The project has planned to improve productivity of 20%. The interventions resulted in the mortality of goats being reduced to less than 5% from about 50%. Considering that the mean number of sold animals would be 2 with an average price of 1200-1500 IR, (USD 300)the project would improve the local income of 250 -300 IR/goat keeper (USD 5/6) or 900 000 IR for the 44 villages (USD 18000). Is this return on investment enough significant to justify the project or is it not indispensable to get a multiplicative effect by the generalization of veterinarian services and better market conditions in all the area?

2.3 Analysis of the actors' system.

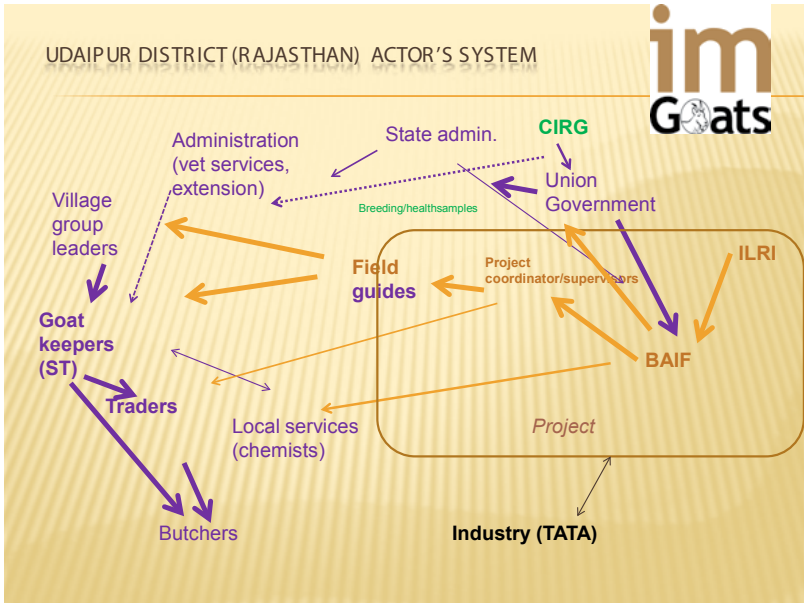

Figure3- The representation of the actors' system; this representation has been drawn from the several interviews. Tata Inc. is the main industrial group in India and is involved in meat and skin industry. CIRG is the Central Institute of Research on Goats.

2.4 Strong and Weak Points – Opportunities – Threats: A SWOT approach on goat and Small Ruminant systems in the imGoats project in India

Strong points :

The good coordination between the several stakeholders
The participation of the local services
A good potential market for goat meat
A high experience and professional know-how in project governance by ILRI and BAIF

Weak points :

Low level of education of farmers
The small size of the herds (<5 does)
The lack of local supplies in vet products
The lack of forage and fodder availabilities, the lack of water

Opportunities :

The improving good economic situation of India
The possible involvement of commercial actors (a Tata group officer has participated in the steering committee)
Keeping a low input production system
The coherence of the project with the national policy; the organization of a larger scale official service

Threats :

The too short duration of the project (3 years officially but but really two due to the delays to begin)

The possible lack of identified long term outputs of the project

2.5 Comparison with the situation in Jharkhand and Mozambique

The project in Jharkhand and Mozambique is based on the same methodology and objectives under the common supervision of ILRI.

In Jharkhand

The local conditions are less arid than in Rajasthan. The local breed is the Black Bengal breed. The size of the animals is smaller but the skins have a higher quality than those of the Sirohi breed and their price is higher. The project is located in the Dumka block. One starting point was the funding from Tata in Bankura and Burdwan districts of West Bengal, a neighbor state that allowed BAIF to test a systematic approach
The project seems to involve less goat keepers and being less dynamic. The number of goat keepers is slightly lower but involve more women. 4 meetings have been organized (33 in Udaipur)

In Mozambique

IInformation has been reported in another Knowledge Harvesting *form (other cases).*

3 The HPI projects in Rajasthan and other states

3.1 Presentation of the projects and methodology

Heifer Project International is financing 3 main projects on goats in India: one in Rajasthan, near Jaipur, one in Bihar, one in Odisha (formerly known as Orissa).

In Rajasthan, the project concerns with mixed milk/meat goat production systems with the Sirohi goat breed, meat and skin systems (Black Bengal breed) in Bihar, and in Odisha.

For the 3 projects, methodology is the same. 3 goats are gifted at each of the 350 families of each community project and the products of these goats are partly re-gifted to other neighboring families. These gifts could be followed by micro – credits operations for small investments in equipment. So, the final impact of the project will be in favor of around 1,000 families. Many families already had goats before the project but some gifted families may not have had goats before the project. The gifts are associated with technical or management training to improve the animal husbandry practices. Many problems are related to animal health (PPR, enterotoxemia, parasites). Para veterinarian technicians are trained with some knowledge in animal health and provide how to get vaccines, anthelmintics and other treatments. Training on animal feeding is based mainly on the use of communal lands and fodder trees.

When goats are milked, milk is mainly used for auto-consumption, meat is both for auto consumption and selling mainly during the time of religious festivals and marketing is not the first priority of the project. Generally goats could be used as savings for urgent expenses.

The projects are financed and supported logistically by HPI. Each project is built in partnership with local Indian NGOs. The partners are listed in Table 3, below.

In Rajasthan, the project has been built simultaneously with a project of the Tata foundation working with the local NGO but each funding is independent. Each project is founded for an approximate total amount of USD 22,000. The projects are financed during 3 years plus 2 years with a monitoring support. Then HPI will keep supporting the local NGO. The decision to implement a project is discussed between the country HPI offices, the local NGO and the communities through participatory meetings.

Table 3 – HPI projects in India by state with the name of main partners.

Name of the State	Name of the Partner
Rajasthan	Urmul
Rajasthan	Ibtada
Bihar	Sathee
Bihar	Nirdesh
Bihar	M.G.V.P
Bihar	G.P.S.V.S
Orissa	CEERA
Orissa	Unnayan

3.2 SWOT approach on HPI projects in India

Strong points:

Projects are based on an internationally acknowledged dynamic organization

Presence in India has been permanent for many years

Founding for an approximate total amount of USD22 000 for every project is not too important

A monitoring support during 2 years and a follow up later

Weak points

The structural situation of goat activities in similar states suffers from similar problems*:*

Rajasthan:

Low availability of fodder as it is a dry and arid state for goats that prevents the farmers for developing large scale goat rearing,
Animal management is still a concern as people are still slow to adopt the improved ways of goat rearing over their traditional ways,
Health wise enterotoxemia is a major concern and low availability of vaccine in the state is an issue in controlling the disease.

Bihar and Orissa (Both are neighboring states, so the issues are more or less same).

The project in Bihar is mostly carried out in flood prone areas and that is the reason why health related issues are higher in this state,

PPR ("Peste des Petits ruminants") is the major killer disease in both the states and the availability of the vaccine and maintenance of cold chain for the vaccine are the major issues as the projects are placed in interior rural areas,

The size of the goats, in both these states, is too low, around 8-10 kg for a one year old marketable castrated buck and so the returns are too low. The impact of the project on the welfare of the beneficiaries and their production system (forage autonomy) is not clearly identified. The projects are only focused on production, not marketing and infrastructure. The promotion of local organizations is not included in the project. The methodology of the project is very dependence on the HPI Know –How, what does not make the partners autonomous.

Opportunitiies_

The potentialities of the goat meat market are the main and important opportunities of such projects

Threats

A possible dependence from HPI and local NGO

The lack of coordination with other local projects and services

The small size of the herds and fodder availability

4 The goat meat production in the Ajmer district, Rajashtan

The situation in another Rajasthan district is described to show the diversity of situations in the meat sector in India. (Source: Exploring dynamics of small ruminant meat market: Abetting livestock keepers: findings from Ajmer and Rajasthan-Sharma, V., Bendapudi, 2011).

The value chain of the meat market in this district is described and the role played by the traders is underlined. It confirmed that most of the households have several activities including salaried work, agriculture and milk production. About 21% of the income comes from the goat meat sector; the stock holdings of the sample households range from a minimum of 2 to a maximum of 72 animals. Almost 66% of the sample households maintained a herd size of about 20 animals during the period 2009-2010. On average, about 8 animals are born in a year and about 6 animals are sold in a year. The herd size of sheep is higher than that of the goats. The average flock size was about 54. The flock size ranged from a minimum of 3 to a maximum of about 250. On an average, 24 animals were born and about 19 were sold to the traders by the animal owners.

These elements confirm the importance of small ruminants as a source of supplementary income for the households. The major production costs incurred by the livestock keepers is for procurement of feed (i.e. fodder trees, grasses and feed concentrate) for goats as well as for sheep. It means that any growth in herd size has to be decided depending on the fodder availability. It seems that in general, the average cost of maintaining goats is much higher than that of sheep.

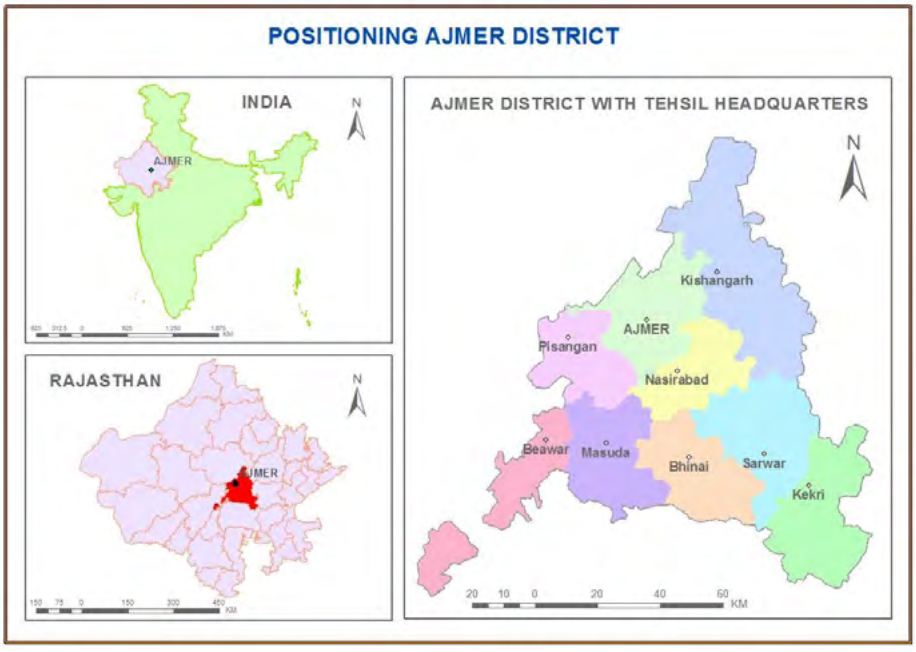

Figure 4. Source: Sharma et al, 2011. The situation described by Sharma and Bendapudi, 2011

Market issues

An important point is that the unorganized nature of market gives some scope for development of a nexus between the small traders, market agents and sub-agents. Absence of strong institutions (that can lend support to animal keepers to address price issues and problems of such a nexus) allows the traders, at times, to dictate terms to the animal owners. More precisely it seems that the high prices received during the peak demand of Bakra Eid, the main Muslim feast, are not reaching the livestock keepers.

The main opportunity identified by this study is the potential for improved returns to the livestock keeper as well as the primary trader through proper access to market information pertaining to distant markets.

At the policy issues level, the authors suggest a specific plan for addressing the issues of goat/sheep marketing. This plan is not specified by the policy document of the government of Rajasthan that has only edited a broad general statement of "developing local markets for live animals especially sheep and goats with facilities such as shelter, drinking water, veterinary facilities, sanitation and security arrangements".

On the fodder scarcity during the summer months forcing the livestock keepers to dispose of their animals prematurely they suggest that collective decision making among the livestock keepers and controlled grazing through appropriate social regulations can be a solution. They suggest that "any such social regulations if backed by policies that address the usufruct rights of the local community on government owned lands will not only help in sustainable maintenance of commons but will also ensure fodder security. Most often, the watershed development programs and the forest department take a blanket view that goats are harmful to the re-forestation programs undertaken by them. Restricting entry of animals into the area is the common approach. During the periods of fodder scarcity, in a given year, by allowing the livestock keepers to lop and take home specific quantities of fodder would encourage even the poor goat keepers to be part of these programs. Awareness of the related nutritional aspects of fodder-valued trees, shrubs and grasses will also encourage livestock keepers to approach the feed and fodder aspects more scientifically". They also suggest that the state promotes and strengthens the establishment of small-scale decentralized slaughter houses. At the institutional aspect, the creation of associations would help in the better management of animals in terms of access to veterinary services, assured fodder supply and better negotiating power to the livestock keepers while selling the animals.

These suggestions are completed by other ones such as promoting weighing scales, developing an access to market information, collective organization for marketing the animals (strengthening the goat keepers in their relation with the traders).

This described situation and problems met are very similar to those of the imGoat's project. Nevertheless the bigger average size of the herds, although of small scale could be a better situation to get a better and quicker impact for a possible future project.

5 Global evaluation and indicators of success and sustainability

Several situations regarding the goat activities were identified and analyzed. Many productions systems and value chain are very similar from a region to a state. The context and conditions of implementation of the several projects and the local specific conditions have enabled the identification of key factors for success in projects to develop goat farming:

-The involvement of the local institutions (to get a larger and more sustainable impact) and social situation

- The existing market (an objective of a project could be to improve the access to the market and added value)

- The duration of the project (at least 5 years)

- The fodder availability (to avoid shortages and ability to support a larger herd)

- The minimum size of the herds (at least 20 goats would be necessary to manage a herd and get enough income)

- The water resources (investments in wells and small dams would be often necessary)

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Annex 1- Interviews reports

Dr. Shoovir Singh, Central Institute for Research on Goats (CIRG), head of the Animal Health Division.

Dr Singh was mostly interviewed on the missions of his Institute, their interactions with the holders and the situations of Goat Production in India.

He mentioned that at the governmental level, the main orientations are decided and formalized in a 5 years plan. Goat mission is one of the mega governmental programs and a priority; CIRG is in charge of the application of this program for Research on Goats. CIRG is a public Research Institute financed by the Union Government, its orientations being given by the Indian Council for Agricultural Research (ICAR).

The CIRG

- The CIRG is based in Makhdom between Mathura and Agra in the Uttar Pradesh State at 150 km from Delhi. The CIRG is divided in 4 divisions with a total of 35 scientists,
- The genetic and breeding Division (12 scientists) is in charge of the breed conservation, animal selection and new technologies. They provide bucks to the farmers,
- The animal physiology division is in charge of reproduction techniques (artificial insemination, embryo transfer, etc.),
- The nutrition feed resources and product technology division is in charge of animal feeding but also of innovation in processing for skin, milk (cheeses) and meat,
- The animal health division is in charge of diseases diagnosis and treatment, vaccine production and veterinarian treatment,
- Another division is dedicated to socio economics, extension and education,
- Thus, the CIRG has a multidisciplinary approach and has to develop interaction with the farmers, extension services and NGOs.

The situation of the Goat sector in India

Dr Singh reminds that we have attended a boom of goat meat in India for several years for several well-known reasons:

- A great part of the Indian population does not eat beef for religious reasons and beef is not considered has a high value meat,
- Poultry is the most eaten meat but poultry feeding is competing with food for human purposes and the sector has suffered the avian flu pandemic disease, 2 years ago,
- Goat meat is appreciated by the consumers everywhere and from all religions particularly during the religious festivals as Bekra Eid (Muslims) and Naksatra (Indu). The consequence of this demand is that goat meat prices are significantly higher than those of other meats.

For him, there are 4 priority problems for goat production:

- The sanitary problem is the first one with a high impact of viral diseases and parasites on animal reproductive performance, mortality and growth. PPR (peste des petits ruminants) appeared recently in 1996 after the rinderpest was eradicated in cattle. Paratuberculosis is endemic as well as brucellosis and goat coccidiosis. Enterotoxemia is particularly present in overfed animals and a polyvalent vaccine is distributed to limits its effects. The parasite problems (and particularly Haemonchus) are a priority. The lack of a serious diagnosis (with frequent samplings) and of available vaccines has a great effect

on the improvement of animal health. He considers that in many cases the orientations are given to the government by the World Organization for Animal Health (OIE) and not through a local expertise. These problems are present for all livestock, but particularly in goats owned by poor and isolated keepers. A network of veterinarians exists, but there are not enough to cover all the country. This point has also been underlined during interviews and particularly by Dr. Nanda who has estimated that 68,000 veterinarians would be necessary when only 22,000 are on the field). Dr. Singh thinks that in many cases the technical complexity of the problems faced is underestimated in the pro-poor development projects.

- The lack of bucks. Simultaneously with the increase of the increase of the livestock, the genetic erosion is high with a higher percentage of WDB (without defined breed) or not described types (NDT) crossed animals. He explains that the 33 defined breeds since 1979 previously existed in their local nucleus. The collective and governmental organizations and means in goat breeding and animal health are key factors for the low productivity of the sector.

- The lack of forage resources; in most areas, all the lands are occupied by crops and there are less and less interstitial areas for planting fodder trees and improving forage resources.

- The lack of training and investors is particularly heavy to face these problems. The interaction with the breeders is particularly important for him. If many goat keepers are very small ones (less than 5 goats), some medium size ones (40 to 100 goats) use to contact him by phone and this interaction is particularly important for him. But in spite of their good will the scientists of CIRG have few financial means to develop the interactions with the projects. During our discussion, we were joined by a journalist of a famous farm magazine (Kalptaru Express) who wanted to get some information on goat and Small ruminant in the world. Dr Singh also suggested promote organizing “goat Universities” to improve significantly goat training. Considering the development projects and particularly the imGoat’s project, his opinion is that in many cases these projects are too short in time (3 to 5 years, 2 for the imGoat’s project) which is not enough to get a significant and sustainable impact.

Mr Sudipta BANERJEE, Tata International, Chennai

The Tata group would be interested in investing both on meat and leather in Rajasthan. The local and Sirohi goats have a lower leather quality than the West Bengal goats but organizing a value chain could be interesting both for meat (slaughterhouse and meat marketing) and skin (leather processing).

Nevertheless, a regular animal supply would be necessary and he would have some doubts that the local production would be reliable.

The Tata Group, the main Industrial one in all sectors (agro-food, cars, communication, services) in India is a worldwide group. They have always developed a social policy for their workers. The Tata foundation provides funding for developing activities but it is a different organization of TATA international that has more industrial objectives

Dr AS NANDA Animal Husbandry Commissioner, Government of India – Chair of the National Agricultural Council (NAC)

Dr Nanda has developed the policy of the Indian government. Their problem is how to develop goat farming without using food supplies for human nutrition. The imGoat’s Project does not aim to increase the

goat population. But is it possible improving productivity without increasing the number of livestock? In this case what could be the fodder supplies; pastoral grazing would be always more restricted and using by products is not organized. He has insisted on the opportunity to use urea treated rice straw (although their efficiency is not good for goats) and to organize its supply.

The lack of veterinarian and financial means to develop services on the field is a strong limitation to apply an efficient animal health policy.

Annex 2- List of people met

Government of India
Dr AS Nanda Animal Husbandry Commission, Government of India – Chair of the NAC

Local Administration
Dr Rajesh, Director, Animal Husbandry, Government of Rajasthan
Dr AG Bandyopadhyay, Director, Animal Husbandry Department, Jharkhand State
Dr Pradep Saraswat, Joint Director, Animal Husbandry Department, Rajasthan State

Research and Studies
Dr Devendra Swarup, Director, Central Institute for Research on Goats (CIRG)
Dr Shoovir Singh, Director Health Division, Central Institute for Research on Goats (CIRG)
Mrs. Tinni Sawhney, South Asia Pro Poor Livestock Policy Program,(National Dairy Development Bureau, FAO)
Dr Ramkumar Bendapudi, ILRI.
Dr Ranjitha Kumar, ILRI-Addis Abeba
Dr Padma Kumar, ILRI- Delhi
Dr Purvi Mehta, ILRI- Delhi

Extension and NGO
Dr Girigh Sohani, BAIF
Dr N.G. Hedge, trustee member, ex-President, BAIF
Dr Avinash Deo, BAIF, Project coordinator for RAJASTHAN and JARKHLAND
Dr R.S. Sharma, BAIF
Dr A.K. Sinha, BAIF
Mr. B.G.Rathore, BAIF
Dr Nikihlesh Modi, BAIF, Project coordinator for Rajasthan
Mr Nand Kumar, BAIF
Shri. Navneet Kumar, BAIF

Private sector
Mr Sudipta Banerjee, Tata International, Chennai

Local actors
Field guides
Goat breeders
Butchers and traders

Annex 3- Report on the imGoats project

by Ramkumar Bendapudi, ILRI

Political and Social context *(key data and facts)*

Rajasthan state is located in the northwestern part of India with geographical area of 3.42 million sq. km. Udaipur district is situated in southern Rajasthan with a geographical spread of 13419 sq. km. This is a semi-arid eco-region in the Northern Plain (and central highlands) that includes the Aravalli hills range. It has medium available water capacity and a length of growing period of 90-120 days. The average rainfall is about 600 mm and temperatures vary from 11.6-28.3 °C in winter to 22-44 °C in summer.

In India, the scheduled castes (SCs), also known as the Dalit, and the scheduled tribes (STs) are two groupings of historically disadvantaged people that are given express recognition in the constitution of India. These categories of people belong to the socially and economically weaker sections of the society. According to the population census of 2001, Udaipur district has the highest ST population in the state accounting for 17.75% of total ST population in the state. About 47% of the total households in the district are below poverty line.

The goat population of the entire Rajasthan state is about 21.5 million with a density of 62.83 per sq. km. Udaipur district accounts for 5% of the goat population in the state with a density of 81.48 per sq. km. Udaipur is ranked 6th among all the districts in Rajasthan in terms of goat population.
The district is divided into 11 administrative blocks. The imGoat's project villages are in the Jhadol and Sarada blocks. These two blocks account for almost 27% of the total goat population in the district.

In the context of governance, Rajasthan has made some major strides in extending democracy through decentralization. The grass root level institutions, namely the Panchayati Raj Institutions (PRIs) are being strengthened. The Rajasthan Panchayati Raj (Modification of provision in their application to the scheduled areas) Act 1999 has been enacted in order to provide wide ranging powers to the village committees in the predominantly tribal areas. As part of various measures taken for empowering the PRIs, elected representatives and village society have been given control over grass root functionaries of various state government departments posted in rural areas.

Characterization of the goat productions systems

Small ruminants form an important source of household income especially for the economically weak and socially marginalized communities in the area. The major livelihood activities of such households are agriculture and wage labor. Livestock, especially goats, provide supplementary income in case of emergencies. Based on the preliminary analysis of baseline data from the sample villages, it is observed that goat husbandry accounts for about 10 % of total annual household income. Goats also provide milk for household consumption.

The majority of the goat population is of the non-descript type. Good breeding bucks are usually identified from own herd or from neighbors. Owing to in-breeding, lack of veterinary services and scarce fodder resources the productivity of these animals remains low.

The small farmers on an average own about 10-15 goats comprising of about 2-6 does. At present, households do not purchase any inputs for rearing goats. Open grazing is the most common way of feeding goats. Goats browse on the common lands, forest lands (wherever available) and private agriculture

lands (post-harvest). Only during the crop harvest season and rainy season, goats are stall-fed by providing lopped tree leaves. Generally, goats are taken care of by the children, women or elderly members of the households.
Expenditure on health care of goats is minimal or non-existent. Access to the local government para veterinarians (paravets) is limited. Health care is limited to the free health camps conducted by the animal husbandry department whenever disease incidence is high.

The market of small ruminants is unorganized with traders playing a major role. The existing marketing structure of goats in the villages is informal and is dependent on one or two local traders for sale of live animals. The goats are purchased at the doorstep of the goat keepers by the traders in small numbers (1-2 animals). Price negotiation takes place based on rough estimate of the weight and general healthy appearance of the animal. In case of bulk buying during peak festival seasons, the distant traders seek the help of local traders to assemble the required animals in their areas.

At present, the goat keepers do not have access to formal credit or insurance services. In case of emergency they borrow from the local money lender.

Environmental issues

A high degree of dependence on common property resources is a key feature. In general goats are perceived to be harmful (especially by the forest department personnel) to the afforestation programs and the local ecology. Conflicts do exist wherever forest areas exist. Or even in common property areas in villages, access to these areas is usually restricted. No evidence of overgrazing or reports referring to those.

Some efforts have been taken up by various Governmental and NGO programs for environmental protection – watershed programs, Common Pool Resource management etc...

Projects engineering

•Precursors of projects (to be identified and described)

The goal of the imGoat's is to increase incomes and food security in a sustainable manner by enhancing pro-poor small ruminant value chains while the objectives are two: (a) to pilot sustainable and replicable organizational and technical models to strengthen goat value chains that increase incomes, reduce vulnerability and enhance welfare amongst marginalized groups, including women and (b) to document, communicate and promote appropriate evidence-based model(s) for sustainable, pro-poor goat value chains.

ILRI is the main implementing institution responsible for technical, administrative and financial management of the project. In India, all the rural community development activities are managed and conducted by the project development partner, namely, BAIF.

A total of 44 villages were selected in Udaipur district (34 in Jhadol block and 10 in Sarada block) for implementing the project activities, with about 3000 households participating, 93 % of which belong to ST and 17 % women headed households. The participating goat keepers are organized into groups. Each group comprises of about 10-12 members. In all, about 235 goat keepers groups are formed in the Udaipur field area.

The development activities in the field are supported by field guides and supervisors. Field guides are goat keepers from the community, but associate with imGoat's project as the grass root level workers. They are being trained to become input and service providers. There are supervisors who coordinate activities at the cluster level (comprising of 8-10 villages) and is responsible for supporting the field guides in the respective clusters.

•Description of the project(s). Objectives, expected qualitative and quantitative impacts

The main target groups are poor small ruminant, mainly goat keepers, especially women, in arid and semi-arid areas. This includes small-scale agro-pastoralists who cultivate small plots of land, as well as the landless.

The project aims to transform subsistence-level goat production to a viable, profitable model- increasing incomes and thereby reducing poverty and enhancing food security, while preserving community and national resource systems. In addition to goat keepers, beneficiaries will include other goat value chain actors, including small-scale traders, input and service providers.

The project is following innovation systems approaches within a value chain framework. The value chain models will be implemented through the mechanisms of innovation platforms and producer hubs, which will be comprised of multiple and diverse stakeholders. Innovation platforms (IPs) provide spaces for value chain actors to interact, communicate, and act to improve performance of the value chain and the resulting benefits to the actors. They will also be the mechanism to stimulate joint action to test feasible technical, organizational and institutional interventions for improving productivity of goats, their marketing and associated service delivery. A number of principles guide the implementation of the project: involvement of a wide range stakeholders from the start; joint problem identification; systems that enable expert and research knowledge to be integrated with local and indigenous knowledge, market intelligence, consumer demands and prevailing regulatory and policy environments; capacity building; and development of solutions through negotiation and brokering deals and agreements based on a full appreciation of the system, local circumstances and the appropriate mix of technical, socio-economic, institutional and policy options available.

It is expected that the by the end of the project period, there will be up to 20 % increase in incomes and improved diet quality and quantity among target households. The other expected impacts include improved production, productivity and profitability of goat enterprises in target households as well as equitable distribution of benefits along the value chain.

Economic and social issues

The important issues identified for the various stakeholders are as follows:

Goat keepers	Traders	Input and service providers
Breed related – Unavailability of good breeding bucks Health related – Prevalence of diseases and ecto-parasites Feed related – Fodder scarcity due to reduced grazing lands Market related – distress sale of goats to meet cash needs; Do not receive full value of goat due to discrepancies while estimating weight of the animal; Unorganized nature of goat marketing	Lack of timely availability of goats in adequate number Lack of healthy animals Transportation problems in rainy season due to damaged roads and overflowing streams which make the villages inaccessible. There is no proper market place/ infrastructure at Udaipur for buying and selling of animals	Goat keepers unaware about the laboratory facilities of the state animal husbandry department facilities Department does not get timely information about incidence of epidemics Use of overdose of medicines by goat keepers

A National Level Advisory Committee was established to provide strategic guidance to the project at critical times; identify key linkages with other organizations/projects involved in similar efforts to share experiences and lessons and; help disseminate/communicate lessons from the project and facilitate scaling up and out. The committee comprises of representatives of the Animal Husbandry Departments of Governments of India, Rajasthan and Jharkhand; IFAD; South Asia Pro Poor Livestock Policy Program (SAPPLPP), BAIF, and ILRI.

Indicators of sustainability and success

Changes in livestock, number of farmers involved, in volumes of meat produced, on local standards of living

Sustainability and success is dependent on the causal relationships between the IP as an institutional intervention, IP outputs (products/deliverables generated by the platform), IP outcomes (knowledge and behavioral changes of IP actors and technical and institutional innovations that have been developed as results of the use of products/deliverables), value chain outcomes (knowledge and behavioral outcomes among value chain actors and changes at the market level due to outcomes at the IP level) and development impact at the household and community level.

Indicators of the expected outputs from the innovation platforms include actor coalition, increased interaction, linkages and communication among actors and increased capacities. The value chain outcomes at the actor level include improved economic/market performance, use/access to services, technical performance, innovation capacity. Outcomes at the value chain level include enhanced governance of the value chain, improved market performance of the chain, improved access/use of services, improved technical performance, increased employment and ecological sustainability.

Annex 4 – Baseline Analysis (Udaipur District) – from the presentation at the ImGoats National Advisory Committee, 2012, by Ramkumar Bendapudi, ILRI

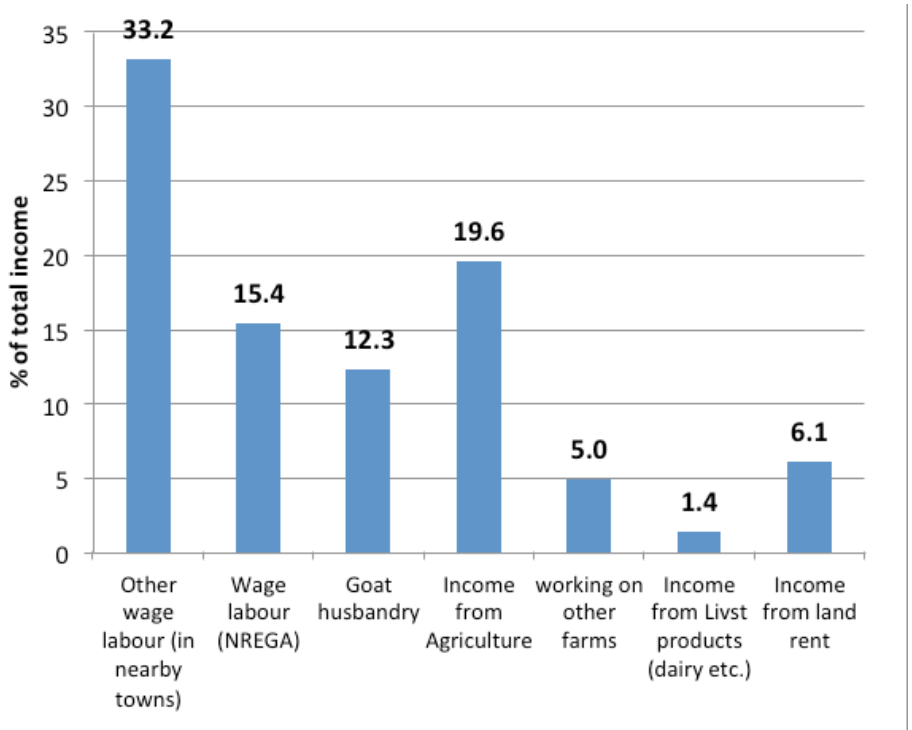
Sampling framework for baseline survey

Particulars	Total	Control
Project villages	44	3
Households covered	2900	40
Sample characteristics		
Number of participating households		89 (64%)
Number of participating women headed households		19 (14%)
Number of non-participating house-holds		30 (22%)
Total		138 (100)

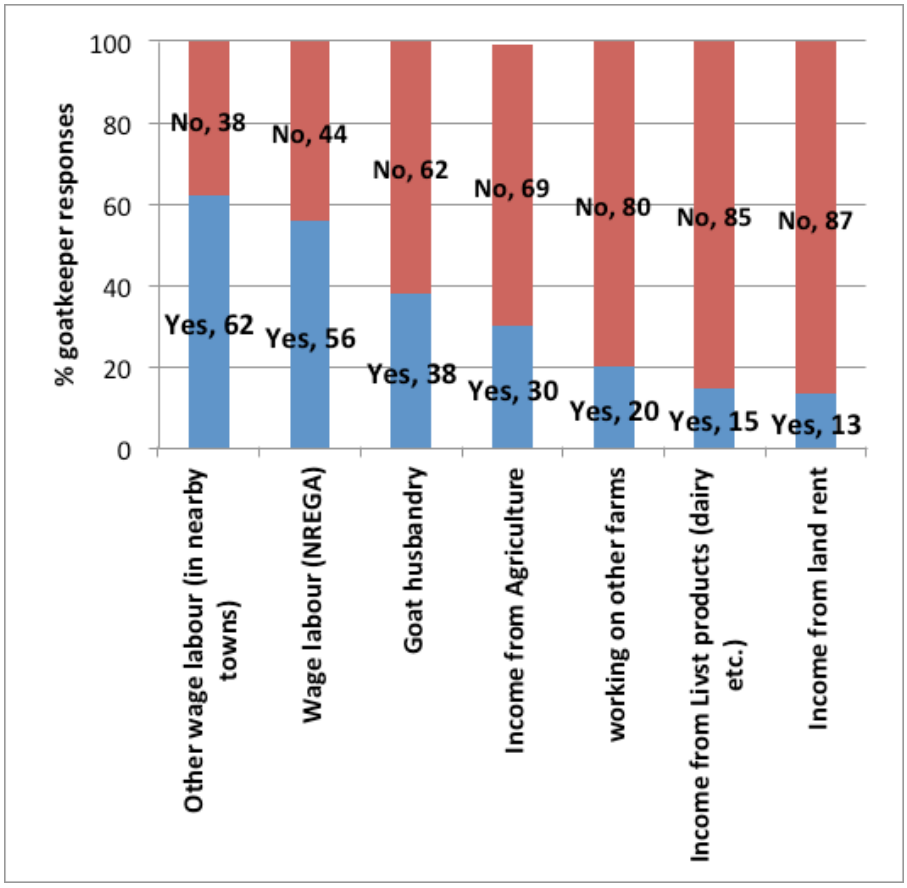
Goat keeper characteristics

Particulars	Mean Area (ha)
Total land owned	0.7
Irrigated cultivated	0.2
Dryland Cultivated	0.3
Permanent Fallow and private pasture	0.1
Seasonal Fallow	0.1
Particulars	Average number
Cattle	1.0
Buffaloes	0.7
Bulls	1.4
Goats	4.9
Sheep	0.4
Poultry	1.4

% contribution to total annual household income



Major sources of income



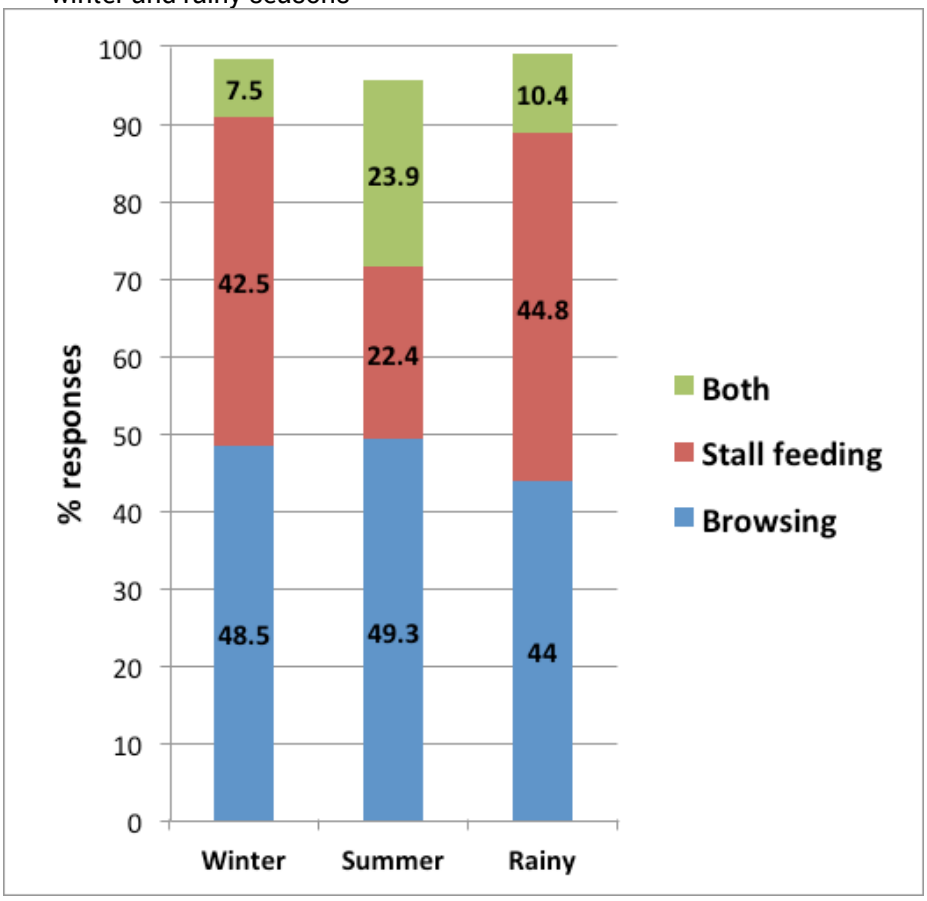
% contribution to total annual household income

Particulars (Apr 2010 – Mar 2011)	Mean
Number of pregnant does	2
Number of kids born	2
Age at first kidding (months)	12
Kidding interval (months)	8
Number of goats in milking	2

Feeding practices

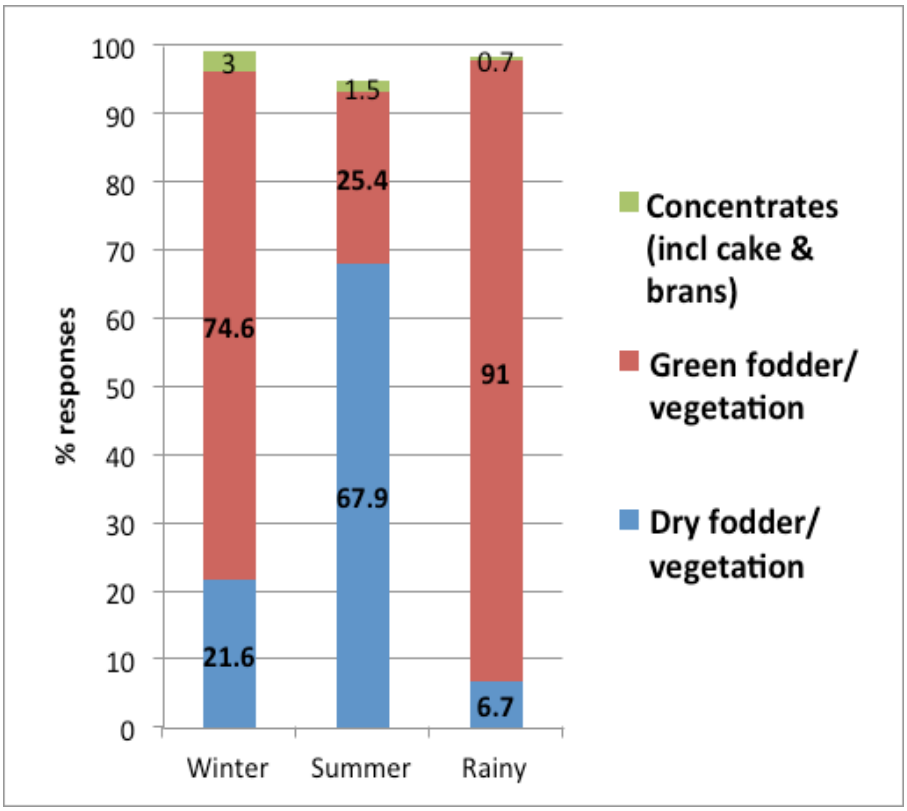
Goat keepers use a combination of open browsing and stall feeding

Stall feeding is done more out of necessity due to standing crop in the fields, especially during the winter and rainy seasons



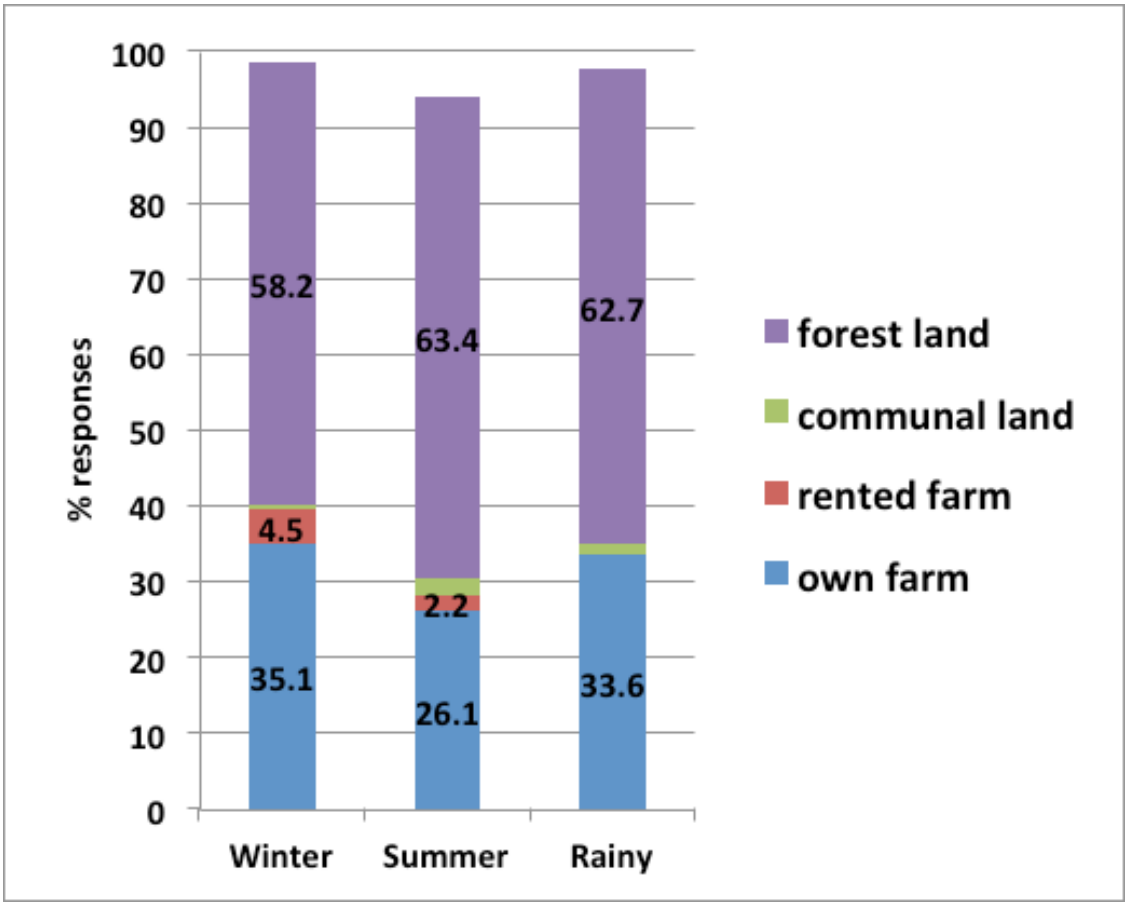
Types of feed

The part of concentrates is very low.



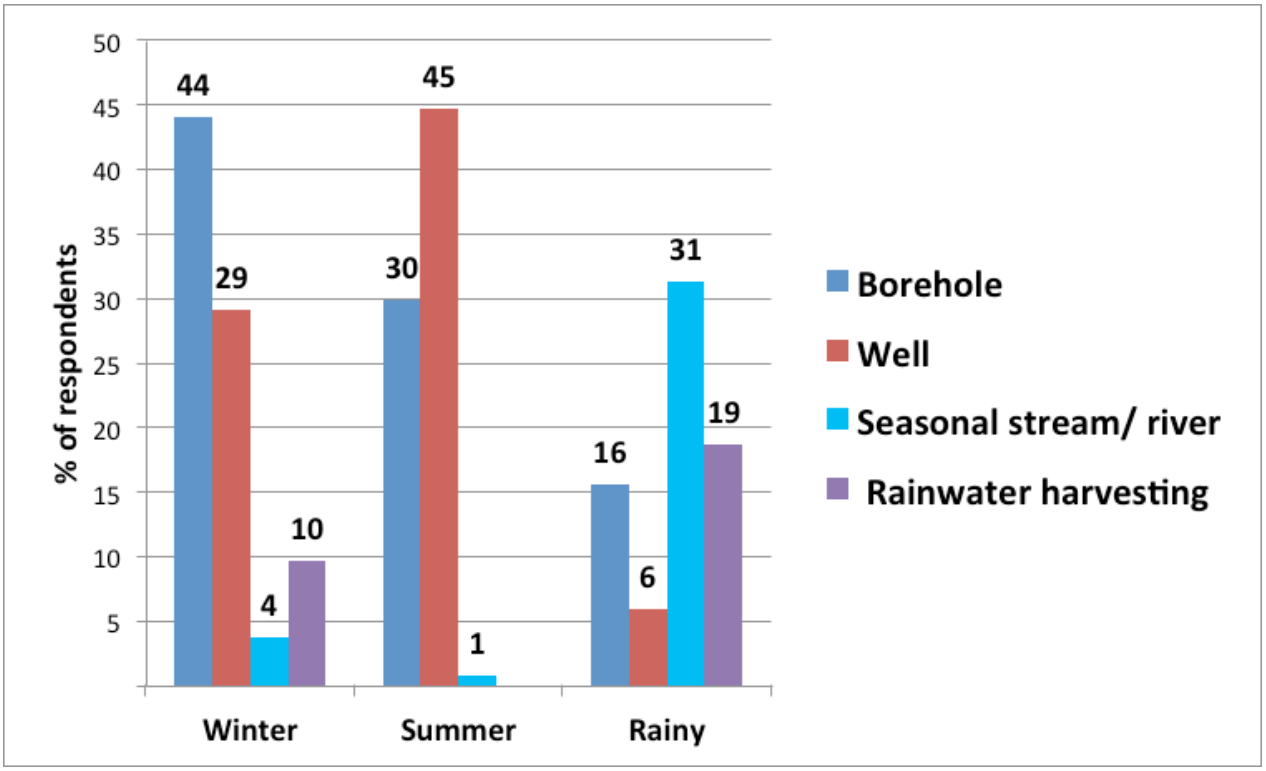
Feed source

Most of the food comes from the farm and forest/common land



Major sources of drinking water for goats (season-wise)

The goat keepers are very dependent on wells and bore holes and there are water shortages for 75% of goat keepers in summer.



Animal health management practices

96%of goat keepers do not make any vaccination, 87% no deworming,93% no treatment for ticks and 87% no curative treatments . In most cases people who do it do not have a previous diagnosis

Mortality of animals (August 2010-July 2011)

For 40% at least one animal died

Details of sale of animals

Particulars	Details
% Goat keepers who sold their animals	87%
Purpose of selling	• To meet household expenses (expected) (80%) • To meet household expenses (unexpected) (20%)
Main expenses covered	• Education (33%) • Food (29%) • Human health (19%)
Sold to whom	• Butcher (66%) • Individual local trader (18%)
Location of sale	At house (87%)
Payment mode	• Spot cash payment (90%) • Credit (10%)

The animals are sold all year long but mainly in November, December, January and March

Mean price of animals sold in “main sales months”

Type of animal	N	Price (Rs./ animal)
Kid (<5 months)	**5**	**1120** (USD22)
Adult female (breeding age)	**7**	**1214** (USD24)
Males (entire)	**82**	**2195** (USD44)

KNOWLEDGE HARVESTING SENEGAL

"The GANAfrica dairy goat project"

Written by Jean-Paul Dubeuf with Juan Capote and edited by Beth Miller

1. Introduction

Senegal is a West African country with a tradition of milk consumption and production. The Fulani pastoralists produce milk from both cattle and goats, with the goat side not well commercialized. The GANAfrica [1] and Fatick projects present useful lessons for dairy goat development to reduce rural poverty, and to build upon complex yet sustainable local production systems.

The GANAfrica dairy goat project (2011-2013) was a decentralized cooperation initiative implemented by the governments of the Spanish Canary Islands and Senegal to introduce improved genetics to improve the production of goats belonging to Fulani women. Decentralized Cooperation is a special European Fund to help European regions to develop their own cooperation policy. This report relies on visits, observations and interviews conducted during a mission to Senegal from May 2nd to 9th, 2012, and project documents.

The Fatick project introduced artificial insemination of improved dairy genetics to goats in an agricultural area, and was financed by the "Poitou-Charentes" French Region (with the support of European Decentralized Cooperation funding). The "AVSF" NGO was also involved but more at an operational level.

2. Senegal's livestock production systems and goats

Map 1. Location of the GAN Africa Ferlo and the AVSF projects in Senegal

1 «Redes de investigación y transferencia entre Canarias y Africa occidental para la autosuficiencia ganadera»,

Senegal is a Sahelian African country with an arid tropical climate characterized by a dry season, between November and June and a rainy season. In the Northern part of the country (including the Ferlo region) rainfall does not exceed 200 mm / year; in other parts (for instance in the Fatick region), it is between 600 mm and 900 mm. The rainy season is cyclical but of very variable intensity from one year to another but with a clear tendency to reduced rainfall. It is the period during when the animals improve their body condition and when people who practice cropping on land near the villages can grow and preserve surplus for the dry season. The population of Senegal is multiethnic, a majority being Wolofs or Serère (58%) who are traditional agriculturists, and 24% Fulani, who traditionally practiced transhumant pastoralism with large herds of cattle, sheep and goats.

Senegal is a developing low income country, with a GDP of USD 1018 per capita in 2012 and extreme poverty index (% of people with less than USD1. 25 per day) of 29.6 %. So, poverty is a major issue for the country, with 70% of population depending on agriculture and livestock for their livelihoods. The Central and Southern regions are generally more suitable for agriculture with livestock complementary but relatively less important. In the Fatick region, one third of lands is too salty for crops and has low potentialities for either agriculture or livestock. Goats in Fatick as in all Senegal, are mainly in small herds, and kept for meat and for self-consumed milk. The goat livestock has grown 29% from 3. 9 million heads in 2002 to 5. 04 million heads in 2012 (FAO Stat, 2013).

Livestock in the Northern region

Livestock is more developed in the Sahelian Northern region (where the GANAfrica Project is located); the pastoralist Fulani grazers practice transhumance with large herds of cattle (local M'Ba Gallo breed), sheep (Ladum breed) and goats (local mixed breed or Guerra Mauritanian breeds). After the great drought of 1973 and the following years, most of them have settled close to already existing irrigated agricultural areas and wills were built to provide supplementary forage to livestock in other places. The areas closest to the Senegal River and Lake Guiers have extensive hydraulic infrastructures with significant agriculture, forage and by – products, available for animal feed. Around the town of Richard Toll, agri-industry includes sweets and sugar cane, tomatoes for canning, peanuts, alfalfa, rice, and vegetables. Livestock owners can use many different by-products (molasses, "bagass" (sugar cane residue), rice straw, tomato pulp, etc.).

Fulanis who settled here own mixed cattle, sheep and goats herds. During most of the year except the drier period, these herds graze around the villages on dry natural pasture composed of dry grasses and the leaves of shrubs (usually acacia). These settled Fulani villages have defined areas for grazing established by Central Administration. During the wet season (lasting about four months), the rains allow a vegetative explosion and the grazing animals can improve their condition. It is also the period when both cows and goats produce most of their annual milk. The Fulani were not farmers and until recently, they did not crop. Settlement has changed this situation and they now practice either rain fed pasture in rotation with vegetable crops, or irrigated agriculture using boreholes in silvo-pastoral areas. Soil fertility is maintained by cattle, sheep and goat manure deposited while grazing crop stubble.

Livestock is considered natural capital by the Fulani, and valued over cash. Cows provide a return on investment through milk and calves but production is low because of the heat, and poor nutrition. Cow milk yields are less than 300 l/lactation (0.7 l / day / per animal). Sheep are primarily used for meat, and lambs can be sold for very high prices for Tabaski Day (Eid al Kebir). Good animals for breeding are sold

at high prices (up to CFA francs 250,000[2]). At the end of the dry season, during the animals graze dry shrubs with little complementary forage around the village the body condition of the herds is poor except for the local goats.

Goats are not a priority for the settled Fulani. They are milked during the wet season with limited production (up to 1 l / day but very often less). When cash is needed (to buy fodder for larger animals, or for family health emergencies or for any other reason), males or old goats are sold. Goats are generally sold to traders up to CFA 20 000 (USD 43) for 35 kg live weight (about CFA 2000 / kg of meat (USD 4.3 / kg), while the "dibiteries" (local grill houses) in town will pay about twice. Animal care, milking and more generally the management of goat herds are the prerogative of women.
Thus, the traditional pastoral livestock system has recently been modified toward a more agro-pastoral one. However, livestock nutrition has decreased because the herds cannot be taken to good pasture during the dry season; yet planting fodder crops is an alien idea and not yet well accepted. There is good potential for fodder technology near the rivers and lakes where commercial crops are developed. The very idea of fodder crops remains limited and controversial where they are boreholes to get water from aquifer because the new settlements could damage the fragile environment.

Sour milk technology

Sour milk is the main type of traditional dairy product. It is generally made with cow milk but also with goat milk when available. The milk is heated to 70° C. and culture and sugar are added. The mixture is then stirred one hour after inoculation, and then stored in plastic bag. The product can be stored two weeks at 5 to 6° C with some refrigeration. It can be eaten as is or in the composition of local dishes

3. Goat development projects in Senegal

Senegal is a rather well organized and stable country compared to many of its neighbors. It is very open to NGOs and a large number of development projects in all sectors have been implemented since the independence in 1960. There have been many projects to develop goats, but few have been well documented or evaluated for impact.

Pro-poor goat projects are generally pilot dairy projects aiming to raise income through improved milk production by importing exotic dairy breeds (Saanen, Alpine Murciana Granadina, Malagueña, or Mejorera) to cross with local goats.

The GANAfrica Canary / Senegal cooperation project for the development of dairy goats

This project is a decentralized cooperation project. It was initiated by the Canary Islands Spanish Region, a leading European region for goat farming and planned between 2010 and 2013. This project imported 128 Canary goats of Majorera breeds from the arid island of Fuerteventura to boost the local production system in Northern Senegal.

The following conditions make Majorera goats a good fit for Senegal:

- The presence in Senegal particularly in the North Sahel region, of local goat herds, mixed with cattle and sheep and kept mainly as capital

2 USD 400

- A tradition of home consumption of ruminant milk, mainly of cow milk but also goat milk, either raw or sour milk
- Low productivity of the local dairy goats
- The Majorera goat is hardy and well adapted to arid hot conditions.

The project had two components, one with researches on farms, and the other with a women's group in the town of Richard Toll.

3.1. "Research and Development project between the Canary Islands and West Africa for livestock sufficiency"

The GANAfrica Partnership for research and development was between the ICIA (Canary Islands Agricultural Research Institute) with ISRA (Senegal Agricultural Research Institute), The Tenerife "Cabildo" Regional Council, the National Agricultural High School (ENSAT) and Thiès University. The objective was to characterize the production system, and document the Canary goats' production in Senegal.

It includes the following actions:

- Distribution of 78 of the 128 imported animals into the experimental farms of ISRA and ENSAT in Thiès and in four chosen farms in diverse setting. (1. a peri-urban cheese maker near Thiès, 2. in a goat producing household near Luga, 3. a center of initiatives and training near St. Louis, 4. a silvo-pastoral community [3].
- Data collection of goat behavior, production and reproduction of goats and monitoring their insertion in the local production system.
- Trials in the experimental farms to compare the performance of the Canary goats and the local goats under same conditions.
- Test plots of specific local fodder crops and trees.
- Communication and dissemination of results.

3.2. "Empowering women through the development of dairy goat products around the city of Richard Toll".

This component was to raise the status of women through improving goat production. The partnership was with Health Services, Department of Veterinary of the Dagana Province in Richard Töll; logistics provided by the Spanish TRAG-Sa (Agrarian Transformations). The women are managing the goats but until now they have few returns from this activity and all the power is in the hands of the men; the idea is to empower them thanks to the development of goat products.

It includes the following actions:

- Distribution and monitoring of 48 Majorera goats held by a group of women from the Farmers Association of Rural Communities (M'Ba village).
- Assistance Training and organizing women in milking and herd management and on milk products processing, marketing and herd management model and recovery of products, by of a Canary technician living there and experienced in goat breeding.
- Building shelters for goats and plots for forage production.

4. Project budget

The total cost to import the 128 Majorera goats was USD 49,920. The price of each goat was USD 260, each t + air transport and controls (USD 130 /goat)

3 This community of poor shepherds is controlled by a female politician owner of herds with political contacts

Component 1 had a total budget of USD 650,000 from 2011 to2013. USD 26,850 was for purchase and transport goats and USD 39,000 for feeding goats during the project.

The budget for funding component 2 of the project was USD 49,500. It includes the cost of goats, the technical assistance by a Spanish technician and training sessions (including a trip in Canary Islands to show the Canary model).

5. The main stakeholders involved; observations and comments about the project

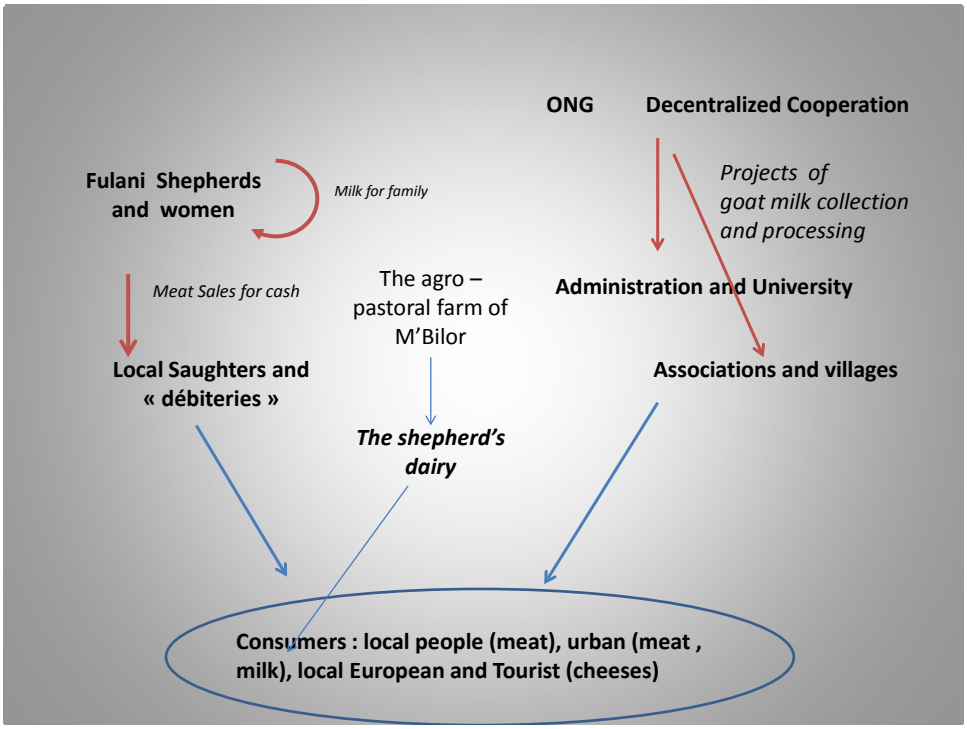


Figure 1. The main actors involved in the dairy sector and related to the project

They are mainly:

- Research and Education - ISRA[4] and the "Ecole Nationale Superieure Agronomique de Thiès", the National High School in Agriculture.
- The Ministry of Livestock. Veterinary and Hygiene Services
- The local communities

Besides, several actors and organizations involved in the dairy sector have indirectly connections with the goat sector and projects (Agro-pastoral farm of M'bilor, Shepherd's dairy, "dibiteries", traders)

6. Observations and comments about the implementation of the project

We have observed during our mission (see appendix 1) that the experimental herds seem quite in good conditions. But several actions have been delayed or have failed because administration has poor cooperation between its services. There was almost no monitoring of breeders reference's farms, and delays in the establishment of nurseries for forage. Therefore the capacity of the partners must be increased for any development project to have a positive impact on the intended beneficiaries. Project

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planning should include an assessment of the partners' abilities and needs.

The discussions with the women in the Breeders' Association showed:

- A strong motivation and willingness to volunteer their time for the benefit of the group involvement,
- A desire for economic returns from their volunteer activity (they say they made it at the expense of other more lucrative activities; the women express that until now they give up their limited time just to help with research,
- An open minded attitude regarding innovation and reflection on existing practices.

To understand the context of the GANAfrica, some other livestock projects in the Richard Toll area are examined. Their goal is to improve the living standards of local small holders often with a special focus on women's condition and the development of the dairy cow sector.

The shepherd's dairy (« La laiterie du Berger ») is one of the few dairies of significant size collecting milk in Northern Senegal. Most of the dairy processors in Senegal use milk powder but many small dairy units process and collect milk around Dakar and other major cities. This company has been created 6 years ago by a Franco-Senegalese veterinarian Bagoré Bathily because nearly 90% of the milk consumed in Senegal is imported as powder while nearly 4 million people, mainly Fulani, are traditional shepherds and milk cows. His company offers dairy products from milk collected locally to improve the living conditions of farmers. The company has received support from a French Senegalese venture capital company and the technical support from Danone Inc. Its turnover is CFA francs 1.2 billion (USD 23 million). It produces almost exclusively yogurt (especially in bags) under the Dolima brand, and pure cream. They are sold in 5300 points in Senegal. The dairy has ceased production of pasteurized milk and cheese due to a too small market. "La laiterie du Berger" collects milk of 600 households supporting approximately 7,000 people in a 50 km radius. Three tours are organized daily for a total of nearly 800 km. Only cow's milk is collected. It is paid CFA francs 350 / liter (USD 0.7) at the dairy (prices are discussed by an agreement with farmers). When milk is collected at the farm, it is paid 200 CFA (USD 0.4 / Liter). This price is 50% lower than the price of milk sold directly to urban consumers by nearby producers. The dairy aims to improve the production of the dairy farmers by providing fodder, particularly during dry periods. According to the season, the milk collection could vary from only 1,200 to 4,000 Liter / day. The dairy does not intend to collect goat milk today and gave up also the production of sour milk due to the local competition on a too small market.

The most isolated shepherds are the most interested to sell their milk to the dairy because the shepherds near the main cities have their own local market. For instance, the Taysir dairy unit (farm of EIG El Hadj DJ Sy Mallick Soowu Waalu) near Richard Töll is an example of small unit which could be a model for such initiatives. They process cow's milk in sour milk but could also buy goat milk in the future.

In 1999, Senegal began a strong agricultural planning and development program (Sall, 2012). The National Agency for Return on Agriculture (REVA) was created in 2006, to motivate populations and young people to work in agriculture thanks to the settlement of "modern" farms. The agro-pastoral farm of MBILOR established near Richard Töll by REVA and funded by the Spanish cooperation is a good example of the dominant perception of modernism. The objective was to establish production of cow's milk near the irrigated area on the Senegal River where forage production is possible. It seems that this project is not really successful. A herd of 100 Jersey cows imported from Denmark is shared within a community of farmers, mostly women belonging to an association. The level of investment in Mbilor is very important and the building seems to be oversized and not adapted for the setting or for 100 cows. The cows are

in a very bad body condition due the high temperature in the buildings, and a free uncontrolled feeding of forage and concentrate. The milking machine seems difficult to operate (too many women involved in milking, risk of disruption and lack of maintenance to the milking machine which may cause mastitis and other udder disorders). The production of the farm is below its objectives and sells less milk than planned. This gives us insight into the assumptions about livestock development among government and donors, and the need for more thorough data collection and understanding of farmer motives and capacity before investing in development projects, much less scaling them up.

7. SWOT analysis of the GANAfrica project

This SWOT analysis is an informal assessment of a project and is based on field observations and opinions formulated by the actors met and the situation of the production systems in the region. Good cross sections of the people impacted were not available to make a full assessment of the project and the selected actors may present a bias.

Strengths

- The Fulani people of Northern Senegal are milking livestock producers.

Their traditional system relies on local feed (low input), which they have adapted to settled areas, creating a form of ecological intensification.

- Open minded and self-critical spirit of the Spanish team. The objective of promoting women's in the Component II seems to be coherent.
- The women show a good interest, involvement and a capacity for collective organization. The Spanish contractor (component II) is familiar with goat breeding and Senegal.
- The two components of the project have been monitored quite correctly thanks to the project's team.
- The project relies on a relatively hardy breed, adapted to arid conditions and high heat.

Weaknesses

- The project schedule is too short and the perception of time by producers and local actors does not match the duration of projects.
- The introduction of exotic genetics requires a long learning and training process.
- A lack of definitions of targets at medium and long term (no scenarios on the impact and lack of prospective).
- No real strong technical team of animation and regular monitoring of both project components. For instance, the monitoring by the Senegalese team seems inadequate; there is only one technician, he is engaged to work for the component II and he is not fully involved in the component I.
- The indirect regional impact is relatively low due to the dispersion of the project. Such a small number of animals can hardly have a regional impact in such a short period of time.
- The absence of full involvement by local institutional bodies.
- The initial study prior to the project has been somewhat limited; the Spanish project team had few previous experience of cooperation.
- Goats are not a priority for the local livestock producers; the challenge would be that thanks to the women's motivation if they are successful, the other producers will want to imitate them.
- A large number of past cooperation projects, several of them being failures. This situation could have favored opportunistic attitudes and cynicism. For instance, the Spanish Cooperation agency was fully aware of the weaknesses of the project but has not formulated any comments.

Opportunities

- The willingness of local farmers to innovate; a pattern of drinking sour milk (which includes cow's milk) and a developing demand on local markets.
- Climate change and drought conditions make research with quick financial returns an urgent priority.

Threats

- The risk of absorption of the Majorera blood by the local animals without impact on the local system (e.g. the project Murciana Granadina and poor adaptation of Saanen in previous projects) because of poor planning, monitoring and evaluation.
- The main danger for the project is a probable lack of relays and financial support for monitoring the goat management after the end of the project. For instance a project in the same region has proposed facilities to develop "vegetable and fruit trees plots" for settled pastoral communities. What is original in this project is to have planned facilities and support during 20 years with a gradual empowerment of the farmers. This example shows once more that planning projects during a longer period would be more relevant than providing a large amount of money during only 3 or 4 years.
- Competition of local milk with the imported powder. Options to promote local milk production include lobbying to change national policy (taxation of imported powder).

Other goat projects in the Fatick region

A regional program has been undertaken since 2005 with the sponsorship of the "Poitou-Charentes" French Region Authority and the technical support the FRESYCA Regional Goat Professional Association. Since 2009, the French NGO « Agronomes et Vétérinaires sans Frontières » (AVSF Association) has joined the project. Two French technicians were engaged to work in the Fatick region, east of Dakar. In this region, populated by 600 000 habitants, livestock activities are complementary to agriculture, with 200 000 goats and 250 000 heads of cattle. Goats are managed by women, who raise them for milk consumption within the household, and to sell the meat or skin (100 t per year in the region). Therefore, the goat is an important source of protein, and natural fertilizers for the crops. However, goats have a bad image and are often associated with the devil because they roam and destroy crops when they are not managed well (Goetz and Jenot, 2012).

Since 2006, an insemination protocol and 3 pilot goat farms were initiated with the support of Capri –IA, the main French Goat Insemination Centre. Also, 18 village model goat farms have been built, 32 local goat groups have been organized and 3 cheese units are in production. The 3 components of the project are "the improvement of the herds' management, adding value to and marketing the goat products (meat and sour milk) and the improved organization of the goat value chain". One thousand goats have been inseminated with predictable limited results due to the local conditions. Micro credits institutions were created to increase access to inputs such as veterinary, concentrates, improved bucks. Several technical workshops were organized.

This project was co financed by the French Development Agency (AFD), European Union (Decentralized Cooperation), and French public regional funding. The initial local Senegalese involvement seems to be very low with few local roots. The "Poitou – Charente" French region, a world leader in dairy goats breeding was interested in developing a presence in Senegal for humanitarian reasons but possibly also for commercial ones. Their motivations have not been analyzed. The transfer of sophisticated technologies applied in France like artificial Insemination has had very limited results. AVSF has had a positive impact by facilitating the creation of the Association of the Goat Producers of the Fatick Region (ARECAF).

Other projects

A previous Spanish project near Thiès to improve genetics by importing selected goats from Andalucia showed the same limited impacts of technology transfer when a project is too short, and is not accompanied with group development and training. Interviews with participants indicates a lack of monitoring after the end of the period of implementation, followed by the village chief appropriating all of the goats for himself, earning the project its nickname as the "project for the goats of the Mayor".

Other projects [5] have associated the gifts of sheep and goats, the promotion of women and the development of animal production with other rural activities in village communities and the creation of women's associations (by the French "Elevage sans frontières" NGO for instance).

8. Lessons from the GANAFRICA projects and from other projects involving goats and livestock in Senegal

The GANAfrica project was not been finished when this report was prepared. Thus, it is very difficult to fully assess its impacts. This project has mobilized important human and financial resources, and established positive linkages between researches, public authorities, and local households.

Besides, there are many similarities between the GANAFrica project and the other reported projects on goats and livestock in general. The initial idea for these projects always has come from the donors. Generally, local actors or local NGOs were not involved in the beginning, or during the planning phase. The Spanish Canary or Andalusia organizations as well as the French "Poitou Charente" ones have all tried to export their own development model based on sophisticated technology and management, without adapted to local conditions, culture or preferences. We observe also that their representation has met the vision of modernity supported by public authorities, most of their officers being influenced by the Western approach. The vision of modernization shared by public authorities and outside donors seems not to be efficient or relevant for small holders. It is well known now than innovation cannot be driven by a down approach but must be designed step by step with strong interactions among the actors.

In spite of the good will of the regional European organizations, they do not seem to have the specific skills to work for development in developing countries. After 3 years, the PAFC Fatick project decided to work with the AVSF NGO to improve the organization and the involvement of the local grassroots people. The "Elevage sans frontières" projects are not specialized only on livestock but also on all activities of the communities, so they must understand the livelihoods and motivations of the men and women involved, and share decision-making with them.

The last important lesson is that projects have to be planned for more time, because 3 years are not enough time to impact sustainably the local systems, especially the behavior of poor producers, who cannot tolerate much risk. Since the 2012 mission, the GANAfrica project has been extended by the Spanish authorities following our recommendations. For Senegal, where sheep and goat meat have a potential large market in the "dibiteries" (restaurants), the development of the goat meat value chain and the improvement of negotiation capacities of the producers could become very significant. Dairy goats will continue to have potential in some niche markets, but greater growth is predicted for goat meat.

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Appendix 1. Program of the visits and meetings to assess the GANAFRICA project in May 2012

The participants: Juan Capote, ICIA Tenerife; Laura dela Campa, Trag Sa Dakar (project logistics; Cesareo Hernandez, livestock technician in charge of monitoring the importation of Majorera goats for the component II of the project, Jean-Paul Dubeuf.

Wednesday, May 2nd:
Meeting with officials of the Senegalese Institute of Agricultural Research (ISRA) (Dr. Traore, Dr. Tiongane, Station director) in Thiès and visit the experimental farm of ISRA.
Visit of the experimental unit of the National Agricultural High School (ENSAT) in Thiès and discussion with Dr. Arone N'diaye Samba, head of the International Cooperation Actions at the University of Thiès.
Visit the farm of Mr. Jules Ka near Thiès.

Thursday, May 3th:
Visit of the village farm of Mrs. Maimounia Sow near Luga.
Visit the Association of Development in the village of Gelhch Peuhl to ROA near St. Louis led by Ousmane SOW.
The GAN project aims to develop three pilot farms in goat through increased forage based on local feed resources to improve their self-sufficiency in fodder. 50 Majorera goats were imported and distributed in the three farms and experimental farms of ISRA and the University of Thiès (ENSAT).

Friday, May 4th:
Meeting the women of the Breeders Association of the Rural Community Committee of Mba and project monitoring committee; observation of milking and animal feeding; meeting with the Veterinary Inspector Dagana, Dr. Barro Moctar responsible for monitoring technical Veterinary Project.
Visit the "Agro-pastoral farm MBILOR" established by the REVA agency's plan "Back To Agriculture."

Saturday, May 5th:
Visit the "laiterie du Berger" in Richard Töll (Dolima) and discussion with the Managing Director and the Associate Director in charge of milk collection and services to shepherds, Arona Diaw.
Visit the dairy processing unit of Taysir (Eig El Hadj Mmllick dj Sy Soowu Waalu) production of liquid curd with cow milk.
Discussion with villagers from the Association for the Development of the Rural Community of Singou Dierry.

Sunday, May 6th:
Visit the rural community of M'Bartubab driven by Mrs. Awa Diallo, owners of a herd of 220 cows in the region of Louga and involved in politics.

Monday, May 7th:
Meeting with the Spanish Cooperation in Dakar (OECID); group meeting and project monitoring GAN AFRICA (ISRA and ENSAT).

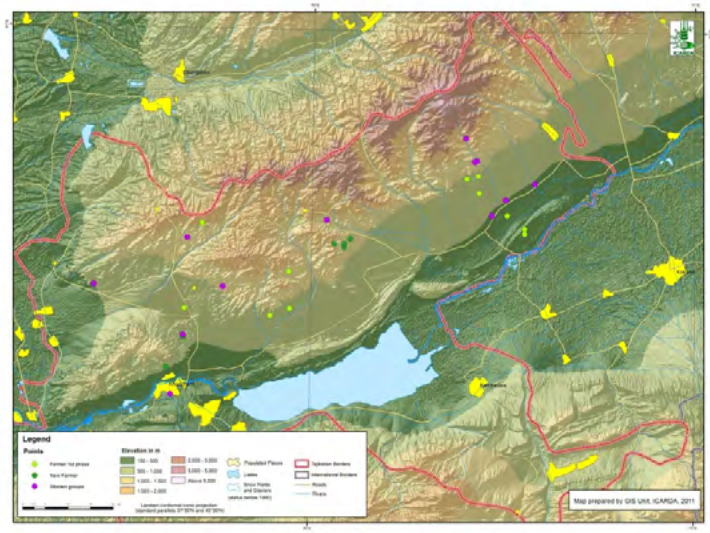

TOTAL

KNOWLEDGE HARVESTING IN TAJIKISTAN:

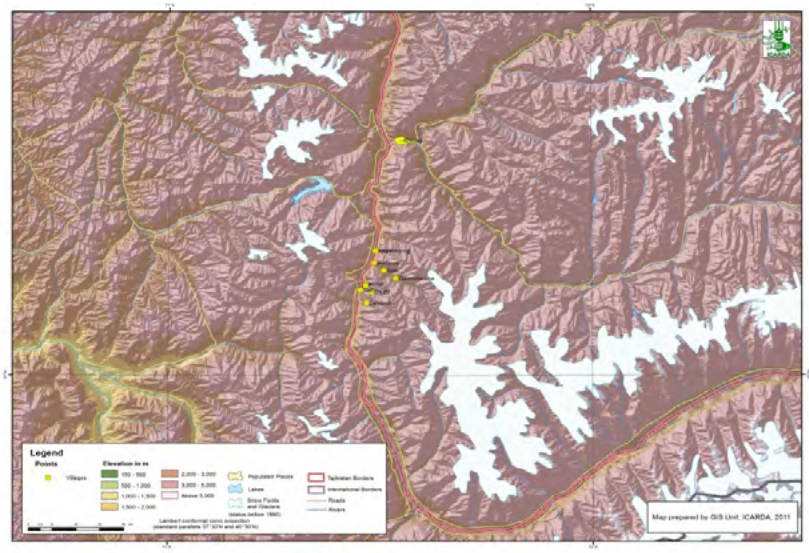
Improving livelihoods of small farmers and rural women through value-added processing and export of cashmere, wool and mohair

Written by Barbara Richkowsky, ICARDA

The IFAD-ICARDA project Improving livelihoods of small farmers and rural women through value-added processing and export of cashmere, wool and mohair operates in two locations in Tajikistan (in Sogd Province in Northern Tajikistan and in Gorno-Badakhshan in South-east Tajikistan, see maps). The project site in Northern Tajikistan had already been included in an earlier IFAD-ICARDA project (ICARDA-816-Community Action in Integrated and Market Oriented Feed-Livestock Production in Central and South Asia) that had been active at the same site from 1 June 2006 to 31 December 2009. In Gorno Badakhshan the IFAD-ICARDA project started its activities in October 2009 until 2012.



Map 1. Project site in Northern Tajikistan (individual goat farmers and women group)



Map 2. Project site in Gorno-Badakhshan, Southeastern Tajikistan (project villages)

1. 1 Political and Social context for Angora goat production in Sogd Province

1.1 Overview of the general local situation (some key data and facts)

Sogd Province is known for Angora goat production and within the province Bobojon Gafurov and Asht are the two districts with the highest number of Tajik Angora goats. In its first phase the project was mainly active in Bobojon Gafurov, in the second phase it focused more on Asht. Detailed socioeconomic surveys and market studies were done in the earlier project so that there is more background information from Bobojon Gafurov district.

1.1.1 Characterization of the area

Within Bobojon Gafurov district, Ismoil Jamoat (third-level administrative divisions, similar to communes or municipalities, in Tajikistan so more or less a community) was selected as target site. Ismoil Jamoat is located on the right shore of the Syrdarya river, at the foothills of Kuramin ridge and in the Syrdarya arid rangelands. It is located 32 km of the city of Khujand, and has a common border with the Tashkent province of Uzbekistan in the north.

The Ismoil Jamoat involves 22 villages (kishlaks) and 4,063 households. The population amounts to 21,535 people including 11,091 women. The total area of irrigated land is 5,979 ha while ranges occupy 33,396 ha. The total area of community is 68.6 thousand ha. The region is poorly developed and displays high poverty. The main activity is agriculture involving the interaction of different types of farms: there are 3 production cooperatives, 27 private farms and the already indicated 4,063 households. Farmers also crop wheat and barley for own consumption and to feed their animals. Fodder crops include sorghum, maize and alfalfa. Some households grow for family consumption horticultural crops and fruit trees such as apricot, almond and walnuts. Angora goat breeding is a main activity in the foothill areas along with the breeding of Jaidara sheep, Jaidara goats and cattle.

Soils are sierozem, heavy clay loam, with organic matter content of 0.92% and bulk density of 1.37 g/cm3. Morphological description of soil structure of the investigated project site is ranged from layer to layer. In the upper layer soil color is gray with a brownish tint, light loamy with stones in the form of boulders with a lots of gravel, unstructured with a large number of plant roots and rootstock of the soil while in the lower layer the soil color is grayish brown is composed of coarse sand with harassing a small amount of soil and stones of medium size in the form of boulders and gravel.

The climate is dry and moderately hot. Winter temperatures in the plains could be as low as -3 to -5°C. Snow cover is usually 3-7 cm. Sharp frosts are observed once in 3-5 years when night temperatures fall down to -25°C. In these occasions the snow cover could be 20-30 cm. The long term average annual precipitation is 152 mm. The frost-free period covers some 185 days. The total annual number of sunny days is about 270 days.

1.1.2 Main statistics on small ruminants and goats in the area

According to the official data, currently there are more than 1.4 million goats in Tajikistan (www.stat.tj ,2012) which include about 500,000 Angora breed goats and their cross-breeds. The Sogd province is

the leader in Tajik Angora breed. The research of the project conducted in 2006-2007 showed that the number of mohair goats in Tajikistan in reality is around 200,000-300,000. Out of that, approximately 90% of the mohair goats are kept in two pilot regions of the Sogd province: in the Bobojon Gafurov region and in the Asht region. A much smaller number is found in the Matchinsk region.

The goats are grazed all year, are sheared once a year and produce around 1.5 kg of mohair on average. Thus, in total the goats produce around 300 tons of mohair worth USD 1,000,000 (assuming a price of USD 5 per kg of mohair) or more, depending on the strength of the fiber market. Mohair production and export is a significant source of livelihood not only for mohair producers but also for spinners and knitters who process part of the clip into yarn and products.

In the Sogd province, there are approximately 500 small, medium and larger producers with 100-500 goats, several cooperatives (former state farms) that raise several thousand goats and hundreds of small scale producers that have small flocks of 10-15 goats. It is estimated that approximately 38% of Angora goats are kept by households, 42% by private farmers and 20% by cooperatives.

Each of the three institutions represents a unique production system. The cooperatives were established on the basis of state farms and are involved in different types of agricultural production including cotton, grains and also livestock. They are operated by local bureaucrats and farm managers many of whom worked for the state farms during Soviet or early post-Soviet period. This group of officials and managers wants to retain control over assets inherited from the state farm system (land, livestock, technology, labor). Managing the so-called cooperatives gives them the opportunity to maintain control, extract rent and continue agricultural production at some level. The cooperatives also offer some employment to the rural population that has no resources to engage in private farming.

Regarding Angora goat production, the cooperatives still own the largest flocks of purebred Angora goats about 2,000-8,000 heads. They continue to follow Soviet-style breeding technology including production of breeding bucks, yearly evaluation of the entire breeding flock, tagging and registration of breeding animals and artificial insemination. They also sort and bail mohair after shearing according to the old Soviet classing system based on cooperatives. By following the Soviet practices, the cooperatives contribute to preserving purebred Angora goat production in Tajikistan. However, they clearly are transitional organizations that suffer from diffuse property rights, poor market incentives, unstable management and frequent predation on their assets. As a result their assets are gradually dwindling – their land is being privatized, their livestock is being sold or bartered, their Soviet technology is not being replaced, and their number of workers is decreasing each year. The majority of cooperatives will eventually be dissolved or privatized which means that the future of Angora goat production depends on private producers.

The gradual dissolution of large Angora goat flocks owned by the cooperatives is paralleled by the emergence of private Angora goat farmers. Most of the private farmers originally worked as shepherds for the state farms and many continue to work for the cooperatives. They own Angora goats and graze them together with the cooperative goats. Although most of them would prefer to work independently, they rely on the cooperatives for access to rangelands, which is a key resource needed for goat production. The largest proportion of rangeland is still owned by the cooperatives and its privatization is an extremely complicated process that requires high bribes or personal ties to the authorities. As a result, most private farmers have only “unofficial” or “informal” access to rangelands and goat pens, which is often tied to their former or current affiliation with the cooperatives. In order to secure their future in goat farming, the farmers will need to formalize their right of access to rangelands and set up a system of range management.

The flocks of private farmers are currently much smaller than those owned by the cooperative farms:

between 100 to 600 animals or even smaller.

The final and most numerous group of Angora goat producers are households that own 5-20 Angora goats each. Households give their animals to farmers to graze and pay them per head or graze their goats around the village in a communal flock. Household producers generally do not follow any breeding strategy and have the fewest resources invested in Angora goat production. Due to an unorganized breeding of different types of goats in village flocks, it is likely that the number of Angora crosses will keep increasing and eventually purebred Angoras will be rare or nonexistent in household flocks.

1.1.3 Local standards of living and main activities

The earlier IFAD-ICARDA project carried out a baseline survey of small ruminant producers in Bobojon Gafurov district, Sogd Province in Tajikistan. Five villages in the district, namely Apon, Karajingil, Takli, Okbulok and Uyas were selected for formal socioeconomic survey. The five villages can be grouped according to the altitude as well as small ruminant production systems. Apon village was in the first group (at the highest altitude, more than 2500 m); goats dominate in these small farms. The second group (at medium altitude, 1500m in the foothill area) consisted of three villages, Karajingil, Takli, and Okbulok. The share of goats and sheep is almost equal in these villages. Uyas village belongs to a third group (at the lowest altitude in the plain area). In this village, there are fewer goats and more sheep. Table 1 summarizes some basic population data of the villages.

Name of the village	No of HHs 2006	Population 2006	:Including Male for 2004 only	Female	Population (under 14 years old)	Note
Apon	121	664	321	341	215	Group 1
Karajingil	163	1,090	571	606	383	Group 2
Takli	9	69	33	35	22	Group 2
Okbulok	5	28	13	14	9	Group 2
Uyas	715	4,220	1,999	2,122	1,339	Group 3
Total	**1,013**	**6,071**	**2,937**	**3,118**	**1,968**	

Table 1. Households and population in the selected villages in Ismoil Jamoat, B. Gafurov district

The total number of households in the survey was 150 including 40 HHs from Group 1, 50 HHs from Group 2, and 60 HHs from Group 3. The analysis of the weighted average household income structure showed that the highest share of income (51%) came from remittances. These were followed by mohair goat production (17%) and income from state jobs (10%). Sheep production provided 7% of the average household income. In general, about 36% of income is obtained from agricultural production. Data on the per capita income distribution showed that people in 75% out of the 150 selected households live below the USD 1,25 a day poverty line, and the daily income of 93% of people in the interviewed households was less than USD 2 (Figure 1).

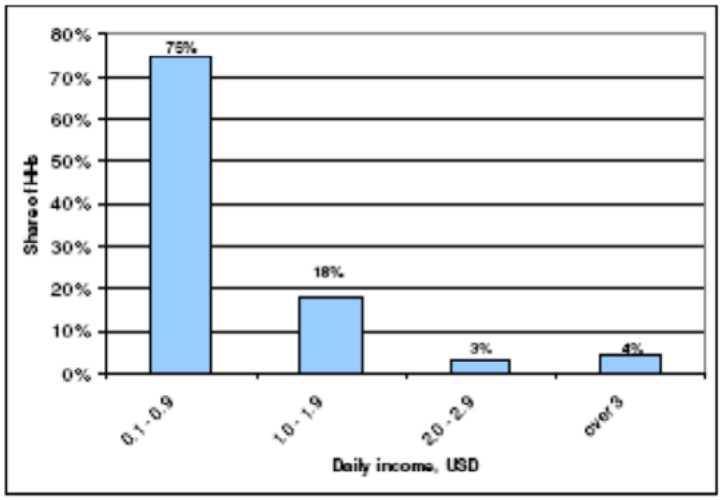


Figure 1. Per Capita Income Distribution

1.1.4 Main tendencies (trends)

- The old farming system collapsed but a new system has not yet fully developed: With the collapse of the Soviet Union the former collective farms (kolkhozes and sovkhozes) were dismantled in Tajikistan. The new private farms are basically household farms.

- Goat owners face difficulties in mohair-oriented Angora goat farming: Tajik mohair goats are traditionally kept basically on marginal pastures with a relatively scarce fodder base. The new producers of mohair goats in the private sector have limited skills in animal husbandry and have little access to technologies to improve the off take from their flocks. Highly productive animals do not get adequate attention. Sometimes livestock farmers continue to maintain low-quality and non-productive females with clear implications on expenses for feeding and over-grazing of pastures.

- Farmers lack access to improved animals: there is a need for creation of breeding flocks so that the farmers can get access to breeding animals through decentralized systems of animal breeding.

- Existing mohair standard does not meet modern technological requirements of world market: it is known that at the international market there is much higher demand for fine fiber than for coarse mohair. And the price for fine fiber is usually 3-5 times higher than for coarser fiber. In the Tajik market, it is the opposite – the price for the coarse Angora mohair is higher than for the fine mohair. Thus, the existing standard of Angora mohair does not match with the requirements of the international market in a number of important criteria.

- Rural women are engaged in adding value to mohair by knitting and marketing: there is a need to include women in the production process and use and further develop their local knowledge in the production and processing of products. Prices at international markets for white and naturally colored mohair are promising, thereby offering an opportunity to increase households income and provide employment opportunities for rural women.

- Access to pastures is complicated and the legal status of ownership of pastures needs to be clarified.

The cooperative farms do not have a long-term future in Angora goat production and village households lack the capacity to produce purebred Angoras in community flocks where breeding happens randomly. Therefore, the future of Angora goat production in Tajikistan depends on effective development of private Angora goat farms also as a source of breeding animals for household farms. Whether private farmers develop competitive Angora goat production depends on their incentives to invest in producing quality Angora goats versus other livestock such as sheep or meat goats. Farmers' capacities and incentives to raise Angoras will be shaped by governmental policies and changes in mohair markets. Governmental policies that affect Angora goat breeders include legislation on rangelands and development of extension services for Angora goat producers, specifically support in breeding and improved access to breeding animals and know-how. Secondly, farmers' decisions will be influenced by changes in mohair prices and markets. Such changes can also be shaped by governmental policies. For example, governmental support of mohair exporters or local processors can influence mohair prices and stimulate farmers' interest in mohair production.

1.2 Characterization of the goat productions systems

1.2.1 Background, feeding resources,

The production systems can be differentiated into six types according to the type and extent of utilization of rangeland resources' for producing small ruminants. The majority of small ruminants is kept in a rangeland –stall-fed system while the largest proportion of food available is in the rangelands.

Short description of the small livestock production systems and proportion of small holders applying the system

Short description of the small livestock production systems and proportion of small holders applying the system.

- Type 1: Joint flock of HHs sent for grazing in the morning and returned to the HHs in the evening, each household herds the flock on a rotational basis (33%).
- Type 2: Same as type 1, the difference is that HHs hires a shepherd for grazing the flock (6%).
- Type 3: Animals are kept on rangelands from spring to autumn and each HH moves their animals to stall-feeding in the winter season (35%).
- Type 4: Animals are kept on remote rangelands with the required infrastructure (sheep-fold, etc.) throughout the year (8%).
- Type 5: Goat producers working in an agricultural cooperative use their position to graze their own flock with the cooperative's flock (5%).
- Type 6: Stall-fed mixed with grazing on nearby pastures around village, each household grazes its flock separately from other households by sending its family member (13%).

The larger herds (private farmers) mainly belong to Type 4 and 5.

1.2.2 Capacity levels

Countries with developed mohair production provide good extension services and mohair marketing support to producers. South African, American or Australian producers are organized into associations and have access to a sector-wide support system that includes extension, breeding and marketing services.

In fact, Angora goat production in Tajikistan was also built on these types of support: during the Soviet period, Tajik Angora producers had access to the Soviet market, received extensive scientific and extension support from the government, and were organized into state farms and cooperatives that collaborated on breeding and other activities. Currently, this support system is broken – Russia's mohair processing sector amounts to a fraction of its former size and its demand for mohair has decreased substantially.

Nowadays, Tajik farmers receive little support. Extension and scientific support for Tajik mohair producers is minimal due the lack of governmental funding and ineffective relationship between the government and private farmers, including Angora goat farmers. Private farms and households are isolated, unorganized and uniformed about global markets and effective production practices. They rely on their individual knowledge and experience but most of them do not receive any assistance from researchers, extension specialists, policy-makers or market experts. Although most farmers do have a good knowledge of basic animal husbandry, they do not have scientific knowledge of breeding principles and often have little experience in selecting breeding animals. This is because Angora goat breeding (just as breeding of all other "Soviet" livestock) was the responsibility of state-funded Livestock Institutes and state breeding farms. Currently the state farms (or their descendants the cooperatives) are in decline and Livestock Institutes continue to operate with very limited funding. The Institute scientists are only learning how to work with private producers and private producers are only beginning to understand that they need professional assistance to improve breeding and livestock productivity. Grassroots-level organizations that serve rural communities and farmers are only just developing.

Given that the Tajik government has little experience in developing institutions and services for private producers, assistance of research for development organizations is essential in building up extension support for the newly emerging private farmers.

1.2.3 Local animal resources (local breeds or populations, performances)

The data from 150 households in Jamoat Ismail showed that on average each small farmer kept 19 mohair goats, 12 sheep, 1 cattle, 1 indigenous goat, and 2 hens (Table 2). The percentage of households in the sample keeping sheep and mohair goats dominated (85% and 81%, respectively) over the other livestock kept. However, nearly half of the households also kept cattle (45%).

Table 2. Livestock flock size

HH characteristics	Sheep	Mohair goats	Dairy goats	Other goats	Cattle	Horses	Donkeys	Poultry	Other
Average flock size									
of150 HHs	12	19	0.2	1	1	0.02	0.5	2	0.05
No. of HH keeping									
certain livestock	127	122	9	12	67	3	53	43	2
Share of HHs for									
certain livestock	85%	81%	6%	8%	45%	2%	35%	29%	1%

1.2.4 Goat products (meat, milk, skin, fiber or mixed orientation)

Based on the research conducted by the project, Tajik farmers who have access to rangelands and experience in producing Angora goats are well positioned to profit from producing quality goats and mohair – they have cheap land to graze their goats all year (albeit their land tenure still need to be formalized), access to cheap family labor and relatively easy access to local mohair markets. The Tajik Angora goats are well adapted to the local conditions and mohair production is profitable. If the local mohair market is vibrant, farmers can earn US $10 per goat just in mohair sales. For example, in the fall of 2010 a farmer who had 100 quality goats could earn US $6.7 per 1 kg of mohair. Given that each goat produces about 1.5 kg of mohair, 100 goats yielded around US $1,000 in revenue, which is a substantial income for a Tajik rural family. Even during a stagnant mohair market, 100 goats can bring about US $500 from mohair.

At the same time the production cost of Angora goats is minimal. The project calculated that one goat costs about US $18.50 to produce. The goat gives not only US $10 in mohair, but also a kid that is worth at the minimum US $15 in the fall, and milk (for 3 months) that is worth US $4 = US $29 total. Based on estimates by some producers, the profit from one Angora goat from mohair sales only is about US $10, which confirms the project calculations.

However, some farmers prefer to produce local crossbred goats for meat production as opposed to Angora goats that are bred primarily for fiber. Although “meat goats” or “Jaidaras” bring much less or no income from fiber and only about 20% higher income from meat, Jaidara goats do not require careful breeding and selection for fiber production. Every crossbred goat regardless of its productivity is considered a “local meat goat” and the production of such goats is easier and cheaper especially in terms of time invested in breeding and fiber harvesting. A producer of “Jaidara” goats can essentially produce crossbred goats without selection. Production of Angora goats requires selection and preparation of breeding bucks and careful management of the entire flock based on multiple criteria. This is more demanding in terms of time and efforts and requires care and dedication on the part of the farmer.

1.3 Environmental issues

Fire, Soil degradation, overgrazing

The project is not working on environmental issues. However, a major problem is rangeland degradation. In the lower parts of the rangeland areas that are more easily accessible there is very little vegetation cover. This is related to the legal status of rangeland ownership. Access to rangelands is available only to some farmers and even in those cases their legal right to rangelands is uncertain. Government assistance is necessary to secure farmers' rights to rangelands. Secondly, the government needs to develop a reasonable framework regarding range management and taxation of land and livestock. This is challenging given the interest in collecting rents and lack of accountability of governmental officials.

1.4 Stakes, constraints and conflicts (anticipation of future critical points to be solved at the beginning of a project)

Currently, farmers have a limited access to mohair markets as Tajikistan is poorly linked to global fiber trade. It mostly relies on regional markets (Russia) and on linkages with Turkey and China. The goat producers supply low quality mohair to local traders who resell it for low prices to China, Turkey and Russia.

The present attractiveness of Tajik mohair is primarily its low price and relatively high yield as opposed to high quality. Most Tajik mohair sold to Russia and more recently to Turkey, is either processed into low price, utility knitwear or used to blend with other fibers. There is no supply and no market for fine, kemp-free, mohair which is highly valued on the global market.

The Tajik Angora goat selection of Tajik Angora goats was driven by the requirements of Soviet textile industries that demanded strong mohair and did not consider the problem of kemp. As a result Tajik mohair is less competitive on global markets. Tajik producers have limited means to eliminate the deficiencies (kemp, high fiber diameter and medullation) without external assistance. While mohair producers in other countries focus on eliminating kemp and increasing fiber fineness, and are supported by sophisticated extension systems in their efforts to improve fiber quality, Tajik mohair producers are largely unaware of quality demands on global mohair markets and continue to operate in a limbo between the Soviet past and the market-driven presence.

The local mohair markets are lacking an established standardization system. Mohair quality is determined by buyers based on the visual assessment. Immediate supply and on the spot settlement are mainly practiced at these markets. Market relations are underdeveloped as there are no certain firms or entrepreneurs involved in regular mohair trading and exporting it abroad, although most of the produced fiber is sent through different channels (mainly smuggling) to Russia in a spontaneous way.

The volume of sold mohair varies by seasons. To resell, middlemen (exporters) procure and store nearly 30% of the total volume of produced mohair during the goat shearing period on farms. Active mohair sales are observed during departure of labor migrants to Russia (March, April, and May). To cover travel costs these workers procure small portions of raw mohair and mohair products for further reselling in Russia.

Poor breeding and fiber quality is costly to Tajik farmers and women who process mohair – it prevents producers from selling mohair for world-market prices which are much higher especially for fine, kemp-free kid mohair. For example, while Tajik farmers earned on average $7-8 for 1kg of mohair in 2011, American farmers earned $15/kg. Poor breeding also lowers fiber productivity and American goats produce

more than twice more mohair per year compared to Tajik Angora goats . In terms of processing, poor fiber quality prevents Tajik spinners from producing high value-added mohair yarn and products without costly and laborious de-hairing. The production cost of 1kg of luxury mohair yarn would decrease considerably provided that the fiber was fine, uniform and kemp-free and did not require de-hairing. This means that both farmers and women who process mohair could earn considerably higher incomes if breeding and fiber quality was improved.

Traditionally, fiber processors refrain from procurement of electric equipment for yarn production due to unstable electricity supply, while half of the smallholders think that it is difficult to find such equipment on local markets.

The occurrence of Contagious Caprine Pleuropneumonia (CCPP) in Tajikistan poses a serious threat for the health of goats in the country reinforced by the inefficient measures undertaken on prevention of its consequences. According to the data of the Veterinary Institute CCPP has spread in North Tajikistan through imports of goats from South Tajikistan to the Asht district and has probably originated from Afghanistan.

A serious problem is that the two responsible parties, the Veterinary Authority and the Research Institute of Veterinary, do not harmonize their activities for disease prevention and control. So far there is no access to an effective vaccine. Most farmers when they observe a sick goat use antibiotics of the tetracycline group, which has been the most efficient measure in preventing the death of goats. Our project team has conducted trainings for farmers and informed them about the disease, its prevention and treatment. It is necessary to mobilize farmers, households, local veterinarians and middlemen trading goats (shuttle traders) for prevention of CCPP and other contagious diseases outbreaks. They should know and timely inform the relevant institutions when they observe goats with CCPP symptoms in order to isolate the goats or location and stop migration (or trade) of goats.

1 Political and Social context of goat production in Gorno-Badakhshan Province

1.1 Small presentation of the general local situation (some key data and facts)

1.1.1 Characterization of the area

The Ishkashim district of Gorno-Badakhshan was selected as project site. The district belongs to the Pamir mountains – the highest mountain area and a unique zone within Tajikistan. The altitude above sea level is 2,500-3,500 m. The climate is distinctly continental and harsh in some areas. Winter temperatures go down to -10 to -30°C, sometimes to -35 and -40°*C*. The annual precipitation is 150-200 mm. The annual precipitation in the area is only about 100 mm, primarily in the form of snow in winter.

Initially eight project villages in the Askar Zamirov Jamoat with a total of 2,572 people and 334 households were selected. The population of the project villages include 261 people (32 households) in Khaskhorog, 437 (56) in Andarob, 296 (37) in Dasht, 265 (37) in Snib, 155 (19) in Dekhlokh, 620 (86) in Garmchashma, 289 (37) in Syst, and 245 (30) in Kukhilal. Later the village Vogz was added. The villages are located around 40-65 km from Khorog in the mountains, along the road to Ishkashim. The village households practice subsistence livestock and crop production. They produce grains (wheat and barley), potatoes, beans, fruits (apples, pears, apricots) and vegetables (tomatoes, cucumbers, carrots, cabbage, onions, and peppers) primarily for family consumption. The amount of arable land in the Askar Zamirov Jamoat is 133 hectares, thus only 0.05 hectares per person or 0.4 per household.

Each family raises several goats and sheep (10-12 on average), 1-3 cows and poultry (primarily chicken). The maximum number of sheep and goats raised by a single household is 30, the smallest number is 5. The Jamoat has 722 ha rangelands that are commonly owned.

Agricultural and livestock production in the area is constrained by the small amount of arable land and pastureland and by the relatively short growing season. Some villages located on the higher mountain plateaus have poor access to water sources. The pressure on the scarce land resources suitable for livestock and crop production is very high and most families cannot produce enough food to ensure balanced nutrition. Only a small share of agricultural production is sold on local markets; most products are produced only for family consumption.

The economic challenges faced by the residents of the Jamoat (and of Gorno-Badakhshan in general) are exacerbated by the geographical isolation of the region and the lack of roads suitable for civil and commercial transport. The region is linked with Dushanbe by two mostly unpaved roads that are passable only by terrain vehicles. Only one road is usable in the winter period.

Main statistics on small ruminants in the area

According to governmental statistics, there are 3,786 goats and 2,524 sheep in the Jamoat. Based on this data, the 334 households have on average 11 goats and 7 sheep each.

The goat genotypes are quite diverse and not pure breeds. Major goat groups include:

- Crosses of indigenous goats with angora type of goats
- Crosses with mohair breed
- Indigenous goats with and without cashmere fiber.

The approximate total number of goats and crossbreds is presented in Table 3.

#	Village name	Total number of cross bred goats	does	kids
1	Khaskhorog	257	118	69
2	Andarob	366	195	140
3	Snib	243	125	68
4	Garmchashma	228	93	58
5	Dekhlokh	198	111	60
6	Dasht	310	151	88
7	Kukhilaal	464	176	109
8	Syst	210	43	23
9	Vogz	193	110	64
	Total	**2,469**	**1,122**	**679**

Table 3. Total number and genotypes of goat flocks kept in the project villages

1.1.2 Local standards of living and main activities

The key source of income for the village households are remittances. Just about every household has one or two members who work in Russia for extended periods or several years and send money home. They send approximately USD 100-150 per month especially during the spring, summer and fall season. In winter there is less work in construction and agriculture and less or no money to send. The USD 100-150 in remittances has to support

a family of 7 or more persons and is often the only source of family income. The migrant workers are primarily men of working age (only about 1/6 are women). Younger men also leave their villages for the army and to study or work in Dushanbe or abroad. This means that the permanent village occupants who do the majority of work in agriculture and livestock production are primarily women, older men and children and thus, most village households are led by women

Women are responsible for taking care of the family livestock. Livestock production is a major source of income (mainly sheep and goats, a few cattle) for rural households in Badakhshan. Goats are more numerous as they can survive in this region better than any other livestock and their meat and milk provides a key source of protein for rural families. Some goats also produce fiber that can be sold to traders in the spring when there are no other agricultural products ready for sale. However, the productivity of goats and other livestock in the pilot villages is low due to problems in breeding, feeding and veterinary care.

1.1.3 Training and Structural conditions

In spite of the suboptimal conditions in livestock production, the social conditions for improving the system by setting up a community-level breeding and extension seem more favorable than in many other regions in Tajikistan and Central Asia. The Pamiri communities have strong bonds and are relatively well organized, the villagers are generally well educated and understand the importance of improving breeding and husbandry, the local authorities seem eager to work on these issues and there are multiple development agencies present that can also support such improvements technically, organizationally and financially. A focused collaboration among governmental officials, development agencies, village leaders, local and international livestock scientists and, most importantly, village households, can lead to considerable improvements in breeding, animal husbandry and livestock productivity. Establishing such collaboration is a key agenda of the IFAD/ICARDA project.

2.2 Characterization of the goat productions systems

2.2.1 Background

During the Soviet period, the 9 pilot villages were part of the “Badakhshan” kolkhoz (agricultural Cooperative during the Soviet period) which was formed in the 1930s. The kolkhoz was focused on livestock and crop production and started working on the development of cashmere goats in 1985. The objective was to develop a white Pamir cashmere goat by using Angora goats imported from northern Tajikistan, and the Gorno Altai cashmere goats imported from the Altai region of Russia. The Angora goats were used primarily to get the white color as the Altai cashmere goats are colored. The scientists who worked on this project brought over several hundred heads of each breed. All the animals had breeding certificates. (Unfortunately the certificates are no longer available – they were used up when there was no writing paper available in the governmental offices after the war.)

The goats were distributed to the state farms in each of the villages. The state farms produced different types of goats in different villages. Some villages focused on producing Angora goats while others had Altai goats. The cashmere the goats produced was combed by women and sold to Orenburg (in Russia) where it was used to make the world-famous “Orenburg shawls” that sell for USD200 and more. By 1991-1992 there were 4,500 of the new cashmere goats in the kolkhoz. Women who participated in combing the goats consider that the goats produced on average 500 grams of cashmere and some of the males produced as much as 1kg. Based on our discussions with shepherds who worked with these

goats, the Altai goats adapted very well to the local conditions but the Angoras did not – they required additional feeding to do well. The Altai goats were large and good meat as well as cashmere producers – this corresponds to the descriptions of the Gorno Altai Cashmere goat published by other sources. The shepherds claimed that the imported goats were even better "mountain climbers" than their local goats. Overall, the shepherds gave the Altai breed very high marks. They claimed that the kolkhoz became profitable mainly due to the cashmere production.
After the breakdown of the Soviet Union and the start of the civil war in Tajikistan the market linkages with Russia were broken and the kolkhoz lost its market for cashmere. In 1997 the kolkhoz was dissolved (to the disappointment of most of the shepherds) and the goats were divided between households. The households sold some of the cashmere goats to Afghanistan and from there the goats were supposedly sold to Pakistan. The remaining goats were bred to local meat goats.
In addition to the Askar Zamirov Jamoat, the cashmere goats were also produced in the Kozede Jamoat (on the road to Iskhasim) – the kolkhoz "Badakhshan" had farms in both Jamoats. There are also 8 villages in the Kozede Jamoat that have flocks with a large percentage of cashmere crosses (30% or more). We collected samples from one of the flocks in this area. Provided that the distribution of cashmere goats is similar to the Askar Zamirov Jamoat, additional 640 kg of cashmere could be collected in this region.

2.2.2 Feeding resources

The households graze their goats and sheep together on common pastures. These observations correspond with official statistics: the households in the nine pilot villages keep about 10-15 sheep and goats and 1-3 cows.

The number is limited by available pastureland, housing and winter feed. These constraints are related to the severe shortage of agricultural land in the research area. Given that the numbers of animals produced in this area cannot be easily increased, the productivity of each animal is very important

The households graze the animals around the villages from March to May and from October to December. All families take turns grazing the village flocks. From May until the end of September the livestock goes with a shepherd to summer mountain rangelands and the families pay the shepherd 2-3 somoni (around USD 0,50) per head per month. From December to March the livestock is stalled in a small pen next to the family home and fed hay and in some cases low quality concentrated feed. Only some families can afford to buy concentrate feed for their livestock. Each family prepares hay in the summer to feed its livestock during winter months. The condition of the village flock is excellent after the animals return from the summer rangelands at the end of September. The condition of the livestock suggests that the rangelands are very good.

The villagers do not collaborate on winter feed production or jointly vaccinate their animals. The absence of selective breeding and insufficient winter feed limits goat productivity and the absence of vaccination can lead to losses of livestock.

2.2.3 Capacity levels

The productivity of village livestock is low partially due to the lack of governmental support and extension services. It is the government's role to address collective action problems and design institutions and services that would serve all community members. Although government officials come to the villages to record the number of livestock and are concerned to show increases in livestock numbers, which is considered a sign of improved economic welfare, they do not provide any practical support to

the villagers in terms of increasing livestock productivity and survival rate. Without extension services that would help create a community breeding system, improve range management and winter feed production, and organize vaccination for village livestock, the productivity of goats, sheep and other livestock is likely to decline further, costing the households more than the animal products are worth.

2.2.4 Local animal resources (local breeds or populations, performances)

Informal interviews were carried out with goat producers in the eight pilot villages. Cashmere goat breeding and husbandry was discussed with the farmers and goat flocks in each village visually assessed. 10-20 fiber samples were collected from each flock.

The visual assessment of the village flocks and sample collection show that the goat population in the villages is very diverse – there are various crosses of the cashmere and Angora goats as well as different types of native meat goats. Clearly, the crosses of the Altai goats produce the largest volume of cashmere – 300 – 500 grams. Their cashmere is thick, long but not exceptionally fine (about 16-17 micron). Some villages still have as many as 30% of the Altai crosses (these villages originally had a greater number of the Altai goats) but other villages have only 20% or less. Based on producers' testimonies, many of the Altai goats were sold to Afghanistan and Pakistan in 1997 after privatization of the state goat breeding farm.

Villages that produced the Angora goats such as the Kuilal village still have around 30% of Angora crosses. The Angora crosses produce fiber that is coarser and in most cases not suitable for processing into luxury yarns. The Kyrgyz traders who purchase sheared goat fleeces for cashmere do not buy fleeces of Angora crosses but purchase fiber of Altai crosses.

The volume and style of cashmere among the native goats seems highly variable. The local meat goats represent about 60-70% of the flock and produce about 50-150 g of fine, short cashmere. Because of the short staple length, the short cashmere is not suitable for hand spinning. It can be sold to industrial processors or blended with longer cashmere.

In addition there are about 10-20% of Angora/Cashmere crosses (again, some villages have more of those than others). The "Cashgoras" produce a blend of guard hair, kemp, mohair and cashmere fibers. Some Cashgoras might be fine enough for spinning purposes if combed and cleaned. Given the distribution of these different types of animals, we can make a rough estimate that the households could comb on average 170-200 grams of cashmere per goat. Women experienced in combing goats confirmed this estimate. If we use the lower estimate of 170g of cashmere per goat, theoretically the 3,786 goats could produce about 640kg of raw cashmere. Even if the women collect only 100-50 kg of cashmere in the spring, it will be enough to start our spinning activity.

The interviews during the mission to monitor the project also showed that none of the households interviewed practice selection of breeding animals; producers select bucks for breeding mostly randomly. They do not trade or purchase bucks from other villages and do not have a community breeding system in place. Goats that belong to individual households graze in village flocks together and the households take turns in taking the goats to pasture each day. From May to September the village flocks migrate to summer pastures. Most males are castrated before they go to the mountain pastures, primarily because many shepherds refuse to take the non-castrated animals and because meat from non-castrated sheep and goats is not used. Some of the households keep one or two bucks that mate with all goats in the communal flock.

However, males left for breeding (often young males) are not selected based on any performance criteria – when asked why her unimpressive male kid was not castrated, the owner told us that the goat managed to escape the veterinarian.

The reason for not producing good breeding males has to do with a collective action problem – i.e. what is optimal for each household is suboptimal for the community. From the perspective of any individual household, it does not make sense to invest in producing quality breeding males because 1) each household has only a few females and keeping breeding males is costly (they require feeding and cannot be slaughtered for meat); 2) all animals graze together in a communal flock during the breeding season and there is no control over the breeding. In other words, there is no guarantee that if a household invested in keeping a good breeding male their females would not be mated by an inferior male kept by another community member. This dilemma can be resolved only by a communal decision to invest into a community-level breeding.

This means that the households do not have much control over the mating process. The bucks left to breed examined by the project team did not exhibit any exceptional characteristics in terms of live weight or fiber quality and some were clearly inferior, immature animals – smaller than average in size and with low yield of cashmere fiber. In many cases the non-castrated males were only 8 months old when breeding.

Regarding other aspects of animal husbandry, most households hesitate to spend USD1 per animal on vaccination for their sheep and goats. As a result, the spread of epidemic diseases can be fast and devastating. The lack of a breeding system and poor animal husbandry practices clearly affect the productivity of the village flocks – based on visual assessment, most animals are not good meat or fiber producers and some show clear signs of inbreeding. In spite of the minimal care, the condition of the livestock is excellent after it returns from the summer rangelands, as noted earlier. This suggests that the availability and condition of summer rangelands is a key to livestock production in the pilot area.

2.2.5 Meat, milk, skin, fiber or mixed orientation

Goats and sheep are used primarily for meat production and also as a quick source of cash income. For the majority of households, meat is too expensive to be part of the daily diet. It is consumed mostly on special occasions (weddings, funerals and holidays). During these events, the household slaughters one or two goats or sheep. In most cases these are 4-6 year old castrates. The project calculations suggest that it costs more (especially with regard to winter feed) to raise a 4-6 year old castrate than to buy an equal amount of meat at the market. Nevertheless, households prefer raising and slaughtering their own animals, specifically old castrates that are considered quality meat. No one calculates how much it costs to raise them and whether it is economical or not. Given that households have a very low income, livestock represents a source of savings and an emergency financial buffer. If a family needs money, for example for medical expenses, they often sell a sheep, a goat or a cow, or slaughter it and sell the meat. There is no market for sheep wool, only some spinners use the higher quality, white wool to make yarn for socks. Goat fiber (from certain types of goats whose fleeces include cashmere) can be sold for about USD 1.5-2/kg to Kyrgyz traders in the spring who come to Tajikistan to buy cashmere-type fleeces which are shorn in April. Selling fiber from 10 goats for USD 2/kg provides a small source of cash for the family during the spring months when there are few other products to sell. The traders collect fiber in the villages over the course of two or three months (from March to May), take it to Osh, Kyrgyzstan and there they resell it to Chinese traders who take the fiber to China and dehair it to obtain cashmere.

None of the goats are currently combed as there is no market for combed cashmere. Some families still have cashmere combs that were used during the area of the kolkhoz. Being resourceful, the women have been using the combs to dig up potatoes and the combs are no longer suitable for cashmere harvesting. Most importantly, however, the skills in cashmere harvesting have not been lost – especially the older women have a long practice in combing goats and can train other.

2.3 Stakes, constraints and conflicts (anticipation of future critical points to be solved at the beginning of a project)

The productivity of village livestock is low partially due to the lack of governmental support and extension services. It is the government's role to address collective action problems and design institutions and services that would serve all community members. Although government officials come to the villages to record the number of livestock and are concerned to show increases in livestock numbers, which is considered a sign of improved economic welfare, they do not provide any practical support to the villagers in terms of increasing livestock productivity and survival rate. Without extension services that would help create a community breeding system, improve range management and winter feed production, and organize vaccination for village livestock, the productivity of goats, sheep and other livestock is likely to decline further, costing the households more than the animal products are worth.

3 Projects engineering

3.1 Precursors of projects (they have to be identified and described before any project)

The current IFAD-ICARDA project was designed on the basis of the ICARDA Grant Programme "Community Action in Integrated and Market Oriented Feed-Livestock Production in Central and South Asia" (ICARDA 816) in Northern Tajikistan which completed its activities in December 2009. It expands approaches and methodologies from ICARDA 816 in similar environments in Southern Tajikistan, Kyrgyzstan, and Iran – depending on the security situation. The ICARDA 816 program collaborates with small producers on improving the production of Angora goats and developing new mohair markets. Many of the project activities targeting production and market constraints of the mohair sector in Northern Tajikistan have been replicated in the new program:

Analysis of markets and farmers' access to market in Tajikistan (Mohair goat fiber).

Improvement in goat management within households (flock structure, feeding, selection/culling and animal health).

Improvement in shearing and classification of fiber, standardization based on international quality standards.

Setting the basis for a decentralized and participatory breeding plan for farmers to access improved animals.

Value-added local women processing of goat fibers and assessment of naturally colored mohair characteristics and potentials for its marketing.

During the first two years, the former project worked with small Angora goat producers on breeding to improve fiber quality and with rural women on the production of luxury mohair yarns for export. The yarn activity focused on the production of yarn samples and their testing

by knitters and buyers in the United States. This has proven to be an effective way to gather market information and apply it at the production level to achieve the desired product quality. After two years of sample production and testing the project established clear indicators regarding the types of yarns that have the highest marketing potential and value. It also identified women's groups that produced the best yarns and the processing techniques they use. The next step was to test-market the selected yarns in stores in the United States in December 2008 to clarify market prices and test the competitiveness of the new yarns. The positive reviews of American knitters showed that the yarns would be popular with consumers.

The new project followed a similar approach at the new project sites

3.2 Description of the project

3.2.1 Objectives

The overall goal of the project is to improve the livelihoods and income of small livestock producers and rural women through improved production, processing and export of value-added fiber in producing areas of Tajikistan, Kyrgyzstan and Iran.

Hence, the project aims at setting up value chains focused on fiber production, processing and marketing at the project sites.

The project objectives are to:

Enhance knowledge and information of women's groups to enable them to make informed decisions.

Improve fiber quality through the introduction of breeding programs, genetics and collaborative breeding strategies;

Improve fiber quality and market value through sorting, grading and pricing fiber according to international standards;

Increase local, value-added processing through new technologies, design and product development to benefit rural women;

Open new markets for value-added fiber and fiber products by linking producers and processors to export markets and facilitating access of foreign buyers to regional markets;

Increase stakeholders' income through the establishment of sustainable market chains at pilot sites.

The target groups are small producers of cashmere and mohair and women processor groups. The pilot sites in Tajikistan were selected to represent typical fiber producing and processing areas.

At each site, the project collaborates with producers on improving breeding, animal husbandry and fiber quality of goats, and works with women's groups on processing the fibers into luxury yarns and products for export. The objective of these activities is to improve the income of the target groups: small Angora and cashmere goat producers, and rural women who add value to cashmere and mohair through local processing. Improvements in goat production help farmers earn more income from selling mohair and

cashmere. Fiber processing and sales of yarns, and other products help poor women in remote, rural areas to earn income and improve livelihoods. The number of direct beneficiaries varies with the nature of the activity. In the case of establishing breeding programs only a small number of farmers have been included as it demands very intensive work and data collection on the farms. The fiber processing activities are targeted at women groups that vary related to the initial experience of the women and conditions at the sites.

3.2.2 Expected qualitative and quantitative benefits

The following qualitative and quantitative benefits are expected from the project activities in Tajikistan:

- Improved fiber production from goats in Tajikistan (before and after assessment of goat productivity and incomes of pilot farms)
- Established Women's groups or women-led small businesses with fully developed capacity for fiber processing and export of value-added fiber and products
- Measurable changes in incomes of fiber producers and women processors and their effects on livelihoods and gender roles (Women's incomes from sales of processed fiber before and after training; changes in the volume, quality, diversity and price of local products)
- Sustainable market chains through strong linkages between producers, processors, buyers and consumers that will benefit all stakeholders and ensure the sustainability of program outcomes.
- Linkages (business, scientific and cultural) between the pilot communities and the global communities of producers, processors and consumers of fiber and fiber products

It is expected that the market-driven dynamics facilitated by the project such as higher demand and prices for quality fiber will stimulate farmers to continue the work on improving breeding, animal maintenance and fiber quality. This will promote long-term development of the sheep and goat sector in each country. The access to export markets and high prices for quality products will stimulate women processors to continue to add value to fiber and demand quality raw fiber from farmers. This will stimulate long-term development and expansion of the local cottage industries. The markets for Tajik fiber and fiber products are expected to expand as consumers become familiar with the quality products and the distribution system develops.

Specifics for Angora production in Northern Tajikistan

The project seeks to build a complete value chain around mohair production and its work with producers is paralleled by collaboration with local processors. Processing mohair by hand-spinning and knitting is highly developed in the pilot region, but focused on low quality yarn and products for the Russian market. Women produce coarse yarn that sells for about US$8-10 per kg and simple mittens and socks that sell for US$ 2 per pair. The production of these cheap items is one of the only earning opportunities available to rural women in the region. Just as the Angora goat producers could not develop quality mohair production without extension support from local and international scientists, Tajik spinners and knitters could not improve product quality, prices and market access without external assistance from develop-

ment specialists who can link them to western consumers.

ICARDA collaborates with Angora goat breeding scientists and private Angora goat producers to develop a breeding program that can preserve and improve Angora goat production in Tajikistan. The breeding program aims at improving fiber quality and flock productivity in general. Improvements in fiber quality should also help to expand the market for Tajik mohair and achieve better prices and higher revenues. The improved fiber quality is a also a prerequisite for the processing by rural women who used to pros duce cheap mohair yarn for the Russian market and are now starting to produce fair trade, luxury yarn and knitwear for export to the United States and Europe.

Specifics for goat production in Badakhshan

The project team is working with Cashmere goat producers in nine pilot villages to improve goat genetics and the condition of local flocks. The project team developed together with the village households a community breeding system that would produce quality breeding bucks for all households while all other males would be castrated. Such breeding system could substantially increase the productivity of local goats in terms of meat and fiber. The villagers and community leaders interviewed by the research team showed a great interest in collaborating on developing a community breeding system and proposed methods of organizing community breeding in the villages. All producers understood the importance of community breeding for selecting breeding males that would be better meat and fiber producers.

This will increase the household income from goat production and create a source of cashgora fiber that can be locally processed into yarn and knitwear for export. For this reason, the project imported eight Altai cashgora bucks from Russia to Badakhshan in the fall 2010 and distributed them in the pilot villages. As explained above Altai goats were previously bred in Badakhshan, with very good results and their crosses are still relatively common in some local flocks. The imported bucks are very good meat producers and give around 600 grams of cashgora fiber (coarse and long cashmere fiber with fiber diameter around 18 micron and 3-4 cm length). In comparison the local goats (which include a variety of different crosses, often inbred and generally not highly productive) give only around 150 grams of fiber and produce less meat than Altai goats and their crosses.

3.3 Economic and social issues

Main issues (farmers income, social conditions, expected outputs, innovations issues)

3.3.1 Expected economic outcome through Mohair sales and processing in Northern Tajikistan (Business plan)

In November 2011 the team organized training for the women's groups focused on producing an estimated budget for processing 500 kg of quality kid mohair into yarn based on the project's and the women's experience with the processing in the last two years. The budget calculation has proven to be a valuable exercise that helped the spinners to estimate the expenditures and proceeds from producing yarn for the American and Russian markets.

The team produced separate budgets for the two different yarns that will be produced from 500 kg Mohair. The budgeting exercise produced the following estimates:

The cost for the 160kg of American yarn will be the following:

Fiber purchase: USD 5,000, dehairing: USD 2,100, scouring: USD 150, carding: USD 160, Spinning: USD4,000

Total processing cost: USD 6,410

Explanations: Dehairing 500kg of mohair will yield approx. 200kg of clean fiber and 300kg of "waste" fiber. Waste fiber will consist of 150kg of dehairing waste, and 150kg of fiber that cannot be dehaired. All "waste" fiber will be processed into yarn for the Russian market.
160kg of dehaired, soured and carded fiber can be spun into yarn for export to the United States or Europe. 210 kg of scoured, carded "waste" fiber can be spun into yarn for the Russian market. Spinning will cost 120 somoni (USD 25) for 1kg of the American yarn, which is much finer that the Russian yarn (i.e. the yardage per 1kg is much greater for the American yarn). The total cost of spinning 160 kg of dehaired fiber into fine, luxury yarn will be approximately USD 4000. Spinning 210kg of yarn for the Russian market will cost 30 somoni/kg (USD 6.25), and the cost of spinning 210kg of fiber will be about USD 1320. Total cost of spinning both yarns will be USD 5320.

Transport: USD 1,600, tariffs: USD 1,600, customs: USD 500

Total cost: USD 15,110 or USD 95/kg

1 kg of yarn for the American market will be sold for USD 140, and 160kg will be sold for USD 22400. Profit per 1kg of yarn will be USD 140-95 = USD 45. Total profits will be USD 7200. Earnings for women processors will be USD 2,100 (dehairing) + USD 150 (scouring) + USD 160 (carding) + USD 4000 (spinning) = USD 6,410. Earnings for Angora goat farmers will be USD 4,500 (USD 5,000 - USD 500 in transport expenses). Total profits and earnings for women's groups from making American yarn will be USD 7,200 + USD 6,410= USD 13,610. Total earnings for farmers and women will be USD 18,110.

The cost of Russian yarn will include:

Scouring: USD 225, carding: USD 210, spinning: USD 1,320

Total cost: USD 1,755 or USD 8.40/kg

1kg of yarn for the Russian market will be sold for 65 Somoni or USD 13.60/kg, and 210kg will be sold for USD 2,856. Profit per 1kg of yarn will be USD 5.20. Total profits will be USD 1,092. The total earnings for women processors will be USD 1,755. Total profits and earnings from making Russian yarn will be USD 2,847. It is important to note that in the above calculations we do not account for raw material costs for the Russian yarn, given that it is made from fiber left over from producing American yarn. This makes the profit from producing Russian yarn seem larger than it actually is. If the spinners had to purchase 300kg of raw fiber to make Russian yarn, they would have to pay at least USD 1,200. This would increase the total processing expenses to USD 2,955 (USD 1,755 processing + USD 1,200 raw material). In this case, the processing costs would be larger than the revenues from yarn sale by approx. USD 100 (USD 2,955 - USD 2,856), meaning that the women would not make any profit from producing this kind of yarn. These calculations imply that the actual profits from making yarn for the Russian market are negligible, and that women make the yarn to earn a small wage from processing.

Finally, if we combine the total expenses, profits and earnings from making and selling both types of yarn, the figures are the following: total production cost of both yarns will be USD 16,865. Total sales of both yarns will be USD 25,256. Total profits will be USD 25,256 - USD

16,856 = USD 8,391. Payments to producers for raw material and to women for making Russian and American yarn will be USD 4,500 + USD 1,755 (Russian yarn) + USD 6,410 (American yarn) = USD 12,665. Local transport expenses will be $500. This means that an investment of USD 16,865 will bring approximately USD 21,556 in profits and earnings to Tajik farmers and women's groups. The project will update these figures at the end of the processing cycle currently underway. Figures obtained at the end of the cycle can be used to prepare a business plan for the groups

3.3.2 *Expected economic outcome (farmers' and processors' income) in Badakhshan*

Unlike other projects that focus primarily on improving cashmere for commercial processing, our project seeks to improve local cashmere specifically for small-scale, manual processing into handspun yarn and knitwear. This will allow the producers - poor rural women who lack other sources of income – to obtain much higher earnings than by selling the finest raw cashmere available. Handspun cashmere yarn sells for USD 40/per 200yards (about 75 grams) in yarn stores in the US and is coveted by knitters who use it to make luxury shawls, sweaters and other clothing. These types of products can be made and sold by the Pamiri women who are excellent spinners and knitters.

The clean yield of 1kg of combed Kyrgyz cashmere was 66%. Assuming that the Tajik cashmere would have a similar yield, we expect that 1 kg of combed cashmere could be processed into 660 grams of clean cashmere and into 600 grams of yarn. The yarn could be used to make (at the minimum) 4 scarves, 150 grams each, that could sell for USD 120 - USD 300 in the US or Europe, depending on the product quality and the market. If the scarves sold for the lowest estimated retail price of USD 120, the wholesale price would be USD 60. Depending on the cost of shipping, taxes, tariffs and other marketing expenses, the women could earn at least USD 30-40 per scarf - the project will guarantee fair trade wages for the women and will assist them to obtain a Fair Trade certificate for their products.

Based on our experiences with mohair processing in northern Tajikistan, an experienced knitter can make a 2 meters long scarf in 4-5 days while performing her regular housework. It takes about 7 days to make 1 kg (or 3,750 meters) of yarn under the same conditions, using a wooden spinning wheel. Based on these estimates, a woman could earn at the very minimum USD 120 by processing 1kg of combed cashmere into 600 grams of yarn and 4 shawls in one month. Such earnings would nearly equal to the amount of monthly remittances the families receives from Russia. Based on the quality of the products and access to luxury markets, the earnings could be much higher. For example, if the scarves sold for USD 200, the wholesale price would be USD 100 and the woman could earn at least USD 60 - 70 per scarf – doubling her monthly income to USD 240 or 280.

Based on our estimates of cashmere production in the pilot area (i.e. 170g of cashmere x 3,786 goats) about 640kg of combed cashmere could be produced in the pilot region. At 66% yield, this cashmere could be processed into 422kg of clean cashmere which could be processed into approximately 380kg of yarn. 380kg of yarn could be processed into 2,508 scarves that could be sold by the women for USD 30 - USD 60 each. In this case the women's direct earnings would be anywhere from USD 75,240 to USD 150,480.

Provided that a family had 11 cashmere goats that produced 500 grams of cashmere each, the family could produce 5.5kg of combed cashmere, 3.63kg of clean cashmere, 3.27kg of yarn and 21 shawls for USD 647 (using the minimum estimates of USD 30 per scarf). This would provide an important contribution to the household income. If the scarf sold for a retail price of USD 240 – which is not inconceivable

based on the prices of the Orenburg shawls, their earnings would double.

We plan to produce not only standard shawls or scarves but a diverse palette of cashmere knitted products based on contemporary design and market demand. Therefore, the cashmere most useful for our purposes will be cashmere suitable for hand spinning and knitting.

The project plans to test different types of cashmere produced by different goats by spinning it into yarn and knitting swatches from the yarn. This will tell us which type of cashmere is most suitable for this type of processing and which types of goats should be used for breeding. We suspect that the cashmere produced by the Altai crosses might be well suited for spinning and knitting given that it is long, reasonably fine and high-yielding. The Altai goats produce large amounts of cashmere and in addition are good meat producers, tested in local conditions. However, cashmere style (or crimp) is also very important for spinning as it affects how the fibers hold together. Some of the native goats sampled seem to have cashmere with a fine style. The cashmere produced by the large variety of cashmere, angora and native meat goat crosses is very diverse. Such diversity would present a challenge for commercial processors who require a specific fiber standard. However, we do not expect that this diversity will negatively affect handspun yarn production – as the different types of cashmere can be blended and make a very nice yarn.

3.4 SWOT / Identification of Strenghts, Weaknesses, Opportunities, Threats for the project in Tajikistan

STRENGHTS	WEAKNESSES
- Having adopted participatory breeding models in each site; - Good demand of Mohair products from international and sub-regional market (all production sold for a total of $3,851USD); - High quality of mohair yarn (comparable to the world famous South African one); - English speaking and computer literate native focal points for marketing HUBs available in South Tajikistan; - Women skills in design and dying technique; - Leaders already created in all groups; - Samples from international markets are provided to beneficiaries to improve production and get used to Western taste; - Women groups are being motivated through fellowships and contests; - Good selling website already in place, will be continuously updated; - Linkages with good local NGOs to support the project (Aga Khan Foundation, CESVI, NAU); - Monitoring carried out twice a year through field visits of the international project team (2-3 months each visit of the PI) and continuous follow-up by the national teams and Tashkent office to collect feedback and provide additional trainings.	- Quality fiber production is not enough compared to demand; - Communication between farmers and international buyer to be strengthened; - Expand contacts with wholesaler in order to cut transport costs; - Always keep competitiveness; - Remoteness of sites; - Government assistance, needed to provide offices, animal vaccination and strengthen sustainability of activities; - Flock diseases (like CPP): governmental support to be strengthened, FAO and ILRI to get involved in long-term prevention strategy; - Field manuals to be prepared

OPPORTUNITIES	THREATS
- Genetic potential of local breeds and quality of fibers can be improved through imported genetics; - Quantity of products can increase; - Expand groups (but not all rural farmers ready to take risks); - Revolving funds to be created within all groups; - Income farmers' data to be produced (and compared to baseline now); - Organize a final workshop for KM and KS and find additional buyers and supporters.	- Quantity of high quality fiber does not meet demand for producing luxury products - Flock disease: weak disease reporting mechanism and attempts to cover up the outbreak; - Ensure long-term support for breeding programs and for women processors

KNOWLEDGE HARVESTING TURKEY

The small ruminant development policy and the "National Sheep and Goat Breeding Program" in Turkey

Written by Jean-Paul Dubeuf and edited by Beth Miller

This report is based on bibliography, visits and discussions with:
Prof. Osman Torum and Prof. Nazan Koluman, Çukurova University
Dr. Irfan Daskiran, Turkish Ministry of Agriculture and Rural Affairs, General Directorate of Agricultural Research
Sheep and goat producers and with Malik Sonmes, industrial investor

This report is an analysis of the National Sheep and Goat Breeding Program undertaken by the Turkish Ministry of Agriculture. It is important because it is one of the largest investments in the small ruminant value chain, so it may serve as a model to other countries interested in designing similar programs. This initiative is possible because Turkey has recognized the enormous potential of the small ruminant market, and because of good communication and harmony between the Ministry of Food, Agriculture and Livestock (MFAL), and the Ministry of Forestry. As in many countries, there was a history of antagonism, and a ban on sheep and goat grazing in national forests. When the government of Turkey lifted the grazing ban, it recognized that good management can sustain both forests and livestock, and government resources can promote it.

The first part of this report is an introduction to the sheep and goat sector, to explore its diversity. Then we will assess the program's efforts to organize the small ruminant sector to promote economic development, solve social problems and reduce poverty.

1. Introduction to Turkey's sheep and goat sector

Since early 2000, Turkey has experienced rapid economic growth and is now a medium income country with significant industrial and agricultural development. Despite its new wealth, many eastern regions have significant poverty pockets with low levels of development (Seker, and Jenkins, 2013).

In spite of the recent recession, the Turkish GDP per capita was USD 10830 in 2012, very near European countries like Hungary or Romania. The extreme poverty rate (less than USD 1,25/day) is low, 1,34%, but disparities are high and the relative poverty rate (less than 40% of the medium income) is more than 16,9%

Map 1. The main sheep and goat areas in Turkey

1.1. The small ruminant sector in Turkey

For centuries, small ruminant production has been a key livestock activity in Turkey as in neighboring Eastern European and Middle Eastern countries. The rapid economic growth from the beginning of the 2000's has seen the demand for sheep and goat milk grow significantly (See table 1). Intensification of productions systems, with the population of sheep and goats stable or with limited growth has allowed increased production. The demand for goat meat has grown less than for milk. Until recently, the small ruminant production systems were dual purposes (meat and milk), and very often the herds had both sheep and goats. Now the sheep and goat production systems are becoming more specialized.

Consequently the production of sheep and goat meat, milk and cheeses is increasingly seen as a profitable opportunity for investors. With more than 60% of the population living with less than 400 USD /month, meat, especially from sheep, is still considered expensive but the government would like to lower these prices by further increasing production. The price of sheep meat currently is 18 USD/kg; sheep milk (paid to the producer) is 1.2 USD/liter or more; while cow milk is valued at 0.5 USD/liter and goat milk is 0.9 USD/liter (Daskiran et al., 2014). Turkey has a rich and diverse heritage of traditional dairy products as described in Appendix 2.

Fiber production from Angora goats decreased dramatically due to government restrictions on grazing in state owned forests, but in 2011 goat grazing again became permissible. However, the sector is not organized and interventions will be needed to rebuild the national herd, to ensure that production is sustainable and stable. For example, near Ankara, there are 150,000 Angora goats but the low quality of the fiber due to a bad organization led the producers to cross them with Damascus type dairy breeds to produce milk. (Tolunay and al., 2014)

	2002	**2012**
Goat (head)	7 022 000	**7 277 953**
Sheep (head)	26 972 000	**25 031 565**
Goat meat (tons)	46500	**49300**
Sheep meat (tons)	206 000	**272 000**
Goat milk (tons)	209 621	**369 429**
Sheep milk (tons)	657 383	**1 010 007**

(FAO, 2013)

1.2. The sheep and goats production systems in Turkey

Traditionally, sheep and goat production in Turkey was based on pastoral or transhumant practices. In the Aegean and Mediterranean regions, pastoralists grazed their goat herds in shrub areas until the 1990's. After 1990, the Forest act n°6831 promulgated by the Ministry of Forestry prohibited public grazing because they believed goats were responsible for the degradation of the state forests. This decreased the number of goats and goat farms until 2009. In 2011, the Turkish government made a radical change in forestry legislation due to pressure from producers with scientific data demonstrating that goats were not the problem. The decrease in goat numbers has been stopped.

Most of the herds are still owned by transhumant pastoralists using traditional methods. In these extensive systems, identification is difficult and the official number of animals is imprecise. The local breeds are dairy oriented, and include the Awassi and Chios sheep breeds. The Damascus, Angora, Norduz, Kilis, "Kil Keçi" (or hair type) are the local goat breeds, and include fiber, milk and meat types. Since 2000 and the economic boom, many new goat producers began intensive production with Damascus or imported Saanen goats, whose number has increased.

In Turkey, each geographical region and ecosystem has its own production system. In the low lands in the Mediterranean areas, mixed grass pastures of more than 18 species are cultivated, using alfalfa, atriplex or "caramba." In piedmont areas between near Adana and Antalya, the production systems are semi-intensive. Grazing is supplemented with hay or alfalfa and a mixture of concentrates (corn, wheat, soy bean meal, cotton seed meal, etc…). For example, a herd of 700 Damascus goats might receive 150 kg concentrates per day for an average production of 3 liters/goat per day. Although the system is half–intensive, many of the producers are not experienced with supplementation and the genetic potentialities of the animals are not well optimized.

The Anatolian Plateau in the center of the country has a mean altitude of 1000 meters above sea level, with flat and mountainous areas, and land for both crops and rangelands. In many areas with good soils and irrigation, crops are dominant, but much of the natural steppe land is used for public grazing, especially from January to June.

At higher altitudes with steeper topography, as in the Taurus Mountains in Southern Turkey, extensive mountain goat production is more common with about 2.5 million goats. In a region of the Taurus Mountains, 50 to 100 different local "heiri" populations of goats are managed in pastoral or transhumant systems. An agreement between the Ministries of Agriculture and Environment, promotes projects in the Mersin – Antalya - Adana region (Taurus Mountains) to preserve pastoral systems. Until now, there

was no collective organization to manage or improve the pastoral areas in the Plateau and in the Taurus mountains.

Pastoralism is also dominant in the Eastern parts of the country but is not encouraged by the government. Generally the flocks and herds graze all day and are gathered every evening for evening milking. The rams or bucks are always with females. Herders give very little nutritional supplementation. Owners consider official identification as a governmental means to collect taxes, so they do not identify all their animals and it is nearly impossible to know the exact number of animals. Although the traditional systems are quite diverse, they are unchanged from previous generations. They do not receive any technical support in the form of training, extension or government services for animal health or marketing. The hygienic conditions of dairy production are generally very low. The educational level of the pastoral population is very low, as are incomes. Most qualify for social family support (20 USD/month per child).

Many private investors want to build modern dairy units. For instance, a private investor in the Anatolian plateau has planned to buy 400 Awassi ewes with the possible financial support of the public authorities and to invest in milking machines and milk quality control systems. The enterprise plans to grow to 10, 000 ewes and to build a farm feed unit at a later date. The investor hopes to produce from 1.5 to 3 kg milk per day per ewe and to milk his flock from March and September.

Other production systems can be more opportunistic, and take advantage of rising prices during periods of high demand for meat. Near Adana, for instance, local goats are produced specifically for meat, and the kids are sold at the end of Ramadan at 16 kg live weight.

1.3. Extension services and development policy

There is not much organized private, professional or public extension sector in Turkey for small ruminants. The official public services are generally limited to administration and compilation of statistics. Private consultancy was not well developed until recently, but the universities could have a central role in the development of small ruminant activities. For example, many scientists or professors already act as consultants to private farmers.

The government has supported the establishment of “professional” farms of more than 300 sheep or 100 goats (the average size is 50 ewes or 20 goats). This governmental support is given through banks offering interest-free loans for “structured farms” or cash advances to begin an activity. To qualify, the farmers must be members of an association. Thirty-two thousand intensive goat farms were started with Saanen goats mainly in the Western Mediterranean region. Some specific regional projects exist for these new investors, for instance to improve milk quality. Intensive farms often test their own milk but there is no official recording or reporting system. Official milk recording is limited only to experimental public farms.

But the traditional pastoral or settled extensive producers generally have no technical or veterinary support. Sixty percent of the traditional producers (pastoralists or settled) have given up their small ruminant activity despite the increased demand for sheep and goat milk. Many explained it was due to poor living conditions and the restrictions on access to pasture imposed by the Ministry of Forestry in the past. .

The large scale investors have changed the market situation, and prices are more stable. Demand has increased and so has production. However, the increased demand has not benefitted the traditional producers in the impoverished pastoral areas.

2. The National Sheep and Goat Breeding Program

2.1. Objectives and Organization

The National Sheep and Goat Breeding Program (NSGBP) of the Ministry of Food Agriculture and Livestock (MFAL) supports the Sheep and Goat Breeders Association in Turkey (SGBAT). SGBAT was created in 2009 to improve and structure the organization of the sector. SGBAT now has 171 000 members owning 18.7 million registered sheep and goats in 80 provinces. In addition, 54 local Breeders Associations belonging to the SGBAT participate now in the NSGBP.

The objective of the NSGBP is to:

- Increase the motivation of producers to join a professional organization,
- Disseminate selection methods and breeding techniques,
- Conserve the local Turkish genetic resources,
- Develop an official livestock identification system, and educate the producers about it,
- Stabilize the number of goat keepers by motivating them not to give up goat farming,
- Improve the income of sheep and goat producers and their socio economic conditions,
- Improve the productivity of the sheep and goats. The program has technical and training objectives targeting the producers using extensive grazing to improve milk quality and hygiene, and animal nutrition and management.

The project started 6 years ago. So far, project involve 24 sheep breeds and 5 goat breeds (for instance (Kilis, Norduz, hairy, yellow goats) in 54 provinces and with 4000 breeders. The program has involved all actors of the sector.

The program is based on basic selection methods to develop pure breeds with high genetic potential. Animals are divided into 3 main groups (elite, semi – elite and base herds, see figure 1). The breeding within the elite flocks are fully controlled and provide high quality rams and bucks to the semi elite group. These in turn produce rams bucks for the base flocks. All breeding data are recorded by the breeders or the technical staff of the project.

The program has been divided in several subprojects, each designed according to figure 1. The MFAL criteria for farm acceptance are size and membership in associations. Farms must have 50 to 1000 head, deliberately eliminating the very small herds and the big ones. The farm owners are selected by the local branches of the SGBAT. The MFAL contracts with the local universities to support the activity on the field.

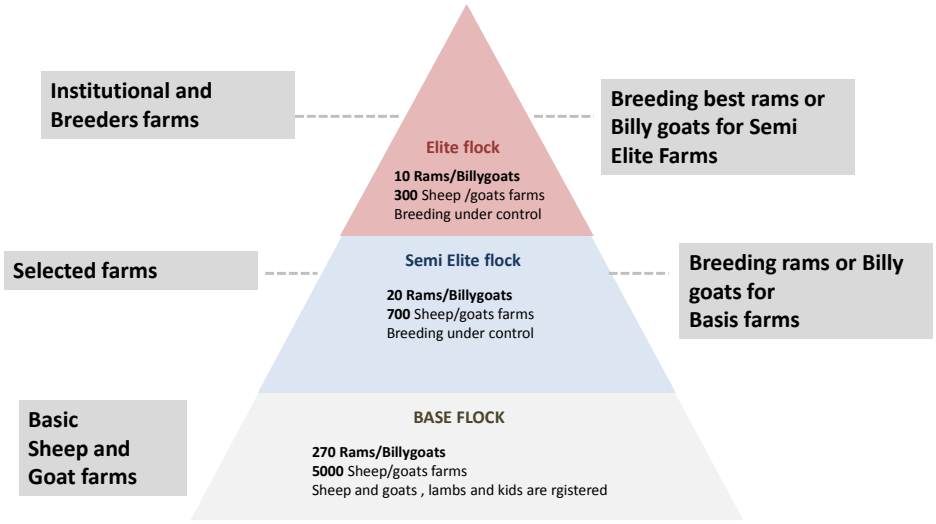


Figure 1. Sub projects design (Daskiran and al., 2014)

The NSGPB also has developed partnerships with 25 Universities all over the country and selected 40 scientists as subprojects leaders. Each subproject contracts an animal production specialist, and a veterinarian, who are paid by the program. The project includes the private investors who produce milk on big farms but will also buy milk from mountain producers and process it.

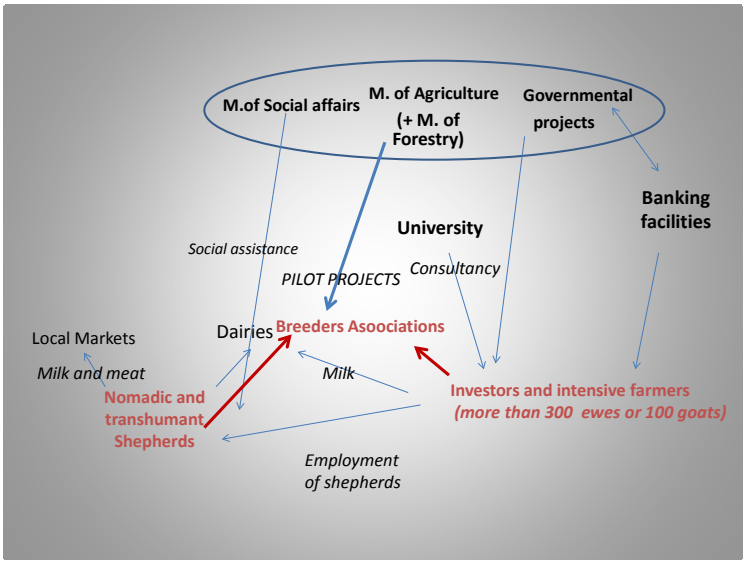


Figure 2. The actors' system and development project of sheep and goats in Turkey

2.2. SWOT Analysis of the NSGBP

The strengths, weaknesses, opportunities and threats of the NSGBP in Turkey result from an analysis of the official description of the program, direct observations and exchanges with its participants.

Strong points

- A long and strong tradition of small ruminant and pastoral production,
- A high level of consumption of small ruminant milk and meat, with good potential for expanding the market,
- The government has established agriculture and animal production as a high priority, with financial resources available,
- Good infrastructure around the country

Weak points

- Absence of extension services,
- Rural emigration and fast disappearance of pastoral systems,
- The lack of awareness about local pastoral systems among decision-makers, with local knowledge often dismissed as primitive and in need of replacement,
- Few consultations with the producers identified in the program design, so their motivations and priorities have not been included, making many reluctant to accept the proposed innovations.

Opportunities

- The recent political will of the Turkish government to develop and structure the sector,
- The incentives to encourage the producers to organize themselves and to belong to associations,
- New collaborations between the Ministries of Agriculture and Forestry could help to build innovative extension projects and promote sustainable pastoralism,
- A new orientation towards local products and future geographical indications (Protected

Geographic Indications and Protected Denominations of Origin), which could favor local know –how and production systems,

- The interest of the investors ensures attention to the sector

Threats

- The difficulty in hiring qualified herders to graze and manage the animals,
- The priority given to investors has already changed the market. Will this priority given boost the sector? Will it help or harm the small scale producers? There is a good chance that poor pastoralists will experience more marginalization and poverty if the resources go to the better off.
- It is an administrative challenge to manage a large number of subprojects

2.3. About pro-poor projects in Turkey

There are some poverty alleviation projects involving small ruminants in the remote Eastern areas. For instance the Ardahan-Kars-Artvin Development Project was supported by IFAD near the Armenian border. It supported women engaged in livestock and horticultural production who were willing and able to commercialize. The project aimed to build the capacity of farmers and provincial agricultural staff to develop a business approach to agriculture. In addition to training and technical advice, the project invested in agricultural infrastructure such as modern barns, drinking troughs, manure pits, hay storage premises and mobile veterinary clinics. Its expected impact was on natural resource management but there was relatively stress on rangeland.

Other projects such as the Diyarbakir, Batman and Siirt Development Projects in the South East of the country were designed in partnership between the Turkish Government, the UN Development program and IFAD with similar objectives. The Murat River Watershed Rehabilitation Project (MRWRP) linked the rehabilitation of degraded land, vegetation and water resources with poverty reduction.

3. Lessons learned from the Turkish program

The NSGBP is a key program to improve and structure the sheep and goat sector at a national level and involves mainly public institutions. It is a good example of the importance of political will needed to develop a strong national program.

It is a major challenge to organize the technical and human elements for such a large nationwide initiative. Few countries have attempted it, so there is great interest in the outcome and lessons learned. There is a good chance of success in market development, because the value chain already includes a network of middle sized cheeses and milk processing units which market well-known local products.

This program is oriented toward technical innovation to increase production and efficiency, and is not specifically pro-poor. The common assumption that poor and marginalized producers operating at a subsistence level want to and are able to imitate the behavior of the better off has never been validated. Regional issues of land use, national resource management and social impact would need to be addressed to ensure a positive impact on the poor.

“Modern” technologies have been advanced as solutions to the low productivity of the sector.

The interventions supported by the program are top down directives with little relationship and relevance to local practices, which are often seen as “primitive” without a strong understanding of their role in

sustainable environmental management or impact on biodiversity or cultural heritage. The responsiveness of the government to requests to graze small ruminants in the national forests is an excellent beginning to a new relationship between producers, central and local government and intermediaries, which can increase the positive outcomes from investments in small ruminant production.

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Appendix 1. Results of a survey of the livestock production systems in the Lower Seyhan River Basin (from Nazan Koluman and Okan Güney, 2007)

Introduction

Livestock management is linked to systems of natural resources. Livestock production is often integrated with cereal production, through grazing of fallow land, or else animals are kept in areas unsuitable for cultivation, composed of shrub ("macchia"), bush land and forest areas. The aim of the extensive livestock system is to produce at the lowest possible cost by using well adapted native animals such as Hair (Kıl) goat (dominant breed of the region), and limiting investments. Although production levels are low, so are costs, so poor farmers realize benefits from otherwise unusable land. Conversely, the native goats have good potential in different productive traits such as milk, meat, hair and leather. Extensive goat husbandry is either at a fixed location or linked to the migratory movements of these farmers. In this region the transhumance system is common, in which animals are grazed in the mountains during summer, and moved to transition areas or plains in autumn and winter. Transhumance is practiced where the quality of the pasture varies during different seasons of the year. Migration patterns partly depend on available natural resources, and also tribal politics. Migration of several indigenous groups is differentiated over the years. Migration routes and the composition of herds vary depending on the potential of the vegetation and farmers' decisions. In the Seyhan basin, there are also some farmers with a sedentary production system.

The survey

84 questionnaires were collected in 10% of the villages of the area. The number of cattle, sheep and goats decreased sharply during the last twenty years. The most important reasons of this decrease were socio-economic and political. Goat keeping has been forbidden in forested areas by the government, creating the greatest obstacle in goat production. In addition, many rural people migrated to urban areas, negatively affecting animal production. Yet, goat production is still the most important animal production activity in the mountainous area of the Mediterranean region of Turkey. But many farmers have given up animal production because of the increase in feed costs and the low price of products in the market. The main source of income in the past was goat production based on small family farms. All family members took part in goat production, and in particular, the women were responsible for their own goat herds and production.

Small ruminant owners indicated seasonal changes in estrus when moved from summer to autumn pastures. We observed also the recent and important development of intensive systems. It is linked to investments and the application of modern management strategies especially for planning and monitoring together with political and financial adjustments. Some new heat tolerant dairy goat genotypes could be incorporated into intensive or semi-intensive systems. During the dry and winter seasons, animals are fed concentrates and crop by-products, such as olive pulp and straw. The farmers declared that in the past they used to take their animals to the plains at the end of the winter, and in the spring, they would go to the rangelands in the mountains. According to the questionnaire results, goats are grazed in higher zones in the summer. The main dairy products of the farms were milk, cheese and yogurt. Farmers use 25% on average of their milk for their own needs (self-consumption). Families prefer to sell their milk as cheese because of higher price. Animal keepers produce white cheese, Tulum cheese, lor, çökelek and butter.

Appendix 2. Turkish cheeses and dairy products (from the Turkish Cultural Foundation)

Çökelek is a type of cheese made from yogurt in various parts of Turkey. This cheese is originally from the Hatay/Antakya (Antioch) region in Southern Turkey on the Mediterranean. It could look like cottage cheese.

The Tulum variety of cheese is produced by breaking up the Teleme (feta type fresh cheese), salting it and letting it sit in special bags. Lamb's milk and a certain ratio of goat milk is used for producing the tulum cheese, does not contain any air pockets, and is left for maturation for at least three months. This yellowish cheese, which is produced especially in the northeastern Anatolian and Aegean regions, tends to be more expensive than other varieties of cheese.

Kasar cheese is prepared in cylindrical molds and it is dark yellow in color. Generally it is produced with lamb's milk. In Turkey, kasar is generally produced in Middle Anatolian and Thrace regions. Mihaliç cheese is mostly produced around Bursa and Balikesir and it involves letting the Teleme sit in salted water.

Lor cheese is created with the whey released during the production of kasar and mihaliç. The extra whey is boiled, and the resulting coagulated matter is broken up into tiny pieces. Lor is an unsalted and inexpensive type of cheese generally consumed as bread spread with the addition of walnuts, tomato paste and various condiments. Alternatively, it is used as filling, "börek".

Other than these major varieties, there are many other types of Turkish cheese; the Otlu cheeses (Eastern Anatolia) are produced by adding cumin, mint, bay leaves, dill, oregano, saffron, fennel or lavender to the white cheese and burying it underground for at least two months. ÿrgü cheese (Southeastern Anatolia) gets its name because it is prepared in braided hair form, and it is suitable for frying. In addition to Dil (Marmara Region), Civil (Eastern Anatolia), Ÿamur (vicinity of Izmir), Ÿerkes (Black Sea Region), Golot (Eastern Black Sea Region), Sikma (Southeastern Anatolia Region), Carra (vicinity of Hatay), Abaza (Middle Anatolia Region), Yörük (vicinity of Denizli), there are many other types of cheese which get their names from the containers used for maturation; çömlek, küp, çanak, testi, etc.

Knowledge Harvesting: Goat Production in the Semi-Arid Northwestern States of Lara and Falcon, Venezuela[1]

Potential for development investment focusing on production intensification for milk production

By Luis Iñiguez, Consultant

Map source: Google map

1. Introduction

Goat production in the Northwestern part of Venezuela is located in the semi-arid region of the states of Lara and Falcon. This activity is widespread and closely associated with resource-poor smallholders, high poverty, low levels of education and poorly organized farmers. There are some 20,000 families whose livelihoods derive from goat production, mainly in extensive systems seconded by other systems (D'Aubeterre et al., 2012). Livelihoods are subsistence level, although market demand for goat products (meat and cheese) is high and unsatisfied. Cheese is processed in an artisanal fashion.

The production systems are traditional, silvo-pastoral and largely dependent on grazing the native vegetation, with minimal technological inputs and low levels of production. Lack of water, degradation of the native vegetation, rural-to-urban migration and goat thievery, alarmingly increased in recent times, affecting the structure of this system. Other constraints to production are incidence of animal diseases, low quality of products and lack of suitable institutions for production and marketing.

This case illustrates the effects of direct investment in creating the basic conditions for goat

1 This summary was possible thanks to the collaboration of Dr. Ramón D'Aubeterre, an animal production scientist under the National Agricultural Research Institute (INIA-Lara) of Venezuela.

intensification. Water catchments supplied communal water for human and animal consumption as well as intensive forage production. Two consecutive development projects funded by the International Fund for Agricultural Development (IFAD), the Sustainable Rural Development Project for the Semi-Arid Zones of Falcon and Lara States (PROSALAFA I and PROSALAFA II), built a network of water catchments, taking into consideration both environmental and production impacts. A major achievement of this project is the support of intensive fodder production, so a lesser number of highly producing animals in confinement is possible. PROSALAFA also initiated pilot sites where production intensification models were successfully implemented.

The existing conditions including increase in demand for cheese, as well as successful pilot projects, and farmers' interest are key ingredients for a mid-term investment for scaling up certain models beyond PROSALAFA II. The focus should be on consolidating the process tested in pilot projects through the strategic scaling up of technologies, with sustainable water policies and management of water catchments and the native vegetation, and to improve marketing that benefits farmers.

2. Production Context

2.1. Characteristics of the Area

The area involves the states of Falcon and Lara in Northwestern Venezuela, where about 914,000 goats (representing 86.5% of the national goat herd) is raised by smallholders (MPPAT, 2009). The climate is tropical and dry. In Falcon, the temperature in the plains averages 29 °C and in the mountains 22 °C, whereas in Lara the temperatures fluctuate between 19 ºC and 29 °C with an annual average of 24 °C.

Impacted by lack of water for forage production, the goat production systems largely rely on the native vegetation forming a semiarid forest which is in progressive degradation due to overgrazing. There are two types of biomass involved: 1) tropical dry forest, with 500-1000 mm rainfall, high evapotranspiration and predominant vegetation consisting of dense thickets of legume trees and small thorny bushes, and 2) less dense thorny tropical bush, with 250 to 500 mm rainfall, elevated evapotranspiration, a low to medium size stratum of thorny shrub, i.e. plants of the cactus family, and a sparse herbaceous stratum usually consumed by small ruminants. The very dry tropical forest and thorny tropical bush occupy 61% and 22% of the xerophytic areas of both states (D'Aubeterre et al., 2012).

Both states are well supplied with roads that connect them with main urban areas of the country.

2.2. Characteristics of the goat production systems

D'Aubeterre et al. (2012) provides details of the prevailing goat production systems in North Western Venezuela. Small fractions (2%) of farms produce animals under strict confinement. Otherwise the systems are either extensive (53%) or semi-extensive (45%) with different degrees of intensification. Most producers (80%) possess some land and about 20% are landless, although they do have access to communal grazing areas. Herd size is less than 100 goats (81% of the producers) of which only 58% are productive does, only 20% of which produce milk at low yields. Extensive and semi-extensive systems have similar herd size averages, 84 and 70 goats, respectively.

Kid mortality is high (36%), quite likely due to underfeeding exacerbated by diseases that affect both the mother and the kids, in particular diarrhea. Kidding occurs year-round, especially in the most extensive systems as males run together with females.

Diarrhea and gastrointestinal parasites were claimed by farmers as the most common causes of low productivity and death. Technical assistance considering health and management matters is poor and accessed only by a small fraction of the producers (8%).

Most systems are poorly equipped with limited facilities. The majority of producers have corrals, but only few have feeders, water reservoirs for watering, a milking parlor, and a processing facility. In general, the systems have low productivity. Producers of extensive and semi-extensive systems have expressed preference for more intensive systems with high productivity. However, the feeding system and current infrastructure are significant obstacles.

In the absence of milking parlors, does are hand-milked which is stressful for the animal, labor intensive and very likely to yield a contaminated product. Milk production averages 0.66 kg/animal/day in extensive and semi-extensive systems. In intensive goat systems of Lara state, it could be as high as 2-3 kg/goat/d over 180-220 days of milking (Muñoz et al., 2004).

Most farmers process their goat milk into artisanal white cheese, for which there is expanding demand, and also opportunities for diversification. Traders visit weekly to buy the cheese, although both farmers (61%) and traders (100%) expressed that the marketability is compromised due to milk contamination and excess salt content. The International Center for Agricultural Research in the Dry Areas (ICARDA) and INIA have developed practical procedures to solve this problem. Adult goats are sold for their meat, for which demand is also increasing. Farmers are poorly organized for both production and marketing.

There is need to improve productivity of these systems. Farmers with access to water can intensify forage production, which will bring the greatest advantages. Farmers with no access to water catchments have less opportunity to increase their incomes, but there are also avenues for them to improve their productivity and be better integrated into the market channels.

2.3. Environmental issues

The number of animals now grazing the forest exceeds its carrying capacity, due to lack of intentional management, leading to land degradation. More intensive management where water reservoirs are present can remedy this problem, but there is a need for new policies and new norms for communal grazing areas. Policies are also needed to regulate the use of water for forage production to avoid community conflicts.

Models for policies that support smallholder goat production include the Sheep Law (MAGP, 2001) and Goat Law (SENASA, 2012) of Argentina, and the pro-poor policies benefitting goat producers in Brazil. Currently the states of Lara and Falcon are working towards legislation to support goat production as a national priority.

2.4. Stakeholders, gender and pastoral issues

The goat production systems operate on a rigid distribution of family labor, as each family member tends to undertake a specific task. Women and children are more involved than men in milking while men carry out other activities. Out-migration of the youth decreases labor availability. Technical assistance and R&D need to be designed accordingly so that labor burdens are not unfairly distributed.

Many producers do not process milk into value added products and operate only at subsistence level. Technical problems such as low milk yields, poor animal health, low prices, transport limitations, and poor product quality can be improved with technologies tested by ICARDA and the Brazilian Agricultural Research Corporation (EMBRAPA) in northeast Brazil, as well as experiences gained in the Chaco region of Argentina by the National Institute for Agricultural Technology (INTA).

2.5. SWOT analysis

Objective: Improvement of the livelihoods of goat producers through adequate investment

Factors/Effects	**Helpful** (to achieve objective)	**Harmful** (to achieve objective)
Internal origin (Peculiarities of the organization)	**Strengths** • Producers interested to improve productivity • Tradition in producing under harsh conditions • Local knowledge concerning the value of native species for feeding • Farmers' positive and negative experience in trading with their products	**Weaknesses** • Dependency on unrestricted communal grazing of rangeland • Poverty and lack of resources • Lack of negotiating power • Poor organization of farmers
External origin (Peculiarities of the environment)	**Opportunities** • Enabling environment for technological change created by development (water reservoirs for community-based use) • Successful R&D interaction experiences suitable for the scaling up of technologies • Goat cheese and meat demand expanding • Opportunity for product diversification • Opportunity for substantial improvement of cheese quality and for value addition • Model of intensification of production tested in areas with access to water reservoirs to produce forages intensively • Growing support from local and national government, and research institutions	**Threats** • Lack of policies regarding 1) use and improvement of native forests, 2) production quality, 3) marketing based on product quality and health and 4) use of the water reservoirs for forage production to support intensive production • Range degradation for extensive and semi-extensive systems • Out-migration as people search for other employment opportunities • Support to intensification ends • Paternalism • Livestock theft

3. Projects

3.1. The Sustainable Rural Development Project for the Semi-Arid Zones of Falcon and Lara States (PROSALAFA II)

PROSALAFA II is a development project for the improvement of livelihoods and economic growth of rural areas in Lara and Falcon states. It has set the foundation for goat production to become an income generating activity. It has a base in the city of Barquisimeto in Lara State and a numbers of local agencies across both states.

The National Agricultural Research Institute (INIA) has a regional center in each of the two states with expertise to assist farmers. INIA developed models based on innovative local producers with access to irrigation. Two universities that link with INIA provide technical and advanced academic education in agricultural and animal production: the Francisco de Miranda National Experimental University (Falcon State) and the Lisandro Alvarado Central-Eastern University (Lara State). Both INIA and the University system have been partners of PROSALAFA II, and implemented goat production improvement activities for this project. The Foundation for Science and Technology, funded by the government with branches in Lara and Falcon states (FUNDACITE-Lara and FUNDACITE-Falcon), is also channeling financial resources to INIA and the universities to support small projects to improve producers' income.

The general objective is to reduce poverty in rural communities in the semi-arid zones of Falcon and Lara states by means of social and economic development that is environmentally sustainable and gender equitable. Specific objectives are to:

- Strengthen the capacity of participants and their organizations,
- Promote conservation of the natural resource base, with a focus on soil and water,
- Transform agricultural and non-agricultural production into a sustainable economic activity (IFAD, 2003).

This project benefits 4,000 households and involves a 15 million US$ loan provided by IFAD in 2006, and is expected to end in 2013. Built on the network of community water reservoirs constructed during PROSALAFA I (also funded by IFAD), this project demonstrated in pilot projects that livestock intensification and income improvement for goat producers are possible. Intensification minimizes critical problems such as lack of water, range degradation, high mortality rates and thievery. Income can increase with increasing cheese production per herd. This project also provided the communities with access to financial services, training, and management and assistance services.

PROSALAFA I and II's objective of improved goat production, income generation, and sustainable use of natural resources will require an additional investment, which will support scaling-up to reach a large number of producers and an adequate environmental policy.

3.2. Impacts of the main project

- The network of water reservoirs addressed one of the main production constraints. Thirty-one percent of all the reservoirs in the area were built by PROSALAFA to support goat production and horticulture, with a storage capacity of 25,000 cubic meters of water. Additionally, reservoirs for watering animals, with a capacity of 12,000 cubic meters, were also built by this project and account for 21% of the

total. The remaining reservoirs are owned by farmers.

- The basis for policy development at the local and national level was created. Further work however will be needed to write, pass and enforce new policies and norms.
- Pilot projects demonstrated that intensive goat production using water reservoirs for intensive forage production is an income-generating system. Further work will be needed to scale up to a large number of producers.
- Farmers were organized in communities under a watershed development model that has proved to be comprehensive in addressing rural development.
- Farmers and farmers' organizations have been trained and strengthened.
- PROSALAFA was proactive in establishing an outstanding relationship with R&D institutions.

3.3. Capacity Building and Adaptive Research to Improve the Productivity of Small Ruminant Production Systems in the Dry Areas of Latin America

The objective of this project, mainly implemented in Brazil and Mexico with a link to PROSALAFA II was to accelerate technological change through community-based testing of technologies to improve productivity and management of natural resources.

ICARDA, PROSALAFA II, and INIA together:

- Conducted an assessment of the constraints on production, processing and marketing of products in specific zones of Lara and Falcon influenced by PROSALAFA II
- Researched cheese processing to overcome excessive salting that affect marketability
- Trained researchers and farmers in improved processing of milk products.

These activities contributed secondarily to the main project achievements and identified critical issues for scaling up.

3.4. Impacts of previous projects

- Writing and dissemination of technical booklets compiling production and resource management information applicable to Lara and Falcon.
- South-south interactions accelerate institutional strengthening processes.
- The goat production and marketing constraints were identified in areas assisted by PROSALAFA II.
- Technologies that solve cheese production and marketing problems developed and successfully tested with farmers.
- Areas and topics for scaling up were identified.

4. Critical issues to be considered by an investment development plan

- Policies and investment are needed to create incentives for farmers to halt and reverse land degradation. The governments of Lara and Falcon have begun to develop legislation that benefits smallholder goat production but they need support.
- Policies are needed to manage water catchments, in particular to help producers with access to reservoirs to produce forage intensively.
- Policies are needed to standardize product quality and ensure equitable marketing of products.
- Policies can be based on successful examples, e.g. the Sheep and Goat laws of Argentina and the Brazilian policies for opening markets for goat milk produced by smallholders.
- Support more value addition processes, in particular cheese processing and product diversification.

- Scale up of models for successful intensification for goat production, fodder production and improved animal management, feeding systems and cheese processing.
- Improve management of animal genetic resources through community-based breeding systems to resolve the poor access to improved breeding animals.

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KNOWLEDGE HARVESTING: OTHER REPORTED CASES

Some cases have been quoted but were not completely analyzed. Here is a brief annotated bibliography.

1. Java (Indonesia)

This case is based on the relevant analysis published by I.G.S, Budisatria and H.M.J. Udo in Small Ruminant Research[1] .

A goat based aid program was analyzed to understand successes and failures of the program, correlated with production achieved by different types of aid recipients. The project was developed to help vulnerable people recover after an earthquake in Central Java, Indonesia. Value added for successful farmer group members was 2.5 times higher in the period that the credit was not yet settled and 1.4 times higher when the credit was settled compared to failed farmer group members. The article shows that any livestock based aid project has to do a proper initial assessment of the candidates, as the beneficiaries are the key to the success of the program.

1 Budisatria, I.G.S. Udo H.M.J., 2013. Goats based aid program in Central Java: an effective intervention for the poor and vulnerable? Small Ruminant Research, Volume 109, Issues 2–3, January 2013, Pages 76-83I.

2. Cabo Verde

The "Bolona Planalto Aged Goat Cheese project" is an example of a small scale regional project to improve the standards of living and income of small communities at local levels [2].

Cheese production is one of many activities reflecting the integration of two souls, the African and European, woven together over the centuries in the population of Cape Verde. The arid environment—the infrequent rainfall on particularly sandy ground—was settled by determined, persevering people, and by goats, the only animals able to survive on so little and still produce a valuable product.

The Slow Food Foundation for Biodiversity supports the project, funded by the Piedmont Regional Authority and the Italian Ministry of Foreign Affairs, and the "Program for the improvement of agri-livestock production on the island of Sant'Antão – Cabo Verde".
Sixty-six herders and cheese makers of the Cooperativa Agricolae Pecuaria Criadores das Montanhas were the beneficiaries of this project. Goat cheese is produced on the various islands of Cape Verde but in the mountainous, dry and almost uninhabited area of the Planalto de Bolona plateau (at an altitude of between 800 and 1500 meters) there is a last nucleus of shepherds. They perform a crucial role in helping to protect the land, which is subject to significant erosion from the torrential, even if rare, rainfall.

The methods used to raise animals and make cheese in Bolona are examples of an impressive capacity to adapt to the difficult environmental conditions. The animals, left to graze freely for the whole day, spontaneously gather in the late morning to drink at the milking area, where the kids are kept in dry stone walled huts. After milking, the goats stay with the kids for two or three hours and then return to graze until the next day. The animals are milked once a day because there is no electricity and it is only possible to work in daylight. Cheese making starts immediately after milking in tiny traditional stone huts with roofs of straw and matting.

Each operation is carried out with extreme care, keeping water consumption to a minimum. Water is valuable here and, except for short periods, has to be brought in by water tankers or donkeys. Processing is carried out naturally without using additional sources of heat.
Kid's rennet produced by the shepherds is added to the raw milk. After about an hour and a half or two hours the curd is broken down to the size of corn grains, left to settle and the whey is removed. The paste is then shaped and pressed by hand into metal molds and left to drain.

The final product is a pure rennet coagulated goat cheese. It is semi-hard and cylindrical in shape (diameter 10-15 cm) with flat faces, low and slightly convex sides (3-4 cm). The paste is compact, uniform, without eyes and ivory-white in color. It has a weak lactic aroma with herbaceous notes. On the palate it is sweet with slightly tangy flavor and a tender elastic consistency.

The Slow Food Foundation for Biodiversity has provided the project with training and assistance needed for the various stages of production (from starter culture to ripening) and, in particular, has worked to make the cheese widely known. Improved commercialization will enable the population of the Bolona highlands to continue living there, thereby preserving their identity in their homeland without having to seek employment opportunities in the cities or tourist villages.

2 From http://www.slowfoodfoundation.com/pagine/eng/presidi/dettaglio_presidi.lasso?-id=1043

The total cost of the project is € 18,000.

Activities	Cost
Improvement of traditional cheese making dairies	7,000 €
Providing basic equipment needed for artisan cheese production	2,000 €
Training in basic methods of hygiene for processing cheese	3,000 €
Supplying packaging and printing labels	2,000 €
Two-week technical mission	4,000 €
Total	**18,000 €**

3.Mozambique

The imGoats project in Mozambique is a part of the imGoats project in Rajasthan and the same methodology was used (see the Knowledge Harvesting study for Rajasthan).

3.1.Baseline data

The project is in the Inhassoro district in Mozambique's Northern Inhambane Province, works in 18 communities and targets 350 small-scale agro-pastoralist households. The district covers approximately 4800 square kilometers and has a population density of 11 inhabitants per square kilometer. The baseline study was carried out in six project communities and three control communities, which were selected based on three criteria: agro-ecological zone (coastal or interior), market access (distance to tar or paved road) and project participation.

Three types of surveys were carried out:

- focus group discussions at village level
- key informant interviews
- individual household interviews

Of the total 108 households surveyed, about 22% were headed by women and 56% were participants in the imGoats project.

In the project area, goat keeping is mainly practiced as a side occupation; crop production was the main occupation for most respondents (66.7%) whereas livestock keeping was a secondary occupation for about 30% of the respondents. Less than 10% of the respondents kept livestock as their main occupation. Goats have always been kept in Inhassoro District. However, during the civil war of 1977-92 the goat population in the district was severely depleted. In Inhambane Province, the small ruminant population decreased by 67% from 97,653 in 1975 to 32,135 in 1994. Following the end of the war, the goat population has increased but it is estimated to be still below what it was before the war.

Respondents have kept goats for relatively short periods (on average, 7 years for female-headed households and 12 for male-headed households) with a range of 1 to 30 goats kept per household and an average of eight.

The main motivation for keeping goats was to generate cash income for emergencies such as food shortage and health care. In addition, the majority of the respondents kept goats for meat consumption on a few special occasions during the year such as the festive season in December, when receiving special visitors, and during ceremonies and birthdays.

4. Recommended project interventions

Based on the baseline results and constraints identified by project participants, the following interventions are recommended:

- Train producers on goat health, reproduction, housing, watering and feeding
- Promote the use of dry season feeding techniques to better cope with feed shortages, for example, feeding of forage tree leaves and the making of hay bales and mineral licks. These options should take into account the availability of labor
- Support the development of communal pasture areas to improve goat feeding and watering
- Organize regular goat fairs for the sale of animals
- The use of weighing scales to determine price should be encouraged to avoid selling animals that are too young (less than 20 kg body weight) and to prevent depletion of the herd
- Support the construction of improved goat shelters

5. Recommended areas for further research

- Assessment of fluctuations in sales
- Study the demand, prices and availability of goats throughout the year to avoid selling when the prices are low
- Analysis of herd size, composition and mortality rate to ensure sustainable increase in sales and avoid depletion of the herd
- Examination of the historical and socio-cultural con¬text of goat keeping in Inhassoro, for example, the reasons why people keep goats and whether increased sales will be an adequate incentive to shift labor towards greater goat production
- Analysis of labor division in goat production and the involvement of women and children, to ensure benefits to all members of the family

Scaling-Up Goat Based Interventions to Benefit the Poor:

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Table of Contents

1. Executive Summary

Goats have been part of rural livelihoods for millennia, and have been instrumental in poverty reduction in resource poor areas. They thrive in nearly all ecosystems, including harsh, frigid and arid ones and can be handled easily. Since goats require less space and feed than cattle, they can be owned even by the landless. They are integrated into complex livelihood systems, and are "multifunctional" by providing milk, meat, manure, cash, savings and status, and often have social or religious uses. The poor are more likely to own goats than cattle, so support for goat-keeping can be a valuable entry point into poor communities to end poverty and hunger.

The "Knowledge Harvesting Project on Goats" by IGA/IFAD from 2011-2012 systematically investigated the suitability of goat value chains for lifting people out of poverty and improving food security. The dairy, meat and fiber value chains for goats all demonstrate significant return on investment, even for producers with limited initial assets, provided that technical training, community organization, supportive policies, and gender and social equality are addressed. The lessons learned support scaling-up goat investments, and provide useful guidelines for the process.

Goat projects can advance all eight Millennium Development Goals, especially the eradication of extreme poverty and hunger, since even the very poor can own goats. Also, goat ownership can help empower women, and the goat project is a good opportunity to build men's support for increased opportunities for their wives and daughters in commercial goat production.

Goats have been overlooked in national agriculture strategies and by donors, but this is now changing. Government planners have associated goats with "backwardness" and "environmental destruction," yet specific goat interventions may be the exact key to reach the poor who depend on them. Public resources such as rangelands and water need to be managed by the

stakeholders, including the poor and marginalized.

Goat projects must be sustainable and equitable before they can be scaled up to larger programs, which include many projects under a single management entity. Successful goat projects promote the following for poor producers, especially women, ethnic minorities and other marginalized groups.

a) Access to services (training, technology, inputs, health and financial services)

b) Access to and sustainable management of goats and the natural resource base

c) Improved management, inclusiveness and skills of community-based producer organizations

d) Access to markets (for milk, meat and fiber) through strong organizations

e) Pro-poor and pro-women policy changes

Scaling-up goat interventions is used here to mean expanding a proven model to impact more people over a regional, national or global area. The model must be robust enough to build community institutions, and lead to self-management of producer groups who can negotiate along the entire value chain, while allowing for local variation and experiences. Partnerships are essential and there must be selection criteria to ensure common values, standards, and a "theory of change."

Drivers for scaling-up are champions, ideas, catalysts and incentives, models and accountability (Hartmann 2008). IGA and IFAD are long standing champions for goat based development to benefit the poor.

This study reveals many successful solutions for delivering services, increasing production, expanding markets and improving the policy environment for smallholder goat producers. The Venezuela project demonstrates innovative water and land management to provide better goat grazing. In Kenya, farmers with tiny landholdings could raise high producing dairy goats in zero grazing units. Majorera goats from the Canary Islands were selected for high milk production under harsh conditions, and were introduced to Senegal to improve genetics. In Turkey, the collaboration between the Ministries of Agriculture and Forestry will allow pastoralists to gain access to valuable pastures. Paravets or village guides were trained in Kenya, India and Mozambique to provide animal health care in remote areas.

Building strong community organizations around goat production is essential In Tajikistan, women formed groups to add value to cashmere fiber through knitting retail products rather than selling wholesale to processors. In Nepal, small village groups organized into federations to coordinate purchase of inputs and to sell goats in lots to traders. In Mexico, producers organized

a group to take advantage of strong local demand for goat milk in the production of "*dolce de leche"* and to negotiate for better prices and policies.

The "Certification of Geographical Origin" or Designation of Origin (DO increases the value of goat products. In Argentina, the government recognized the Nuequen DO after 5 years of consultations with smallholders and NGOs. In Morocco, meat from goats that graze the Argan trees near Essouria also has a recognized and appreciated flavor, and a certified label of origin will improve marketing. In Turkey there is interest in official designation of origin for its small ruminant cheese produced in pastoralist communities.

Improving the policy environment can help producers to access training, markets and inputs. In Kenya, Farm Africa nurtured good working relations with local politicians, and established contacts with AU-IBAR and the East African Community to support regional coordination and harmonization of animal health regulations. The Government of Argentina passed a "Goat Law" in 2006 which creates space for producers, processors, traders, retailers and regulators to meet and negotiate for mutually beneficial policies, and to ensure access to pasture by farmers. The Government of Brazil uses its national social protection program, "Fome Zero" (No Hunger) to purchase goat milk directly from organized groups of producers in poor and marginal areas, and to process and distribute it to needy families.

The imGoats Project piloted Innovation Platforms for the goat meat value chain in India and Mozambique, which bring together all stakeholders to establish common interests, and remove obstacles to improved trade. The project helped producers organize and demand better prices through economies of scale by selling goats in lots rather than individually.

The case studies all document how profitable goat investments can be in a variety of settings and value chains. Financial data was collected and analyzed for feasibility and likely impact after scaling-up. Annual net income before labor costs without the intervention is around US $100-150 for Kenya, Nepal, India and Tajikistan, where flocks are small and goat production is integrated into diverse livelihood strategies. After the goat intervention, annual net income before labor costs rises to US $240-340 per family in Nepal, India and Tajikistan, and $600 in Kenya.

In Argentina, Brazil, Mexico, Morocco and Venezuela, goat production is the main income generating activity. Net income before labor costs rises from US $1,000 per family to US $2,000-11,500 after the intervention. Interventions in technical training for goat production, group organization, market linkages and policy changes can raise people out of poverty and improve environmental management.

The IGAD/IFAD project provides evidence to support scaling-up goat-based interventions, and identifies appropriate pilots, models and best practices, to help governments and development

actors make good decisions. Pro-poor and pro-women policies and research will help producers realize more benefit from their goat assets, while improved training in small ruminants and smallholder production will improve extension. Scaled up goat projects with rigorous monitoring will allow continuous learning to alleviate poverty and eradicate hunger.

2. Acronyms used

AU-IBAR	Africa Union Interafrican Bureau for Animal Resources
BRAC	Bangladesh Rural Advancement Committee
BMGF	Bill and Melinda Gates Foundation
CAHW	Community Animal Health Worker
CBO	Community-based organization
CoP-PPLP	Community of Practice for Pro-Poor Livestock Policies
DO	Designation of Origin
FAO	Food and Agriculture Organization of the United Nations
FA	Farm Africa
FGD	Focus Group Discussions
GO	Government Organization
HI	Heifer International
MDG	Millennium Development Goals
NGO	Non-governmental organizations
OFDA	Office of Foreign Disaster Assistance
SA-PPLPP	South Asia Pro-Poor Livestock Policy Programme
USAID	United States Agency for International Development

3. Introduction

Goats have been part of rural livelihoods for millennia, and have been instrumental in poverty reduction in resource poor areas. They thrive in nearly all ecosystems, including harsh, cold and arid ones and can be handled easily. Because goats require less space and feed than cattle, they can be owned even by those with little or no land. They are integrated into complex livelihood systems, and are "multifunctional" by providing milk, meat, manure, fiber, hides, cash, savings and status, and often are valued for their social or religious uses.

The "Knowledge Harvesting Project on Goats" by IGA/IFAD from 2011-2012 systematically investigated the suitability of goat value chains for lifting people out of poverty and improving food security. The dairy, meat and fiber value chains for goats demonstrate the likelihood of significant return on investment, even for producers with limited initial assets, as long as the need for technical training, community organization, gender and social equality and a supportive policy environment are addressed. Well-designed development projects using goats advance all eight Millennium Development Goals, and will be important to the post 2015 development agenda to end hunger and malnutrition. The lessons learned from these case studies support scaling-up goat investments, and provide useful guidelines.

The dairy, meat and fiber value chains for goats demonstrate the likelihood of significant return on investment, even for producers with limited initial assets.

Scaling-up is increasingly imperative to impact large numbers of people, and manage scarce development resources efficiently. The challenge for large-scale programs is to maintain focus on the small-scale producers, while managing an increasingly complex group of actors, and facilitating behavior change within institutions as well as on farms. It also requires an increased engagement with government institutions. Good development is community based, which may create conflict if politicians and bureaucrats oppose shifting power to the grassroots if they do not believe that local communities can manage money and projects effectively (Binswanger 2009).

Goats have been overlooked in national and international agriculture strategies and also by donors, but this is now changing. Government planners have associated goats with "backwardness" and "environmental destruction," yet specific goat interventions may be the exact key to reach the poor who depend on them. Public resources such as rangelands and water must be managed by the stakeholders, including the poor and marginalized. Traditional management can be improved while respecting the values and experiences of the local people, using participatory techniques and building on indigenous knowledge. Because goats are often managed by women, they are likewise "invisible," since livestock data are usually collected from male heads of households, who tend to overlook smaller animals kept by women. Livestock experts in government or development agencies may not recognize the existing or potential contributions of goats to livelihoods and food security.

Government planners have associated goats with "backwardness" and "environmental destruction," yet specific goat interventions may be the exact key to reach the poor who depend on them.

Success is empowering men and women to manage their own development and to make choices that lead to desirable outcomes. Raising incomes is a necessary but not sufficient result of a development investment. An underlying cause of poverty often is social exclusion based on ethnicity, gender, and location, which limits accumulation or use of assets, and must be understood and addressed. Goats provide an excellent entry point into marginalized communities because they are valued by the poor. An implementing agency can use them as an incentive to help organize small-scale producers to improve their technical, social and political skills, as well as increase food and income.

Goats can be an especially important tool for empowering women, who are generally disadvantaged compared to the men of their own class and ethnicity. Gender discrimination is a cause of poverty, and deepens existing poverty (Kabeer 2003). Because goats are often undervalued, women may be able to own or manage goats with minimal interference from their menfolk. Although women seldom own land they often independently own small livestock, such as goats in West Africa (Okali 1986). However, men may claim ownership of traditionally women's crops and livestock (and livestock products) when production is commercialized and markets formalized (Njuki and Sanginga 2011) Projects that protect and increase women's use of income have the strongest impacts on child nutrition and welfare (Smith 2003). Because women's time is a constraint on all agricultural activity, labor- and time-saving investments improve outcomes in goat focused projects (Rota 2010).

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Successful and sustainable development takes time. Men and women in transition from subsistence to market economies have a huge and often painful learning curve, as they shift from sharing or bartering assets and using social capital, to exchanging money for goods and services. Many institutions necessary for successful development, such as government entities, community based organizations and the private sector do not yet have pro-poor or pro-women orientation or policies. Adequate time and incentives are needed to encourage the cultural and behavioral changes for individuals and institutions to adapt and work together. Scaling-up is a long haul process, taking over five to 10 years to develop transparent and accountable organizations that can institutionalize the successful results achieved through pilots (UNDP 2013). Investments in institutional reform are essential for sustainable impact.

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Existing value chains usually favor the better off who tend to be better organized, so a key objective for goat projects must be the development of strong farmer organizations as well as pro-poor and pro-women policies regarding markets, sanitary standards, taxes, financial and non-financial incentives and enforcement. Farmer organizations need the political skills to develop allies and supporters, and the space to meet with and influence policy makers, with evidence to support their positions.

4. Background

Livestock development historically has had a cattle bias, and has been poorly coordinated with crops, human nutrition, poverty reduction or sound environmental management (Steinfeld 2006), but this scenario is starting to change. Goats are more important to the poor than larger animals, so they can have a greater impact on reducing poverty. In rural areas, there is a high correlation between the ownership of goats and poverty. Goats are found in the drier, more fragile and less-favored environments, which have a high incidence of poverty (Devendra 2013). Goat rearing is also characterized by a greater involvement of women (SA-PPLPP 2014) compared to cattle, but this can change as the activity becomes more profitable. Poorer households which have fewer cattle are more dependent on small ruminants than their wealthier neighbors, making diseases and losses of them relatively more costly and potentially devastating (Perry 2009).

Cattle continue to receive the bulk of research and development funding for livestock. In 2002, ILRI expended over 80% of its resources at research targeted at cattle and less than 20% at other species. As goats are relatively more important to the livelihoods of the rural poor, investments in goat health, productivity and sales can have greater impact on poverty alleviation (ILRI 2002).

As goats are relatively more important to the livelihoods of the rural poor [compared to cattle], investments in goat health, productivity and sales can have greater impact on poverty alleviation (ILRI 2002).

In the countries of the Southern African Development Community (SADC), cattle numbers have remained constant during the last 20 years, but goat numbers are steadily increasing because of their high reproductive rate, adaptability to various habitats and their relatively low production cost compared to cattle. Goat populations recover more quickly after population crashes and households are able to rebuild goat herds faster than cattle herds. Climate change and its associated economic instability exacerbate the vulnerability of the poor, so investments that increase the value of their goat assets increase their resilience to shocks.

Restocking programs after natural or political disasters have distributed goats because of their lower cost and rapid reproduction. Humanitarian organizations have funded goat projects to improve household nutrition. Research institutions have tested new breeds or nutritional interventions, which often show improved production under controlled conditions. Nevertheless, funding to learn the long-term impact, including social and environmental effects, has not been available for these piecemeal goat projects.

The 2011-2012 IGA/IFAD Knowledge Harvesting study examined a significant number of projects implemented by many types of organizations. Non-governmental humanitarian agencies such as Farm Africa in Kenya and Heifer International in Nepal led partnerships with local governments and NGOs. Partnerships between public authorities, local NGOs, research institutions and goat producer associations are seen in the case studies from Tajikistan, Morocco, Argentina, Brazil, Venezuela, Mexico, Senegal, India and Turkey.

4.1. *What makes a good goat project?*

Projects must be sustainable and equitable before they can be scaled up to larger programs. A program is defined here as many projects under a single management entity with common accountability standards but local flexibility. Successful projects using goats share the same characteristics as any other good project: adequate planning, monitoring and evaluation that enables learning by the people impacted and the organization(s) implementing it. Although the need for these features is well documented, they are not always found, either from inadequate funding, lack of time or skill by planners, or a narrow focus on production.

These case studies demonstrate that pro-poor and pro-women goat projects need to promote the following:

- Access to services such as training, technology, inputs, health and financial services
- Access to and sustainable management of livestock and natural resources
- Improved management, inclusiveness and skills of community-based producer organizations
- Access to markets through strong organizations
- Pro-poor and pro-women policy changes

Strategies built on understanding attitudes and behaviors of the men and women operating throughout the value chains will enhance success. It is especially important that biases about women and ethnic minorities are recognized and addressed so they can participate and benefit from all project interventions.

The livestock sector in general, and the goat sub-sector in particular, is often isolated from other development partners, making market development for smallholders difficult. There has been little interest in policy until very recently. Historically, goat projects tended to focus on the technical aspects of production to the exclusion of social, political or food security elements, but technology-centric solutions alone are inadequate to solving the problems of the poor (Dijkman 2009) (FAO 2009). Technical training on feeding, breeding, health and management of goats is necessary but not sufficient for success.

Technology-centric solutions alone are inadequate to solving the problems of the poor (Dijkman 2009) (FAO 2009).

Goat production is rarely the only livelihood activity of poor men and women, so the larger context from the farming system to global economy will affect the project. Preplanning data include the economic, social and political environment so priorities and potential bottlenecks are clear. The key lesson from all successful goat projects is to understand the people participating, and to invest in their capacity to make decisions, as well as introducing technical interventions with the goats.

4.2. *Project Planning Tools*

There are many good tools for community based livestock project management which integrate local issues with regional or national trends. The Goat Value Chain Toolkit was developed through the IGA/IFAD project as a resource for ensuring adequate attention to all nodes along the chain, and to maximize benefits to small-scale producers. Highly detailed tools such as Sustainable Livelihoods Models may be too cumbersome for each small project, but a large-scale program justifies a significant investment in understanding the farming systems, cultural norms and variations of attitudes and behavior, and the external policy and trade environment. There is always a balance between gathering useful data, and practical use of time, but a minimum pre-planning report should include poverty incidence and education across ethnicity, age and gender lines, as well as livelihoods strategies, transport and infrastructure, and the policy environment. Social status of women and men can be estimated from data such as age at first marriage (UNDP 2013), ratio of men to women in leadership in producer groups and government, and analysis of ownership and decision-making within the family. The underlying cause of poverty must be examined so that existing social bias can be addressed, or the projects may reinforce existing inequality. Plans need to be adapted to the particularities of each community, but background data on public policies, markets or behaviors must inform each local plan.

The Nepal case study on meat goats used many methods of data collection throughout the val-

ue chain, including household surveys, key informant surveys, focus group discussions (FGD), stakeholder meetings and workshops, direct observation and checklist surveys from farmers groups, traders, meat retailers and consumers. This combination of quantitative and qualitative information is called Q Squared or Q2, and is essential for meaningful interpretation of data (Behrman, et al. 2012)

Data collection to inform planning can start with United Nations, World Bank and national databases and literature reviews on poverty, education and livestock markets, and confirmed or updated with site visits and interviews. The imGoats/India project relied on outdated poverty maps, so many of the participants were not especially poor by local standards. Therefore, focus group discussions as well as interviews with other NGOs or agencies in the area can help understand the local situation (Maarse 2013).

The focus groups with men and women are an especially important way to understand how ideas such as "own" or "decide" are understood in local settings, to avoid mistaken assumptions about behavior and motivations (Hillenbrand 2012). For example, in Bangladesh, men and women agreed that household decisions should be made jointly by husbands and wives together. When asked if they would respect their wives' opinions if they were different from theirs, however, most husbands said no. Therefore, decision-making was called "joint" but in reality the wife was expected to agree with her husband's decision (HKI 2011).

4.3. *Accountability*

Accountability systems ensure that money is spent as planned (outputs) and that impact is assessed and improved (outcomes), with good communication and coordination between producers, processors, consumers, policy makers and donors. Self-monitoring by the community means that data will be used where they are most needed. Monitoring is required to ensure that poor women and men benefit from the goat projects so that the better off do not capture all of the benefits (Pretty 2008).

Evaluations during a project should enable adjustments to the implementation plan, by addressing unexpected obstacles. Donors demand evaluations to know that their money has had the desired impact, but the most valuable use is for communities to learn about themselves. Unfortunately most evaluations are sent to the funder, and not used by the implementer or the community. Both the Heifer and Farm Africa teach communities to manage their projects and resources, which include a culture of deliberate evaluation and self-improvement.

Governmental institutions such as extension services may be threatened by evaluations, and staff may feel pressure to falsify results to keep their jobs or funding. Institutional cultures which punish poor performance rather than seek solutions need meaningful reform starting from the top. There can be a long learning curve for conservative institutions to reward risk-taking and innovation rather than obedience.

5. Scaling-up: drivers and spaces

Scaling-up goat interventions is used here to mean expanding a proven model to impact more people over a regional or national area. The model must be robust enough to build community institutions, and lead to self-management by producer groups who can negotiate along the entire value chain, while allowing for local variation and experiences. Partnerships are essential and there must be selection criteria to ensure common values, standards, and a "theory of change." If local livestock oriented partners do not have the capacity to guide the communities through institution building, environmental management or gender equality, additional training and policies may be needed, or additional partners recruited.

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Hartman and Linn's analytic model for scaling-up is useful for the goat sector. They note that a large-scale program can reach more people with better impact than scattered projects where each discovers the steps for success. Furthermore, institutional reforms must be implemented across sectors, and scaled up initiatives require cross-sectoral linkages. Institutional reforms, such as training, transport and incentives for extension staff will have long-term benefits (Hartman and Linn 2008).

Scaling-up is a political process, and political support is necessary from the beginning. Empowering the poor to organize and demand services or transparency may antagonize those who benefit from the status quo. Powerful interests may try to appropriate the money or resources or new organizations. Development is about changing behavior among individuals and institutions alike, and resistance must be anticipated and planned for (ARD 2012).

5.1. Drivers

Drivers for scaling-up are champions, ideas, catalysts, and incentives (Hartman and Linn 2008). Champions are influential, respected and persistent individuals or groups, who are at the table with decision makers and willing to remind them about the ultimate goal.

The International Goat Association (IGA) has been the global champion for using goats to benefit humankind since 1982. Through its network of scientists, development practitioners, and the private sector, IGA has been an advocate for goats in development, and also a network for sharing evidence to inform policies, project designs and markets. Member institutions such as Farm Africa and Heifer International have international visibility to highlight the benefits of goats to

the poor, and all members can share successful innovations with each other. IGA is organized through Regional and Country directors, ensuring communication across the globe on all goat related topics. Respected leaders such as Warren Foote, Jean Boyazoglu, David Sherman, Christie Peacock, Rosalee Sinn and Adel Abul Naga have insisted that goats be included in the development agenda despite initial resistance.

IFAD has been a champion of goat-based development through support for goat projects on the ground, and the process of learning from them. This Knowledge Harvesting report promotes increased use of goats to reach very poor farmers as part of integrated development interventions.

5.1.1. Ideas

The goat case studies reveal a multitude of ideas for sustainable pro-poor livestock models, including natural resource management, production services, producer organizations, markets, and policies.

a. **Access to and sustainable management of livestock and natural resources, especially land and water.**

The Venezuela case in the semi-arid northwestern states of Lara and Falcon demonstrates innovative water and land management initiatives to improve goat nutrition. The pilot project invested in water catchments for forage production, which allowed producers to raise fewer numbers of higher producing animals in confinement, protecting the environment from overgrazing. In Kenya, land holding and crop production had been decreasing, so raising dairy goats in zero grazing units permitted those with very small plots of land to participate, while increasing soil fertility through manure fertilization.

Forestry officials are often hostile to goat production, and may restrict goat grazing in public land or forests. Several of the case studies showcase improved relations between Forestry Departments and goat producers, resulting in both environmental protection and improved goat nutrition. In Rajasthan, India, restricting entry of animals into forest areas was common. Now livestock keepers are allowed to lop and take home specific quantities of fodder to keep their goats fed. The case study from Turkey describes the new collaboration between the Ministries of Agriculture and Forestry, after decades of Forestry's efforts to eliminate goat keeping in forests. The increase in forest fires made officials aware of the value of pastoralist goat management, so the new government goat project includes technical support to work with pastoralists to improve their goat production.

The increase in forest fires made officials aware of the value of pastoralist goat management, in Turkey.

b. **Access to services (training, technology, inputs, health and credit)**

Improved technology can include improved genetics, varieties of forage or management systems like zero grazing. The Senegal case study describes the introduction of purebred Majorera goats from the Canarian island of Fuerteventura, which has a similar climate. The Majorera goats have been selected for high milk production but are hardy enough to thrive under Senegalese conditions. The research component compares the performance of the Canarian goats with the local goats under same conditions. Majorera goats were also distributed to local Fulani women's groups to increase their income generation from milk sales.

Farm Africa trains Community Animal Health Workers (CAHWs) to deliver animal health care in isolated rural areas in Kenya, unserved by veterinarians. It also developed a private sector model called "Sidai," which franchises animal health supplies and extension services (Sidai 2014).

Good ideas are often proposed by the farmers themselves. In India, GALVmed's Newcastle Disease Control Project [for poultry] supported Community Animal Health workers (CAHWs) to deworm and vaccinate poultry against Newcastle Disease in Odisha (formally Orissa) state. The women who raised the poultry also raised goats, and asked for goat health treatments and husbandry advice. The CAWHs then received training in both species by the NGO partners. Additional surveys across India and Africa revealed that most rural women who raise poultry also raise goats, yet government extension is not interested in either. Therefore, training women in both poultry and goat keeping improved their food security, and also raised incomes for the CAHWs, increasing the sustainability of the interventions (GALVmed 2012).

The government of China is actively supporting dairy goat development in Fuping County of Shaanxi Province with funding for research, genetics and scaling-up the size of individual farms (Schoenian 2009). Public investments in extension, milking machines and processing have been implemented.

c. **Access to markets, by supporting producer organizations and their integration into the value chain.**

The Nepal case study describes the transformation of many small self-help groups into multi-purpose cooperatives with hubs for live goat buyers. Women are required to be the representative of each participating family, to build recognition for women's importance in home-based ag-

riculture. The cooperatives can purchase inputs such as feed and medicine in bulk, and make them available for members, even in remote areas. These cooperatives are organized into larger producer federations, to achieve more influence in policy and market development.

In Tajikistan, the outdated government pricing system pays more for lower quality fiber. In response, women formed mohair goat producer groups, and then began to add value to cashmere fiber through knitting retail products rather than selling wholesale to processors. They are also developing their skills to lobby for government change in pricing and access to rangeland.

"Certification of Geographical Origin" or "Designation of Origin" (DO) is used in three of the case studies to increase the value of goat products and expand markets. In Argentina, the government recognized the Neuquén DO after 5 years of consultations with smallholders of North Neuquén Province, who raise the Neuquén Criollo Goat. The summer grazing area in the high altitudes of the Northern Range of Neuquén gives the kid meat a distinctive flavor that commands a premium price (Lanari 2009). It is now marketed successfully as Neuquén Chevito, in the nearby tourist region of Los Lagos. In Morocco, meat from goats that graze the Argan trees near Essouria also has a recognized and appreciated flavor. The producer organization "Association Nationale Ovine et Caprine" (ANOC) is working towards a certified label of origin, which will improve their marketing. In Turkey, producers are interested in official designation of origin for their small ruminant cheeses produced in pastoralist communities.

d. Pro-poor policy change and producer organizations

The imGoats Project piloted Innovation Platforms (IPs) for the goat meat value chain in India and Mozambique. An Innovation Platform creates space to bring together all stakeholders to establish common interests, and remove obstacles to improved trade (van Rooyen 2009). The project helped producers organize and demand better prices through economies of scale by selling goats in lots rather than individually.

The imGoats Rajasthan (India) case study demonstrates the improved interactions between the local, state and national officials and stake holders, as a result of the Innovation Platform. Policy issues include the ongoing shortages of veterinarians and vaccines, which are supposed to be provided by the government. The project trained community "field guides," which function as paravets, and as village promoters and representatives to the IPs.

Government policy can be an obstacle to successful goat keeping, but in Argentina and Brazil, laws to protect and promote goat production have been developed which are practical models for other countries. The Government of Argentina passed a "Goat Law" in 2006 which creates space for producers, processors, traders, retailers and regulators to meet and negotiate for mutually beneficial policies, and to ensure access to pasture by farmers.

In Argentina and Brazil, laws to protect and promote goat production have been developed which are practical models for other countries.

The Government of Brazil uses its national social protection program, "Fome Zero" (No Hunger) to purchase goat milk directly from organized groups of producers in poor and marginal areas, and to process and distribute it to needy families. Not only does this secure a market for the present, it introduces a new generation to goat milk, creating demand in the future (GoB 2014).

The Kenya case demonstrated the commercialization of goat milk markets, and addressed policy obstacles through good working relations with local politicians. Farm Africa worked with the African Union's Inter African Bureau of Animal Resources (AU-IBAR) and the East African Community to support regional coordination and harmonization of animal health regulations on goat vaccines, medicines and laboratory testing.

There are many other creative and useful ideas for including goats in development projects. Goat production is rarely the only livelihood activity in any farming system, so successful projects can build on other valued interventions in the community. The Helen Keller Institute (HKI) in Bangladesh developed its homestead food production (HFP) program initially through home gardens and nutrition education. A goat component was added to improve nutrition through animal source foods (ASF) and provide cash through sales. The model was so successful that is has been scaled up throughout Bangladesh, as well as Asia and Sub-Saharan Africa (Iannotti 2009).

Many successful projects build on the complementarity of goat and crop production. In Nigeria, a pilot project introduced simple new technology for transforming cassava waste into goat feed, increased the growth rate and health of the goats, and helping to commercialize production (Fuller 2011). In Tanzania, ILRI is developing a goat-cassava-sweet potato extension package in which improved goats are fed by-products of new varieties of cassava and sweet potatoes, and goat manure is used to fertilize the crops (Saghir, et al. 2012).

"One Health" approaches human and animal health as intrinsically linked, and needing improved coordination. The "ROSA" project in Morocco began by training women in remote areas in improved care for both children and goat kids through good sanitation, nutrition, appropriate vaccination and early treatment for respiratory infections and diarrhea. Because women in the conservative rural Ouarzazate province cannot travel far, or interact easily with men, the goat experts (all women) come to the village or even the home to provide advice. ROSA has grown into a women's cooperative for small scale livestock production. It is so successful that it receives more requests than the female livestock extension agents, all volunteers, can handle (Kanoubi 2012).

5.1.2. Ideas become models through testing and refinement

The IGA/IFAD study identified several programs with standardized processes to ensure quality, while maintaining a community focus. Models suitable for scaling-up shift the focus from technology to the institutions that deliver and support the goat innovations (farmer organization, service provision, and markets).

The Heifer International Model was developed in the 1990's based on 50 years of grassroots livestock development, and uses livestock "loans" as a tool for community development (Aaker 2007). Farmers must attend training and join a community group to receive one or several goats "on loan," which are "paid back" by giving offspring to new members of the group. Heifer uses "appreciative inquiry" to build on the strengths and culture of the community, rather than focusing exclusively on needs or deficits. The Farm Africa Model for Dairy Goats develops local capacity to coordinate and extend services (veterinary care, breed improvement and inputs) through farmer organizations and private service providers (Peacock 2007), avoiding dependency on government services.

Models suitable for scaling-up shift the focus from technology to the institutions that deliver and support the goat innovations (farmer organization, service provision, and markets).

Models cannot be mistaken for blueprints, so adjustments must be made for new situations, reporting needs and communication. Strong community development requires trained facilitators, who in turn can train local animators or leaders. This "social capital" is often overlooked in both budgeting and cost benefit analysis, especially in the short term. However, long term impact requires strong community organizations, so goat investments that omit building institutional capacity run a higher risk of failure. Often local NGO's can provide training and backstopping, but it cannot be learned from a book, and requires resources and monitoring.

5.1.3. Catalysts and Incentives

External and internal catalysts can drive farmers to try new ideas, while a robust monitoring and evaluation (M&E) system encourages learning from experience. External catalysts can be human and environmental pressures, such as population growth, competition for land and water, degradation of natural resources, decline of farm size, climate change, and natural and human-based disasters. Increased demand from urbanization and rising incomes can inspire innovation for improved quantity and quality in production, and sound environmental management.

Natural and human disasters drive demand for goats, which reproduce faster and are hardier than cattle. The best goat restocking projects work with established groups that select recipients, and organize training to improve health, production and marketing. Unfortunately, most restocking projects do not continue data collection after the project ends, so impact is unknown. For example, in Zambia the USAID Office of Foreign Disaster Assistance (OFDA) distributed 2,000 goats from 2010 to 2012 in Kazungula and Sesheke districts, through Land O'Lakes International Development Division. The goal of the project was to improve food security in areas devastated by flooding, drought, and cattle losses from CBPP (Contagious Bovine Pleuro Pneumonia). During the 8 month project, demand for goats was strong, but when it ended, no further data were collected (LOL-IDD 2014).

Conversely, a goat restocking project after a drought in Mali, implemented by Norwegian Church Aid, continued even during fighting near Goa in 2012-2013. Each community had elected a four person committee to distribute goats based on vulnerability, which continued to function both in refugee camps and after refugees returned. Project officials attributed success to the pastoralist tradition of supporting each other, development of community based organizations, and the trust that the committee inspired (Diallo 2011).

During Liberia's Civil war, refugees living in camps in Guinea learned to raise dairy goats in confinement, which was new to them. They developed a taste for goat milk, and brought back an interest and knowledge of dairy goat keeping. The local NGO VOISED-Africa provided dairy goats and training when the refugees returned to Liberia (Miller 2009).

In Venezuela, rangeland degradation, limited water, and losses from goat diseases, inspired producers to join the project, which also commercialized production. In Kenya, dairy goats are an attractive alternative to crop based livelihoods when farm size and crop yields decline, due to human population pressure and climate change.

The imGoats project in India and Mozambique demonstrates that donors can be the catalyst to expand goat value chains. Small-scale farmers kept goats to store wealth, in the absence of banks and other reliable financial systems, but only sold individual goats when cash was needed. The project organized markets which increased profits for enterprising and commercially oriented farmers.

Cell phones have become a catalyst for more transparent markets. Farmers with real time knowledge of markets can negotiate better prices and retain more of the value of their goats. All types of information can be shared more easily, including consultations with veterinarians for livestock technicians or CAHWs.

Information exchange is a key catalyst for new ideas. IFAD's Community of Practice for Pro-Poor Livestock Development (http://www.cop-ppld.net/) and the South Asia Pro-Poor Livestock Policy Programme (http://sapplpp.org/) are online networks for development practitioners to share experiences and best practices. Although not limited to small ruminants, both networks provide an easy means to access formal and informal documentation about technical aspects of goat production (feeding, breeding, health and management), marketing, processing and policies to ensure voice and benefits to the socially marginalized. These networks also expand contacts between individual with expertise, which is "social capital" for development institutions.

Resource-poor farmers cannot afford to invest time and effort without seeing some tangible benefit early on, which ensures the buy-in from the community, the government, and other stakeholders (IFPRI 2012). Monitoring for early results allows the implementing agency to verify the model, and if necessary, to adapt the approach. Heifer International distributes pregnant does to farmers, so that lactation and therefore milk or kid sales can begin quickly, building enthusiasm.

Incentives are internal catalysts. A key driver of sustainability is profit to the goat producer and other participants in the value chain. The IGA/IFAD study documents how profitable goat investments can be in a variety of settings and value chains.

Financial data from the IGA/IFAD case studies were analyzed for feasibility and likely impact after scaling-up. Pre- production, production and processing activities for each country were calculated, resulting in annual net income before and after the intervention, as well as projected values over 10 years, including Internal Rate of Return (IRR) and the Net Present Value (NPV).

Annual net income before labor costs without the intervention is around US $100-150 for Kenya, Nepal, India and Tajikistan, where herds are small and goat production is not the main livelihood. Net income before labor costs is over US $1,000 per family for Argentina, Brazil, Mexico, Morocco and Venezuela.

After the goat intervention, annual net income before labor costs rises to US $240-340 per family (Nepal, India and Tajikistan) and to US $2,000-11,500 per family (Argentina, Brazil, Mexico, Morocco and Venezuela). In Kenya, it increased to US $600 per family.

Annual net income from goats (before labor costs) rose from US $100-150 for Kenya, Nepal, India and Tajikistan, before the intervention, to US $240-340 per family in Nepal, India and Tajikistan, and $600 in Kenya.

In Argentina, Brazil, Mexico, Morocco and Venezuela, goat production increased annual net income (before labor costs) from US $1,000 per family, to US $2,000-11,500 after the goat intervention.

Although the cost of investment included some collective assets (improved bucks, cooling tanks, carding machines and minor infrastructure) the main intervention in these case studies was technical assistance, which is relatively inexpensive compared to other interventions. The third highest Internal Rate of Return (IRR) is Brazil where the only intervention is technical assistance.

This financial analysis is a useful first step for understanding the powerful potential for improving livelihoods with goat based interventions. Further refinements in the economic model could include the social capital which producers bring to their projects, and which can increase as their institutions become stronger. In addition to financial and social capital, a complete livelihoods analysis includes physical, natural and human capital. Social capital is especially important for producers in transition from subsistence to commercial economies, and should not be lost as money increases in importance. Experience has shown the rural population is not a collection of isolated, atomized individuals with only individual interests, but is made of families and communities with both shared and personal preferences, abilities and influence (C. Okali 2011).

For example, the initial financial analysis for goat production in Mozambique noted that although most producers keep livestock for cash income, they do not behave as "formal" producers (Technoserve 2009). Nonetheless, the project proceeded with the assumption that they would change their behavior automatically when market opportunities were available, but this did not occur. Therefore, assumptions about human behavior and "theories of change" matter, especially during the transition from subsistence to market economies.

Models to capture social capital in veterinary economics do exist and should be used because they provide greater insight into the process of overcoming poverty and improving nutritional outcomes (Rushton J. 2003). Other useful models are "behavioral economics" which incorporate cultural preferences or pressures to better predict successful interventions. Gendered economic models are necessary because although the household is essentially a collaborative endeavor, men and women do not share information, resources, benefits or responsibilities uniformly or equitably.

The rural population is not a collection of isolated, atomized individuals with only individual interests (C. Okali 2011).

Community Animal Health Worker (CAHW) or Paravet programs also depend on financial incentives and reliable supply chains. Training local people to provide services in remote areas can dramatically increase access to animal health care, yet most programs fold once the donor leaves. Farm Africa's successful CAHW program includes realistic prices to provide an income to service providers, and regular refresher courses (Peacock 2007).

Non-financial incentives for producers include goat shows, prizes, competitions, and field trips to farms in other districts, as seen in the imGoats and Morocco case studies. Budgets should re-

flect the transportation costs, and recognize that financial impacts may not be seen for several years.

Within households, each person contributing to the goat enterprise must have an incentive for work. If husbands appropriate the goat generated income, wives may have little incentive to continue with the increased work load, and production or quality may decline. Although many project M&E systems use the household as the unit of analysis, it is necessary to gather data from both men and women, as well as the old and young, to understand household dynamics which impact overall success (Njuki and Sanginga 2013). The Nepal Meat Goat project illustrates the importance of holding "gender training workshops" for men, to sensitize them to women's contribution to the goat enterprise through their labor, and their need for cash to take care of the family.

The Nepal Meat Goat project illustrates the importance of holding "gender training workshops" for men, to sensitize them to women's contribution to the goat enterprise through their labor, and their need for cash to take care of the family.

5.1.4. Accountability

Scaled up programs are more complex than community projects, and different stakeholders have different information needs. Accountability is the other side of incentives; how does the implementer know if there are problems that need solving? To whom can the community appeal if promised services have not been delivered? What if there are unintended negative social or environmental impacts?

Many development organizations collect data to send to the donor. It can take time and incentives for a culture of honest self-assessment to flourish, and requires a committed donor who is also a partner to the process.

Staff in government, research and animal health services need training and incentives to work with goats and with poor men and women. Participation and respect for small-scale farmers is rarely an institutional principle in university programs in animal science, veterinary medicine, research or advisory services. Changes in institutional culture must be incremental and rewarded. Staff accountability may include questions during yearly evaluations, public recognition, travel, merit pay, surveys of end users, and opportunities to train others.

5.2. Creating Space to Grow

5.2.1. Fiscal and financial space

Scaled up development programs involving goats require more up front funding than many individual small programs because of the need to invest in long-term institutional strengthening. Coordinated donor support for "mainstreaming" the right policies and institutional mechanisms for agriculture, rural development, and nutrition can lead to more efficient use of resources in the long run (Hartman and Linn 2008). Therefore, the program also needs a longer time frame to see results.

Poverty-reducing agricultural markets for smallholders require, "simultaneous and complementary investments in all links in the supply chain" (Poulton 2006). The need for complementary investments from different market participants makes each individual investment highly risky, as its success depends on the investment decisions of other players. Innovation Platforms to coordinate the participants is essential, but takes time, money and leadership, as seen in the imGoats case studies.

The massive financial resources required to scale up successful goat programs will need to come from private sector investment to mobilize private-public partnerships (PPPs). The models in the IGA/IFAD study are profitable and describe engagement with the governments to create the enabling environment.

Small-scale goat producers need credit and other financial services to expand their goat businesses and pay for services, where commercial banks do not consider them viable clients. One solution is to include a microcredit or revolving credit component in the project design. Another is to collaborate with an existing microfinance institution in an area where people are investing in goats, to ensure good technical advice for production and marketing to protect the goat investments. For example, The Grameen Bank's approach was integrated into IFAD's smallholder poultry production model (SHPPM) in Bangladesh.

5.2.2. Political space

Farmer organizations need to be strong and inclusive, and able to demand a seat at the table to promote pro-poor and pro-women goat policies. Alliances and support must be built before negotiations to pass favorable policies. Politicians want to be seen helping large numbers of people, so the more farmers or value chain actors who demand a certain policy, the better the chances of approval. Organized groups of farmers or federations of cooperatives create "political capital" that gets the attention of politicians with the power to approve or ignore demands.

"Scaling-up is a political process, so solutions that are "second-best" from a technical perspective may have to be promoted to gain political support" (Hartman and Linn 2008). Donors and project implementers need to agree beforehand about which program elements are non-negotiable. While benefits to the better off are necessary to assure their support, it cannot be at the further expense of the poor.

In Africa, male politicians think of goats as shameful for those who cannot afford cattle so they have been unwilling to fund goat based interventions. Improved livestock data collection that includes informal as well as formal markets shows the current and potential contribution of goats to development.

Engagement with political leaders requires reliable data as well as good diplomatic skills. For example, in Africa, male politicians think of goats as shameful for those who cannot afford cattle so they have been unwilling to fund goat based interventions. Therefore, better livestock data collection is necessary that includes informal as well as formal markets, and in the case of goats, intentionally identifying animals owned by women as well as men. This way, strong arguments can be made for investing in goats to reach the poorest and most marginalized of rural inhabitants, as done by Farm Africa (Peacock 2007).

5.2.3. Policy space

Lack of an appropriate policy framework is one of the main causes of failures of scaling-up. Yet, when there is space for input from small-scale producers and positive policies result, scaling-up often happens effectively. For example, under the Brazil's *Fome Zero* policy framework, a national social protection program was implemented with fresh goat milk purchased by the government and distributed to needy families. The policy took years to develop, and required an effective coalition of producers, researchers, NGOs and politicians.

An Innovation Platform is a forum for participatory identification and implementation of a competitive production system to reduce transaction costs along the value chain (van Rooyen 2009), and to develop pro-poor and pro-women policies to support a goat intervention. Innovation Platforms need skilled facilitation, which in turn requires ongoing training and backstopping. In very authoritarian cultures it may be challenging to build trust or assertive speaking among hierarchical social groups. Understanding and promoting policy and institutional change depends on the underlying capacities for change, which depend on the quality of relationships among actors in a sector (Otte, et al. 2012). If Innovation Platforms can strengthen these relationships, then there is a greater chance of implementing pro-poor policies.

The Nepal case study shows how regular meetings built trust among consumers, traders and producers. Before these meetings, producers distrusted traders, whom they accused of harmful

behaviors such as kicking animals to lower their value, while traders thought that farmers demanded unjustifiably high prices, and required too many visits to buy a goat. Improved communication led to better functioning markets and increased income for both producers and traders.

In Venezuela, the local governments started to develop policies for enabling smallholder goat production, which still need to be finalized and enforced. The Mexico case study concludes that a communication platform between government, private processors, and farmers about policies, payments and enforcement would increase producers' benefits from goat interventions. This would require stronger farmer organizations, and perhaps an external driver like a donor, and political will, as seen in the Argentina and Brazil case studies.

Because existing value chains generally favor the better off and the larger scale producers, new policies must be developed regarding access to common resources like rangeland and water, transparent pricing, premium prices for quality, competition with subsidized imports, phyto-sanitary regulations and protection from monopolistic processing, storage, and trading systems. For example, the improvement in milk marketing rules by the government of Kenya favored the investment in a pilot farmer-owned goat milk processing plant by FARM-Africa which enlarged the milk market opportunities for producers. The Tajikistan case study illustrates the importance of legally protecting producers' access to grazing land, as well as the need for premium prices to be paid for higher quality products. Outdated pricing systems discourage quality production, and destroy markets.

The Senegal case study revealed that imported milk powder produced with subsidies undermined prices for local goat milk producers. In Nepal, meat goat producers had to compete with producers from India who enjoyed subsidized loans for their goat enterprises. In Venezuela, there is no incentive to produce clean milk because the price paid remains the same.

Goat milk is generally higher in fat and protein than cow's milk, so processors can make more cheese or other products from the same volume. When payment is based on liquid milk volume rather than butterfat content, one of the main advantages of goat's milk is lost, while processors gain extra resources. Testing for fat content at the time of sale to a collector or processor discourages producers from adding water to milk, which lowers quality. A premium price for cleaner milk with fewer coliform bacteria creates a strong incentive for improved quality, and also benefits the processor and the final consumer.

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Phyto-sanitary regulations of animal source foods are necessary to protect public health, yet they can be used to prevent the poor from participating in or having access to markets. Policies

in developing countries show a systematic bias towards industrialization and concentration, favoring large- over small-scale operators (Otte, et al. 2012). In East Africa, restrictive regulations on the informal milk trade were in place, but the Kenya Dairy Board (KDB) finally embraced the informal sector as legitimate participants in shaping policy and regulations, after much NGO pressure. Ugandan and Tanzanian policy makers remain hostile to the informal milk market, which is the main outlet for goat milk producers (Kurwijila 2011).

Pro-poor networks such as the Community of Practice for Pro-Poor Livestock Development (http://www.cop-ppld.net/) and the South Asia Pro-Poor Livestock Policy Programme (http://sapplpp.org/) provide examples of policies from around the world which can serve as models in new locations.

Pro-poor policies such as improved rural infrastructure, price transparency, market access and inclusion of small-scale producers in policy development are necessary (Otte, et al. 2012). Pro-poor policies are not necessarily pro-women, so gender gaps need to be addressed as well, such as women's longer work day, lower social status, weaker property rights, and lower levels of education.

To ensure women's voice in policy making, many developing countries have adopted the "one third" system of reserving a minimum of one third of the seats in any decision making forum for women, including local and regional boards, producer unions, and government. It is important for women to participate as leaders not just in community groups, but in higher levels of organization such as producer federations and Innovation Platforms. Implementing agencies must prove their trustworthiness and organize safe transport for women so they can get permission to travel.

For small community based projects, investments in policy reform may seem irrelevant, because most small ruminant production is outside the formal sector (McSherry and Brass 2007). However, scaling-up goat-based interventions will require a substantial change in customary and legal frameworks for asset ownership and management (Heffernan 2014 forthcoming).

5.2.4. **Organizational and Institutional space**

Scaling-up is about shifting focus from pro-poor production or marketing technologies (forage production or "designation of origin") to the institutions which support them across a large geographical area, and can continue after withdrawal of donor funding. The necessary institutions in developing countries, such as government, producer groups, research and educational faculty, need strengthening to meet these responsibilities. Institutional capacity building must be at all levels and include both "hardware" (infrastructure, facilities and equipment) and "software" (management and technical knowledge) to provide services to all members of the communities.

Smallholder institutions need improved organizational management and a process to generate funding to operate. They must assist their members to commercialize production, and build on existing social capital and community trust, without deepening existing gender or ethnic inequalities. Community-based institutions that can aggregate into “apex” or national organizations can achieve economies of scale to acquire inputs or sell products, provide services, and influence policy-makers. For example, the Tajikistan model organizes the goat producers and spinners into groups allowing for a critical mass of production and access to markets in the US and Europe

Change in behavior is part of all innovation, including institutional capacity building. Scalability of an innovative goat model depends on project staff understanding the behavioral changes needed, and the leadership capacity of the implementing agency. If effective large-scale implementation of new innovations implies greater capabilities than those currently existing, then there is no way around investing in systems and organizations (ARD 2012).

Chronically marginalized smallholders are often inexperienced in dealing with distant markets and government officials. Adequate time and training is necessary to develop strong, socially cohesive and equitable, business-oriented and profitable smallholder institutions which can confidently negotiate with buyers, exporters, and policy makers. It is possible, as seen in the Heifer Nepal Case study.

a) **Government institutions**

Scaled up goat programs require engagement with government agencies to facilitate policies and activities during implementation and beyond. Many government ministries, and well as established project administrators, exhibit deeply embedded authoritarian cultures (deHaan 1997). Government staff in many developing countries are not always rewarded for efficient service. They are often poorly paid and may not necessarily be promoted on merit or held accountable for poor performances (LID 1999). Strategies to improve extension include increased budget for transportation and training in Zambia, cooperation with universities, as seen in Senegal, and self-funded services through producer groups as seen with Farm Africa in Kenya.

The Goat Law in Argentina in an innovative strategy to direct resources to poor goat producers. It was passed in 2006, as a result of two years of consultations and workshops with smallholders, government and research institutions, and producer organizations. The Ministry of Agriculture is the coordinator at the national level, with a commission composed of government officers and producer representatives, which distributes funds based on the total goat population. A similar commission operates at the provincial level, and distributes grants, subsidies and credits to approved projects (Maria Rosa Lanari, INTA-Bariloche, personal communication).

Brazil's "Fome Zero" is an example of social and agricultural ministry cooperation. The Food Acquisition Program (PAA) of the Ministry of Social Development (MSD) is part of the federal government. It provides funds for states to purchase goat milk from approved small family farmers in the Northeastern states of Bahia, Pernambuco, Paraíba, Rio Grande do Norte and Ceará. The milk is processed and distributed to food insecure families (GoB 2014). The program demands good relations between state and federal institutions. When different political parties controlled the two areas, payments to goat milk producers were disrupted. Government purchase of goat milk quotas has been essential for the survival of small scale producers in Brazil, but it also raises the question of dependency and sustainability.

b) **Research institutions and universities**

Research institutions invest time and money developing technical innovations to improve goat production. They often manage development projects to test their ideas, but often too little effort is devoted to link research results with practical implementation so impact on poor producers is limited (Gündel 2001).

Past goat development and research programs have focused, almost exclusively, on genetic improvement to increase productivity. There have been very few livestock improvement programs that focus on improving management. Therefore, few projects have raised the skills of farmers to take advantage of the new breeds, or developed reliable health care networks (Peacock 2007).

Research organizations reward staff for the number of scientific papers they publish rather than on the impact of their research on the poor, so scientists have little incentive to invest in participatory, client-led research that would result in the development of more appropriate technology for the poor. (LID 1999). For example, the Small Ruminant Collaborative Research Support Program (SR-CRSP) which developed the Kenya Dual Purpose Goat (KDPG) was successful for the professional careers of the scientists who published papers, but today no KDPGs can be seen. The end of donor support effectively terminated the entire program (Okeyo 2000).

Research institutions such as EMBRAPA in Brazil have been successful in improving goat production in the smallholder sector, and also in influencing policy. Universities, NGOs and government agencies have cooperated to bring improved genetics and management to goat producers in Northeastern Brazil.

The 1992 UN Conference on Environment and Development in Rio de Janeiro led to an increased interest in environmentally friendly agriculture that has become known as "agroecology," the interdisciplinary scientific study of cultural and agricultural practices from farm plot to entire ecosystems. It focuses less on technical interventions and more on social or organizational improvements (Pretty 2008). The study of the ecology of the entire food systems, encompassing ecological, economic and social dimensions, enables better resource management and ensures

adequate nutrition for the human population. It is also a tool to breakdown the "silos" or sectoral divisions between livestock, agronomy, nutrition, sociology and economics (Wezel 2009).

Agroecology has particular relevance for goat production, as goats may be the only livestock that can support the people who live in fragile or harsh ecosystems. These communities are often the most impoverished and marginalized from political power, and goat interventions with good natural resource management can ensure their survival. Nevertheless, "agroecological approaches" are more often found in NGO projects, rather than research or government ones, because of the difficulty in crossing sectoral lines in institutions.

Differences in institutional budgets and cultures have discouraged cooperation and coordination among sectors in both government and research. They also may be in competition for funding or recognition, and rapid staff turnover can limit institutional bridges. Students at universities tend to be funneled into their respective disciplines without much exposure to peers, faculty, and professionals in other departments, limiting the broad perspectives needed for successful scaled up programs (von Braun 2011).

Many livestock professionals have become adept at community development, but learned participatory practices through NGOs during their careers, rather than during formal education. Veterinary schools in developing countries continue to emphasize the health of larger animals such as cattle and buffalo, or providing services to large scale producers (LID 1999). Makerere Veterinary Faculty in Uganda is a leader in training its new veterinarians to be agents of development, through sociology modules to improve services to resource-poor men and women, and their livestock (Hill 2009).

5.2.5. **Partnership space**

Partnerships between diverse agencies and organizations are needed to manage the complexity of large scale goat interventions, because no existing organization can have the staff or skills to reach all of the target areas. Partnerships widen the reach of the program, but there are challenges from mixing different organizational cultures. For example, partners from the private sector may be accustomed to defining success in financial terms only, whereas research institutions may prioritize animal production, extension may count up the numbers of farmers who attend training, and nutrition agencies look at changes in the rate of child stunting.

One key to success is to limit the number of partners to no more than four, to ensure realistic blending of cultures and effective communication. Another strategy is to map out a common understanding of poverty and a theory of change. Private sector agents often assume that poverty is an individual's lack of money, whereas development workers are accustomed to linking social and technical change. All partners must have common and realistic assumptions about human behavior, and collect data to support their assumptions.

For example, Heifer International's Theory of Change focuses on capacity building, social capital, and empowering women (Aaker 2007). During the scaling-up of its model of smallholder dairy production and marketing in the East Africa Dairy Development Program (EADD), the new partner organizations did not discuss their assumptions about poverty and gender. Baseline and monitoring data revealed that dairy incomes were rising but accruing to the men only, because processors sent the monthly dairy check to the head of household, usually a man. The partners and their staff did not recognize and address gender difference within the family or cooperative. Additional activities to allow women access to family income were added but significant time was lost (Mutinda 2011). A second phase of the project has gender equality as an explicit objective with activities, budget and indicators for monitoring. The funder, the Bill and Melinda Gates Foundation, recognized that scaling-up is complex, and time is needed for the donor as well as the partner institutions to learn from their own experiences.

The private sector can be an important partner in scaled up livestock programs, to ensure financial sustainability. Successful models include "social entrepreneurs" such as the Bangladesh Rural Advancement Committee (BRAC), which harness the power of the market to generate both income and social justice. BRAC supports poultry and dairy cow projects in Bangladesh which bundle technical training, inputs such as feed or live chicks and marketing, with services provided to groups, or to "the door." Even poor women or those living in "purdah" (seclusion) can participate and generate income, and this model can be adapted for goat value chains (BRAC 2011).

5.2.6. Cultural space

One of the pre-requisites allowing for scaling-up of a model is its cultural acceptability. For example, in some societies or among some ethnic groups drinking goat milk is a taboo, so it would be inappropriate to attempt a dairy goat project there. However, cultures are constantly changing, so current attitudes must be continually examined, rather than relying on assumptions. For example, upper caste Hindus do not consume meat, but many dietary practices are not followed as strictly as in the past. Goat meat is now a valuable commodity in India and Nepal.

However, in India it can be difficult to find veterinarians willing to work with meat goat producers, or to inspect slaughterhouses because of the prevalent vegetarian ideology among highly trained professionals, who are usually Brahmin (highest caste). It is also difficult to attract government attention and support for meat producing livestock activities.

Because discrimination against women is widespread, they may find that they are not welcome in public spaces or at the decision-making table. In Tajikistan, it is difficult to find women with the high technical, managerial and business skills that are required to become spinners or group leaders. They may face restrictions in mobility and in interactions with men. More time must be invested finding women candidates and preparing them for leadership positions.

Goat development modes must adjust to each new location to ensure outreach to ethnic minorities and other marginalized groups. Effective training must be in the local language, which often means hiring indigenous extension workers. Trainers may need to discuss women's participation with the men first, to ensure their support. Childcare, short lessons and materials with pictures rather than words (for preliterate groups) can also increase women's participation.

5.2.7. Learning space

A strong accountability system is especially important for large scaled up programs, so that lessons about what does and does not work can be used for continuous improvement. For example, Heifer International country programs budget for yearly meetings for representatives of each project, where both successes and failures are shared. Although all participants want to be respected for their successes, the safe space to learn from setbacks builds confidence, accelerates learning, and establishes realistic goals.

Successful projects can be models to other donors and farmers in an area. For example, a farmer group working with imGoats in Rajasthan, India, discovered that when women sold their goats, they either purchased land or invested in the education of their daughters. They noted that when the man has to spend money, his preference is still for boys to be educated, but a mother gives equal treatment to her daughters (imGoats 2012).

Communities of Practice can be live or online spaces where best practices can be shared, or advice exchanged. The CoP-PPLP and SA-PPLPP provide a huge amount of information, but online discussions tend to be limited, because there is no one common language. Also some institutional cultures discourage public sharing of anything but successes. Budgets for live interactions for farmers, project staff and researchers are important ways to build enthusiasm, develop "social capital" and improve learning.

6. What are the most serious likely obstacles and risks, and what can be done to mitigate them?

Successful scaling-up takes significant time, money and oversight, so the donor, government and implementing agencies need to be able to count on each other to make and keep commitments. A minimum of 10 years is needed to impact institutional cultures, or develop alternative institutions. Large scale programs with complex value chains tend to focus on technical or market investments, especially if they are led by technical managers, so planning processes must require data and activities to promote positive social and institutional impact.

6.1. Government Priorities and Prejudices

Historically, governments in developing countries have prioritized crops and the commercial farming sector, because of powerful local elites and vested interests of decision-makers. Furthermore, the small-scale livestock production system in general has been considered backward, un-productive and inefficient, or shameful, even leading to adverse policies (e.g. sedentarization of mobile pastoralists). Livestock are now associated with greenhouse gases and zoonotic diseases.

IFAD, IGA and other institutions must unite to advocate for the benefits from goat investments to governments and the delivery of goat extension and health services to small scale producers. This IGA/IFAD report should be shared and discussed, with funding agencies so each country can learn from its own experience. Donors can influence research institutions by funding technical innovation with goats that have the greatest chance of impacting the poor.

6.2. Technical advisory services, markets and inputs

Appropriate technology and advisory services are the backbone of successful goat projects. Producers need relevant and timely information on feeding, breeding, health and management. They also need access to financial services to fund investments in productivity, access to inputs, and a market for their products.

Good technical advice is not enough if the recommended inputs such as feeds, medicines and health services are not locally available, in small units or reasonably priced. IFAD's Smallholder Poultry Production Model (SHPPM) in Bangladesh consists of a poultry production and marketing chain, with linked enterprises for production, inputs & supplies, credit, and extension services. Even women living in purdah (seclusion) can participate since inputs and products are available at the doorstep.

Technical interventions introduced in the wrong sequence can fail. For example, improved genetics can increase milk or meat or fiber production in goats, but they bring the most benefits after community groups have formed, feeding and labor issues addressed, and transport to markets organized. The introduction of breeding farms alone to provide improved genetics benefit the better off the most, and rarely impact the poor. Nor will producers be willing to shift time and money to goats, at the expense of staple crop production. The shift from subsistence to commercial production may expose them to volatile food market prices and increased food insecurity (Moti Jaleta 2009), so commercialization must proceed slowly to minimize risk.

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Inputs such as feed or improved bucks may be subsidized as an incentive to join a project or improve management, but can be notoriously difficult to end, and can be appropriated for political purposes. For example, Malawi's fertilizer subsidies boosted maize production, but the better off tended to benefit more, because they often have easier access, and the price is the same for all buyers. Voucher systems can focus subsidies to those most in need, which improves performance (Chirwa 2013).

A long standing obstacle to commercialization of smallholder dairy production in developing countries is dumping of subsidized milk powder, which undermines markets for local producers. For example, in Senegal, the Fulani women's group could not sell their fresh goat milk at a competitive price in urban markets because the government prioritizes cheap milk powder from the EU to keep urban food inexpensive. The Brazilian model of government purchases of fresh milk, and distributing it to the needy requires close management but leads to better outcomes for all sectors of society. Other countries impose taxes on imports produced with subsidies to level the playing field.

6.3. Communication and Cultural Assumptions

Scaled up programs involve multiple actors and activities, so the quality of communication can determine outcomes. Electronic and mobile phone communication can bridge physical distances, but may not be reliable or available in some areas. An explicit process for sharing reports and updates is essential, as in a process for interpreting and then using that information. The communication process must be routinely improved based on experiences from the community to the partners, donors and government. The budget must cover physical meetings, to ensure that participants develop positive relationships.

Multiple institutions have different cultures for making decisions and handling setbacks, as well as assumptions about causes of poverty and satisfactory outcomes. The partners must make these differences visible, and then reach a common working model. Novelty and resistance may slow down implementation, so diligent monitoring, with training and backstopping is important.

Scaled up programs that cross sectors can be challenging. For example, experts in goat production may not be accustomed to working with political and market actors, as well as nutrition and gender experts. IFAD now uses chronic child malnutrition (height for age measurements) as an indicator of impact, because increased production or income does not automatically lead to better child health. Traditional livestock workers may be unfamiliar with this metric, and may need to work with new partners.

The imGoats project started with the assumption that small scale goat keepers had both the skills and desire to commercialize if markets were more convenient. The smallholder population turned out to be more diverse than expected, and some functions of goats were invisible to outsiders, such as their value as social capital through gifts and sacrifices (Hendrickx 2013). Subsistence producers rely on goats to store their wealth, and will not sell them until viable alternatives are available and accessible, such as village banks. They also need to have a minimum size goat herd before they can risk selling any animals. Technical advisors may assume that poor producers prioritize breeds that will increase production, when in fact they may prefer goats that simply survive harsh conditions with minimal purchased inputs (FAO 2012).

Subsistence goat producers survive by avoiding risk. Commercialization brings new risks, from dependence on purchased inputs or coordinated actions, to inflation and money losing its value. Commercial production and reliance on cash to purchase food may increase food insecurity when food prices are volatile. If commercialization shifts goat generated income to husbands, and traditionally women are ashamed to ask for money for food, child nutrition and health will decline. Without quick increase in production, farmers cannot accept the risks inherent in new breeds, inputs, or technologies.

One way to minimize the damage from mistaken assumptions is to start small with pilot projects, and build on lessons learned at each step. The donor must be patient and willing to accompany the implementing organizations and producers over their learning curve. Large-scale programs can lead to large-scale mistakes.

Many local implementing partners are accustomed to a passive role in carrying out activities listed by the donor, and will not add or adjust the plan even if there are obvious oversights. For example, in India the imGoats project had an objective to lift people out of poverty, and although the implementing agency had excellent tools to identify the poor in the community through wealth ranking, these were not used because they were not specified in the contract (Maarse 2013).

The Innovation Platform is a useful strategy to address starting assumptions and ensure good communication during successful scaling-up. When value chain actors have antagonistic or biased attitudes towards each other, markets do not work well. This cannot be addressed unless there is a safe place to air their perspectives and find solutions, as seen in imGoats, Rajasthan.

6.4. Tools and skills for project management

Large programs need a system for planning and approving projects, rather than replicating identical plans in each new location. The planning process requires skilled facilitators so each com-

munity can assess its own environmental and social context. The budget must include "training of facilitators" because new staff may not have the needed skills. Local community based leaders such as the "field guides" in the imGoats projects may need years of assistance to become adept at sharing information, suggestions and outcomes with their constituencies, especially when farmer groups are still in the process of getting established (Hendrickx 2013).

Some data collection tools may take too long to be useful. Good baseline information is important for measuring impact, but if too complex they can take years to plan, implement and interpret. Preplanning should include a literature search on both production and culture, interviews with peer organizations, and then small group meetings in target communities to verify or change assumptions. The monitoring system needs to focus on "who needs to know what, and why" to limit unduly cumbersome and expensive surveys. A combination of quantitative and qualitative data (Q2), and the institutional will to interpret and share information leads to continuous learning and improvement.

A common mistake in data collection is to regard each household as a homogeneous unit, which can hide gendered impacts such as increasing women's workload in managing goats, or shifting control of income to their husbands. Solutions include specific objectives and activities for empowering women to ensure that training is woman friendly, workloads are shared, and men are supportive of women's need for income, as seen in the Nepal case study.

Selection criteria for participants need some standardization to ensure that the poor will benefit. Requirements such as land ownership can exclude the very poor or women, but distributing free goats without any qualifications, limits success. For example, following an earthquake in Central Java, a goat-based aid program provided "goat credit" to groups of farmers, but did not include any technical training. A year and a half later, only those farmers with previous experience with goats had successfully repaid their credit (Budisatria 2013).

A scaled up goat program should harmonize the conflicting standards currently seen, with many small and disorganized goat projects. Sometimes goats are distributed on credit, at subsidized cost, or for free, as are vaccines and other health inputs, and feed or supplements. Scaled up programs reduce confusion and costs through elimination of unsustainable practices like distribution of goats without requiring training or joining a group. It is never appropriate to provide free goats, however tempting this may be to humanitarian organizations. What is received for free is never valued and looked after in the same way as when a payment is made, however modest (Peacock 2007).

6.5. Weak community institutions

It is most effective to work with farmer groups rather than with individuals, but poor goat pro-

ducers rarely have strong community institutions. If producer groups are already present, they may not include the resource poor, the women, the landless, ethnic minorities, or those with low or no caste. They may need outside facilitation to form institutions that represent the whole group and to join with similar groups to develop political influence, and develop service and market hubs to exploit economies of scale. The Nepal case study documents the steps leading from small self-help groups, to larger cooperatives and finally to federations of cooperatives to influence policy, prices and services.

A frequent obstacle to long-term project success is dependence on donors or government support, which can come to an end. If the community institution is strong, and the marketplace is level, the members will be able to continue and expand their goat enterprises.

6.6. Too short time frame

The time frame for a goat project must be realistic for both implementation and to see impact. For example, Land O'Lakes in Liberia has a 3 year grant (2011-2014) from the United States Department of Agriculture (USDA) to restock 21,000 goats and develop the goat meat value chain, to replace depleted livestock from its Civil War from 1989 to 2003. Although goats reproduce quickly, training and value chains take a long time to design and implement, especially in places where organized markets are rare. Hopefully impact data will be collected for several years after the project ends. (LOL-IDD 2014).

Much of Heifer Nepal's success comes from a long-term presence, in Nepal and other countries. Projects are funded for a minimum of five years and much longer in many cases, with older projects assisting newer ones. The East Africa Dairy Development project is funded by the Bill and Melinda Gates Foundation (BMGF) for 10 years.

6.7. Climate change

Climate change is already impacting the poorest livestock keepers, who live in the most marginal areas, and are most dependent on goats for their livelihoods. In Mexico, land is becoming more arid, increasing the areas where goats are the only livestock that can thrive. The need for improved and scaled up goat interventions is becoming more urgent. Climate change will affect breed selection, with hardier indigenous breeds having advantages in harsher climates. For example, in East Africa, Maasai communities are now restocking the red Maasai hair sheep, a parasite resistant breed nearly lost due to subsidies in the 1970s for crossbreeding with more productive but less drought tolerant Dorper sheep (Omore 2014).

7. Conclusions

Successful development programs focus on people, and the goats and other activities are the means to improve their livelihoods and welfare. Goats make an excellent entry point into poor communities, and their relatively low cost means that more people can participate in goat-based activities. Goat projects can help reach the Millennium Development Goals (MDGs), especially the eradication of extreme poverty and hunger, because even the very poor can own goats. The MDG deadline is 2015, and although extreme poverty has been reduced around the world, this has not translated into adequate progress regarding hunger, child mortality, access to primary education, reproductive healthcare, and sanitation (IFPRI 2013).

The post-2015 development agenda will focus on the elimination of hunger and under-nutrition globally by 2025. Goat interventions will be particularly useful, because they can be targeted to the very poor, especially women, which will increase impact on family nutrition and health, if they can continue to control the income that the goats generate.

A goat project is a good opportunity to build men's support for increased opportunities for their wives and daughters. Goat income in the hands of women is more likely to be spent on education for children, especially daughters; health care which reduces child mortality, and improved family nutrition, which increases resistance to infectious disease such as HIV/AIDS and malaria. Women's health improves when they enjoy higher social status and become more confident. Knowledge of goat reproductive health can help them understand their own bodies, and good sanitation improves both human and animal health.

Improved goat management leads to enhanced environmental quality as well as increased production, especially in the marginal areas where most of the rural poor live. A large-scale goat program is an excellent opportunity for previously isolated sectors such as agriculture, nutrition, environmental sustainability, and human and animal health to work together and achieve common goals.

The IGA/IFAD Knowledge Harvesting study adds to the evidence that the very poor can successfully participate in goat value chains as long as adequate policies, processes, infrastructure and institutions are in place. Scaled up programs involving goats must be designed and monitored to lead to benefits to all members of the household, and to the resource-poor people in the value chain. All development interventions are complex, and outcomes from even well planned projects cannot be guaranteed. A well-managed program linking technical and social interventions using goats increases the chances of people leaving poverty behind and enjoying a food secure future.

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Business assessment and Cost Benefits analysis

for Pro-Poor Small Ruminant Development

By Dino Francescutti,
FAO Investment Centre, Viale delle Terme di Caracalla, 00153 Rome, Italy
dino.francescutti@fao.org

Business Assessment and Cost-Benefits Analysis for Pro-Poor Small Ruminant Development, based on the IFAD-IGA cases studies

1. Methodology for the business assessment

To complement the technical and socio-economic information gathered through the knowledge harvesting exercise, the case studies were subjected to a simplified financial feasibility analysis. Data was gathered from documents and qualified informants, using basic templates. Pre-production, production and processing activities for each country were analyzed separately. Net benefits were subsequently aggregated to an appropriate scale, so as to account for collective investments.

For goat production systems, the representative unit of production is the herd or flock with an average number of mature goats, with a one year cycle. The most appropriate unit of production is the one that allows relevant producers to estimate income and production costs, in their natural context. Once defined, the unit of production determines the way data is collected and analyzed for each activity. The most appropriate cycle is the one that better reflects the natural periods of operation and harvest or product generation. Crops have clearly defined cycles, whereas livestock production systems have continuous input-output dynamics

Income items, inputs, labor tasks and investments vary depending on the activity assessed. Value chains associated with goat production involve pre-production activities, production activities and processing/ marketing activities. Pre-production activities include livestock breeding, input provision and pasture/ feeds production. Production activities involve goat production for meat, milk and meat combined; and meat and fiber. Processing activities involve kid/goat slaughtering, retail butchering, milk processing and fiber processing.

The following cases were used for this analysis:

- Argentina kid/fiber production and processing
- Brazil goat milk production
- Mexico goat milk production and processing
- Kenya goat milk production
- Morocco Argan kid production and processing
- Nepal goat production
- India goat meat production
- Tajikistan kid/fiber production and processing
- Venezuela goat milk production and processing

Annex 1 contains Tables 1-8 with summarized information on features and results of the analyzed illustration cases. More detailed analysis is in Annex 2.

Table 1 presents the major features of each case, including pre-production, production and processing activities, and the financial impact with and without the intervention. Products, services and inputs were assessed at market prices. Same product prices and unitary costs were applied to situations with and without interventions, unless changes in product quality (and other product features) were observed or foreseen. Pre-production activities such as livestock breeding included service fees or sale of

breeding stocks, and inputs included forage, concentrates and by products and equipment to maintain and manage breeding stocks. Key parameters for goat production systems included flock size (does and bucks), fertility and reproductive rate, mortality rate (for kids and adult animals), weaning rate, replacement of breeding stock, daily milk production and lactation period, annual fiber production and weight of sold kids/goats.

For each activity, income and costs were estimated and converted in USD values, at the exchange rate prevailing when data was collected, for with and without interventions. Values were estimated per unit of production per cycle, including income, operation costs (inputs and labor), net income before labor costs, net income considering labor cost, and labor generated (person/days either family labor or remunerated labor). The value of investments associated with each activity, were also estimated in USD values with and without intervention. Information gathered included costs of investment items, economic life, residual value and annual reserve to replace investments at the end of economic life. Tables 2 and 3 present the above-mentioned financial estimates without intervention. Tables 4 and 5 present the same financial estimates with intervention. Finally, incremental values were calculated, subtracting without intervention figures from with intervention figures. Incremental results were estimated for: net income before labor costs, net income considering labor costs, and net income considering both labor costs and annual reserve to replace investments. Net income before considering labor costs is the indicator that better reflects the income available for consumption, since labor is often an in-kind contribution. When labor is well remunerated, rural wages often only cover basic needs. Tables 6 and 7 present these incremental financial results. Tables 2, 4 and 6 present results at project or aggregate level, depending on interventions. Tables 3, 5 and 7 present average results per family involved.

To estimate conventional financial feasibility indicators, incremental figures were projected for a period of 10 years. Residual value of investments was estimated at the end of the 10-year evaluation period. Incremental net income flows allowed for estimation of the Internal Rate of Return (IRR) and the Net Present Value (NPV) considering an annual discount rate of 12 %. A gradual process was assumed to move from the situation without intervention to the situation with intervention. The period to achieve values with intervention varies from 3 to 5 years. In general, a conservative period of 5 years was assumed, unless herd projections and gathered evidence support shorter periods – the later applies to illustrative cases for Nepal and India. Table 8 presents a summary of the above-mentioned financial feasibility indicators.

It is important to emphasize that estimated results are for illustrative purposes. Even though data was gathered from specific cases, some adjustments were made based on data from other country cases. Some input and labor items were simplified when the value was not substantial. In some case, labor costs were estimated using minimum wages applicable to unskilled or rural labor (published in websites).

Finally, a sensitivity analysis was conducted for the key factors of the businesses assessed within each illustration case. In essence, switching values were calculated for critical factors – switching values are those which reduce the expected NPV close to zero and thus the IRR close to 12 %. Table 8 also presents a summary of such switching values.

2. Summary of business assessment results

As shown in Table 1, the best intervention scale involves groups of 200-250 families with flocks (ranging from 120 to 334 families). Interventions for Nepal and India are of a significantly larger scale (from 3000 to 140,000 families) since they mainly foresee distribution of goats to increase flock sizes in shorter periods, so as to improve food security of poor households. The case of Morocco also considers a sizable scale since extension support is coupled with a sizable investment in slaughtering facilities for a well-known goat production region, which lacks such services. The case of Venezuela essentially represents business plans of two families, assisted by an extension agency under a project for arid land development. However, around 1,650 family rural businesses were also supported with this development project.

As shown in Table 3, annual net income before labor costs without intervention ranges from USD 100-3,000 per family. Net income is around USD 100-150 for Kenya, Nepal, India and Tajikistan – relatively low due to the small flock size per family. Therefore, income for goat production contributes partially to family survival. Net income before labor costs is over USD 1,000 per family for Argentina, Brazil, Mexico, Morocco and Venezuela. Productive labor generated follows a pattern similar to net income, ranging from 50-90 person/days per year (Argentina, Brazil, Kenya, Nepal, India and Tajikistan) to 160-320 person/year per year (Mexico, Morocco and Venezuela).

As shown in Table 5, annual net income before labor costs with intervention ranges from USD 240-340 per family (Nepal, India and Tajikistan) to 2,000-11,500 per family (Argentina, Brazil, Mexico, Morocco and Venezuela) – Kenya is between previous ranges with USD 600 per family. Productive labor generated ranges from 50-180 person/days per year (Argentina, Brazil, Kenya, Nepal, India and Tajikistan) to 230-810 person/year per year (Mexico, Morocco and Venezuela). Even though the small ruminant interventions bring about a substantial income increase, income per family is still insufficient for survival.

As shown in Table 7, incremental annual net income before labor costs ranges from USD 120-210 per family (Nepal, India and Tajikistan) to 850-8,000 per family (Argentina, Brazil, Mexico, Morocco and Venezuela), with Kenya between the previous ranges with USD 440 per family. Incremental productive labor generated ranges from 0-50 person/days per year (Argentina, Brazil, Kenya, Nepal, India and Tajikistan) to 80-500 person/year per year (Mexico, Morocco and Venezuela). Incremental net income before labor cost is 70-230% relative to net income without intervention. Consequently, there is great potential to increase productivity and value added on the existing production systems in all cases.

As shown in Table 8, IRR and NPV estimates per family follow a pattern somewhat different to incremental net income figures. NPV per family ranges from USD 100-220 (India, Tajikistan and Venezuela) to 2,000-5,200 (Brazil, Mexico and Morocco) – Nepal, Kenya and Argentina are between previous ranges with USD 360-530. IRR ranges from 12-16% (Argentina, India and Venezuela) to 54-72% (Kenya and Tajikistan) – Brazil, Mexico, Morocco and Nepal are between previous ranges with 24-41%. These results imply that the potential returns are proportionally greater in cases like Kenya and Tajikistan, where investment needed to bring about expected net income increases are proportionally less compared to case like Argentina, India and Venezuela. Even though Kenya and Tajikistan foresee investments on collective assets (genetically improved bucks, cooling tanks, carding machines and minor infrastructure) the main intervention is technical assistance, which are relatively inexpensive compared to other interventions – the third highest IRR is Brazil where the intervention is only technical assistance.

In addition, Table 8 also presents the switching values or proportional changes of critical factors, which would result in financial feasibility indicators below acceptable levels. Argentina, Brazil and Venezuela are very sensitive to proportionally small price reductions of milk and milk processed products (1-6%). Tajikistan is also sensitive to price reductions of fine fiber exported to USA/EU (8%). The other cases are

more resilient to such price reductions (37-50%). Brazil, Kenya, Mexico and India are moderately resilient to reductions in milk productivity (17-53%).

Last but not least, Table 8 includes the number of families with flocks to be involved in the analyzed interventions. In this regard, Venezuela and Argentina are quite sensitive to reduction in scale of interventions. The Venezuela case involved a small number of families. In turn, Argentina requires a minimum number of flocks providing fiber to a common processing unit. The base scenario is close to the minimum scale for these interventions. In contrast, Brazil, Kenya, Mexico, Morocco, Nepal and India can drastically reduce the scale of intervention (from 74 to over 90%) and still be financially feasible.

Annex – **Summary of illustrative cases (for each case, separate available calculation sheets were performed to support analysis)**

Table 1: Summary of illustrative cases: major activities, scale and type of interventions

Country	Value chain segment	Products - services	Unit of Production	Number of Units of production	Investment			
					Infrastructure	Equipment	Livestock	Technical Assistance
Argentina	Pre-Production							
	Production	Kids and fiber	Flock	250	x			x
	Processing	Dehaired cashmere	Unit	1	x	x		x
Brazil	Pre-Production							
	Production	Milk and kids	Flock	250				x
	Processing							
Kenya	Pre-Production	Breeding	Station	1	x		x	x
	Production	Milk and kids	Flock	200				x
	Processing					x		x
Mexico	Pre-Production	Breeding	Center	1	x			x
	Production	Milk and kids	Flock	120		x		x
	Processing							
Morocco	Pre-Production							
	Production	Argan kids	Flock	1,444				x
	Processing	Slaugthering	Facility	1	x	x		x
Nepal	Pre-Production							
	Production	Kids	Flock	138,000			x	x
	Processing							
India	Pre-Production							
	Production	Milk and kids	Flock	2,990			x	x
	Processing							
Tajikistan	Pre-Production							
	Production	Kids and fiber	Flock	334				x
	Processing	Processed mohair	Unit	1	x	x		x
Venezuela	Pre-Production	Forage	Plot	2		x		x
	Production	Milk and kids	Flock	2				x
	Processing	Cheese and milk jam	Unit	2	x	x		x

Table 2: Summary of illustrative cases: financial results without intervention at aggregate level

Country	Value chain segment	Products - services	Unit of Production	Number of Units of production	Aggregate results without intervention				
					Livestock (adult goats)	Investment Value	Net income before labor	Net income with labor	Labor (p/days)
Argentina	Pre-Production								
	Production	Kids and fiber	Flock	250	94,250	1,799,844	296,781	11,625	23,063
	Processing								
	Aggregate				94,250	1,799,844	296,781	11,625	23,063
Brazil	Pre-Production								
	Production	Milk and kids	Flock	250	4,500	1,767,099	386,958	142,111	16,656
	Processing								
	Aggregate				4,500	1,767,099	386,958	142,111	16,656
Kenya	Pre-Production								
	Production	Milk and kids	Flock	200	800	86,053	30,000	11,084	9,213
	Processing								
	Aggregate				800	86,053	30,000	11,084	9,213
Mexico	Pre-Production								
	Production	Milk and kids	Flock	120	4,800	1,783,903	267,379	135,979	18,600
	Processing								
	Aggregate				4,800	1,783,903	267,379	135,979	18,600
Morocco	Pre-Production								
	Production	Argan kids	Flock	1,444	72,200	9,743,564	3,438,857	3,039,748	371,429
	Processing								
	Aggregate				72,200	9,743,564	3,438,857	3,039,748	371,429
Nepal	Pre-Production								
	Production	Kids	Flock	138,000	414,000	59,853,360	18,503,040	6,611,942	6,296,250
	Processing								
	Aggregate				414,000	59,853,360	18,503,040	6,611,942	6,296,250
India	Pre-Production								
	Production	Milk and kids	Flock	2,990	14,950	1,633,426	351,048	194,419	136,419
	Processing								
	Aggregate				14,950	1,633,426	351,048	194,419	136,419
Tajikistan	Pre-Production								
	Production	Fiber	Flock	334	3,340	49,645	32,188	4,100	15,392
	Processing								
	Aggregate				3,340	49,645	32,188	4,100	15,392
Venezuela	Pre-Production								
	Production	Milk and kids	Flock	2	90	31,900	3,753	1,061	289
	Processing	Cheese and milk jam	Unit	2		6,744	3,248	68	342
	Aggregate				90	38,644	7,001	1,129	631

Table 3: Summary of illustrative cases: financial results without intervention at family level

Country	Value chain segment	Products - services	Unit of Production	Number of Units of production	Aggregate results without intervention				
					Livestock (adult goats)	Investment Value	Net income before labor	Net income with labor	Labor (p/days)
Argentina	Pre-Production								
	Production	Kids and fiber	Flock	1	377	7,199	1,187	47	92
	Processing								
	Aggregate				377	7,199	1,187	47	92
Brazil	Pre-Production								
	Production	Milk and kids	Flock	1	18	7,068	1,548	568	67
	Processing								
	Aggregate				18	7,068	1,548	568	67
Kenya	Pre-Production								
	Production	Milk and kids	Flock	1	4	430	150	55	46
	Processing								
	Aggregate				4	430	150	55	46
Mexico	Pre-Production								
	Production	Milk and kids	Flock	1	40	14,866	2,228	1,133	155
	Processing								
	Aggregate				40	14,866	2,228	1,133	155
Morocco	Pre-Production								
	Production	Argan kids	Flock	1	50	6,748	2,381	2,105	257
	Processing								
	Aggregate				50	6,748	2,381	2,105	257
Nepal	Pre-Production								
	Production	Kids	Flock	1	3	434	134	48	46
	Processing								
	Aggregate				3	434	134	48	46
India	Pre-Production								
	Production	Milk and kids	Flock	1	5	546	117	65	46
	Processing								
	Aggregate				5	546	117	65	46
Tajikistan	Pre-Production								
	Production	Fiber	Flock	1	10	149	96	12	46
	Processing								
	Aggregate				10	149	96	12	46
Venezuela	Pre-Production								
	Production	Milk and kids	Flock	1	45	15,950	1,876	531	145
	Processing	Cheese and milk jam	Unit	1		3,372	1,624	34	171
	Aggregate				45	19,322	3,501	565	316

Table 4: Summary of illustrative cases: financial results with intervention at aggregate level

Country	Value chain segment	Products - services	Unit of Production	Number of Units of production	Aggregate results with intervention				
					Livestock (adult goats)	Investment Value	Net income before labor	Net income with labor	Labor (p/days)
Argentina	Pre-Production								
	Production	Kids and fiber	Flock	250	94,250	2,695,313	442,206	157,050	35,826
	Processing	Dehaired cashmere	Unit	1		87,400	70,452	67,899	204
	Aggregate				94,250	2,782,713	512,658	224,949	36,030
Brazil	Pre-Production								
	Production	Milk and kids	Flock	250	4,500	2,405,491	1,000,063	621,844	25,729
	Processing								
	Aggregate				4,500	2,405,491	1,000,063	621,844	25,729
Kenya	Pre-Production	Breeding	Station	1		5,400	1,494	1,132	91
	Production	Milk and kids	Flock	200	800	108,224	115,774	92,418	11,375
	Processing								
	Aggregate				800	113,624	117,269	93,550	11,466
Mexico	Pre-Production	Breeding	Center	1		56,600	24,897	10,128	343
	Production	Milk and kids	Flock	120	7,680	2,530,423	605,636	474,236	27,166
	Processing								
	Aggregate				7,680	2,587,023	630,533	484,364	27,509
Morocco	Pre-Production								
	Production	Argan kids	Flock	1,444	79,420	10,826,149	6,320,342	5,921,233	371,429
	Processing	Slaugthering	Facility	1		725,666	89,280	20,504	8,979
	Aggregate				79,420	11,551,815	6,409,622	5,941,737	380,407
Nepal	Pre-Production								
	Production	Kids	Flock	138,000	1,104,000	136,752,877	47,255,340	35,364,242	6,296,250
	Processing								
	Aggregate				1,104,000	136,752,877	47,255,340	35,364,242	6,296,250
India	Pre-Production								
	Production	Milk and kids	Flock	2,990	23,920	3,461,737	724,023	567,394	136,419
	Processing								
	Aggregate				23,920	3,461,737	724,023	567,394	136,419
Tajikistan	Pre-Production								
	Production	Kids and fiber	Flock	334	3,340	49,645	32,188	4,100	15,392
	Processing	Processed mohair	Unit	1		5,648	69,218	19,336	44,970
	Aggregate				3,340	55,293	101,406	23,436	60,362
Venezuela	Pre-Production	Pasture	Plot	2		13,512	2,098	400	183
	Production	Milk and kids	Flock	2	90	40,233	5,578	1,079	484
	Processing	Cheese and milk jam	Unit	2		17,107	15,460	6,498	963
	Aggregate				90	70,851	23,136	7,977	1,630

Table 5: Summary of illustrative cases: financial results with intervention at family level

Country	Value chain segment	Products - services	Unit of Production	Number of Units of production	Aggregate results with intervention				
					Livestock (adult goats)	Investment Value	Net income before labor	Net income with labor	Labor (p/days)
Argentina	Pre-Production								
	Production	Kids and fiber	Flock	1	377	10,781	1,769	628	143
	Processing	Dehaired cashmere	Family	1		350	282	272	1
	Aggregate				377	11,131	2,051	900	144
Brazil	Pre-Production								
	Production	Milk and kids	Flock	1	18	9,622	4,000	2,487	103
	Processing								
	Aggregate				18	9,622	4,000	2,487	103
Kenya	Pre-Production	Breeding	Family	1		27	7	6	0
	Production	Milk and kids	Flock	1	4	541	579	462	57
	Processing								
	Aggregate				4	568	586	468	57
Mexico	Pre-Production	Breeding	Family	1		472	207	84	3
	Production	Milk and kids	Flock	1	64	21,087	5,047	3,952	226
	Processing								
	Aggregate				64	21,559	5,254	4,036	229
Morocco	Pre-Production								
	Production	Argan kids	Flock	1	55	7,497	4,377	4,101	257
	Processing	Slaugthering	Family	1		503	62	14	6
	Aggregate				55	8,000	4,439	4,115	263
Nepal	Pre-Production								
	Production	Kids	Flock	1	8	991	342	256	46
	Processing								
	Aggregate				8	991	342	256	46
India	Pre-Production								
	Production	Milk and kids	Flock	1	8	1,158	242	190	46
	Processing								
	Aggregate				8	1,158	242	190	46
Tajikistan	Pre-Production								
	Production	Kids and fiber	Flock	1	10	149	96	12	46
	Processing	Processed mohair	Family	1		17	207	58	135
	Aggregate				10	166	304	70	181
Venezuela	Pre-Production	Pasture	Plot	1		6,756	1,049	200	91
	Production	Milk and kids	Flock	1	45	20,116	2,789	540	242
	Processing	Cheese and milk jam	Family	1		8,553	7,730	3,249	482
	Aggregate				45	35,426	11,568	3,988	815

Table 6: Summary of illustrative cases: financial results with intervention at family level

Country	Value chain segment	Products - services	Unit of Production	Number of Units of production	Incremental results (with minus without intervention)				
					Livestock (adult goats)	Investment Value	Net income before labor	Net income with labor	Labor (p/days)
Argentina	Pre-Production								
	Production	Kids and fiber	Flock	1	-	3,582	582	582	51
	Processing	Dehaired cashmere	Family	1		350	282	272	1
	Aggregate				-	3,931	864	853	52
Brazil	Pre-Production								
	Production	Milk and kids	Flock	1	-	2,554	2,452	1,919	36
	Processing								
	Aggregate				-	2,554	2,452	1,919	36
Kenya	Pre-Production	Breeding	Family	1		27	7	6	0
	Production	Milk and kids	Flock	1	-	111	429	407	11
	Processing								
	Aggregate				-	138	436	412	11
Mexico	Pre-Production	Breeding	Family	1		472	207	84	3
	Production	Milk and kids	Flock	1	24	6,221	2,819	2,819	71
	Processing								
	Aggregate				24	6,693	3,026	2,903	74
Morocco	Pre-Production								
	Production	Argan kids	Flock	1	5	750	1,995	1,995	-
	Processing	Slaugthering	Family	1		503	62	14	6
	Aggregate				5	1,252	2,057	2,010	6
Nepal	Pre-Production								
	Production	Kids	Flock	1	5	557	208	208	-
	Processing								
	Aggregate				5	557	208	208	-
India	Pre-Production								
	Production	Milk and kids	Flock	1	3	611	125	125	-
	Processing								
	Aggregate				3	611	125	125	-
Tajikistan	Pre-Production								
	Production	Kids and fiber	Flock	1	-	-	-	-	-
	Processing	Processed mohair	Family	1		17	207	58	135
	Aggregate				-	17	207	58	135
Venezuela	Pre-Production	Pasture	Plot	1		6,756	1,049	200	91
	Production	Milk and kids	Flock	1	-	4,166	912	9	97
	Processing	Cheese and milk jam	Family	1		5,181	6,106	3,215	311
	Aggregate				-	16,103	8,067	3,424	499

Table 7: Summary of illustrative cases: incremental financial results at aggregate level

Country	Value chain segment	Products - services	Unit of Production	Number of Units of production	Incremental results (with minus without intervention) Livestock (adult goats)	Investment Value	Net income before labor	Net income with labor	Labor (p/days)
Argentina	Pre-Production								
	Production	Kids and fiber	Flock	250	-	895,469	145,425	145,425	12,763
	Processing	Dehaired cashmere	Unit	1		87,400	70,452	67,899	204
	Aggregate				-	982,869	215,877	213,324	12,967
Brazil	Pre-Production								
	Production	Milk and kids	Flock	250	-	638,392	613,105	479,733	9,073
	Processing								
	Aggregate				-	638,392	613,105	479,733	9,073
Kenya	Pre-Production	Breeding	Station	1		5,400	1,494	1,132	91
	Production	Milk and kids	Flock	200	-	22,171	85,774	81,334	2,163
	Processing								
	Aggregate				-	27,571	87,269	82,467	2,254
Mexico	Pre-Production	Breeding	Center	1		56,600	24,897	10,128	343
	Production	Milk and kids	Flock	120	2,880	746,520	338,256	338,256	8,566
	Processing								
	Aggregate				2,880	803,120	363,154	348,384	8,909
Morocco	Pre-Production								
	Production	Argan kids	Flock	1,444	7,220	1,082,585	2,881,485	2,881,485	-
	Processing	Slaugthering	Facility	1		725,666	89,280	20,504	8,979
	Aggregate				7,220	1,808,251	2,970,765	2,901,989	8,979
Nepal	Pre-Production								
	Production	Kids	Flock	138,000	690,000	76,899,517	28,752,300	28,752,300	-
	Processing								
	Aggregate				690,000	76,899,517	28,752,300	28,752,300	-
India	Pre-Production								
	Production	Milk and kids	Flock	2,990	8,970	1,828,311	372,975	372,975	-
	Processing								
	Aggregate				8,970	1,828,311	372,975	372,975	-
Tajikistan	Pre-Production								
	Production	Kids and fiber	Flock	334	-	-	-	-	-
	Processing	Processed mohair	Unit	1		5,648	69,218	19,336	44,970
	Aggregate				-	5,648	69,218	19,336	44,970
Venezuela	Pre-Production	Pasture	Plot	2		13,512	2,098	400	183
	Production	Milk and kids	Flock	2	-	8,333	1,825	18	194
	Processing	Cheese and milk jam	Unit	2		10,363	12,212	6,430	622
	Aggregate				-	32,207	16,134	6,847	998

Table 8: Summary of illustrative cases: incremental financial results at family level

Parameter	Swithing Values Argentina	Brazil	Kenya	Mexico	Morocco	Nepal	India	Tajikistan	Venezuela
Number of families	250	250	200	120	1,444	138,000	2,990	334	2
Internal Rate of Return	14%	41%	54%	24%	37%	24%	16%	48%	12%
Net Present Value per family	362	5,264	530	4,968	2,066	434	125	90	223
Critical factors:									
Price of kids	(2%)				(40%)	(37%)	(44%)		(1%)
Price of milk		(6%)	(50%)	(38%)					
Price of fine fiber								(8%)	
Price of standar fiber	(18%)							(44%)	
Price of milk jam									(1%)
Production of milk		(17%)	(53%)	(39%)			(22%)		
Goats per flock					(40%)	(13%)	(13%)		
Flocks involved	(6%)	(99%)	(97%)	(80%)	(74%)	(93%)	(88%)	(87%)	0%
Minimum no. flocks	*235*	*2*	*6*	*24*	*370*	*10,000*	*370*	*45*	*2*

Case study: Argentina - Neuquen - Improvement of Kid Meat and Fiber Production

Context: Project issues

Certificacion (DO) of the "Chivito" criollo Neuquen kid.
Development of the potentialities of the Neuquen breed for fiber.
Management of pastures (Goat law).
The project will be based initially on the 250 members of the Association fior the Chivitto crillo kid.

Main challenges

To improve prolificity and kid conformation.
To increase local sales (through linkages withtourism and skiing resorts).
To maintain goat keepers in the area.
To generate jobs for women (for sales of kids and possibly to sell cashmere).

Initial situation

Grazing from dry and low altitude ranges to semi-arid cold high ranges (2000-3000 mm).
Very extensive production systems.
Weak marketing organization.
Low valorization of the fiber potentialities.

Investments

Dehairing processing plant, including machinery and infrastructure.
Training and capacity building.
Infrastructures in range lands (Shelters, weels, fences)
Development of extension services and collective work of Association.

FLOCK

Activity: ***Kid and fiber production***

Production Unit: Average Flock

Situation	*Present*	*Expected*
Number of heads (female goats)	377	377
Number of heads (male goats)	38	38
Adult mortality	10%	10%
Adult discard rate	20%	20%
Discarded goats	83	83
Fertility rate	60%	70%
Number of kidding goats	226	264
Number of kids per kidding	1.4	1.4
Number of kids born	316	370
Cashmere per goat per cycle (kg)	-	0.13
Proportion of cashmere combed	0%	50%
Proportion of cashmere sheared	0%	50%
Weaning rate	65%	85%
Number of weaned kids	205	315
Number of kids for replacement of adult goats	113	113
Number of kids sold	92	202
Liveweight of female sold (kg)	39	39
Liveweight of male sold (kg)	64	64
Liveweight of sold kid (kg) - less than 6 months old	6	8
Labor time required for Cashmere combing (minutes/goat)	-	120
Labor time required for Cashmere shearing (minutes/goat)	-	10

Production Cycle: One Year

Situation	Present	Expected
Number of cycles per year	1	1

Income per Average Flock per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Cashmere combed	Potential	Kg combed	-	24.5	-	7.50	-	184
Cashmere sheared to dehair	Potential	Kg combed eq.	-	24.5	-	7.50	-	184
Kids sold	Middleman	Head	92.0	202.0	16.63	18.75	1,530	3,788
Adult goats sold	Middleman	Head	83.0	83.0	2.13	2.50	176	208
TOTAL							1,706	4,363

Inputs per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Supplementary feeds	Government	Head	-	166.0	-	12.50	-	2,075
Health treatments	Local provider	Head	415.0	415.0	1.25	1.25	519	519
TOTAL							519	2,594

Labor per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Flock care	Own Family	Person/day	91.3	91.3	12.50	12.50	1,141	1,141
Communal care of bucks	*Castronero*	Head	1.0	1.0	16.63	18.75	17	19
Cashmere combing	Own Family	Person/day	-	47.1	12.50	12.50	-	589
Cashmere shearing	Own Family	Person/day	-	3.9	12.50	12.50	-	49
TOTAL							1,141	1,141

	Present	Expected
Net Income before Labor Cost per Average Flock per Year	1,187	1,769
Net Income considering Labor Cost per Average Flock per Year	47	628
Labor generated per Average Flock per Year (Person/day)	92	143

FIBER DEHAIRING

Activity: Cashmere dehairing

Production Unit:Processing Unit

Situation	Present	Expected
Supplying Families	-	250
Cashmere collected (kg)	-	6,126
Dehaired cashmere / combed cashmere ratio	-	67%
Cashmere processed per person/day of labor (kg)	-	30

Production Cycle:One Year

Situation	Present	Expected
Number of cycles per year	-	1

Income per Processing Unit per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Dehaired Cashmere	Potential	Kg	-	6,126.3	-	22.50	-	137,841
TOTAL							-	137,841

Inputs per Processing Unit per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Cashmere opportunity cost	Local Flocks	Kg	-	6,126.3	-	7.50	-	45,947
Other inputs	Local provider	Kg	-	6,126.3	-	3.50	-	21,442
TOTAL							-	67,389

Labor per Processing Unit per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Processing	Local Labor	Person/day	-	204.2	-	12.50	-	2,553
TOTAL							-	2,553

	Present	Expected
Net Income before Labor Cost per Processing Unit per Year	-	70,452
Net Income considering Labor Cost per Processing Ur	-	67,899
Labor generated per Processing Unit per Year (Person/day)	-	204

INVESTMENT

Production Units:

	Present	Expected
Flocks served	250	250
Processing Unit	-	1

Investment on Average Flock - Present Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Female Goats	Own Family	Head	94,250	16.6	1,566,906	-	-	-	-
Male Goats	Own Family	Head	9,500	16.6	157,938	8	2	20,188	17,219
Infrastructure	Own Family	Flock	250	300.0	75,000	5	-	-	15,000
TOTAL					1,799,844				32,219

Investment on Average Flock - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Female Goats	Own Family	Head	94,250	18.8	1,767,188	-	-	-	-
Male Goats	Own Family	Head	9,500	18.8	178,125	8	3	23,750	19,297
Infrastructure	Own Family	Flock	250	3,000.0	750,000	20	-	-	37,500
TOTAL					2,695,313				56,797

Investment for 250 goat keepers - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Dehairing machinery	Project	Unit	1	45,000	45,000	20	4,500	4,500	2,025
Infrastructure	Project	Unit	1	25,000	25,000	20	-	-	1,250
Technical assistance	Project	Month	24	725	17,400				
TOTAL					87,400				3,275

PRESENT NET INCOME

Present Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Kid and fiber production	-	1,187	250	1	296,781
-	-	-	-	-	-
					296,781

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Kid and fiber production	-	47	250	1	11,625
-	-	-	-	-	-
					11,625

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	**(20,594)**

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Kid and fiber production	-	92	250	1	23,063
-	-	-	-	-	-
					23,063

EXPECTED NET INCOME

Expected Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Kid and fiber production	-	1,769	250	1	442,206
-	-	70,452	1	1	70,452
					512,658

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Kid and fiber production	-	628	250	1	157,050
-	-	67,899	1	1	67,899
					224,949

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	**164,877**

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Kid and fiber production	-	143	250	1	35,826
-	-	204	1	1	204
					36,030

Expected incremental results

Increase in Annual Net Income before Labor Costs	215,877
Increase in Annual Net Income considering Labor Costs	213,324
Increase in Annual Net Income considering Labor Costs and Annual Reserve to replace Inves	185,471
Increase in Employment Generated (Person/days)	12,967
Number of Participating Families	250
Per-Family Increase in Annual Net Income before Labor Costs	864
Per-Family Increase in Annual Net Income considering Labor Costs	853
Per-Family Increase in Annual Net Income considering Labor Costs and Annual Reserve	742
Per-Family Increase in Employment Generated (Person/days)	52

SENSITIVITY

Approximative IRR &NPV

Year	-	1	2	3	4	5	6	7	8	9	10
Start-up curve		20%	40%	60%	80%	100%	100%	100%	100%	100%	100%
Incremental Annual Flows	(982,869)	42,665	85,330	127,995	170,659	213,324	213,324	213,324	213,324	213,324	213,324
Residual value											686,938
Net Flows	(982,869)	42,665	85,330	127,995	170,659	213,324	213,324	213,324	213,324	213,324	900,262

IRR	**14%**
Aggregate NPV	**90,514**
Families	**250**
NPV per family	**362**

Switching Values

Critical Factors	Unit	Without	With Project			Without	With Project			% Change
		Project	Minimum	Base	Min/Base	Project	Minimum	Base	Min/Base	
Kids' sale price	Head	16.63	18.75	18.75	1.00	16.63	18.30	18.75	0.98	(2%)
Dehaired cashmere price	Kg	-	22.50	22.50	1.00	-	18.50	22.50	0.82	(18%)
Fertility rate	%	60%	70%	70%	1.00	60%	69%	70%	0.99	(1%)
Weaning rate	%	65%	85%	85%	1.00	65%	84%	85%	0.99	(1%)
Supplying Families	Flock	250	250	250	1.00	235	235	250	0.94	(6%)

Case study: Brazil - Nort-East - Intensification of Goat Milk Production

Context: Project issues

Milk collected in cooling tanks of producers' association and packaged to supply school feeding program
A very small part of the milk is processed in: *dolce de leite* (or cooked milk jam), cheese , yogurt and butter
Production systems are based on complementary grazing of the «Caatinga» Biome *(in 10 years with 6 NGO)*

Main challenges

Difficulty to motivate the breeders to adopt improved technology
Scarce alternatives for milk surplus of government social programs
Limited cash available to breeders

Initial situation

During droughts, farmers burn cacti to eliminate thorns and feed their flocks
With excessive rains, negative effects such as parasitism affect flocks
There is no shepherd and the goats come back by themselves to the farm every day for feeding
There is an network of extension, training and innovation transfer but limited coverage in the N-East

Investments

Extension program with clear indicators to increase extension outreach to improve production technology
Market promotion of goat products in better-off southern states

Scenarios for the future

Future development of infrastructure as dairy units, milk tanks, slaughter houses and parks to gather kids
Contribute to gradually contain rural exodus of young farmers

FLOCK

Activity:Goat milk production

Production Unit:Average Flock

Situation	Present	Expected
Goats	18	28
Bucks	1	2
Adult mortality	8%	8%
Adult discard rate	20%	20%
Discarded goats	4	6
Fertility rate	80%	80%
Number of milking goats	14	22
Number of kids per kidding	1.5	1.5
Number of kids born	21	33
Milk produced per goat per day (lt)	0.80	1.25
Milking period (days)	180	200
Abortion and kid mortality	17%	8%
Number of weaned kids	17	30
Number of kids for replacement of adult goats	5	8
Number of kids sold	12	22
Liveweight of goats sold (kg)	30	30
Liveweight of bucks sold (kg)	42	42
Liveweight of sold kid (kg)	10	12
Labor time required for milking (minutes/lt)	5	5

Production Cycle:One Year

Situation	Present	Expected
Number of cycles per year	1	1

Income per Average Flock per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Goat milk produced	Processing	Lt	2,016.0	5,500.0	0.64	0.64	1,284	3,504
Kids sold	Local Butcher	Kg Liveweight	120.0	264.0	7.35	7.35	882	1,940
Adult goats sold	Local Butcher	Kg Liveweight	120.0	180.0	5.29	5.29	635	953
							2,801	6,396

Inputs per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Concentrate for milking goats	Local provider	Kg	420.0	1,980.0	0.25	0.25	103	485
Mineral salt	Local provider	Kg	218.9	357.5	0.61	0.61	133	217
Forage	Local provider	Kg	12,626.0	21,017.4	0.08	0.08	947	1,576
Health treatments	Local provider	Head	36.0	60.0	1.96	1.96	71	118
							1,253	2,396

Labor per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Flock care	Own Family	Person/day	45.6	45.6	14.70	14.70	671	671
Goat milking	Own Family	Person/day	21.0	57.3	14.70	14.70	309	842
							979	1,513
Net Income considering Labor Cost per Average Flock per Year							568	2,487
Labor generated per Average Flock per Year (Person/day)							67	103
							Present	Expected
Net Income before Labor Cost per Average Flock per Year							1,548	4,000

INVESTMENT

Activity:Goat milk processing

Production Units:	Situation	Present	Expected
	Average Flocks	250	250
	Extension service	1	1

Investment on Production Units - Present Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Female Goats	Own Family	Head	4,500	220.5	992,250	-	-	-	-
Male Goats	Own Family	Head	250	308.7	77,175	8	-	-	9,647
Flock facilities	Own Family	Flock	250	2,790.7	697,674	20	-	-	34,884
					1,767,099				44,531

Investment on Production Units - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	7,000	220.5	1,543,500	-	-	-	-
Bucks	Own Family	Head	500	308.7	154,350	8	-	-	19,294
Flock facilities	Own Family	Flock	250	2,790.7	697,674	20	-	-	34,884
					2,395,524				54,177

Investment for Common Use - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Technical assistance	Project	Month	30	332.2	9,967				
					9,967				-

PRESENT NET INCOME

Goat milk processing

Present Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
-	-	1,548	250	1	386,958
					386,958

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
-	-	568	250	1	142,111
					142,111

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments 97,580

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
-	-	67	250	1	16,656
					16,656

EXPECTED NET INCOME

Expected Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
-	-	4,000	250	1	1,000,063
					1,000,063

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
-	-	2,487	250	1	621,844
					621,844

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	567,666

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
-	-	103	250	1	25,729
					25,729

Expected incremental results

Increase in Annual Net Income before Labor Costs	613,105
Increase in Annual Net Income considering Labor Costs	479,733
Increase in Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	470,086
Increase in Employment Generated (Person/days)	9,073
Number of Participating Families	250
Per-Family Increase in Annual Net Income before Labor Costs	2,452
Per-Family Increase in Annual Net Income considering Labor Costs	1,919
Per-Family Increase in Annual Net Income considering Labor Costs and Annual Reserve	1,880
Per-Family Increase in Employment Generated (Person/days)	36

SENSITIVITY

Approximative IRR &NPV

Year	-	1	2	3	4	5	6	7	8	9	10
Start-up curve		20%	40%	60%	80%	100%	100%	100%	100%	100%	100%
Incremental Annual Flows	(638,392)	95,947	191,893	287,840	383,786	479,733	479,733	479,733	479,733	479,733	479,733
Residual value											531,956
Net Flows	(638,392)	95,947	191,893	287,840	383,786	479,733	479,733	479,733	479,733	479,733	1,011,689
IRR	41%										
Aggregate NPV	1,315,884										
Families	250										
NPV per family	5,264										

Switching Values

Critical Factors	Unit	Without Project		With Project			Without Project		With Project		% Change
			Minimum	Base	Min/Base			Minimum	Base	Min/Base	
Goat milk price	Lt	0.64	0.64	0.64	1.00		0.64	0.60	0.64	0.94	(6%)
Kids' sale price	Kg LW	7.35	7.35	7.35	1.00		7.35	6.20	7.35	0.84	(16%)
Milk per goat per day	Lt	0.80	1.25	1.25	1.00		0.80	1.04	1.25	0.83	(17%)
Milking period	Day	180	200	200	1.00		180	167	200	0.84	(17%)
Abortion and kid mortality	%	17%	8%	8%	1.00		17%	26%	8%	3.25	225%
Flocks served	Flock	250	250	250	1.00		2	2	250	0.01	(99%)

Case study: Kenya - Intensification of Goat Milk Production

Project issues

Transform the lives of 120,000 poor families (720,000 people).
Project duration is 10 years with involvement of 6 local NGOs .

Main challenges

To develop the market of goat products.
To organize and promote development at regional level.

Initial situation

Low yield production (meat and milk) at local level.
Several nucleus of improved farms - efficiency of production system is proved.
Successful presence for many years of Farm Africa

Investments

Training and mentoring for NGO management.
Support and extension services.
Import of Toggenburg goats and breeding program to obtain 75% Toggenburg goats.
Goat milk processing plants.
Creation of breeding stations.

Scenarios for future

Market saturation.
Development of goat farms.

FLOCK

Activity: Goat milk production

Production Unit:

Average Flock		
Situation	Present	Expected
Number of goats	4	4
Number of bucks	1	1
Adult mortality	10%	5%
Adult discard rate	20%	20%
Discarded goats	1	1
Fertility rate	70%	70%
Number of milking goats	3	3
Number of kids per kidding	1.5	1.5
Number of kids born	5	5
Milk produced per goat per day (lt)	0.20	1.00
Milking period (days)	70	200
Abortion and kid mortality	17%	8%
Number of weaned kids	4	5
Number of kids for replacement of adult goats	1	1
Number of kids sold	3	4
Liveweight of goat sold (kg)	25	25
Liveweight of buck sold (kg)	40	40
Liveweight of kid sold (kg) - less than 6 months old	6	6
Labor time required for milking (minutes/lt)	5	5

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	1	1

Income per Average Flock per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Goat milk produced	Processing	Lt	42.0	600.0	0.50	0.50	21	300
Kids sold	Local Butcher	Kg Liveweight	18.0	24.0	3.00	3.76	54	90
Adult goats sold	Local Butcher	Kg Liveweight	25.0	25.0	3.00	3.00	75	75
							150	465

Inputs per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Concentrate for milking goats	Local provider	Kg	-	222.0	-	0.45	-	100
Veterinary service	Local provider	Head	-	9.0	-	2.00	-	18
Breeding centre fee	Centre	Flock	-	1.0	-	13.28	-	13
							-	132

Labor per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Flock care	Own Family	Person/day	45.6	45.6	2.05	2.05	94	94
Goat milking	Own Family	Person/day	0.4	6.3	2.05	2.05	1	13
							95	107

	Present	Expected
Net Income before Labor Cost per Average Flock per Year	150	334
Net Income considering Labor Cost per Average Flock per Year	55	227
Labor generated per Average Flock per Year (Person/day)	46	52

BREEDING STATION

Activity: Goat breeding station

Production Unit:

Station		
Situation	Present	Expected
Flocks serviced	-	200

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	-	1

Income per Station per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Fee	Flock owners	Unknown	-	200.0	-	13.28	-	2,656
							-	2,656

Inputs per Station per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Veterinary service	Local provider	Head	-	1.0	-	2.00	-	2
Forage	Local provider	Kg	-	730.0	-	0.05	-	37
Feeds	Local provider	Kg	-	135.1	-	0.45	-	61
							-	99

Labor per Station per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Breeding station care	Hired Labor	Person/day	-	91.3	-	3.97	-	362
							-	362

	Present	Expected
Net Income before Labor Cost per Station per Year	-	2,556
Net Income considering Labor Cost per Station per Year	-	2,194
Labor generated per Station per Year (Person/day)	-	91

INVESTMENT

Activity: Goat milk production

Production Units:

Situation	Present	Expected
Flocks served	200	200
Breeding station	1	1

Investment on Production Units - Present Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	800	75.0	60,000	-	-	-	-
Bucks	Own Family	Head	200	120.0	24,000	8	-	-	3,000
Flock facilities	Own Family	Flock	200	10.3	2,053	20	-	-	103
					86,053				3,103

Investment on Production Units - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	800	93.9	75,122	-	-	-	-
Bucks	Own Family	Head	200	150.2	30,049	8	-	-	3,756
Flock facilities	Own Family	Flock	200	10.3	2,053	20	-	-	103
					107,224				3,859

Investment for 200 Flock owners - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Toggenburg buck	Project	Unit	1	600.0	600	8	-	-	75
Cooling tanks	Project	Unit	1	1,000.0	1,000	20	-	-	50
Technical assistance	Project	Month	36	300.0	10,800				
					12,400				125

PRESENT NET INCOME

Present Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	150	200	1	30,000
Goat breeding station	Station	-	-	-	-
					30,000

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	55	200	1	11,084
Goat breeding station	Station	-	-	-	-
					11,084

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	7,981

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Goat milk production	Average Flock	46	200	1	9,213
Goat breeding station	Station	-	-	-	-
					9,213

EXPECTED NET INCOME

Expected Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	334	200	1	66,713
Goat breeding station	Station	2,556	1	1	2,556
					69,269

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	227	200	1	45,409
Goat breeding station	Station	2,194	1	1	2,194
					47,604

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	43,620

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Goat milk production	Average Flock	52	200	1	10,375
Goat breeding station	Station	91	1	1	91
					10,466

Expected incremental results

Increase in Annual Net Income before Labor Costs	39,269
Increase in Annual Net Income considering Labor Costs	36,520
Increase in Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	35,639
Increase in Employment Generated (Person/days)	1,254
Number of Participating Families	200
Per-Family Increase in Annual Net Income before Labor Costs	196
Per-Family Increase in Annual Net Income considering Labor Costs	183
Per-Family Increase in Annual Net Income considering Labor Costs and Annual Reserve	178
Per-Family Increase in Employment Generated (Person/days)	6

SENSITIVITY

Approximative IRR &NPV

Year	-	1	2	3	4	5	6	7	8	9	10
Start-up curve		20%	40%	60%	80%	100%	100%	100%	100%	100%	100%
Incremental Annual Flows	(33,571)	7,304	14,608	21,912	29,216	36,520	36,520	36,520	36,520	36,520	36,520
Residual value											13,960
Net Flows	(33,571)	7,304	14,608	21,912	29,216	36,520	36,520	36,520	36,520	36,520	50,480
IRR	54%										
Aggregate NPV	105,961										
Families	200										
NPV per family	530										

Switching Values

Critical Factors	Unit	Without Project	With Project		
			Minimum	Base	Min/Base
Goat milk price	Lt	0.50	0.50	0.50	1.00
Kids' sale price	Kg LW	3.00	3.76	3.76	1.00
Milk per goat per day	Lt	0.20	1.00	1.00	1.00
Milking period	Day	70	200	200	1.00
Abortion and kid mortality	%	17%	8%	8%	1.00
Flocks served	Flock	200	200	200	1.00

Without Project	With Project			% Change
	Minimum	Base	Min/Base	
0.50	0.25	0.50	0.50	(50%)
3.00	-	3.76	0.00	(100%)
0.20	0.47	1.00	0.47	(53%)
70	93	200	0.47	(54%)
17%	100%	8%	12.50	1150%
6	6	200	0.03	(97%)

Case study:Mexico - Comarca Lagunera - Improvement of Goat Milk Production

Context: Project issues

Initially 8000 famillies of poor small holders dedicated to produce milk in bad conditions.
Goat production have been modified to supply a milk processing industry for condense milk jam or fudge.
In the Comarca lagunera, there are 450 000 goats for 8 000 families.
This integration has been acheived by Development Research and non-systematic production support initiatives.

Main challenges

The management of range lands available without restriction.
Overgrazing
Lack of water
Lack to criteria for selection of bucks and prepubertal females in general
Seasonally of milk production in extensive system
Asymetry between breeders creates conflicts
Improve agro-enterprise management. Farmers able to use technical and economic data

Initial situation

Low productivity per goat
Low milk quality
Low number of milking goats
Bad carcass conditions of kids
Low amount of concentrates
Low control on the system by the farmer

Investments

Capacity and training equipment
Genetic Improvement Center for breeders in extensive system
Extension services

Scenarios for future

A larger proportion of breeders with with high production level
Flocks with increased number of heads.
Managment of breeding season according to local condition

FLOCK

Activity: Goat milk production

Production Unit:

Average Flock		
Situation	Present	Expected
Number of goats	40	64
Number of bucks	4	6
Adult mortality	5%	5%
Adult discard rate	20%	20%
Discarded goats	9	14
Fertility rate	85%	85%
Number of milking goats	34	54
Number of kids per kidding	1.5	1.5
Number of kids born	51	81
Milk produced per goat per day (lt)	1.000	1.144
Milking period (days)	180	210
Abortion and kid mortality	35%	35%
Number of weaned kids	33	53
Number of kids for replacement of adult goats	10	16
Number of kids sold	23	37
Liveweight of goat sold (kg)	40	42
Liveweight of buck sold (kg)	64	64
Liveweight of kid sold (kg) - less than 6 months old	8	8
Labor time required for milking (minutes/lt)	5	5

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	1	1

Income per Average Flock per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Goat milk sold	Urban Market	Lt	6,120.0	12,973.0	0.25	0.32	1,530	4,151
Kids fattened and sold	Local Butcher	Kg Liveweight	184.0	296.0	4.00	4.00	736	1,184
Adult goats sold	Local Butcher	Kg Liveweight	360.0	588.0	0.69	0.69	248	406
							2,514	5,741

Inputs per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Concentrate for milking goats	Local provider	Kg	510.0	1,458.0	0.35	0.35	180	515
Grazing land rental	Local provider	Flock	1.0	1.0	42.30	42.30	42	42
Health treatments	Local provider	Head	77.0	123.0	0.83	0.83	64	102
Breeding center fee	Center	Flock	-	1.0	-	9.29	-	9
							286	668

Labor per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Flock care	Own Family	Person/day	91.3	91.3	12.00	12.00	1,095	1,095
Goat milking	Own Family	Person/day	63.8	135.1	12.00	12.00	765	1,622
							1,095	1,095

	Present	Expected
Net Income before Labor Cost per Average Flock per Year	2,228	5,073
Net Income considering Labor Cost per Average Flock per Year	1,133	3,978
Labor generated per Average Flock per Year (Person/day)	155	226

BREEDING CENTRE

Activity: Goat Breeding Centre

Production Unit:

Centre		
Situation	Present	Expected
Flocks serviced	-	120

Production Cycle:

One Month		
	Present	Expected
Number of cycles per	-	12

Income per Centre per Month

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Fee	Flock owners	Unknown	-	120.0	-	9.29	-	1,115
							-	1,115

Inputs per Centre per Month

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Medicines and santiary inputs	Local provider	Month	-	1.0	-	30.77	-	31
Forage	Local provider	Ton	-	10.0	-	173.08	-	1,731
Feeds	Local provider	Bag	-	10.0	-	8.46	-	85
Electricity	Local provider	Month	-	1.0	-	76.92	-	77
Water	Local provider	Month	-	1.0	-	29.23	-	29
Gas	Local provider	Month	-	1.0	-	23.85	-	24
Fuel	Local provider	Month	-	1.0	-	153.85	-	154
							-	2,130

Labor per Centre per Month

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Centre maintenance	Hired Labor	Person/day	-	64.3	-	12.92	-	831
Dehorning and dehoofing	Hired Labor	Person/day	-	2.4	-	12.92	-	31
Control of serviced flocks	Hired Labor	Person/day	-	28.6	-	12.92	-	369
							-	1,231

	Present	Expected
Net Income before Labor Cost per Centre per Month	-	(1,015)
Net Income considering Labor Cost per Centre per Month	-	(2,246)
Labor generated per Centre per Month (Person/day)	-	29

INVESTMENT

Activity: Goat milk production
Production Units:

Situation	Present	Expected
Flocks served	120	120
Breeding Center	-	1

Investment on Average Flock - Present Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Female Goats	Own Family	Head	4,800	160.0	768,000	-	-	-	-
Male Goats	Own Family	Head	480	256.0	122,880	8	44	21,197	12,710
Flock facilities	Own Family	Flock	120	2,790.7	334,884	20	-	-	16,744
Fences	Own Family	Plot	120	4,651.2	558,140	20	-	-	27,907
					1,783,903				57,362

Investment on Average Flock - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Female Goats	Own Family	Head	7,680	168.0	1,290,240	-	-	-	-
Male Goats	Own Family	Head	720	256.0	184,320	8	44	31,795	19,066
Flock facilities	Own Family	Flock	120	2,790.7	334,884	20	-	-	16,744
Fences	Own Family	Plot	120	4,651.2	558,140	20	-	-	27,907
Milking area	Project	Unit	120	1,357.0	162,840	20	-	-	8,142
					2,530,423				71,859

Investment for all Flock owners - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Centre structure	Project	Unit	1	32,000	32,000	20	-	-	1,600
Management facilities	Project	Unit	1	4,250	4,250	10	-	-	425
Office equipment	Project	Set	1	4,300	4,300	10	-	-	430
Laboratory equipment	Project	Set	1	9,850	9,850	10	-	-	985
Software	Project	Contract	1	6,200	6,200	10	-	-	620
					56,600				4,060

PRESENT NET INCOME

Present Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	2,228	120	1	267,379
Goat Breeding Centre	Centre	-	-	-	-
					267,379

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	1,133	120	1	135,979
Goat Breeding Centre	Centre	-	-	-	-
					135,979

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments 78,618

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Goat milk production	Average Flock	155	120	1	18,600
Goat Breeding Centre	Centre	-	-	-	-
					18,600

EXPECTED NET INCOME

Expected Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	5,073	120	1	608,726
Goat Breeding Centre	Centre	(1,015)	1	12	(12,182)
					596,544

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	3,978	120	1	477,326
Goat Breeding Centre	Centre	(2,246)	1	12	(26,951)
					450,374

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	374,456

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Goat milk production	Average Flock	226	120	1	27,166
Goat Breeding Centre	Centre	29	1	12	343
					27,509

Expected incremental results

Increase in Annual Net Income before Labor Costs	329,164
Increase in Annual Net Income considering Labor Costs	314,395
Increase in Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	295,838
Increase in Employment Generated (Person/days)	8,909
Number of Participating Families	120
Per-Family Increase in Annual Net Income before Labor Costs	2,743
Per-Family Increase in Annual Net Income considering Labor Costs	2,620
Per-Family Increase in Annual Net Income considering Labor Costs and Annual Reserve	2,465
Per-Family Increase in Employment Generated (Person/days)	74

SENSITIVITY

Approximative IRR &NPV

Year	-	1	2	3	4	5	6	7	8	9	10
Start-up curve		20%	40%	60%	80%	100%	100%	100%	100%	100%	100%
Incremental Annual Flows	(803,120)	62,879	125,758	188,637	251,516	314,395	314,395	314,395	314,395	314,395	314,395
Residual value											617,548
Net Flows	(803,120)	62,879	125,758	188,637	251,516	314,395	314,395	314,395	314,395	314,395	931,943
IRR	24%										
Aggregate NPV	596,157										
Families	120										
NPV per family	4,968										

Switching Values

Critical Factors	Unit	Without Project	With Project		
			Minimum	Base	Min/Base
Goat milk price	Lt	0.25	0.32	0.32	1.00
Kids' sale price	Kg LW	4.00	4.00	4.00	1.00
Milk per goat per day	Lt	1.000	1.144	1.144	1.00
Milking period	Day	180	210	210	1.00
Abortion and kid mortality	%	35%	35%	35%	1.00
Flocks served	Flock	120	120	120	1.00

Without Project	With Project			% Change
	Minimum	Base	Min/Base	
0.25	0.20	0.32	0.63	(38%)
4.00	-	4.00	0.00	(100%)
1.000	0.700	1.144	0.61	(39%)
180	128	210	0.61	(39%)
35%	100%	35%	2.86	186%
24	24	120	0.20	(80%)

Case study: Morocco - Development of Argan Kid Meat Production

Context: Project issues

Certification of the Argan kid and development of marketing the kids for urban market

Valorization of the specific dietetic and sensory quality of a kid fed within the argene tree area and nuts

Improvment of herd management with conservation of the Argane tree endaemic forect (used for Argan oil)

Improvment of hygienic conditions of slaughtering (veterinary control)

To develop complementary incomes to Argane tree industry (women working for crushing the nuts)

To organize selection and breeding of the local breed to improve

A project supported by the Essaouira Province Royal administration

Main challenges

Organizing complementarity between the development of Argane tree industry and goat raising (traditional but threatened)

Managing the flocks to prevent pasture and forest degradation due to frequent droughts

Developing a collective organization of breeders

To prevent «pirat» grazing by big transhumant, cow, camels and goat herds (political problem)

To convince local actors that argane tree industry and goats are compatible

Initial situation

Goat raising is a traditional activity and kids are sold to local butchers

A very structured and old collective organization of pasture management (agdal)

A «berber» population (Haha tribes) with a pastoral tradition

Livestock: 370 000 caprine heads in the Essaouira province (more than 1 million in the argane tree area)

A dynamic village Smimou: 85000 heads, 30 breeders

Investments

Certification and controls

Slaughtering facilities

Training

FLOCK

Activity: Argan kid meat production

Production Unit:

Average Flock		
Situation	Present	Expected
Number of goats	50	55
Number of bucks	4	5
Adult mortality	5%	5%
Adult discard rate	5%	5%
Discarded goats	3	3
Fertility rate	65%	65%
Number of kids per kidding	1.5	1.5
Number of kids born	49	54
Kid mortality	20%	5%
Number of weaned kids	39	51
Number of kids for replacement of adult goats	5	6
Number of kids fattened and sold	34	45
Liveweight of goat sold (kg)	23	23
Liveweight of buck sold (kg)	35	35
Liveweight of sold kid (kg)	13	13
Age at slaughtering (months)	8	6
Carcass weight over liveweight	62%	62%
Carcass weight of kid to slaughter	8	8

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	1	1

Income per Average Flock per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Kids fattened and sold	Local Butcher	Kg Carcass	272.0	-	8.06	-	2,192	-
Kids fattened and sold	Urban Market	Kg Carcass	-	360.0	-	8.86	-	3,191
Adult goats sold	Local Butcher	Kg Carcass	69.0	69.0	8.06	8.06	556	556
							2,748	3,747

Inputs per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Barley for kids	Local provider	Kg	220.5	291.6	0.46	0.46	102	134
Alig+Zegmouna	Local provider	Kg	220.5	291.6	0.35	0.35	76	101
Feedstuff for does	Local provider	Kg	300.0	363.0	0.46	0.46	138	167
Vaccination	Local provider	Head	103.0	114.0	0.50	0.50	52	57
Slaughtering fee	Local provider	Kg Carcass	-	360.0	-	0.39	-	141
							367	600

Labor per Average Flock pear Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Sheperd	Own Family	Person/Day	257	257	1.07	1.07	276	276
							276	276

	Present	Expected
Net Income before Labor Cost per Average Flock per Year	2,381	3,147
Net Income considering Labor Cost per Average Flock per Year	2,104	2,871
Labor generated per Average Flock per Year (Person/day)	257	257

SLAUGHTERHOUSE

Activity: Goat slaugther house

Production Unit:

Facility		
Situation	Present	Expected
Flocks supplying goats	-	1,444
Kids slaughtered	-	65,000
Carcass weight of kid to slaughter	-	8
Residual material per kid slaugthered	-	-

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	-	1

Income per Facility per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Fee for kids slaugthered	Flock owner	Kg Carcass	-	520,000.0	-	0.39	-	203,566
Residual material	Unknown	Kg	-	-	-	-	-	-
							-	203,566

Inputs per Facility per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Materials	Local provider	Slaugthered Head	-	65,000.0	-	0.39	-	25,376
Gas	Local provider	Million BTU	-	3,466.7	-	5.00	-	17,333
Electricity	Local provider	Kwh	-	18,448.5	-	1.41	-	26,000
Transport	Local provider	Trip	-	-	-	-	-	-
							-	68,709

Labor per Facility per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Operations	Hired Labor	Person/day	-	8,978.6	-	7.66	-	68,776
							-	68,776

	Present	Expected
Net Income before Labor Cost per Facility per Year	-	134,857
Net Income considering Labor Cost per Facility per Year	-	66,081
Labor generated per Facility per Year (Person/day)	-	

INVESTMENT

Activity: Argan kid meat production and processing

Production Units:

Situation	Present	Expected
Flocks supplying kids	1,444	1,444
Slaughter house	-	1

Investment on Average Flock - Present Situatio

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	72,222	115	8,299,818	-	-	-	-
Bucks	Own Family	Head	5,778	175	1,010,413	8	175	1,010,413	-
Facilities	Own Family	Flock	1,444	300	433,333	5	-	-	86,667
					9,743,564				86,667

Investment on Average Flock - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	79,444	115	9,129,800	-	-	-	-
Bucks	Own Family	Head	7,222	175	1,263,016	8	175	1,263,016	-
Facilities	Own Family	Flock	1,444	300	433,333	5	-	-	86,667
					10,826,149				86,667

Investment to serve 1444 Herders - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Slaughterhouse - Building	PMVCA	Unit	1	321,000	321,000	20	-	-	16,050
Slaughterhouse - Pen	PMVCA	Unit	1	5,400	5,400	10	-	-	540
Slaughterhouse - Lab	PMVCA	Unit	1	36,400	36,400	15	-	-	2,427
Slaughtering Equipment	PMVCA	Set	1	4,300	4,300	10	-	-	430
Informatic Equipment	PMVCA	Set	1	4,300	4,300	5	-	-	860
Furniture	PMVCA	Set	1	1,975	1,975	10	-	-	198
Training and TA	Project	Project	1	352,291	352,291	-	-	-	-
					725,666				20,504

PRESENT NET INCOME

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Argan kid meat production	Average Flock	2,381	1,444	1	3,438,857
Goat slaugther house	Facility	-	-	-	-
					3,438,857

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Argan kid meat production	Average Flock	2,104	1,444	1	3,039,748
Goat slaugther house	Facility	-	-	-	-
					3,039,748

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments 2,953,081

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Argan kid meat production	Average Flock	257	1,444	1	371,429
Goat slaugther house	Facility	-	-	-	-
					371,429

EXPECTED NET INCOME

Expected Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Argan kid meat production	Average Flock	3,147	1,444	1	4,546,121
Goat slaugther house	Facility	134,857	1	1	134,857
					4,680,978

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Argan kid meat production	Average Flock	2,871	1,444	1	4,147,011
Goat slaugther house	Facility	66,081	1	1	66,081
					4,213,093

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	4,105,922

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Argan kid meat production	Average Flock	257	1,444	1	371,429
Goat slaugther house	Facility	8,979	1	1	8,979
					380,407

Expected incremental results

Increase in Annual Net Income before Labor Costs	1,242,121
Increase in Annual Net Income considering Labor Costs	1,173,345
Increase in Annual Net Income considering Labor Costs and Annual Reserve to replace Inves	1,152,841
Increase in Employment Generated (Person/days)	8,979
Number of Participating Families	1,444
Per-Family Increase in Annual Net Income before Labor Costs	860
Per-Family Increase in Annual Net Income considering Labor Costs	812
Per-Family Increase in Annual Net Income considering Labor Costs and Annual Reserve	798
Per-Family Increase in Employment Generated (Person/days)	6

SENSITIVITY

Approximative IRR &NPV

Year	-	1	2	3	4	5	6	7	8	9	10
Start-up curve		20%	40%	60%	80%	100%	100%	100%	100%	100%	100%
Incremental Annual Flows	(1,808,251)	234,669	469,338	704,007	938,676	1,173,345	1,173,345	1,173,345	1,173,345	1,173,345	1,173,345
Residual value											1,250,918
Net Flows	(1,808,251)	234,669	469,338	704,007	938,676	1,173,345	1,173,345	1,173,345	1,173,345	1,173,345	2,424,264
IRR	37%										
Aggregate NPV	2,983,605										
Families	1,444										
NPV per family	2,066										

Switching Values

Critical Factors	Unit	Without Project	With Project		
			Minimum	Base	Min/Base
Number of goats	Head	50	55	55	1.00
Kids' sale price	Kg Carcass	8.06	8.86	8.86	1.00
Kid mortality	%	20%	5%	5%	1.00
Live weight of kid sold	Kg	13	13	13	1.00
Flocks supplying kids	Flock	1,444	1,444	1,444	1.00

Without Project	With Project			% Change
	Minimum	Base	Min/Base	
50	33	55	0.60	(40%)
8.06	5.30	8.86	0.60	(40%)
20%	39%	5%	7.80	680%
13	11	13	0.85	(15%)
370	370	1,444	0.26	(74%)

Case study:Nepal - Improvement of Goat Meat Production

Project issues

Goats form an integral part of the mixed crop/livestock farming system in Nepal.

There is high demand for goat meat, with consumption highest in urban centres.

There are 200 Indian traders operating the Kathmandu goat market.

The local goat marketing chain is undeveloped and there is no organised marketing on a commercial scale to meet the specific needs of markets.

Observations suggest that farmers are the price taker rather than price maker.

Main challenges

Project Goal: By 2016, importation of live goats is reduced by 30% and milk (from dairy cattle/buffalo) by 10% by involving 138,000 smallholders in value chain enterprises of goat and dairy for increasing their family income and nutrition level.

Initial situation

On an average, a typical farmer sells less than 2 goats annually.

Investments

The total project cost is estimated to be over USD 23 million. Heifer International is covering 75 % of the project cost and the remaining 25% will be leveraged through local government (VDC and DDCs), development partners (mainly PAF), Dairy industries and community organizations including SHGs and cooperatives.

FLOCK

Activity: Goat production

Production Unit:

Average Flock		
Situation	Present	Expected
Number of goats	3	8
Number of bucks	0.2	0.4
Adult mortality	5%	5%
Adult discard rate	20%	20%
Discarded goats	1	2
Fertility rate	50%	50%
Number of kidding goats	2	4
Number of kids per kidding	1.5	1.5
Number of kids born	3	6
Abortion and kid mortality	40%	20%
Number of weaned kids	2	5
Number of kids for replacement of adult goats	1	2
Number of kids sold	1	3
Liveweight of goat sold (kg)	25	25
Liveweight of buck sold (kg)	40	40
Liveweight of grown kids (kg)	25	25

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	1	1

Income per Average Flock per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Manure	Own Family	Ton	5.2	13.4	10.00	10.00	52	134
Kids sold	Middleman	Kg	25.0	75.0	4.12	4.12	103	309
Adult goats sold	Middleman	Kg	25.0	50.0	4.12	4.12	103	206
							258	649

Inputs per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Supplementary feeds	Local provider	Kg	260.6	577.8	0.15	0.15	39	87
Forage	Local provider	Ton	7.7	20.1	10.00	10.00	77	201
Health treatments	Local provider	Head	3.2	8.4	2.25	2.25	7	19
							123	307

Labor per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Flock care	Own Family	Person/day	45.6	45.6	1.89	1.89	86	86
							86	86

	Present	Expected
Net Income before Labor Cost per Average Flock per Year	134	342
Net Income considering Labor Cost per Average Flock per Year	48	256
Labor generated per Average Flock per Year (Person/day)	46	46

INVESTMENT

Activity: Goat production

Production Units:

Situation	Present	Expected
Flocks	138,000	138,000
Self Help Groups	-	690

Investment on Production Units - Present Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	414,000	103.0	42,642,000	-	-	-	-
Bucks	Own Family	Head	20,700	164.8	3,411,360	8	-	-	426,420
Infrastructure	Own Family	Flock	138,000	100.0	13,800,000	5	-	-	2,760,000
					59,853,360				3,186,420

Investment on Production Units - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	828,000	103.0	85,284,000	-	-	-	-
Bucks	Own Family	Head	55,200	164.8	9,096,960	8	-	-	1,137,120
Infrastructure	Own Family	Flock	138,000	100.0	13,800,000	5	-	-	2,760,000
					108,180,960				3,897,120

Investment for Common Use - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats distributed	Project	Head	276,000	103.0	28,428,000	-	-	-	-
Technical assistance	Project	Month	24,840	208.6	5,180,997				
					33,608,997				-

PRESENT NET INCOME

Present Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat production	Average Flock	134	138,000	1	18,503,040
					18,503,040

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat production	Average Flock	48	138,000	1	6,611,942
					6,611,942

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	3,425,522

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Goat production	Average Flock	46	138,000	1	6,296,250
					6,296,250

EXPECTED NET INCOME

Expected Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat production	Average Flock	342	138,000	1	47,255,340
					47,255,340

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat production	Average Flock	256	138,000	1	35,364,242
					35,364,242

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	31,467,122

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Goat production	Average Flock	46	138,000	1	6,296,250
					6,296,250

Expected incremental results

Increase in Annual Net Income before Labor Costs	28,752,300
Increase in Annual Net Income considering Labor Costs	28,752,300
Increase in Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	28,041,600
Increase in Employment Generated (Person/days)	-
Number of Participating Families	138,000
Per-Family Increase in Annual Net Income before Labor Costs	208
Per-Family Increase in Annual Net Income considering Labor Costs	208
Per-Family Increase in Annual Net Income considering Labor Costs and Annual Reserve	203
Per-Family Increase in Employment Generated (Person/days)	-

SENSITIVITY

Approximative IRR &NPV

Year	-	1	2	3	4	5	6	7	8	9	10
Start-up curve		25%	50%	75%	100%	100%	100%	100%	100%	100%	100%
Incremental Annual Flows	(81,936,597)	7,188,075	14,376,150	21,564,225	28,752,300	28,752,300	28,752,300	28,752,300	28,752,300	28,752,300	28,752,300
Residual value											69,648,600
Net Flows	(81,936,597)	7,188,075	14,376,150	21,564,225	28,752,300	28,752,300	28,752,300	28,752,300	28,752,300	28,752,300	98,400,900
IRR	24%										
Aggregate NPV	59,923,764										
Families	138,000										
NPV per family	434										

Switching Values

Critical Factors	Unit	Without Project	With Project		
			Minimum	Base	Min/Base
Number of goats	Head	3	8	8	1.00
Abortion and kid mortality	%	40%	20%	20%	1.00
Price of kids sold	Kg	4.12	4.12	4.12	1.00
Flocks served	Flock	138,000	138,000	138,000	1.00

Without Project	With Project			% Change
	Minimum	Base	Min/Base	
3	7	8	0.88	(13%)
40%	40%	20%	2.00	100%
4.12	2.6	4.12	0.63	(37%)
10,000	10,000	138,000	0.07	(93%)

FLOCK SIZE PROJECTION

		0	1	2	3	4	5	6	7	8	9	... 20
Stock												
Adult goats		**3**	5	6	7	8	8	8	8	8	8	8
Milking goats		2	3	3	4	4	4	4	4	4	4	4
Kids born		3	5	5	6	6	6	6	6	6	6	6
Kids alive		2	4	4	5	5	5	5	5	5	5	5
Changes												
Goats distributed		2	-	-	-	-	-	-	-	-	-	-
Kid mortality		1	1	1	1	1	1	1	1	1	1	1
Goats discarded (sold or consumed)		1	1	1	1	2	2	2	2	2	2	2
Kids sold or consumed		1	2	2	3	3	3	3	3	3	3	3
Female kids kept in flock		1	2	2	2	2	2	2	2	2	2	2
Annual growth of flock		**1.0**	**1.7**	**2.0**	**2.3**	**2.7**	**2.7**	**2.7**	**2.7**	**2.7**	**2.7**	**2.7**
Parameters												
Fertility rate		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Kids per kidding		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Annual mortality rate for kids		0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Annual discard rate for adult goats		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Proportion of kids sold or consumed		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Proportion of female kids ketp in flock		0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Source: Sample projection based on information provided by IGA and Heifer Intern

Case study: Rajasthan - Improvement of Goat Meat Production

Context: Project issues

A high and growing demand for goat meat.
The importance of traders.
Goats are mainly marketed for meat and skin in India.
Goat milk is mainly for auto consumption.
The importance of the market for muslim feasts.

Main challenges

Decreasing the mortality rate.
Improving the conformation of animals.
Improving the negociation capacity of the breeders and the selling price.
Managing the offer (animals are sold when cash is requested).
Develoing the local pure breeds.
Public veterinarian services (deworming and vaccination for PPR, enterotoxemia).

Initial situation

Low availability of fodder resources.
Low educational level of the breeders.
The small size of herds (often < 5 does).
The lack of supplies and services (limited vaccination and deworming).
A low input production system.
There are 33 local breeds identified.

Investments

Capacity building by creating a network of field guides and extension services.
Veterinarian services with the authorities.
Organization of the markets (through negociation with traders to weigh the animals).
Improving the market facilities.

FLOCK

Activity: Goat production

Production Unit:

Average Flock		
Situation	Present	Expected
Number of heads (female goats)	5	8
Number of heads (male goats)	1	1
Adult mortality	5%	5%
Adult discard rate	20%	20%
Discarded goats	1	2
Fertility rate	50%	50%
Number of kidding goats	3	4
Number of kids per kidding	1.5	1.5
Number of kids born	5	6
Milk per goat per cycle (lt)	0.40	0.60
Lactation period	140	168
Abortion and kid mortality	40%	20%
Number of weaned kids	3	5
Number of kids for replacement of adult goats	1	2
Number of kids sold	2	3
Liveweight of female sold (kg)	27	30
Liveweight of male sold (kg)	43	50
Liveweight of sold kid (kg) - less than 6 months old	6	10

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	1	1

Income per Average Flock per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Milk	Own Family	Lt	168.0	403.2	0.37	0.37	62	149
Kids sold	Middleman	Head	2.0	3.0	22.22	25.00	44	75
Adult goats sold	Middleman	Head	1.0	2.0	37.04	46.30	37	93
							144	317

Inputs per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Supplementary feeds	Local provider	Kg	70.0	268.8	0.19	0.19	13	50
Health treatments	Local provider	Head	6.0	9.0	2.22	2.78	13	25
							26	75

Labor per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Flock care	Own Family	Person/day	45.6	45.6	1.15	1.15	52	52
							52	52

	Present	Expected
Net Income before Labor Cost per Average Flock per Year	117	242
Net Income considering Labor Cost per Average Flock per Year	65	190
Labor generated per Average Flock per Year (Person/day)	46	46

INVESTMENT

Activity: Goat milk processing

Production Units:

Situation	Present	Expected
Flocks	2,990	2,990
Seld-help Groups	-	15

Investment on Production Units - Present Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	14,950	37.0	553,704	-	-	-	-
Bucks	Own Family	Head	2,990	37.0	110,741	8	37	110,741	-
Infrastructure	Own Family	Flock	2,990	324.1	968,981	5	130	387,593	116,278
					1,633,426				116,278

Investment on Production Units - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	23,920	46.3	1,107,407	-	-	-	-
Bucks	Own Family	Head	2,990	46.3	138,426	8	46	138,426	-
Infrastructure	Own Family	Flock	2,990	648.1	1,937,963	7	324	968,981	138,426
					3,183,796				138,426

Investment for Common Use - Expected Sit

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats distributed	Project	Head	5,980	46	276,852	-	-	-	-
Technical assistance	Project	Month	538	109	58,818				
					335,669				-

PRESENT NET INCOME

Present Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat production	Average Flock	117	2,990	1	351,048
					351,048

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat production	Average Flock	65	2,990	1	194,419
					194,419

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments 78,141

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Goat production	Average Flock	46	2,990	1	136,419
					136,419

EXPECTED NET INCOME

Expected Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat production	Average Flock	242	2,990	1	724,023
					724,023

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat production	Average Flock	190	2,990	1	567,394
					567,394

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	428,968

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Goat production	Average Flock	46	2,990	1	136,419
					136,419

Expected incremental results

Increase in Annual Net Income before Labor Costs	372,975
Increase in Annual Net Income considering Labor Costs	372,975
Increase in Annual Net Income considering Labor Costs and Annual Reserve to replace Inves	350,827
Increase in Employment Generated (Person/days)	-
Number of Participating Families	2,990
Per-Family Increase in Annual Net Income before Labor Costs	125
Per-Family Increase in Annual Net Income considering Labor Costs	125
Per-Family Increase in Annual Net Income considering Labor Costs and Annual Reserve	117
Per-Family Increase in Employment Generated (Person/days)	-

SENSITIVITY

Approximative IRR &NPV

Year	-	1	2	3	4	5	6	7	8	9	10
Start-up curve		33%	67%	100%	100%	100%	100%	100%	100%	100%	100%
Incremental Annual Flows	(1,886,040)	124,325	248,650	372,975	372,975	372,975	372,975	372,975	372,975	372,975	372,975
Residual value											1,605,741
Net Flows	(1,886,040)	124,325	248,650	372,975	372,975	372,975	372,975	372,975	372,975	372,975	1,978,716
IRR	16%										
Aggregate NPV	372,533										
Families	2,990										
NPV per family	125										

Switching Values

Critical Factors	Unit	Without Project	With Project		
			Minimum	Base	Min/Base
Number of goats	Head	5	8	8	1.00
Price of kids sold	Head	22.22	25.00	25.00	1.00
Milk per goat per day	Lt	0.40	0.60	0.60	1.00
Lactation period	Day	140	168	168	1.00
Abortion and kid mortality	%	40%	20%	20%	1.00
Flocks served	Flock	2,990	2,990	2,990	1.00

Without Project	With Project			% Change
	Minimum	Base	Min/Base	
5	7	8	0.88	(13%)
22.22	14.00	25.00	0.56	(44%)
0.40	0.47	0.60	0.78	(22%)
140	115	168	0.68	(32%)
40%	40%	20%	2.00	100%
370	370	2,990	0.12	(88%)

FLOCK SIZE PROJECTION

		0	1	2	3	4	5	6	7	8	9	... 20
Stock												
Adult goats		**5**	7	8	8	8	8	8	8	8	8	8
Milking goats		3	4	4	4	4	4	4	4	4	4	4
Kids born		5	6	6	6	6	6	6	6	6	6	6
Kids alive		3	5	5	5	5	5	5	5	5	5	5
Changes												
Goats distributed		**2**	-	-	-	-	-	-	-	-	-	-
Kid mortality		2	1	1	1	1	1	1	1	1	1	1
Goats discarded (sold or consumed)		1	1	2	2	2	2	2	2	2	2	2
Kids sold or consumed		2	3	3	3	3	3	3	3	3	3	3
Female kids kept in flock		1	2	2	2	2	2	2	2	2	2	2
Annual growth of flock		**1.0**	**1.4**	**1.6**	**1.6**	**1.6**	**1.6**	**1.6**	**1.6**	**1.6**	**1.6**	**1.6**
Parameters												
Fertility rate		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Kids per kidding		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Annual mortality rate for kids		0.4	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Annual discard rate for adult goats		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Proportion of kids sold or consumed		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Proportion of female kids kept in flock		0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

Source: Sample projection based on information provided by IGA and Heifer International

Case study: Tajikistan - Improvement of Mohair Production

Context: Project issues

Developing the access on high quality fiber market (mohair).

Developing cashmere product marketing.

Main challenges

To improve fiber quality.

To develop dehairing process.

To support collective organization and capacity building for business entrepreneurship.

To contact buyers.

To improve production systems and goat nutrition.

To develop selection process for fiber angora goats.

Initial situation

Low specialization.

Weak marketing.

Investments

Capacity and training equipment.

Develop associations and marketing infrastructure.

Extension services.

FLOCK

Activity: Mohair production

Production Unit:

Average Flock		
Situation	Present	Expected
Number of heads (female goats)	10	10
Number of heads (male goats)	1	1
Adult mortality	10%	10%
Adult discard rate	20%	20%
Discarded goats	2	2
Fertility rate	60%	60%
Number of kidding goats	6	6
Number of kids per kidding	1.5	1.5
Number of kids born	9	9
Mohair per goat per cycle (kg)	1.50	1.50
Milk per goat per cycle (kg)	1.14	1.14
Lactation period	70	70
Weaning rate	65%	65%
Number of weaned kids	6	6
Number of kids for replacement of adult goats	3	3
Number of kids sold	3	3
Liveweight of female sold (kg)	27	27
Liveweight of male sold (kg)	43	43
Liveweight of sold kid (kg) - less than 6 months old	6	6
Labor time required for Mohair shearing (minutes/goat)	20	20

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	1	1

Income per Average Flock per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Mohair	Potential	Kg	16.5	16.5	8.40	8.40	139	139
Milk	Middleman	Kg	480.0	480.0	0.05	0.05	24	24
Kids sold	Middleman	Head	3.0	3.0	12.00	12.00	36	36
Adult goats sold	Own Family	Head	2.0	2.0	2.40	2.40	5	5
							203	203

Inputs per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Supplementary feeds	Local provider	Kg	27.3	27.3	0.61	0.61	17	17
Forage	Local provider	Kg	1,588.0	1,588.0	0.05	0.05	79	79
Health treatments	Local provider	Head	11.0	11.0	1.00	1.00	11	11
							107	107

Labor per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Grazing	Sheperd	Head/Month	29.7	29.7	1.11	1.11	33	33
Flock care	Own Family	Head/Month	45.6	45.6	1.11	1.11	51	51
Mohair fiber shearing	Own Family	Person/day	0.5	0.5	1.11	1.11	1	1
							84	84

	Present	Expected
Net Income before Labor Cost per Average Flock per Year	96	96
Net Income considering Labor Cost per Average Flock per Year	12	12
Labor generated per Average Flock per Year (Person/day)	46	46

MOHAIR PROCESSING

Activity: Mohair processing

Production Unit:

Processing Unit		
Situation	Present	Expected
Supplying Families	-	334
Mohair supplied (kg)	-	5,511
Fine wool for the US&EU market / Mohair wool obtained	0%	16%
Yarn for the Russian market / Mohair wool obtained	0%	28%
Wool for local traders / Mohair wool obtained	0%	28%

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	-	1

Income per Processing Unit per Yea

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Fine fiber for US&EU market	USA	Kg	-	881.8	-	130.00	-	114,629
Yarn for Russian market	Russia	Kg	-	1,543.1	-	13.60	-	20,986
Fiber for local traders	Local trade	Kg	-	1,543.1	-	8.40	-	12,962
							-	148,577

Inputs per Processing Unit per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Mohair collected	Local Flocks	Kg	-	5,511.0	-	8.40	-	46,292
Transport to US&EU&Russia	Local provider	Kg	-	2,424.8	-	10.00	-	24,248
Taxes and duties	Government	Kg	-	881.8	-	10.00	-	8,818
Customs	Government	Kg	-	881.8	-	10.00	-	8,818
							-	88,176

Labor per Processing Unit per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Dehairing fine fiber for US&EU	Local Labor	Person/day	-	10,581.1	1.11	1.11	-	11,737
Scouring fine fiber for US&EU	Local Labor	Person/day	-	881.8	1.11	1.11	-	978
Carding fine fiber for US&EU	Local Labor	Person/day	-	881.8	1.11	1.11	-	978
Spinning fine fiber for US&EU	Local Labor	Person/day	-	20,280.5	1.11	1.11	-	22,496
Scouring other fiber	Local Labor	Person/day	-	1,543.1	1.11	1.11	-	1,712
Carding other fiber	Local Labor	Person/day	-	1,543.1	1.11	1.11	-	1,712
Spinning other fiber	Local Labor	Person/day	-	9,258.5	1.11	1.11	-	10,270
							-	49,882

	Present	Expected
Net Income before Labor Cost per Processing Unit per Year	-	60,401
Net Income considering Labor Cost per Processing Unit per Year	-	10,518
Labor generated per Processing Unit per Year (Person/day)	-	44,970

INVESTMENT

Activity: Mohair production, processing and marketing

Production Units:

Situation	Present	Expected
Flocks involved	334	334
Processing units	1	1

Investment on Production Units - Present Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	3,340	12.0	40,080	-	-	-	-
Bucks	Own Family	Head	334	12.0	4,008	8	2	802	401
Infrastructure	Own Family	Flock	334	16.6	5,557	5	-	-	1,111
					49,645				1,512

Investment on Production Units - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	3,340	12.0	40,080	-	-	-	-
Bucks	Own Family	Head	334	12.0	4,008	8	2	802	401
Infrastructure	Own Family	Flock	334	16.6	5,557	5	-	-	1,111
					49,645				1,512

Investment for Common Use - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Carding machine	Project	Unit	1	2,000	2,000	20	200	200	90
Infrastructure	Project	Unit	1	3,000	3,000	20	-	-	150
Marketing support	Project	Month	12	417	5,000				
Technical assistance	Project	Month	36	41	1,458				
					11,458				240

PRESENT NET INCOME

Present Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Mohair production	Average Flock	96	334	1	32,188
Mohair processing	Processing Unit	-	1	-	-
					32,188

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Mohair production	Average Flock	12	334	1	4,100
Mohair processing	Processing Unit	-	1	-	-
					4,100

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	2,588

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Mohair production	Average Flock	46	334	1	15,392
Mohair processing	Processing Unit	-	1	-	-
					15,392

EXPECTED NET INCOME

Expected Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Mohair production	Average Flock	96	334	1	32,188
Mohair processing	Processing Unit	60,401	1	1	60,401
					92,588

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Mohair production	Average Flock	12	334	1	4,100
Mohair processing	Processing Unit	10,518	1	1	10,518
					14,618

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	12,866

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Mohair production	Average Flock	46	334	1	15,392
Mohair processing	Processing Unit	44,970	1	1	44,970
					60,362

Expected incremental results

Increase in Annual Net Income before Labor Costs	60,401
Increase in Annual Net Income considering Labor Costs	10,518
Increase in Annual Net Income considering Labor Costs and Annual Reserve to replace Inves	10,278
Increase in Employment Generated (Person/days)	44,970
Number of Participating Families	334
Per-Family Increase in Annual Net Income before Labor Costs	181
Per-Family Increase in Annual Net Income considering Labor Costs	31
Per-Family Increase in Annual Net Income considering Labor Costs and Annual Reserve	31
Per-Family Increase in Employment Generated (Person/days)	135

SENSITIVITY

Approximative IRR &NPV

Year	-	1	2	3	4	5	6	7	8	9	10
Start-up curve		33%	67%	100%	100%	100%	100%	100%	100%	100%	100%
Incremental Annual Flows	(1,886,040)	124,325	248,650	372,975	372,975	372,975	372,975	372,975	372,975	372,975	372,975
Residual value											1,605,741
Net Flows	(1,886,040)	124,325	248,650	372,975	372,975	372,975	372,975	372,975	372,975	372,975	1,978,716
IRR	16%										
Aggregate NPV	372,533										
Families	2,990										
NPV per family	125										

Switching Values

Critical Factors	Unit	Without	With Project		
		Project	Minimum	Base	Min/Base
Number of goats	Head	5	8	8	1.00
Price of kids sold	Head	22.22	25.00	25.00	1.00
Milk per goat per day	Lt	0.40	0.60	0.60	1.00
Lactation period	Day	140	168	168	1.00
Abortion and kid mortality	%	40%	20%	20%	1.00
Flocks served	Flock	2,990	2,990	2,990	1.00

Without	With Project			% Change
Project	Minimum	Base	Min/Base	
5	7	8	0.88	(13%)
22.22	14.00	25.00	0.56	(44%)
0.40	0.47	0.60	0.78	(22%)
140	115	168	0.68	(32%)
40%	40%	20%	2.00	100%
370	370	2,990	0.12	(88%)

Case study: Venezuela - Lara and Falcon - Intensification of Goat Milk Production

Project issues

Create the basic conditions for intensification of production systems.

Investments to build water catchments for communal use for animal/human consumption and fodder production.

Capitalize on farmers' interest in shifting their extensive production systems toward intensified production systems.

Take advantage of the opportunity of increasing demand for goat products.

Consolidate the experience of successful pilot projects through strategic outscaling of technologies.

Support appropriate policies for sustainable use of water catchments and native vegetation.

Improve marketing aspects that benefit goat producers and small farmers in general.

Main challenges

Dependency on unrestricted communal grazing of rangeland.

Poverty and lack of resources. Migration in search of other income generating - employment opportunities.

Limited negotiating power and poor organization of farmers

Lack of policies on: use of communal lands; product quality and safety; use of common water reservoirs.

Rangeland degradation for over-grazing

Livestock thievery

Initial situation

Lack of water for forage production. Goat production systems largely rely on native semi-arid vegetation.

There is a well developed road network which connet rural areas with urban centers in the two states.

The National Agricultural Research Institiute (INIA) has regional centers in each of the two states.

Two universities link with INIA technical assistance and education.

INIA developed models for goat production intensification to overcome natural constraints.

In extensive and semi-intensive goat systems, milk production averages 0.7 kg/doe/day for 210 days/year on average.

Goat milk is generally processed into white cheese in an artisanal manner.

Other products include: condensed milk jam, ricotta and yougurt and fresh milk.

Investments

On-farm investments include: flock and flock facilities, processing facilities and equipment, irrigation system

Communal investments include: water catchment and technical assistance.

FLOCK

Activity: Goat milk production

Production Unit:

Average Flock		
Situation	Present	Expected
Number of heads (female goats)	45	45
Number of heads (male goats)	2	2
Adult mortality	8%	8%
Adult discard rate	20%	20%
Discarded goats	9	9
Fertility rate	83%	83%
Number of milking goats	37	37
Number of kids per kidding	1.4	1.4
Number of kids born	52	52
Milk produced per goat per day (lt)	0.66	1.86
Milking period (days)	210	210
Abortion and kid mortality	36%	18%
Number of weaned kids	33	43
Number of kids for replacement of adult goats	13	13
Number of kids sold	20	30
Liveweight of female sold (kg)	28	28
Liveweight of male sold (kg)	40	40
Liveweight of sold kid (kg) - less than 6 months old	6	6
Labor time required for milking (minutes/lt)	5	5

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	1	1

Income per Average Flock per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Goat milk produced	Processing	Lt	5,128.2	14,452.2	0.81	0.81	4,174	11,763
Kids fattened and sold	Local Butcher	Kg Liveweight	120.0	180.0	3.25	3.25	390	585
Adult goats sold	Local Butcher	Kg Liveweight	252.0	252.0	2.35	2.35	592	592
							5,156	12,941

Inputs per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Concentrate for milking goats	Local provider	Kg	5,374.3	13,513.0	0.45	0.45	2,428	6,106
Other feeds	Local provider	Kg	-	3,085.7	-	0.40	-	1,238
Mineral salt	Local provider	Kg	23.5	23.5	0.19	0.19	4	4
Forage	Local provider	Bale	333.0	444.3	2.33	2.33	774	1,033
Forage	Own Farm	Bale	-	730.0	2.33	2.33	-	1,698
Health treatments	Local provider	Head	47.0	47.0	1.55	1.55	73	73
							3,280	10,152

Labor per Average Flock per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Flock care	Own Family	Person/day	91.3	91.3	9.30	9.30	849	849
Goat milking	Own Family	Person/day	53.4	150.5	9.30	9.30	497	1,400
							1,346	2,249

	Present	Expected
Net Income before Labor Cost per Average Flock per Year	1,876	2,789
Net Income considering Labor Cost per Average Flock per Year	531	540
Labor generated per Average Flock per Year (Person/day)	145	242

MILK PROCESSING

Activity: Goat milk processing

Production Unit:

Processing Unit		
Situation	Present	Expected
Flocks supplying milk	1	1
Milk produced (lt)	5,128	14,452
Proportion of milk processed into condensed milk jam	20%	80%
Milk processed into condensed milk jam (lt)	1,026	11,562
Condensed milk jam per lt of milk (gr)	235	235
Proportion of milk processed into cheese	80%	20%
Milk processed into cheese (lt)	4,103	2,890
Milk required per kg of cheese (lt)	7	7
Milk processed per person/day of labor (lt)	30	30

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	1	1

Income per Processing Unit per Year

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Condensed milk jam	Urban Market	Pack of 100 gr	2,410.0	27,170.0	0.93	0.93	2,242	25,274
Cheese	Local Market	Kg	586.1	412.9	8.14	8.14	4,770	3,361
							7,012	28,635

Inputs per Processing Unit per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Milk	Own Flock	Lt	5,128.2	14,452.2	0.81	0.81	4,174	11,763
Rennet	Local provider	Lt	5.7	4.0	10.47	10.47	60	42
Salt	Local provider	Kg	74.1	52.2	0.19	0.19	14	10
Sugar	Local provider	Kg	341.9	3,853.9	0.93	0.93	318	3,585
Spices	Local provider	Bag	57.0	160.6	1.40	1.40	80	224
Container	Local provider	Unit	2,531.0	28,529.0	0.07	0.07	177	1,990
Wrapping plastic	Local provider	Roll of 1500 m	0.2	1.8	40.70	40.70	7	74
Labels	Local provider	Unit	2,996.1	27,582.9	0.06	0.06	174	1,604
Gas	Local provider	Cylinder of 10 kg	34.0	385.0	1.00	1.00	34	385
Sanitizer	Local provider	Lt	28.5	80.3	11.36	11.36	324	912
Transport	Local provider	Trip	2.4	27.2	11.63	11.63	28	316
							5,388	20,905

Labor per Processing Unit per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Processing	Own Family	Person/day	170.9	481.7	9.30	9.30	1,590	4,481
							1,590	4,481

	Present	Expected
Net Income before Labor Cost per Processing Unit per Year	1,624	7,730
Net Income considering Labor Cost per Processing Unit per Year	34	3,249
Labor generated per Average Processing Unit per Year (Person/day)	171	482

FORAGE

Activity: Forage Production

Production Unit:

Average Plot		
Situation	Present	Expected
Irrigated area (ha)	-	1.0
Yield per cycle (bales per ha)	-	730

Production Cycle:

One Year		
Situation	Present	Expected
Number of cycles per year	-	1

Income per Average Family Plot per

Item	Market	Unit	Quantity		Unit Price		Total Income	
			Present	Expected	Present	Expected	Present	Expected
Forage	Own Flock	Bale	-	730.0	2.33	2.33	-	1,698
							-	1,698

Inputs per Average Family Plot per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Fuel for pomp	Local provider	100 lt	-	255.5	1.23	1.23	-	315
Oil for pomp	Local provider	Lt	-	108.0	2.56	2.56	-	276
Urea	Local provider	Kg	-	200.0	0.29	0.29	-	58
							-	649

Labor per Average Family Plot per Year

Item	Source	Unit	Quantity		Unit Cost		Total Cost	
			Present	Expected	Present	Expected	Present	Expected
Pasture care and cutting	Own Family	Person/day	-	91.3	9.30	9.30	-	849
							-	849

	Present	Expected
Net Income before Labor Cost per Average Family Plot per Year	-	1,049
Net Income considering Labor Cost per Average Family Plot per Year	-	200
Labor generated per Average Family Plot per Year (Person/day)	-	91

INVESTMENT

Activity: Goat milk processing

Production Units:

Situation	Present	Expected
Flocks supplying milk	2	2
Processing units	2	2
Average Plots	-	2

Investment on Production Units - Present Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	90	173.3	15,593	-	-	-	-
Bucks	Own Family	Head	4	355.8	1,423	8	94	376	131
Flock facilities	Own Family	Flock	2	2,790.7	5,581	20	-	-	279
Fences	Own Family	Plot	2	4,651.2	9,302	20	-	-	465
Processing facilities	Own Family	Unit	2	2,325.6	4,651	20	-	-	233
Refrigerator	Own Family	Unit	2	441.9	884	10	44	88	80
Stove	Own Family	Unit	2	465.1	930	10	47	93	84
Processing equipment	Own Family	Set	2	139.5	279	4	-	-	70
					38,644				1,341

Investment on Production Units - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Goats	Own Family	Head	90	255.8	23,023	-	-	-	-
Bucks	Own Family	Head	4	581.4	2,326	8	94	376	244
Flock facilities	Own Family	Flock	2	2,790.7	5,581	20	-	-	279
Fences	Own Family	Plot	2	4,651.2	9,302	20	-	-	465
Processing facilities	Own Family	Unit	2	2,325.6	4,651	20	-	-	233
Refrigerator	Own Family	Unit	2	441.9	884	10	44	88	80
Stove	Own Family	Unit	2	465.1	930	10	47	93	84
Processing equipment	Own Family	Set	2	139.5	279	4	-	-	70
Water storage tank	Own Family	Unit	2	1,162.8	2,326	20	-	-	116
Water pump	Own Family	Unit	2	3,488.4	6,977	10	349	698	628
Irrigation piping	Own Family	Mt	1,200	3.0	3,628	4	-	-	907
Pasture establishment	Own Family	Ha	2	523.3	1,047	4	-	-	262
Forage cutter	Own Family	Unit	2	930.2	1,860	4	93	186	419
					62,814				3,785

Investment for Common Use - Expected Situation

Items	Source	Unit	Quantity	Unit Cost	Total Cost	Useful Life	Salvage Unit Value	Salvage Total Value	Annual Reserve
Technical assistance	Project	Month	24	334.9	8,037	20			
					8,037				-

PRESENT NET INCOME

Present Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	1,876	2	1	3,753
Goat milk processing	Processing Unit	1,624	2	1	3,248
Forage Production	Average Plot	-	-	-	-
					7,001

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	531	2	1	1,061
Goat milk processing	Processing Unit	34	2	1	68
Forage Production	Average Plot	-	-	-	-
					1,129

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	(211)

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Goat milk production	Average Flock	145	2	1	289
Goat milk processing	Processing Unit	171	2	1	342
Forage Production	Average Plot	-	-	-	-
					631

EXPECTED NET INCOME

Expected Situation

Annual Net Income before Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	2,789	2	1	5,578
Goat milk processing	Processing Unit	7,730	2	1	15,460
Forage Production	Average Plot	1,049	2	1	2,098
					23,136

Annual Net Income considering Labor Costs

Activity	Production Unit	Net Income per Production Unit	Number of Production Units	Number of Cycles per Year	Total Annual Net Income
Goat milk production	Average Flock	540	2	1	1,079
Goat milk processing	Processing Unit	3,249	2	1	6,498
Forage Production	Average Plot	200	2	1	400
					7,977

Annual Net Income considering Labor Costs and Annual Reserve to replace Investments	4,192

Annual Employment Generated

Activity	Production Unit	Person/days per Production Unit	Number of Production Units	Number of Cycles per Year	Annual Labor (Person/days)
Goat milk production	Average Flock	242	2	1	484
Goat milk processing	Processing Unit	482	2	1	963
Forage Production	Average Plot	91	2	1	183
					1,630

Expected incremental results

Increase in Annual Net Income before Labor Costs	16,134
Increase in Annual Net Income considering Labor Costs	6,847
Increase in Annual Net Income considering Labor Costs and Annual Reserve to replace Inves	4,403
Increase in Employment Generated (Person/days)	998
Number of Participating Families	2
Per-Family Increase in Annual Net Income before Labor Costs	8,067
Per-Family Increase in Annual Net Income considering Labor Costs	3,424
Per-Family Increase in Annual Net Income considering Labor Costs and Annual Reserve	2,202
Per-Family Increase in Employment Generated (Person/days)	499

SENSITIVITY

Approximative IRR &NPV

Year	-	1	2	3	4	5	6	7	8	9	10
Start-up curve		33%	67%	100%	100%	100%	100%	100%	100%	100%	100%
Incremental Annual Flows	(32,207)	2,282	4,565	6,847	6,847	6,847	6,847	6,847	6,847	6,847	6,847
Residual value											(272)
Net Flows	(32,207)	2,282	4,565	6,847	6,847	6,847	6,847	6,847	6,847	6,847	6,575
IRR	12%										
Aggregate NPV	446										
Families	2										
NPV per family	223										

Switching values

All factors are close to critical values

Key issues and Lessons from learned experiences:

How to develop strategic investments in sustainable pro-poor small ruminant development for securing sustainable livelihoods

By Dilip BHANDARI, Heifer Project International
and Jean-Paul DUBEUF, INRA/SAD, project coordinator

Introduction

The all study has been based on a comparative analysis of operation projects and experiences. The diversity and complementarities of these cases have given a significant overview of the key issues to take in account before planning a development project for securing sustainable livelihoods and bases on goat activities.
The major key issues to answer are:

To define project objectives

To identify main expected outputs

What are the indicators of success

What main investments to be planned according to objectives and commodities

Key issues on project objectives

For the goal of securing sustainable livelihoods through enhancing the capacity of vulnerable and smallholder farmers (especially women) in goat raising the project should bring holistic changes in the communities in five aspects:

increasing income and assets,

improving food security,

improving the environment,

increasing women's empowerment

building social capital

The first three physical aspects are coupled with building social capital and empowering women to create a multiplier effect which will deepen the project impact.
The true focus of the project should be people's development. Once the community's capacity is developed, they can take leadership in increasing goat productivity using the technical knowledge and skills provided by the project.
From our experience, we observed that these general objectives are rather well identified. But they have to be more specific and more quantified.

How to define quantified objectives

The following objectives are proposed for pro-poor development through goat-raising. These objectives are applicable ranging from a community to a regional level with potential of scalability to a larger scale covering multiple countries and also for all types of goats (meat, dairy and fiber).The objectives have to be associated also with quantified outputs. The types of quantified indicators are presented below:

1 By year xxxx, strengthen social capital through organizing # of goat farmers in farmer institutions (self-help groups-SHGs1[1] and cooperatives/associations) with enhanced management capacity, selecting # women to represent a family.

Outputs:
1.1 # of SHGs consisting # of goat farmers formed and engaged in goat value chains
1.2 # of goat farmers organized in to # cooperatives which are linked to goat value market chains.
1.3 # of women farmers engaged in goat farming and managing cooperatives

2 By year xxxx, increase goat productivity by at least x % through adoption of improved goat management technologies to contribute to increased family income and assets

Outputs:
2.1 # of does and bucks provided to goat farmers for expanding goat production enterprises
2.2 Goat farmers engaged in skills of improved goat farming practices for % increasing production resulting in increased income and assets.
2.3 Goat productivity is increased through genetic improvement

3 By year xxxx, diversify income sources of the families through goat and other farm production for food security and nutrition.

Outputs:
3.1Food consumption is improved in terms of quality, quantity ad diversity of ingredients because of increased income
3.2Year-round food is available for the goat farmers through goat farming and other farm production

4 By year xxxx, # of SHGs and their associations will form alliance with other stakeholders along the goat value chain and develop marketing enterprises.

Outputs:
4.1 # of goat producer cooperatives/associations establish and manage distribution and transport of goats and work closely with other staekholders
4.2 # of goat collection centers/market hubs are in place and are coordinated with relevant stakeholders for their operation and regulation
4.3 Standard marketing practices are followed and transparent pricing systems for goats are established

1 [1] A self-help group (SHG) is a registered or unregistered group of persons having a more or less homogenous social and economic background. The members voluntarily come together to save small amounts of money on a regular basis. They mutually agree to contribute to a common fund to meet their emergency needs on the basis of mutual help. (several references on Development and Microfinance).

5 By year xxxx , participating goat farmers have implemented # of **environmental improvement** practices for sustainable goat production.

Outputs:

5.1 **#** of trainings on compost making and agro ecological practices to the goat farmers

5.2 Sufficient fodder trees and forage planted by the goat farmers in their land for feeding goats and maintaining the greenery

5.3 # of education campaigns on environmental protection and climate change conducted

Proposed activities and indicators of success according to objectives

The o**b**jectives and indicators described in the above pages are applicable in all cases and all types of goats whatever is the main commodity (meat, milk/cheese or fibers).

Major Objectives	Indicators of success
1. Increase income and assets	
• Distribution of goats, vegetable seeds and saplings, • Trainings on goat management and fodder production, • Training on kitchen gardening, savings and credits, and **enterprise development** • Quarterly • Quarterly participatory self-review and planning PSRP[1] of SHGs • Goat health camps	• Increased capital mobilized through savings and credit schemes of Self-Help Groups (SHGs) • Increased access to financial institutions • Diversified sources of income • Reduced migration to cities
2. Food security and Nutrition	
• Improved goat production • Training on homestead food production • Support fund for homestead garden • Training on family nutrition	• Increased production of goat on # of smallholder families • Increased year-round food security of participating families • Increased diversity in food consumption of participating families • Hygienic food preparation and storage techniques adopted • Improved and equitable household food distribution
3. Environment	
• Trainings on Fodder development and agro forestry • Trainings on environment, composting/ organic fertilizers • Introduction and leveraging of improved technologies: rainwater harvesting system, improved cooking stoves • Trainings and mobilization for improved sanitation	• Integration of agro-forestry and efficient usage of arable agricultural lands • Application of improved goat management techniques (manure usage, stall feeding) • Proper usage of land and water resources • Presence of improved sanitation facilities and rain water harvesting system • Community led environment improvement activities

4. Women Empowerment	
• Self-Help Groups (SHGs) are formed with women as the representatives of their family • Training and Women's leadership and capacity development. • Gender training for men and women.	• Equitable sharing of resources and workload among male and female members of the family • Equitable treatment of girls and boys (especially related to nutrition and education) • Number of women increased leadership capacity and entrepreneurial skills • Number of SHGs instituted and fully led/managed by women
5. Social capital	
• Organize, create, and strengthen SHGs • Values enhancement and PSRP training for both men and women • Leadership development training • Social mobilization & institution development	• SHGs developed short and long-term plans • Clarity in roles and procedures of SHGs • Reduced incidence of social discrimination and domestic violence • Observaition of intra- and inter-family cohesion • Linkages and coordination with concerned agencies • Collective actions for community development

Main types of projects and investments

The main existing goat production systems in the world and the characteristics of the main commodities have been described above in the report "An overview on the context of the study and the socioeconomic importance of the goat sectors".
The development projects are related to each productions systems, to the main commodity to develop their geographical extension and localization.

The process to define the type of projects and requested investments

The following process is proposed to define what type of projects is required and with what investments:

Description of the existing production system

Defining the appropriate value chain and mapping of the actors (see the value chain tool kit)

Main existing infrastructures and investments to plan

Livestock play a critical role in supporting families but large animals are very difficult for them to raise due to lack of financial and forage resources. In arid or semi-arid areas of Africa (Western Africa in Mali, Ghana, Niger, Guinea or Senegal, in East Africa in Kenya, Tanzania, Malawi, Rwanda, Ethiopia, Mozambique, Rwanda), India, in South –Eastern Asia (Indonesia, Philippines) more humid countries, or in Middle –East Central Asia, goats are playing role to improve the lives of farmers and pastoralists.

The cultural attitudes regarding goats in these areas are very different from a country to another and the first factor to consider is the local acceptance of goats and goat products. For instance, goat milk is highly regarded and accepted in East Africa, Middle East and Central Asia, which is not the case in Western Africa, where Fulani spastoralists have mixed herds in which goats are mainly used for meat in religious feasts or as financial support provider through immediate sale when needed.

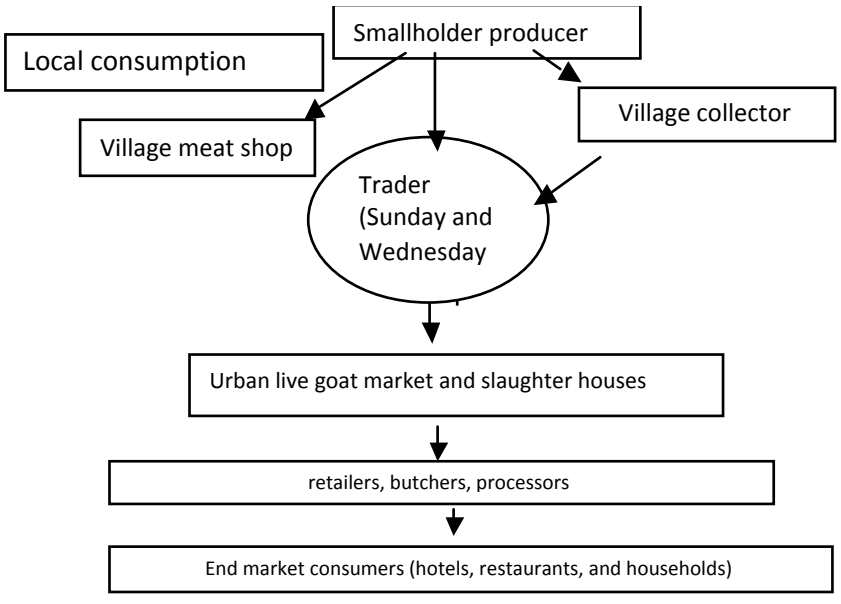
Smallholder Production systems: The production systems are generally not specialized and multipurpose and integrated with crops. Mixed crop livestock systems are often common for the smallholders having less than one hectare of land. One important challenge is generally to improve the production of the crops, to save some byproducts for goats as well as fodder and forages for goats and sheep in lands not suitable for crop production and goat manures are used for fertilizing the kitchen garden or the forage and fodders.

Pastoral systems are common among the smallholders in many areas and a traditional practice. Climate change and droughts have put these smallholders vulnerable. Several projects which were part of this study including India, Mozambique, Indonesia, or Kenya were focused on improving the economic status of the smallholders and pastoralists. Improvement of performances of the herds thereby increasing food auto sufficiency in meat, milk and manure and get small income for basic cash through small ruminants were the objectives of these projects. These projects were of small in size and mainly implemented through local organizations.

Case 1: Smallholder goat production at community levels for food security and emergency

How we can improve the smallholder production system?
This type of production system is very small, requires minimal investments and external resources to improve the productivity and is often integrated with other agricultural practices. The projects are generally implemented at a community/village scale (or few villages). Investments for such projects are done mainly through small local livestock development organizations, but can work as a stepping stone for larger integrating regional or national level projects.

Such projects should be formulated in partnership with local NGOs or associations. For instance, some NGOs like HPI or Farm Africa have followed this process to develop successful community based actions for more than 60 years in several countries. Objectives of such interventions are to improve food security and immediate cash resources for resource-poor farmers to meet their urgent needs.
Value chain: The value chain corresponding to this type of situation is simple as seen in like the framework below



Mapping the actors:
Major actors are the smallholder farmers mostly women, local retailers, extension agents, veterinarians and community animal health workers (paravets). Some traders for supplies and selling the products in district markets could be also involved in this mapping.
This type of project would involve less number of families from covering a small community to a larger villages (100 to 1000 families) in selected clusters (1 to 3 generally no more). Majority of the goats produced in such cases will go for local consumption (milk meat, manure) and local traders and village collectors for urban markets.

Mapping core processes, actors and flow of products

Input supply (non to basic health service, feed, water)

Management (breeding and feeding; basic housing, stall feeding to some communal pastures)

Goat keepers

Production (multipurpose: milk, meat; manure)

Goat keeper

Retailing (local consumption, village shops; nearby urban markets)
Goat keepers, women, traders

Major specific constraints on this case with recommended interventions

The animals: An important cause for the limitation of animal production in the communities is often the herd size and the quality of animals. It is linked to the lack of investment capacity of the goat keepers.
The gift or loan of 2 to 4 to goats in each family has been the established practice in many successful projects which has added tremendous value in increasing the economy of limited resource smallholder goat keepers. Such types of small projects with the practice of "passing on the gift" have helped many families through the difficulties and also have built their social capital as in case of Heifer International in India. When goats are used from within the area, not imported the production potentialities are limited unless the animals are selected purposefully.
Selected crossed animals could be efficient but it is generally advised not to import high value animals of exotic breeds and origin.
The adaptation of imported animals is often problematic and they often disturb the local production system (problems to breed together local animals)
Animal health and reproduction: Low fertility of goats and low fecundity, small size, low body conditions and mortality rate of the kids, low milk yield are the main reasons of low productivity.

The absence of systematic vaccinations (for instance for Peste des Petits Ruminants -P.P.R) and deworming by local veterinarians or paravets could explain many animal health problems. Regular supply of appropriate vaccines (e.g. PPR, enterotoxaemia,) and anthelmintic drugs through CAHWs; training to farmers on basic health and husbandry will address this issue.

Goat feeding and forage resources: Forage resources and water availability are the main limiting factors for reproductive performances, live weight gain and milk production.

This leads to suggest the following basic actions to precise in each local condition:

- Planting of locally available fodder trees and forage well adapted to local environment in the available land not used for crop cultivation. Leguminous forages are also introduced to increase soil fertility.
- Providing training on nutrition and good feeding practices to the smallholder through extnesion agents or through the paravet having basic knowledge on nutrtion

Capacity building of farmers and marketing: This type of project should also include basic courses on practice and hygiene of milking and milk handling and milk conservation, organization of local small shops with women, participatory meetings with local traders to organize the sales of the supplying products to urban and niche markets.

Financing small projects: The investments are minimal and smallholder can increase their income by certain amount but it may not bring families to resiliency. Such projects cannot cover larger areas of critical mass and generally last for 2-3 years. The project funding is mainly for the purpose of-

- Purchasing of goats
- Purchasing vaccines and de wormers and their use.
- Purchasing seeds and saplings of forage/fodder for nutrition supply.
- Providing basic training to paravets.
- Creating basic infrastructures like water wells or small slaughter areas.
- Organizing courses and train the farmers (retribution of local field guides).

Main returns, risks and prospect: This type of project is a foundation for smallholder goat farming groups. It could give short terms significant outputs. The returns are generally very good if they are designed well respecting local goat raising practices and cultures.
The main risk and lack of sustainability of such a project is the absence of support for multiple stakeholders

Table 1: Example of Cost Benefits Analysis in Rajasthan
(simplified table from Dino Francescutti, FAO[2]):

*Total investment (*Does + bucks + Infrastructure + services): USD 4 700 000 (+ *annual reserve* : USD 139 000)

	Initial situation	**Final Situation**	**Return**
Goat /family	5	8	+3
Milk/goat /day (l)	0.4 /day (120 days)	0.6 (130 days)	+0.2
Number of kids sold or consumed/year	2	3	+1
Live weight of kids	6 kg	10kg	+4 kg
Annual dairy production	180	806	626

2 **Dino Francescutti,** Business assessment and Cost –Benefits analysis for Pro-Poor Small Ruminant Development, FAO? &"P+annex (document enclosed in the IFAD study; 13 pp. + annexes

Goat meat (kg)	12	30	+18
Income/family	144	269	+125 *(+117 after reserve)*
Impact for 2990 families	430560	803535	+372975 *(+350825 after reserve)*
Total Income day/family (USD)	0.40 $/day/family	0.74y	+0.34

Case 2: Improving Goat Production for smallholders at Regional Levels

This type of project aims to increase the productivity and economic returns of small holder goat farmer at a regional level covering critical mass of the families bringing out of poverty through goat production and business skills through various means

These projects always engage higher investments and multiple stakeholders. Several successfully implemented local projects outlined in case-1 could lead to implement these regional projects and aggregate local initiatives

The Development agencies seeking the financial support in such instances has to be well established and legitimate nationally by the report of previous successful results whether public governmental organizations in Brazil)or International or National Development organizations (e.g. Farm Africa in Kenya, Heifer International in India). The participation of National or International Research Institutes is generally required (ILRI, ICARDA, National Institutes as Embrapa in Brazil).

A detail feasibility study including value chain study would be useful before beginning the project to confirm:

- community expectations[3]; project should match their needs and expectations
- basic minimum requirements for improving goat production at a profitable scale
- Resource, skills and technologies needed for increasing herd size of the goats.

Production systems and commodities: There are no predefined production systems to implement this type of investment. But starting with smallholder and increasing their capacity to increase herd size, introduction of improved breeds, technologies, will bring success if they are carefully and systematically designed. This system may not work well for the nomadic pastoral communities due to the high cost to build infrastructures in nomadic pastoral low density areas.

Although all the production systems are always multipurpose the project will generally focus on one or two commodities only (milk in Kenya, Brazil, Mexico, cheese in Venezuela, meat in India, meat and fibers in Argentina, or Tadjikistan).

3 Cf the success and failure factors in the case described in Java : Budisatria, G.S. Udo H.M.J. Goats based aid program in Central Java: an essential resource for the poor and vulnerable? *Small Ruminant Research*, *Volume 109, Issues 2–3*, *January 2013*, *Pages 76-83*I.

Entrepreneurial perspectives

In these projects, most of the beneficiaries will spend their improved incomes either for their personal expenses, either to increase slightly the size of their herds and it is difficult to anticipate their individual behavior. Many of them have little additive labor available and could not extend their herd without affecting all their production system. But some of them have a more entrepreneurial attitude. In this case they plan to increase their herd for instance from 4 to 28 goats in few years by re-investing all their additional income in the herd as seen in Nepal by Heifer Project. A sample budget has been prepared to support these entrepreneurship initiatives by Heifer Project International (Table 2).

Table 2: An example of Cost Benefits Analysis for a Regional project in Nepal
(simplified table from Dino Francescutti, FAO[4]):

	Initial situation	**Final Situation**	**Return**
Number of family flocks	138000	138000	
Self help groups	0	690	
Goat /family	3	8	+5
Kids alive	2	5	+3
Number of kids sold or consumed/year	1	3	+2
Annual mortality rate	40%	20%	-20%
Net Income excluding labor cost (USD/flock)	134	342/	208
Total Net income before labor cost (USD)	18 492 000	47 196 000	28 704 000
Net Income after labor cost (USD/flock)	**48**	**256**	**+ 208**
Total Net income after labor cost	**6 624 000**	**$ 35 328 000**	**$ 28 704 000**
Annual net income considering annual reserve and labor costs (USD/flock)	3 425 522	$ 31 467 122	+$28 041 600
Annual Employment generated			
Person/day/unit	46	46	
Person/day Annual Labor	6 2956 250	6 2956 250	

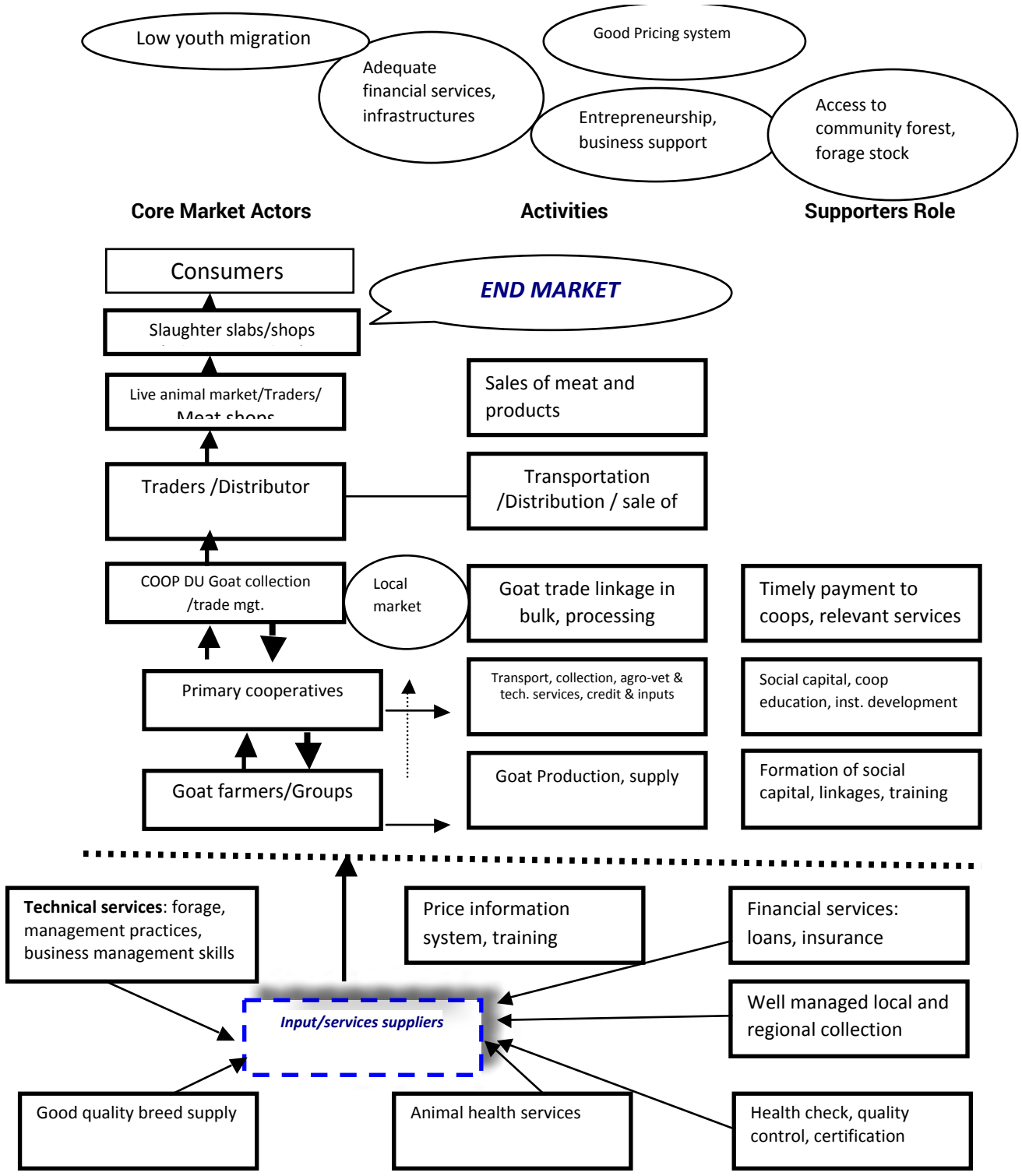
		Per flock (USD)	Total for the project(USD)
Project investment			**33 608 997**
Goats (2 goats distributed by flock)	+276000	103	28 428 000
Technical Assistance (month)	36 months/ group	208	5180997
Family additional investment (Invested Capital)			
Goats (X2)	+414000	103	42642000
Bucks (5 years expected useful life)	+34500	164.85	5687325

4 **Dino Francescutti,** Business assessment and Cost –Benefits analysis for Pro-Poor Small Ruminant Development, FAO? &"P+annex (document enclosed in the IFAD study; 13 pp. + annexes

Approximate Internal Rate of Return (IRR) and Net Present Value (NPV)
The investment would be covered after 4 years (all amounts in USD)

Year	-	1	2	3	4
Start-up curve		25%	50%	75%	100%
Incremental Annual Flows	81 936 597	7 188 075	14 376 150	21 564 225	28 752 300
Residual value					
Net Flows	81 936 597	7 188 075	14 376 150	21 564 225	28 752 300
IRR	24%				
Aggregate NPV	59 923 764				
NPV per family	434				

Value chain: The core process and actors mapping of the value chain have many interactions and involve a large set of actors. Below is an example of a meat goat value chain framework conducted by a group of experts in Nepal working for HPI showing multiple stakeholders.



Funding and implementation of regional goat projects: Such project funding ranges from 15- 50 M US$ mainly through large institutional donors and the projects are implemented for the duration of more than five years. The focus of project are mainly on capacity building, technology transfer, creating infrastructure, supporting all stakeholders of the value chain.

Capacity building and technology transfer:

- access to services (vaccination, quality and hygiene, access to basic supplies)
- appropriate technology transfers (training and contracting with local field technicians, extension services
- Business and entrepreneurship training
- Breeding centers
- Research projects, references and diffusion

Social capital:

- Formation of self-help groups, cooperatives, women/farmer associations

Market value chain:

- Organizing information on markets,

After the end of the project, a transition period is planned with a minimal financial support by the donor institution and these are the investment in personnel and operational costs.

Main risks:

- Lack of opportunities for the products (to be careful with the milk market).
- Problems of governance, planning and coordination of the project
- Lack of infrastructures for processing (to be solved by other types of investments, case 3)
- Lack of motivation of the households These risks can be addressed through appropriate interventions and are part of the project planning)

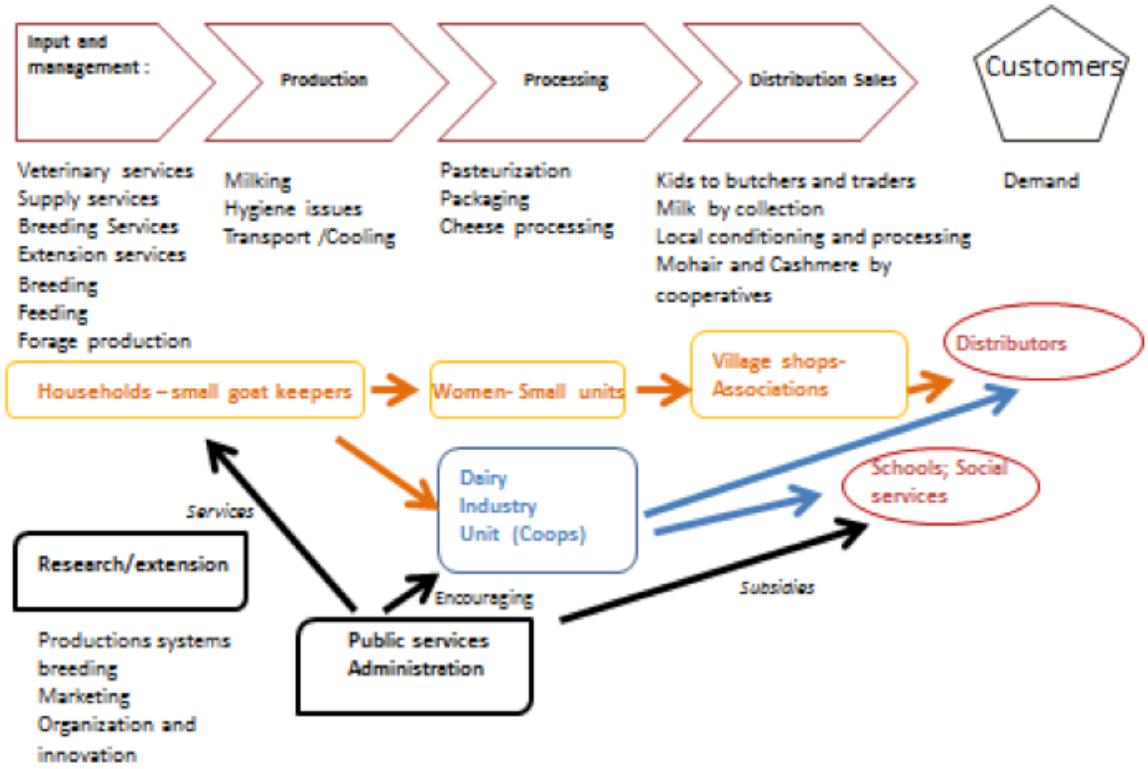
Case 3: Large scale goat development at regional and national level to organize a complete goat value chain

The success of projects to develop production by smallholders at local and then regional levels could lead very quickly to problems to market the products. The investments to organize the value chain and marketing are interconnected with the improvement of goat production and quality but are generally complex and specific.

Case 3.1: Dairy Goats Production

Although more than 90 % of the produced goat milk is consumed locally and not marketed outside, there is a renewed interest for goat milk products in many places (liquid milk, soft cheese, hard cheeses, and specialties)(Dubeuf et al., 2007). Unlike cow milk market there is no global goat milk markets and to some extents goat milk markets are often "Niche markets". Niche markets will keep dominant for goat milk and cheese because of the production capacity and the fact that no all people like goat milk anf cheese. Experiences have shown that investing on the goat milk market is relevant when there is identified demand.

Value chain and actors mapping



Investment: The identified investment for dairy production is the equipment to process, package and sell good quality milk the investments for such cases may vary. Two examples are cited below from different countries.

Table 3: An example of Cost Benefits Analysis for a regional project to organize the goat milk value chain in Meru region in Kenya *(Simplified table from Dino Francescutti, FAO[5]):*

Main issues and beneficiaries	120 000 poor families /720 000 people 10 years-6 NGOs
Main objectives	Development of goat milk markets at a regional level
Initial situation	Low yield – successful presence of NGOs and nucleus of improved farms.
Main investment	Creation of 600 breeding stations for 200 farms each with import of Toggenburg goats for crossing Cooling stations

	Initial situation	**Final situation**	**Return**
Goat /family	4	4	=
Adult mortality (%)	10	5	-5
Milk/goat /day (l) **(lactation lenght, days)**	0.2 (70)	1.8 (200)	+1.6
Total mik (l/farm)	42	1080	+1384
Kid mortality (%)	17	8	-9
Number of kids sold or consumed (6 kg Lw)	3	4	+1
Outputs(USD/farm) Milk (USD 0.5/l) Kids (USD/kid -/kg) Adult goats	150 21 54 -3 75	705 540 90 - 3,76 75	+555
Inputs (USD /farm) Concentrates (kg/day/doe- total) Veterinary (USD/doe) Breeding Centre fee	 - - -	126 (1.2-) 100 18 8	126
Labor (USD /farm)	95	117	+22
Income/family (USD) Without labor With labor	 150 55	 579 479	 +429 +424
Total regional income (i labor) *Minus reserve* **Annual net income**	6 600 000 1861000 **4 788 600**	57 480 000 *2 390000* **55 090 000**	+ 880 50 000 **+50 301 400**
Total investment (USD) and IRR	**51631800**	**68114400**	**+ 16482600 (54%)**

5 **idem**

Investment: The investment for dairy production is the equipment to process, package and sell good quality milk the investments for such cases may vary. Two examples are cited below from different countries.

The second case is about artisanal cheese making . The studied cases are in Capo Verde or in Venezuela.

Table 4: An example of Cost Benefits Analysis for a regional project to organize a small scale cheese production in semi arid areas in Venezuela (Lara and Falcon state)
(Simplified table from Dino Francescutti, FAO[6]):

Main issues and beneficiaries	4000 households		
Main objectives	Development of goat milk intensification through irrigation and improving market aspects		
Initial situation	Low yield – lack of water Artisanal white cheese ricotta, milk jam, yogurt and fresh milk		
Main investment	Flock and processing facilities, irrigation systems facilities		
	Initial Situation	**Final situation**	**Return**
Goat /family	45 (37 milked goats)	45 (37 milked goats	=
Adult mortality(%)	8	8	=
Milk/goat /day (l) **(lactation length, days)**	0.66 (210)	1.86 (210)	+1.2
Total milk (l/farm)	5128.2	14452.2	+9324
Kid mortality (%)	36	18	-18
Number of kids sold or consumed (6 kg Lw)	20	30	+10
Outputs(USD/farm - small scale unit) Condensed milk jam (USD 0.93/100g) Cheese (USD 8.14/kg) Kids fattened and sold (USD 3.25/kg) Adult goats (USD 2.35/kg)	**7994** 2242 4770 390 592	**30112** 25274 3661 585 592	**+22118** +23032 -1109 +195 =
Inputs (USD/farm) Concentrates+minerals+sub products Veterinary Forage Products for processing milk	**4443** 2432 73 774 1164	**19294** 7348 73 2731 9142	**+14851** 4916 **=** 1957 7978
Labor (USD 9.3/person/day) **For production** (person/day) - USD /farm **For processing** (person/day) - USD /farm	**2936** (144.7)1346 (170.9)1590	**6730** (241.8) 2249 (481.7) 4481	**+3794**
Income/family (USD) **Without labor** **With labor**	 **3551** 615	 **10818** 4088	 **+7267** +3473

6 **idem**

Total regional income (i labor) USD *Minus reserve USD* **Annual net income USD**	**2 460000** 5 364 000 **(2904)**	**16 352 000** *15 140 000* **1 212 000**	+ 50 880 000 **+ 50 301 400**
Total investment (USD) and IRR (%)			**+ 96696000** **(12%)**

Markets issues:

- Social market guaranteed by the government (Brazil)
- Goat product market opportunities by Industry (Mexico)
- Small scale cheese market with quality issues (Venezuela and Capo verde)
- Local market organization (Kenya)

Main risks:

The main risks of such investments are:

- The low supply of milk (due to the failure of production conditions and projects) or lack of confidence of the goat keepers in the organization of sales
- The possible technological gap for the goat keeper to control the changes
- A market lower than expected due to the low acceptance of goat milk or goat milk products, the competition with cow milk or imported skim powder (Senegal)
- The low quality of the products (quality improvement having to be part of the project)
- Main markets

Case 3.2: Meat Goat Production

Goat meat production is less specialized than other meat sectors. We remind here that: Most of the goat production systems are multipurpose and in meat production,
Meat production can be developed in all conditions including pastoral nomadic ones.. Goats are mixed with animals like cattle and sheep and used as capital when cash is needed.
Such projects or investment will cover at least between 2500 and 10 000 households in which each goat keeper may have initially a small herd (around 10 to 50 goats) according to the local situations and their capacity. Often the project helps to identify the optimum number of goats for each family should maintain to run the business profitably at their level.

It is often relevant to develop this type of regional projects because since the last couple of decades, the demand for goat has increased dramatically and new value chain are developing. Besides, goat meat markets are still often for local consumption and often informal.

The challenges for goat meat production systems are:

- To increase fertility and fecundity and weight gain with better nutrition management (fodder/forage supply)
- To decrease morbidity and mortality by health management and vaccination and increase weight gain by deworming
- To improve breeding and reproduction management within the herds for better carcass conformation (by separating the young males from the herd)
- To manage the kids to sell them in better body conditions

Mapping Value Chain and actors mapping: The critical points and solutions for the goat meat value chain are:

To improve the standardization of the slaughtered animals

To build the capacity the farmers for better production and pricing

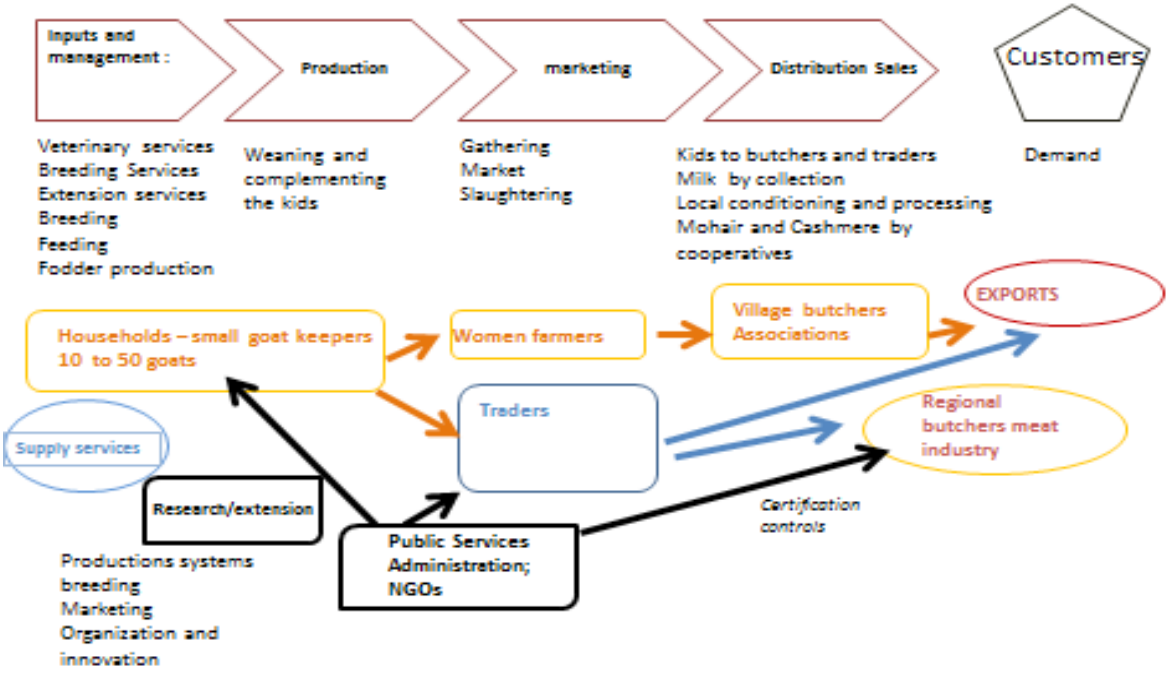
To engage all stakeholders of the meat value chain

To improve slaughtering (local hygienic slaughterhouses)

To build market infrastructures

To identify goat meat by certification and organization of breeders associations,

To promote goat meat at regional levels by fairs, cooking festivals, etc…



These several issues have been implemented in very diverse situations. Some examples of these practices have been observed as following:

- Certification - Argentina, Morocco
- Festivals - Brazil, Morocco
- Slaughterhouses market places -Morocco, India(Rajasthan)
- Negotiation with the traders - Western Africa, India (Rajasthan)

The flows involved to develop the goat meat markets are at least the district or the region level.
Once the technical interventions are done well and have addressed the production related constraints (on herd management, on breeding, on vaccination and health,as described for case 1 and 2) If the initial productivity is basically low (high mortality rate, low fertility and fecundity, low growth rate of the kids, no real in herd selection and breeding), technical and organizational improvement can lead to important improvement and the income could improve easily from 15 to 30% or even more at the end of the project.

To give an idea of the issues of the goat meat market oriented projects, the following example is based on the Moroccan case of the Project of development and certification of the Argan Kid meat.
The project has invested on slaughter houses, hygienic conditions of local markets (souks), water tanks, refrigerated trucks, engineering for Geographical certification and technical assistance for 1144 breeders.
The main risks are the operational capacity of the slaughter house and marketing to achieve the objectives to access a larger market. This example based on 1444 families at the first step could be generalized at a larger level, the final target of the Kid valorization project being 22700 beneficiaries.

Table 5: An example of Cost Benefits Analysis for a Regional project in Morocco
(Simplified table from Dino Francescutti, FAO[7] and the PMTVA project):

	Initial Situation	**Final Situation**	**Return**
Number of expected beneficiaries **Number of goats**	1444 300000	1444 300000	
Average flock size	**50**	**55**	**+5**
Kids alive	**49**	**54**	**+3**
Number of kids sold or consumed/year	**34**	**45**	**+11**
Number of adult goats sold or consumed	3	3	
Annual mortality rate (%)	20	5	-15
Carcass weight to slaughter (kg)	8	8	=
Outputs/flock (USD) Kid meat price (USD/kg) Kids fattened and sold (kg)- USD Adult goat sold (8.06USD/kg) (kg)- USD	**2748** 8.06 (272) - 2192 (69)556	**3747** 8.86 (360) – 3191 (69)556	**+999** +10% +999 =
Inputs (USD) Barley for kids (0.46 USD/kg) Alig+Zegmouna (0.35 USD/kg) Feed stuffs for does (0,46) Vaccination and health Slaughtering fees (0.39/kg carcass)	**367** 102 76 138 52 -	**600** 134 101 167 57 141	**+233**
Income before labor costs (USD/flock) Labor costs (USD)	**2381** 276	**3147** 276	**+766**
Net income/flock after labor cost	**2104**	**2871**	**+36%**
Total Net income after labor cost **Goat slaughter house facilities** **Annual reserve** **Total Net income (USD)**	**3 039 748** 86 667 **2 953 081**	**4 147 011** **66 081** 107 171 **4 105922**	 **+1086759** **+1 152 841**
Total investment *(in slaughtering certification and assistance)* **Number of jobs generated** (person/day)		*1 600 000* 8979	
IRR and NPV per family (% , USD)		**37 , 2066**	

Case 3.3: Cashmere and Mohair Production

The demand for high quality fibers has increased significantly from western consumers.
Central Asian countries like Iran, Tajikistan or Kirghizstan have a long time tradition in Angora Mohair breeds or cashmere animals and population (among them the women) has a high motivation for this type of production and projects could be easily implemented in such areas. It is necessary to insist that

7 **Dino Francescutti,** Business assessment and Cost –Benefits analysis for Pro-Poor Small Ruminant Development, FAO? &"P+annex (document enclosed in the IFAD study; 13 pp. + annexes

to organize the production and management of the herds (of sheep and goats) local (case 1) or regional (case 2) investments in technical improvement (breeding, veterinary assistance, food management) is also often required.
The investments on fiber markets require a previous analysis of the market potential and the identification of the local skills of the households. The dangers of overproduction with quick effect on the prices are very high and quality segmentation is a main challenge for a market generally dedicated more towards luxury sectors.

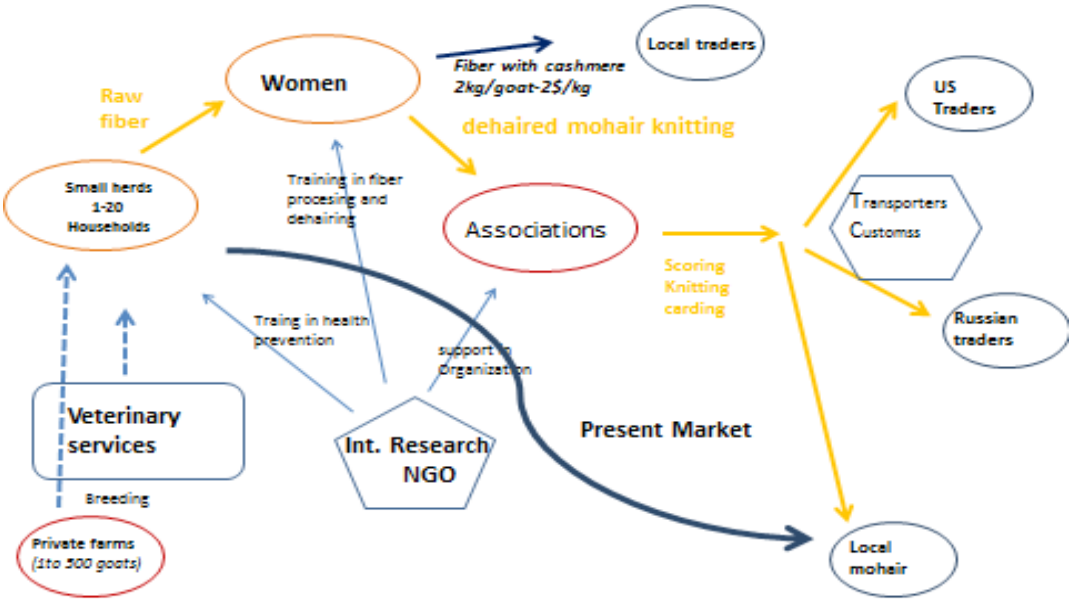
The main objectives of such investments on market value chain are simultaneously

- to improve the average fiber quality
- to develop de hairing, scouring, carding and kitting to sell a part of the production to the US international market
- to organize farmer's cooperatives to negotiate with the traders and reach the international markets

The objective of the investments described here is to improve the access to final markets.

Value chain and actors mapping: *The* cashmere market is dominated by the Western industry organizing one's supply in China and Mongolia where cashmere industry has developed during the last decades. Some niche markets could be developed in other areas such as Central Asia but most opportunity could come from Mohair wool for which the demand is also high although unsteady. South Africa, Australia and the USA are presently the biggest producers but Central Asia (including Turkey) is the area of origin of the Angora goat.
The initial value chain is local with few collective organizations. Until the collapse of the Soviet Union in 1991, Central Asia had access to a sector-wide support system including extension, breeding and marketing services such as Australia, South Africa or America where mohair industry is developed. These services do not exist anymore and farmers receive few support.
Although the level of organization is very different from a region to another the farmers are generally isolated and have difficulties to sell quality products and reach markets.

Source: Richowsky



In the initial situations, the farmers have simple value chain and are very dependent from traders (selling low medium quality mohair on the Russian market or rather raw cashmere fleece on the Chinese or Turkish markets).
The objective of such projects will be to develop the product value by more dehairing combing carding scouring and knitting by the family women. They could be developed at a district level (1,000 to 10,000 households).
Mapping the actors: International research institutes and NGOs will work on the organization of Associations to help them to negotiate with traders and the final markets (for instance in the US) and organizing the marketing of significant volumes.

Number of actors and volumes of products, economic model: Two economic models are proposed for Cashmere and mohair production. These models are based on cases in Tajikistan but could be adapted to any situation where a market has been identified for fibers. The model is based on one household with 11 goats (average size of local households in Tajikistan as described in the Tajik knowledge harvesting report)

Table 5: Cost Benefits Analysis for a regional project to improve mohair production in Tajikistan *(simplified table from Dino Francescutti, FAO[8]):*

	Initial situation	**Final situation**	**Return**
Supplying families	334	334	
Female goat /family	10	10	=
Adult mortality	10%	10%	=
Milk/goat /day (l) **(Lactation length – days)**	1.14 (70 days)	1.14 (70 days)	=
Total milk (l/farm)	480	480	=
Total mohair production (kg/farm)	16.5	16.5	=
Number of kids sold or consumed (6 kg Lw)	3	3	=
Outputs (USD/farm) Mohair (16,5 kg/farm) Milk (USD 0.05/kg) Kids fattened and sold (USD 12/kid) Adult goats (USD 2.4/goat)	**204** 139 24 36 5	**204** 445 24 36 5	**=** = = = =
Total mohair marketed production (kg)	**5511**	**3968**	
Output (at the community level) USD **For local trade (kg) – USD** **Yarn for Russian market (kg) – USD** **Fine fiber for US (kg) – USD**	**46292** (5511) **46292** -	**148585** (1543.1) **12962** (1543.1) **20996** (881.8) **114629**	**102295**

8 **idem**

Production Inputs (USD/farm) Concentrates + Veterinary + Forage	**107**	**107**	**=**
Processing input (USD) *(at the community level)* Dehairing (USD UE/US) Scouring Dehairing (USD UE/US- other) Carding Dehairing (USD UE/US- other) Spinning Dehairing (USD UE/US- other)	 - - - -	**49882** 11737 978+1712 978+1712 22496+10270	
Total community income USD Total output USD Total input (USD with labor) *Annual reserve USD* **Total net income**	**28902** (USD 86/farm) 68136 35738 *1512* **27390**	**84675** *(USD 253/farm)* 170295 85620 *1752* **+82928**	**+ 55773** +102159 +30118
Total investment (USD) and IRR			**+11458 (48%)**

The data presented above have been prepared by Barbara Richowsky, ICARDA, as her contribution in the IGA /IFAD small grant agreement "Improving Livelihoods of Small Farmers and Rural Women through Value-Added Processing and Export of Cashmere, Wool and Mohair" - IFAD Grant 1107 – ICARDA. The total founding of the project covering Kirghizstan, Tajikistan, Iran and involving technical investments were USD 2 million.

The main investments are in:

- Capacity building : training in business entrepreneurship and quality management
- Social capital of Association (of goat farmers, of women, of sales association)
- Market – value chain : investment in organizing marketing and infrastructure to contact the buyers

By considering, the days to impact the households and the markets a five year project would be necessary to implement. It includes:

- Involvement of research,
- Recruitment of technicians to support the Associations,
- Organization of meetings, travels, etc…

Main risks:

- Market risks and difficulties with traders
- Financial irregularities along the value chain
- Lack of acceptance by the households
- Elasticity offer demand and effects on prices

Proceedings of the seminar of the study

"Scaling-up Successful practices on sustainable pro-poor small ruminant development projects"

Organized by:

Funded by:

"Investments on goats as means to fight poverty: A winning card if initial conditions are satisfied and with an appropriate business planning"

Held during the XI International Conference on Goats in Las Palmas de Gran Canaria (Spain)
8:00- 13:00, September 25th, 2012

1. Objectives, rationale, introduction and participation

1.1. The seminar, an activity included in the rationale of a larger project

This seminar was one of the main activities planned during the implementation of the project and study entitled "Scaling up successful practices on sustainable Pro-poor Small Ruminant Development", undertaken with the International Goat Association during 2011/2012 and funded by the International Fund for Agricultural Development (IFAD).

The main objective of this seminar was to discuss findings and main key factors developed during the project to explore and share synergies and collaboration for the way forward which will be included in the final publication "Scaling-up successful practices on sustainable pro-poor small ruminant development".

The primary and general goal of the study is to demonstrate that small ruminant production (mainly goat) is an effective tool for poverty reduction in resource-poor regions. The specific objectives are to prioritize processes/strategies and sensitize national policy, decision makers and donors on relevant development projects to reduce poverty. Based on the harvested knowledge, the final publication includes tools to help project planners in preparing their projects.

Full methodology and rationale are presented separately in the final publication of the project. They are based mainly on Knowledge Harvesting process as defined below. These discussions and debates were an integral part of this process. During a first meeting in Rome in July 2012, the main case studies had been discussed within the study steering committee to develop a common approach in the identification of these successful practices.

1.2. Definition of Knowledge Harvesting

"Knowledge Harvesting is a process to convert top-performer expertise into knowledge assets that improve organizational performance. It is a registered Trade Mark since 1996. A knowledge harvesting project follows a staged process of: focus, find, elicit, organize, package, share, apply, and evaluate and adapt. The ultimate purpose of knowledge harvesting is to capture enough details from an expert so that the target learners can understand and actualize the process and achieve good results."

2. Introduction

Fifty-seven participants attended the seminar from 27 countries. Many of them are scientists and experts in extension, development projects from diverse origins. Several NGOs' representatives attended the seminar. Twelve are members of the International Goat Association (IGA) and 11 were involved in the IGA/IFAD project and study at several levels (Steering Committee, Referee Committee, Information providers, etc.).

After a formal opening by the President of IGA and co-organizer of the International Conference on goats where the seminar was held, the meeting opened by general and synthetic presentations on the main issues in goat development to identify the main success factors in pro-poor goat projects. After this first stage, most time was dedicated to debates and proposals on the most accurate way to support the projects founders of pro – poor goat projects and how to prepare the business planning in such projects.

3. Plenary presentations

To introduce the discussions and round tables, the seminar began by some introductory presentations. The full text of these presentations is included in the final report, "Scaling-up successful practices on sustainable pro-poor small ruminant development" and can be consulted in this document.

3.1. Why IFAD needs more elements about pro-poor goat projects; Introduction on the objective of the seminar for "Scaling-up successful practices on sustainable pro-poor small ruminant development"? by Antonio ROTA, Senior Technical Adviser, Livestock and Farming Systems, IFAD, Rome, Italy

Antonio Rota considered that small livestock could offer many poor people the possibility to improve child nutrition and health, generate employment, contribute to the empowerment of women, and ensure environmental sustainability. It means that most of the MDGs could be achieved thanks to small livestock and particularly goats. But he enhanced that many International and national institutions policy and decision makers are still reluctant to support the small livestock sector. But to achieve the MDGs and express their potentialities, the small livestock sector needs effective and consistent national pro-poor policies, livestock farmer's institutions, participatory and adaptive research, relevant extension programs and training market-led approaches. To achieve the desired results, the above needs to be based on harvested knowledge, developing a business-like approach to prioritize processes/strategies and sensible national policy, decision makers and donors about the effectiveness of small ruminants development to reduce poverty.

3.2. Investments on pro-poor Development projects on goats: Ensuring Success for improved Livelihoods, by Dr. Canagasaby Devendra, Consulting Tropical Animal Production Systems Specialist, 130A Jalan Awan Jawa, 58200 Kuala Lumpur, Malaysia

The elements developed by Dr. Devendra during his conference have been published in the Asian-Australasian Journal of Animal Science (Vol. 26, No. 1: 1-18, January 2013). He introduced the main issues regarding the success of investments on pro-poor goat projects. He described why goats are significant in providing socio-economic, managerial and biological advantages to face the exploding food crisis and increasing animal product demand. He defined precisely the key elements of successful and failure projects and gave some guidance on imperatives in project designs (by understanding key issues, defining and managing prerequisites and focusing on rain-fed areas with clear development strategies).

3.3. The implementation of the IGA/IFAD study and knowledge harvesting: what has to been done, by Jean-Paul Dubeuf

The objectives and methodology of the IGA/IFAD study were presented. Development projects on goats were mapped and characterized and the scalability of the success factors were defined. The business planning approach was based on value chain analysis and livelihood expectations. The several studied cases were presented.

3.4. Development of a goat production simulation model by Vinícius Guimarães. EMBRAPA Goats and Sheep, Sobral, Ceara, Brazil

The contribution of simulation models and scenarios was suggested to analyze productive prospects for small farmers and goat keepers and to monitor the pro-poor projects involving goats. For this task, it

was proposed to use a Systems Thinking approach adapted to solve complex problems caused by the inter-relationship between variables.

The following elements to consider for developing such models are: key variables on production (labor, facilities, animal, feeding, handling, etc.) and extra production (government policies, climate change, economic crisis, marketing variations…), time horizon (5 to 20 years or any other timeframe desired), a dynamic definition of the problem, initial hypothesis, mapping, etc. The model has to reproduce the behavior of the problem according to his purpose, it must behave realistically when subjected to extreme conditions and unexpected events.

For decision makers this approach is very important operationally because it will enable them to anticipate the possible differences in achievements compared to their objectives. Regarding very risky environments, it will lower the dangers of failure in the projects by enhancing their success factors.

A first didactic model was built to show how goat production could increase the average income of smallholders. This first model took into consideration how projects could support the activity. The governmental policies, environmental problems and the time to approve new projects are also considered as variables. Such a model could help experimenting the decision rules, strategies and structures to be implemented in a prospective way. The model will be built on real local examples. Such simulation models would be useful to monitor the implementation of projects and build collectively realistic scenarios. Such an approach could be developed in a further study as an extension of the present one.

4. Report of the plenary discussions

Several key factors were identified from case studies as developed in the presentation “The steps for preparing a project: What are the necessary steps that should be taken in planning and preparing proposals for scaling up successful practices?” These proposed factors were initial suggestions to be debated and possibly modified.

4.1. Key factor 1: “To develop goat production, it is necessary that smallholder producers are interested and keen or allowed to participate at all stage of project design”

All agree that goats are often seen as easy to raise animals and they are well adapted to poor people with few capacities. Such an assessment is not so simple. There are many chances that any project would be a failure if people have no initial know–how in managing a goat herd and do not express clearly their interest for goat raising.

To invest in goat keeping is more generally to invest in animal production. It means to support people in selecting, breeding, feeding, managing goats and valorizing their products. On this point, we can agree that there is no basic difference between goats and other livestock with the exception that getting goats is less expensive and risky than getting cattle for instance; goats are more selective than other species of livestock and therefore can select diets of high quality. This factor is particularly important if the first objective of a project is to develop value chains and to valorize production. Training communities (and especially women among these communities) with little tradition in goat raising can be very risky. The participation and agreement of the targeted communities need to be tested very carefully.

Many past failures have shown that such innovations cannot be implemented if proposed innovations and changes are too far removed from the initial production systems. Several clear examples have shown difficulties to develop goat milk commodities with selected dairy breeds for pastoral populations who are more accustomed to local meat-oriented pastoral goats. In addition, the available funds brought by a project could lead to opportunistic enthusiastic initial attitudes which do not demonstrate the real interest of the local populations.

During the discussion, the following opinions were expressed by participants:

- It is better to focus on the improvement of cooperative organizations.
- There is not a minimum size for goat herds but the projects have to take in account the local production system.
- Nevertheless, the most important factor is to identify the purpose of the future project and if necessary how to organize the market.
- Each market and farmer is different; there is no sense in generalization.
- In actuality, projects cannot be proposed as a magic formula, successfully applicable everywhere. Designing a project requires a deep preliminary analysis and diagnosis of the local situation. Several methodologies (surveys, focus groups, etc.) exist to realize this type of analyses that are integral parts of business planning. A coherent approach and flexible implementation that would be generically applicable is needed.

Several participants believe that we sometime forget that often farmers could be interested in goats for many reasons, for instance for manure, an important resource that embrace ecological objectives. So, two goats for very small land tenants could be enough to provide them sufficient manure. For every project, it is very important to identify these motivations.

The conclusion of the discussion on this first factor seems trivial. It is well known that every situation is different, every farmer has his own aspirations, and a top-down predefined scale would not have any real sense. This assessment is even the basic of development cooperation. All agree that we take into consideration what people need. But the experience in Central Java, for example, has shown that very often, these questions are underestimated as they are always complex and sometimes contradictory or ambiguous. Generally, project proponents have great determination and dynamism. This quality could lead them to not sufficiently consider the aspirations of the possible beneficiaries and could apply only one approach. We should not forget that in many cases the SWOT analysis has shown that goat activities are still depreciated and not considered socially rewarding. The project objectives could be too ambitious but in many cases, it is often easy and possible to generate at least US$ 2/day and per person to rise out of poverty.

4.2. Key factor 2: “Intensified systems based on high inputs are not recommended for pro-poor projects”

This second proposal had to be specified too. The problem is not intensification for itself but the possible dependence of goat keepers on external inputs what would make them highly technologically dependent, especially from commercial feed. Intensification based on human labor and local know-how, and a good valorization of human resources would be often a good way to produce major income increases.

Selected exotic specialized breeds are definitely not recommended, especially at the beginning of a project, due to the farmer’s dependence of feed suppliers and their initial technical or other capabilities to raise these animals.

In that sense, "agro-ecology" is a concept to be introduced. It is not only fully compatible with the fight against poverty but it can be an operational answer to environmental problems and climate changes, which are one of the main MDGs. For those reasons, agro-ecological solutions should be investigated ad proposed for pro-poor goat projects. Local know-how, breeds, and local resources have to be enhanced in the projects rather than exotic models.

4.3. Key factors 3: "There are some imperative key factors: (i) minimum goat keeping activities identification, (ii) minimum public general infrastructures, (iii) a form of political will is identified, minimum research and development institutions and local existing organization (NGOs)".

All attendants agreed that implementing a project in an area with no initial goat activities and no production system has few chances to be successful. In all cases, a cost-benefit analysis of the real impacts of the projects is necessary.

It was agreed that to develop goat activities, a minimum infrastructure would be necessary (for instance, wells for water, roads to market the products and get supplies, veterinary services to vaccinate the animals or deworm them, schools or extension services to train people and build the goat keepers capacities. When these conditions do not exist, the main investments would need to focus on these infrastructures. In addition, a form of real political will has to be identified at the local, regional, or national levels (whatever by local NGOs or regional administrations).

4.4. Key point 4: "The design of a pro-poor development project must consider targeted and measurable social and economic returns".

This is probably the most important factor to be able to build and implement a project. All participants of the seminar involved in any type of projects have insisted on this point. What returns can be expected from a project? We are talking of poverty alleviation, people in transition from subsistence to marketing.

These outputs and returns have to be defined through two aspects:

- Commodity aspect: What products people will be able to develop considering their situation, (meat, milk and cheese or fiber)?
- The priorities to focus on: capacity building, social capital, policies, market value chain, management of the local resources and the environment.

Methods to approach these outputs have been proposed: livelihoods analysis for investments in human and social capital, and broadening the scope of our language on benefit analysis, and to not only focus on the financial aspect; value chain analysis to better understand the relations between the actors, the flow of products and the market.

There was also a global agreement to say that goats are not adapted to any geographical and social condition. For example, attention was given on emergency projects to develop activity and food security. The idea was to develop goats (for instance Indonesia after an earthquake with goats in place where some people have no tradition and no interest in goat raising. Other projects introducing dairy goats, simply because investment are low, in areas without present or previous market experience or local know-how very often failed. Consequently, donors are reluctant to finance new projects on goats when the problems are not goats but the context. A real involvement of farmers and their participation have been enhanced several times as a real critical point.

Most of the projects failed because local conditions were not taken into account and activities were not adapted. The first step before building the proper project is always to identify the real expectations of the farmers. Developing research in social sciences (sociology, economics, psychology, gender issues or anthropology) and particularly research on innovation and then crossing these approaches with more bio-technical results would be particularly relevant.

Other important comments have insisted that a major and clever inclusion of women at any step of a project is a priority. Projects which do not take into account women expectations and situations lose at least half of the human potential resources of each family. Extension services should include women in training. Furthermore, women are nearly always responsible for children education and could transfer to them good practices and know-how.

Another important point is to consider that project timeline and goat keepers' time do not necessarily match. In other words, more time than the duration of a project (generally 2 to 5 years) is necessary to get sustainable results. Realistic intermediary objectives have to be planned as well as other financial resources to keep on implementing the general framework of the projects.

4.5. Key point 5: "Smallholders can benefit from current market opportunities", an introduction to working groups

The presentation by commodities generates some important comments, all included in the concluding remarks of the seminar:

- Better than market approach, in goat based development projects, the key factors which make the difference are the distance between consumers' areas (urban areas) and production areas. For instance, a project that aims to improve milk production for market purposes will be in a completely different perspectives if in a peri-urban area or in an isolated pastoral area far away from any concentration of population.
- Although goat activities are often multi purposes, development projects have to define what commodities and market to focus on. Quite often, development projects have forgotten the importance of markets. In addition, the present interest in goats as a tool to raise people out of poverty is due to the increasing demand for goat meat in developing countries. In most projects, how to improve market access is a key objective but the characteristics and constraints of each commodity market have to be clearly identified.

5. Report of the discussions in each focus group

The audience was divided into three working groups, one for each market commodity.
The common question for each commodity was: "How poor families can benefit from actual market opportunities"? The conclusions of each group are as follows:

5.1. Working group A: dairy commodities

Animated and reported by Jean-Paul Dubeuf

The following opinions were developed during the discussion:

- For any project, a clear definition of the objectives is needed to target and draw the path to achieve them.
- The greatest contribution of goat milk is for food and nutritional security: family and household nutrition, especially the children, pregnant mothers and elders. Ninety percent of goat milk production is for family consumption or very local consumption, situated in areas far away from cities. These realities are very important for improving food safety. Ten percent of goat milk is produced by farms with a main dairy purpose but other products are as well important (production of kids, leather). Projects that aim to improve milk production under a market approach have to identify from the beginning where the market is located and how to access it. Many projects failed because they increase productivity without taking into account market access. The dairy markets are generally emerging and niche markets, particularly for cheeses.
- In dairy projects, breed improvement is a main issue and the path usually undertaken for improvement is through crossbreeding. Crossing the local goats has been a usual way to increase the genetic potential for dairy production. The issue at hand is to keep the multipurpose aptitude and the rusticity of the local animals. Crossing by absorption could lead to new genotypes which could be more dependent on expensive feedstuffs and not able to valorize the local fodders. Several projects failed because the local goat keepers could not manage their herds as in the past and because the market for additional milk was not clearly defined. This threat was observed in Senegal where training the women in Canary goat management required time and a high degree of change in their production system. It is important to thoroughly analyze the situation to be sure that improving goat milk production by crossbreeding could be successful. This point is related to the necessity of thinking of projects according to the proximity of services and population and is depending on the presence of roads and transport infrastructure. Very often, improving goat milk production could be more easily achieved in or close to peri-urban areas. The markets would be closer and the breeders could more easily get the supplies these animals would need to express their potentialities.
- Projects usually do not last more than three years, which is not long enough to get sustainable and demonstrate longtime impacts.
- Furthermore, the success of projects to develop dairy commodities demands high levels of organization and management. Farmers have to be aware of these issues with clear objectives and the will to reach them.
- Once more, in this working group, everybody has insisted that there is no standard approach. Even in one country, situations can be different from a region to another. Within a local population, a target public has to be identified.

5.2. Working group B: fiber market

Animated and reported by Luis Iñiguez, former ICARDA Scientist and Consultant on Small Ruminants Development.

A common point about fiber production is that it is located in arid and semi-arid areas with specific goat breeds with mohair or cashmere aptitudes. The group identified some problems and some actions that can be implemented to help producers. The main problems of fiber production are:

- Poor quality (management of purchasing without de-hairing, scouring and carding),

- Lack of marketing (all fiber is sold together at a low price without pricing on quality),
- Production constraints (nutrition, diseases, predators),
- Lack of associative actions.

Some actions to improve the situation of fiber producers are:

- To improve marketing through associative actions. Once again, there is no general model and specific situations can be crucial for the success of a project: in ex-republics of the Soviet Union, due to their recent history, farmers are very reluctant to participate in cooperatives or even in associations; they always link with the Soviet communist experience. So a major issue is to promote the relations and the organization between stakeholders.
- To improve quantity and quality through community-based breeding. Training, trials and demonstrations are necessary as well as experiences and exchanges with other communities.
- To improve knowledge in harvesting and post-harvesting.
- To establish women's groups or women-led small businesses with fully developed capacity for fiber processing and export of value-added fiber and products by knitting and crafting.
- To explore the organic production for which there is a niche market.
- To consider other associated outputs such as meat, skin, and milk.

Some experiences to be considered are:

- Central Asia (ICARDA projects mainly in Tajikistan),
- Argentina (community-based breeding projects and quality of harvesting).

Some very developed sectors to be mobilized are:

- Israel (cooperatives),
- South Africa (wool production),
- Australia (experiences on marketing and quality).

It is underlined that these issues could be applied perfectly to other ruminant livestock such as llamas and alpacas. Antonio Rota has commented that IFAD has just approved a project in Central Asia with women groups to further develop mohair goat production initiated with ICARDA into a full value chain.

5.3. Working group C: meat market

Animated and reported by Vinicius Pereira Guimarães, Scientist at EMBRAPA Goats and Sheep.

- Meat goat production has great opportunities all over the world as we observed that goat meat has developed more than other types of meat in the world. There are also niche markets.
- There are some countries with a traditional consumption of goat meat and where opportunities of market are growing (Brazil, Mexico, Venezuela, etc.). But at the same time they are importing goat meat. So, farmers could benefit from these opportunities.
- Productivity is low, prices are not differentiated according to the live weight or quality of kids and farmers market their products without meeting the market demands (the carcass qualities are very diverse and do not always meet the consumers' expectations, the image of goat meat is often very negative, the dietetic quality of goat milk is not well valorized, there has been little interest from the meat industry until recently).
- The farmers are often very dependent on traders, with little ability to negotiate and their margins are lower than those of traders, butchers and other intermediaries. But even though there is a generalized low opinion of traders, very often they are essential when farmers cannot have a direct access to markets. So although the balance between the goat keepers and the traders has to be improved, the

traders have also to be beneficiaries of any goat meat-oriented projects.

- The associative action for marketing meat production is poor, as well as the link between the production and the market chain.
- Technologies to improve productivity are available; nevertheless, the adoption is still limited, even though there are encouraging precedents.
- Problem identification should be done at the grass root level and plan with them.

After this diagnosis, some actions to improve market accesses were proposed:

- Capacity building (technical and non-technical),
- Creating farmers' institutions, cooperatives (To bring people together),
- Training that include women and men,
- Developing research, trials and references involving all stakeholders including farmers,
- Studying markets and goat meat value chain (bottle neck – engage farmers),
- Developing access to market information for producers, and market infrastructure,
- Shortening the chain from producers to consumer if it is possible,
- Developing meat quality (homogeneity) and safety (vaccination, deworming),
- Encouraging proactive public policies (incentives for smallholders, adapted regulations and laws to favor goat keepers and pastoralists) and developing public services,
- Access to services (veterinary services, food supply in case of drought to avoid overgrazing),
- Management of production (fertility and mortality control, encouraging improvement of local breeds),
- Avoiding top down planning for instance by considering the multi-activity of farmers with a holistic approach,
- Considering also sub-products such as skins and manure.

Concluding remarks: final output and communication for the stakeholders

The conclusions of the seminar have clarified which final output will be developed from observations and knowledge harvested during the study.

The starting point acknowledged by each participant was that the several studied cases and identified key factors have given key information on how to prepare and implement a pro-poor project on goats.

Antonio Rota insisted on the necessity to formalize all this information. Output must be operational to support potential donors and projects leaders, and to design and implement more effective, efficient and relevant business planning.

6.1. Value Chain Approach

Access to market has been confirmed as a major factor for the contribution of goat raising in the fight against poverty. Although goat activities are nearly always multipurpose, value chain analysis must generally consider each commodity separately. The elements harvested during the discussions of each focus group good starting point for any further value chain analysis.

The identified positive experiences described through the several case studies have given elements on how to facilitate small-scale farmers' access to markets. To do it, a value chain analysis is needed and could be a first stage by:

- Mapping the actors,

- Identifying the number of actors and volumes of products,
- Mapping the core processes and flow of products.

This value chain analysis will also identify the main investments to plan for pro-poor goat projects. This approach could be completed by elements of livelihood analysis and all these elements would help to identify constraints and opportunities on goat based projects.

6.2. Structure and realization of the final output

The final output of the study must provide a real operational tool kit for potential investors (foundations, NGOs, International Institutions).

6.2.1. Step 1 – Investments typology

The main types of investments have to be identified to introduce the value chain analysis. For instance, the following investments to introduce the subject were quoted:

- To invest in food safety,
- To invest in regional capacities,
- To invest in access to markets (meat, milk or fiber),
- To invest in environmental stewardship.

For each type of investment, the prerequisites as well as the main elements of the value chain (actors system, main actions and objectives) will be identified.

6.2.2. Step 2 – Compiling the elements of value chain analysis

A general framework will be written by Jean-Paul Dubeuf and Dilip Bhandari to prepare the structure of the final tool kit. This framework will be based on the several cases harvested during the period of the study

6.2.3. Step 3 – Organizing a collective write shop to prepare the tool kit

The tool kit will have to be adapted to the targeted audience (international Institutions, foundations, international NGOs). To achieve this objective, it is proposed to organize a write shop with Heifer Project officials under the coordination of Dilip Bhandari with Jean-Paul Dubeuf.

This write shop will be realized in a location where several important goat projects take place. The test of the tool kit will be based on this field case. It was suggested to organize the write shop in Nepal.

6.2.4. Step 4 – Cost-benefit analysis

Compiling data on the studied productions systems would give references to the minimum acceptable cost–benefit ratio to build a goat oriented pro-poor project. The mobilization of a FAO economist as a consultant to complete the analysis has also been suggested. Interacting with Dino Francescutti to prepare such an agreement was finally approved.

6.2.5. Step 5 – Possible further extension with a possible future simulation model

The idea to develop a simulation model was developed by Vinicius Guimarães from EMBRAPA and a first example of the method was presented (in “Development of a goat production simulation model”) during the seminar. Such a methodology could be developed later in a further extension of the present study.

The final conclusion was from Albert Einstein quoted by C. Devendra to not forget that “Beyond our diagrams and equations we have to remember the face of the hungry man”.

These proceedings were reported by Jean-Paul Dubeuf and Remedios Carrasco in collaboration with Lucia Sepe and Fernando García-Dory.

7. Annex 1 – Program of the Seminar

"Scaling-up Successful practices on sustainable pro-poor small ruminant development"
September 25th, 9.00-14.00; Hotel Cristina, Las Palmas de Gran Canaria

7.1. Introduction

Goats, once of little economic and social interest, are now of high importance for the challenges the world is presently facing: climate change, water shortages, use of marginal lands, environmental degradation. Goats are on the forefront of all these issues but overall they are seen as a way to fight poverty and hunger.

The International Goat Association aims to raise awareness of these challenges and help find joint solutions. It is with this approach in mind that the International Fund for Agriculture Development has proposed IGA an expertise to increase the interest of using goats in the fight against poverty. Precisely, the IGA network has identified projects involving goats and key success factors. These factors have been mobilized to develop a business planning approach. Based on several examples from real situations, this approach aims to support decision in implementing successful projects using targeted tools and procedures and realistic operational analyses.

This seminar was organized during the XIth International Conference on Goats held in Las Palmas de Gran Canaria (Spain) in September 2012. Its goals were to share results and to put forward the debate concerning the use of goats in the fight against poverty and the pre-requisites that those types of initiatives need to reach a guaranteed level of success.

7.2. Program

- 9:00- 9:10 Opening session, by Juan Capote
- 9:10-9:20 Why IFAD needs more elements about pro-poor goat projects, by Antonio Rota
- 9:20-9:50 Diversity of goat production systems, markets and commodities for goat sectors around the world; Perspectives for building business plans on pro-poor development projects involving goats and success factors?
- 9:50-10:20 Debate
- 10:20-12:00 How can poor families benefit from actual market opportunities?

This last point is debated in working groups. The audience is divided into three groups (world coffee method). Each group stays 20 minutes in each commodity table and then move to another table. At the end, all participants will have attended the three following commodity tables:

- The goat meat market is growing nearly everywhere. Can small poor goat keepers benefit? How?
- The fiber market demands a high quality product. How could smallholders improve fiber quality? What is the return?
- Goat milk is often seen as an opportunity with a growing demand in several emerging countries. Where? What are the investments to promote? How to organize production for smallholders?

- 12:00 – 12:30 Coffee break
- 12:30–13:00 Common Restitution introduced by C. Devendra "A picture of goat farming future from the experience of the last decades"
- 13:00- 13:30 Common debate
- 13:30-13:45 Conclusions and closing session: Final outputs and communication for stakeholders?

7.3. Reserved to the steering committee

- 16 :00 – 18 :00 Last meeting of the steering committee
  - Deadlines and organization of the final publications
  - Projects still to implement and factors to expand
  - Possible further developments on business planning for goats.

8 . Annex 2 - List of Participants

Country and LAST NAME	First Name	Organization	E-mail address
Argentina			
BEDOTTI	Daniel O.	INTA	dbedotti@anguil.inta.gov.ar
Australia			
MCGREGOR	Bruce	Deakin University	bruce.mcgregor@deakin.edu.au
Bolivia			
IÑIGUEZ	Luis	Independant Consultant	luisiniguez8@gmail.com
Brazil			
FACO	Olivardo	Brazilian Agricultural Research Corporation (Embrapa Goats and Sheep)	faco@cnpc.embrapa.br
BOAVENTURA NETO	Oscar	c/o University of Sassari	oscar_bn@yahoo.com.br
PEREIRA GUIMARAES	Vinicius	Brazilian Agricultural Research Corporation (Embrapa Goats and Sheep)	vinicius@cnpc.embrapa.br
Canada			
DELANAY	Carol	UVM Center for Sustainable Agriculture	cdhornofplenty@gmail.com
Egypt			
ABOULNAGA	Adel	Animal production research institute	Adelmaboulnaga@hotmail.com
France			
ALEXANDRE	Gisèle	French Institute for Agricultural Research (INRA) and IGA	gisele.alexandre@antilles.inra.fr
DECOSTER	André	Élevages Sans Frontières	andre.decoster@elevagessans-frontieres.org
DUBEUF	Jean-Paul	French Institute for Agricultural Research (INRA) and IGA	dubeuf@corse.inra.fr
Germany			
ALKINDI	Amal	University of Kassel	aalkind@gwdg.de
SCHIBORRA	Anne	Georg-August-Universität Goettingen, Dept. of Animal	aschibo@gwdg.de
India			
PADMAKUMAR	Varijak-shapanicker	ILRI	v.padmakumar@cgiar.org
SOMENATH	Ghosh		somenath.bdr@gmail.com
Israël			
GLASSER	Tzach	Ramat Hanadiv Nature Park	tzach@ramathanadiv.org.il
Italy			
ROTA	Antonio	IFAD	a.rota@ifad.org

SEPE	Lucia	National Council for Agriculture Research (CRA) and IGA	lucia.sepe@entecra.it
BATTINI	Monica	-	moni1703@gmail.com
Kenya			
PEACOCK	Christie	SIDA and IGA	christiep@farmafrica.org.uk
Malaysia			
DEVENDRA	C	Independant Consultant	cdev@pc.jaring.my
RAMLI	Abdullah	University of Malaya, Malaysia	ramli@um.edu.my
KHADIJAH WAN EMBONG	WAN	University of Malaya, Malaya	wkhadi@um.edu.my
Mexico			
MEZA HERRERA	Cesar	Universidad Autónoma de Chapingo-Uruza	cmeza2020@hotmail.com
MONTEMAYOR	Hector M. A.	Universidad Autónoma de Queretaro	andrademontemayor@yahoo.com.mx
Country and LAST NAME	First Name	Organisation	E-mail address
Nepal			
LOHANI	Mahendra	Heifer International	mahendra.lohani@heifer.com
BHANDARI	Dilip	Heifer International	Dilip.Bhandari@heifer.org
KUSHWAHA	Peetambar	Heifer International	peetambar.kushwaha@heifer.org
Peru			
MARIATEGUI	Irma Celi		irma_celi@yahoo.com
Saudi Arabia			
BASMAEIL	Saeid	King Saud University	basmaeil@gmail.com
South Africa			
DONKIN	Ned	University of Pretoria, Institute for Food, Nutrition and Well-being and IGA	Ned.Donkin@up.ac.za
Spain			
ÁLVAREZ	Sergio	Canarian agriculture research Institut (ICIA)	salvarez@icia.es
CAPOTE	Juan	Canarian agriculture research Institut (ICIA) and IGA	jcapote1@gmail.com
CARRASCO	Remedios	International Goat Association IGA	remedios.carrasco@gmail.com
FRESNO	María del Rosario	I. Canario de Investigaciones Agrarias	mfresno@icia.es
FLORES	Pastora	Facultad de Veterinaria de Las Palmas	mflores@dpat.ulpgc.es
GUTIERREZ	Rosario	Universidad de Sevilla	charo-84@hotmail.com
GARCIA DORY	Fernando	Spanish Federation of Shepherds	fernandogd@campoadentro.es
RUIZ	Francisco de Asís	CIFA Andalucía	franciscoa.ruiz@juntadeandalucia.es

SAAVEDRA	Jaime	CODE Consulting	jsaavedra@codeconsulting.net
Sudan			
BUSHARA	Ibrahim	Dalanj university	bushara3000@yahoo.cm
Trinidad & T.			
APHZAL	Mohammed	The University of Trnidad and Tobago	aphzal.mohammed@utt.edu.tt
Turkey			
DASKIRAN	Irfan	Ministry of Agriculture and Livestock	irfan.daskiran@gmail.com
KOLUMAN	Nazan	University of Kucurova - IGA	ndarcan@gmail.com
USA			
DE VRIES	James	Heifer International [retired] IGA	jimdev56@gmail.com
LUGINBUHL	Jean-Marie	North Caroline State University IGA	jean-marie_luginbuhl@ncsu.edu
MILLER	Beth	Miller Consulting –IGA	beth@bethmiller.org
NELSON ESCO-BAR	Enrique	University of Maryland-Eastern Shore	enescobar@umes.edu
NEWTON	Gary R.	Prairie View A&M University	grnewton@pvamu.edu
NUTI	Louis	Prairie View A&M University	lcnuti@pvamu.edu
SINN	Rosalee	Heifer International [retired]	dansingoat@aol.com
TSUKAHARA	Yoko	American Institute for Goat Research, Langston University	yoko3t@gmail.com
Venezuela			
PARIACOTE	Fidel	Centro de Investigaciones Agropecuar-ias	fpariaco@gmail.com
ALVARADO	Carlos	Universidad Central de Venezuela	alvarado1959@yahoo.com
D'AUBETERRE	Ramòn	INIA VENEZUELA	rdaubeterre@inia.gob.ve
Zimbabwe			
SEBATA	Allan	National University of Science & Tech-nology	allans20022002@yahoo.com

DEVELOPMENT OF A GOAT PRODUCTION SIMULATION MODEL

A proposal presented by Vinicius Guimaraes, EMBRAPA Ovinos Caprinos, Sobral, Ce, Brazil.
vinicius@cnpc.embrapa.br

1. Introduction

During the meeting of the project "Scaling-up Successful Practices on Sustainable Pro-poor Small Ruminant Development" held in Canary Islands-Spain from 24 to 27 September 2012, the importance of simulation models and scenarios to analyze productive prospects for smallholders in particular those related to goats has been enhanced.

2. Systems Thinking concept

The essence of Systems Thinking is the idea that elements interact and form clusters for achieving goals, allowing the user to visualize dynamic interrelationships and not only static ones. This approach is increasingly being used by people working for local institutions, including the animal production industry. It raises the possibility of joint assessment of system components, aids the understanding of its operation and could solve complex problems caused by the inter-relationships between the component variables.

The Systems Thinking explains that the very obvious solutions may not work, or only improve problems in the short-term. Nevertheless, well targeted efforts can produce meaningful and lasting improvements, when implemented within the correct framework. This idea is fundamental to make the analysis of a production system or more broadly of a value chain, because it is often hard to know with certainty what or where the bottleneck activities are. That is why it is common to have immediate attitudes that can solve the problem momentarily, instead of considering a longer-term approach.

Systems Thinking can make a general assessment of the production system and the vision of the crucial points for their operation, allowing the producers, technicians and stakeholders to make decisions for improving them in the long term.

For this assessment, is important to create a model aiming at making predictions and identifying behaviors. The purpose of the models, according to Pidd (1996), is to assist in decision making and control through a simplified representation of reality. The construction of a model (modeling) is a systematic process of trial and error, adapting the known (Ford, 1999), and following the premise of increasing complexity. That is why models are used to illustrate a situation or object, or simply practice the act of modeling.

3. Rules for design and evaluation

- Specifying the scenario: which environment will emerge?
- Decision rules: Which decision rules, strategies and structures will be experienced in the real world? How can they represent the real world?
- Analysis "what if": What are the effects of policies and measures taken?

• Sensitivity analysis: how robust are the rules and measures of recommendations given under different scenarios and uncertainties?

For decision makers this approach is very important operationally because it will enable them to anticipate the possible differences in achievements compared to their objectives. Regarding very risky environments, it will lower the dangers of failure in the projects by enhancing their success factors.

For these models System Dynamics (SD) will be used. It consists of a network of variables with feedback relationships that generates responses dynamically based on the interaction of variables. The SD takes a view of the entire problem by focusing on the behavior of projects and their relationships with management strategies (Sonawane, 2004). This methodology is appropriate where the problems are dynamically complex due to feedback processes and solutions that require a long-term approach. However, from the point of view of organizational learning, the SD has been used in such a way that the main objective is not the accurate simulation of the behavior of organizational systems, but rather the possibility of assessing the patterns of behavior of the system as a whole, their inter-relationships and influences, to improve the understanding of responsible decision making (Richardson, 1994).

4. Model implementation steps (4.1 to 4.5)

4.1. Articulation of the problem

4.1.1. Selection of the matter

The production of small ruminants worldwide is growing and must be inserted in a context of social development. It is an alternative to food security and poverty reduction in several regions of the world, but must seek to understand their importance in complex production systems and the prospect for the coming years of activity.

4.1.2. Key Variables

The variables that comprise the productive systems (hand labor, facilities, animals, feeding, handling, etc.) and external to the production systems such as government policies, climate change, economic crisis, marketing variations, etc., will be considered.

4.1.3. Time Horizon

Five to 20 years or any other desired

4.1.4. Dynamic definition of the problem

Goat production is an activity that creates food security and income for a large number of small producers around the world. Understand the rationale for this productive activity for the coming years will direct investments into this sector.

4.1.5. Creation of the initial hypothesis

A goat can be an alternative for social and productive inclusion of small producers.

4.1.6. Mapping

Maps should be developed based on initial assumptions, key variables, modes and other reference data available to define the structure of causes using tools such as:

- Model diagram,
- Diagram subsystem,
- Diagram of causality,
- Flow maps and inventories,
- Diagram of structural rules or measures.

4.2. Development of a simulation model:

- Specification of the structure, rule-making,
- Estimation of parameters, behavioral relations and initial conditions,
- Test for consistency with purpose and limits.

4.3. Test

- Comparison with reference methods: the model reproduces the behavior of the problem according to his purpose?
- Robustness under extreme conditions: the model behaves realistically when subjected to extreme conditions?
- Sensitivity: how the model behaves with the uncertainty of parameters, initial conditions, limits and aggregation model?

4.4. Production systems

If we refer to production systems (of any sort and including all the value chains), the generic concept of these systems should consider an agricultural and social reality. The definition of the inputs of the system corresponds to the direct or indirect interactions of the environment with the system under study. These inputs are grouped into categories such as physical-chemical conditions (light, temperature, humidity, etc.); Physical resources (materials, facilities, money, etc.); People and knowledge, information, technology and methods.

The definition of products or outputs of the system corresponds to the direct and indirect interrelationships that the system has with the surrounding environment, the products and services, social welfare, ecological concerns, economic wealth, knowledge and information.
The use of this methodology will identify and analyze structures that can cause amplification and fluctuations in production and distribution of productive chains, and creating rules to improve decision-making and analysis of policies and measures adopted involving simulation models in which change coefficients to evaluate different system responses.

The first model was developed to show how goat production could increase the average income of smallholders. This first model as presented below (Figure 1) took into consideration the help of projects to sustain the activity, government policies and environment problems and the time to approve new projects to keep fostering the goat production activity.

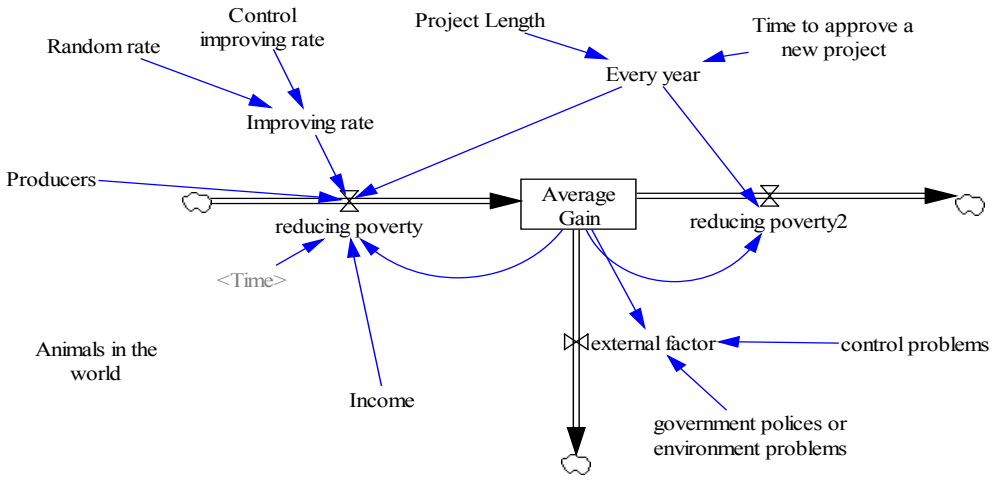


Figure 1. Example of a model that simulate scenarios for goat production systems

4.5. Realization of the model

To implement and apply the general simulation model, we proposed to build the model on real characteristic operational examples. Some field interviews have to be planned to define the main parameters during which the main public policy and particularities will be identified. The variables to be included in a scenario simulation will be discussed with the committee project leaders. Variables like government policies, environment and climate changes and social particularities will vary from each site and must be considered in the model. Such a model could be very easily used as a complementary tool kit to improve the decision ability of donors to invest in pro-poor goat projects and monitor them. Such simulation models could be developed in future projects.

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2. Some important websites

Bill & Melinda Gates Foundation

http://www.gatesfoundation.org/

Farm Africa

http://www.farmafrica.org/

Food and Agriculture Organization of the United Nations, FAO

http://www.fao.org

Heifer Project International

http://www.heifer.org/

imGoats, "Small ruminant value chains as platforms for reducing poverty and increasing food security in dry-land areas of India and Mozambique"

http://www.imgoats.org

International Center for Agricultural Research in the Dry Areas, ICARDA

http://www.icarda.org

International Fund for Agricultural Development, IFAD

http://www.ifad.org

International Goat Association, IGA

http://www.iga-goatworld.com/

International Livestock Research Institute, ILRI

http://www.ilri.org

Knowledge Harvesting®

http://www.knowledgeharvesting.com/

Value Chain Analysis

MEDA, http://www.meda.org/publications-ml/331-program-design-for-value-chain-initiatives-market-development-toolkit

OUTLINED BASIC QUESTIONNAIRE

1. Diagnosis

- What is the origin of the project? Who are its promoters?
- Are local people interested in goat raising? What is their initial know-how, technical and educational capacities?
- What is the initial general situation of goats in the area previous to the project?
- What are the production systems? What are the main commodities for goats?
- Is there a market for goats and goat products?
- What technical feasible, viable and sustainable improvements can be boosted?
- What are the main local forage resources?
- What is the role of women in the existing system?
- Are there initially extension (in nutrition, forage production, herd management, hygiene, and marketing) or veterinary services and supplies facilities?
- What are the infrastructures of the area?
- Are there significant data and statistics on local goat activities (number of breeders, of goats, volumes, etc.)?
- Who are the main stake holders and how they are involved? What is the local political and social situation?
- What are the other activities of the area?

2. Project implementation

- Which beneficiaries to focus on?
- How much to invest?
- What goat breeds to use for developing goats in the area?
- What forage are available and how to improve their production?
- What are the main risks of the project?

3. Project governance

- What are the main problems faced during the implementation? How were they solved?
- What is the involvement of the beneficiaries? Is it consistent with the objectives of the project?
- Do I have to reorient some actions and in what directions?
- What is the continuation of this project (other project, reshaping and continuation, failure, etc.)?
- What was the impact of the project? How has it been evaluated?

Annex 2:

REFERENCES ADDITIONAL DOCUMENTS

Several documents likely to interest readers of this study have been included in this final report to be consulted. They are either methodological documents, information on near approaches in other sectors or additive documents on the studied cases. Some of them are quoted in the Additional Resources.

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- Framing Questions for a Discussion on Country Experiences with Scaling Up (IFAD Brochure 1 and 2)

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- Poultry Project Assessment and Design checklist (IFAD document)

- PTA KM-Approach (IFAD Brochure)

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Goat Value Chain Toolkit

A guideline for conducting value chain analysis of the goat sub-sector

Prepared by Heifer Project International

Table of Contents

List of Figures and Tables

Introduction

Background

International Fund for Agriculture Development (IFAD) has commissioned the International Goat Associate to collect best practices related to pro-poor small ruminant development, including a knowledge harvest document covering wide range of best practices. As part of that initiative, IGA undertook the development of this toolkit for conducting value chain analysis on goat production around the world.

IGA and IFAD requested the service of Heifer International to facilitate the development of this toolkit. To that end, a three-day writeshop was carried out with participation from Heifer Nepal, Heifer Headquarters, Heifer India, in country experts and IGA to gather materials and take advantage of expert guidance. Based on that writeshop, a toolkit was further developed and refined.

Heifer International and their office in Nepal were chosen for development of this toolkit for the following reasons.

- Heifer International has a proven history of strong impact in bringing families from vulnerable to resilient and sustainable communities through development of value chains. There is a very successful example of dairy value chain project funded by Gates Foundation in East Africa and a new goat value chain project in Nepal funded by Heifer International.
- Heifer International Nepal is currently implementing a goat value chain project which covers more than 138,000 families for next five years. This project is funded through multiple donors.
- Heifer Nepal and IFAD are collaborating on an additional large scale project which will use value chain methodology.
- Recently, Heifer International Nepal has conducted extensive goat value chain study as a part of the project. This goat value chain study served as useful in the toolkit to provide appropriate examples.
- As a part of writeshop, field staff of Heifer International Nepal who are engaged in the implementation of the large scale value chain project were utilized to bring grassroots expertise to the process.
- Conducting the writeshop in Nepal was relatively cheaper as compared to the other places.

Purpose of this Toolkit

This toolkit is a compilation of best practices and suggested tools/methodologies for value chain analysis in the goat sector. It can be used by development organizations, project founders and other actors throughout the world to guide in preparation and implementation of their projects through the analysis

goat value chains, whether meat, milk or fiber. Through such value chain analysis, activities can be planned for strengthening mutually beneficial connections between actors in the value chain and bringing increased benefit to marginalized, disadvantaged members of society.

A value chain is a network of firms that buy and sell to each other in order to supply a particular set of products or services to a particular group of final consumers. Value Chain Analysis is used by development agencies to identify how poor people, small enterprises or other target groups can play a larger and more lucrative role in a particular value chain and how a value chain's structure or characteristics can be changed to enable it to grow in pro-poor ways. Value-chain analysis is increasingly used to help develop a competitiveness strategy for a value chain or industry.

How this toolkit was produced

The skeleton of this toolkit was produced through a participatory "writeshop" held 3 to 7 February 2013 in Chitwan, Nepal. The writeshop involved about 12 participants from different organization including goat value chain expert, value chain expert, project staff implementing goat value chain projects, trainers and a facilitator. The information was further consolidated and refined into this toolkit format after the workshop.

Overview of the Goat Value Chain

The term value chain refers to the full range of activities required to bring a product, here in this case goats and their products from the different phases of production to delivery to final consumers. A goat value chain exists when all of the actors in the chain operate in a way that maximizes the generation of value along the chain.

Goats were the first domesticated among the farm animals and cosmopolitan in distribution. They are adaptable to any types of environment and are often neglected by the farmers. In rural areas of the developing countries, goats make a very valuable contribution to the poor. Goats are more important source of livelihood for many more people as they are easy to raise as compared to large animals and can survive in adverse condition with less investment. Goats are popular with small holders because of their efficient conversion of feed into edible and high-quality meat, milk and hide. Goats are also used as holistic tools for land vegetation management and fire fuel load control.

There are approximately 800 million goats in the world. The largest number of goats in the world is in China, followed by India, Pakistan and Bangladesh, all of them are in Asia. Number of goats in these four countries constitutes about 45% of the world total.

Raising goats can have many benefits. They are often more manageable, affordable and hardy for the smallholder farmer. Goats forage on plant varieties that are not preferred by other grazing animals and can improve the quality of pasture land. They can serve as pack animals navigating landscapes where other species could not travel. Goats also produce a diverse array of products from milk (cheeses, yogurt, cosmetics) to fiber (cashmere, mohair) to meat.

A goat value chain looks at the complex range of activities implemented by various actors through a chain to the sale of final products (milk, meat, cheese, fibers, etc.). It does not only look at the activities implemented by a single enterprise, but includes all its backward and forward linkages, until the goats and its products will be linked to the final consumers.

In developing countries, it is often very difficult for smallholder goat farmers to engage in either new or existing value chains in a manner that will benefit them. Even if demand is high, such vulnerable farmers first need to have their capacity built in production, business skills and entrepreneurship in order to develop their activities to an enterprise level allowing them to engage in the value chain.

However, when properly empowered and trained, smallholders can greatly benefit from goat value chain development. Goats already supply a continuous flow of income, which is often difficult to obtain through raising seasonal vegetables. When fully engaged in the value chain, the farmer's livelihood can be built even further to the level of enterprise and sustainability.

Goat Value Chain Framework

The goat value chain can be graphically represented by a framework which identifies the main actors as well as the operations and the relations among them. The main purpose of preparing this framework is to summarize the value chain structure in a clear pictorial format. There are many different ways to prepare value chain framework- horizontal, vertical and circular. The drawings in this chapter present a very simple value chain with few critical elements as well as very complex value chain structures. During the process of value chain study, the framework described in this toolkit can be revised to reflect the reality on the ground.

A General Goat Value Chain Framework:

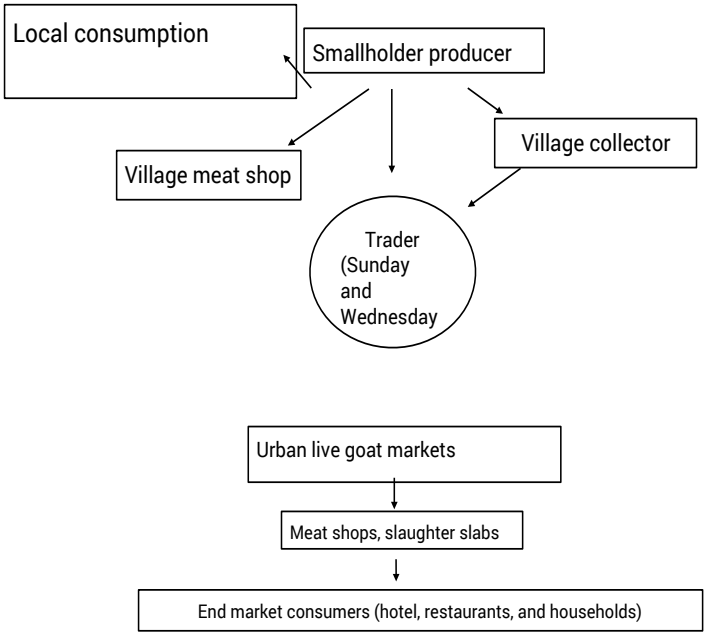

Figure 1: General Goat VC Framework

In this case smallholder goat producers raise goats for meeting their own needs rather than focusing the specific market. Generally the production system is integrated with crop and minimal inputs are considered.

It is generally relevant when examining the value chain for the purpose of development, to prepare a more extensive goat value chain analysis as situations are often fairly intricate. For all types of goat (dairy, meat and fiber), the value chain can be as complex as outlined in the next page. Such value chains are not localized in a specific community but extend to the provincial/state, country or regional level. Three possible complex value chains for dairy, meat and fiber sector outlined during the goat value chain workshop are mentioned in the following pages. However, when value chain studies are done at country or regional level, they may differ depending upon the actors and their level of involvement in the value chain.

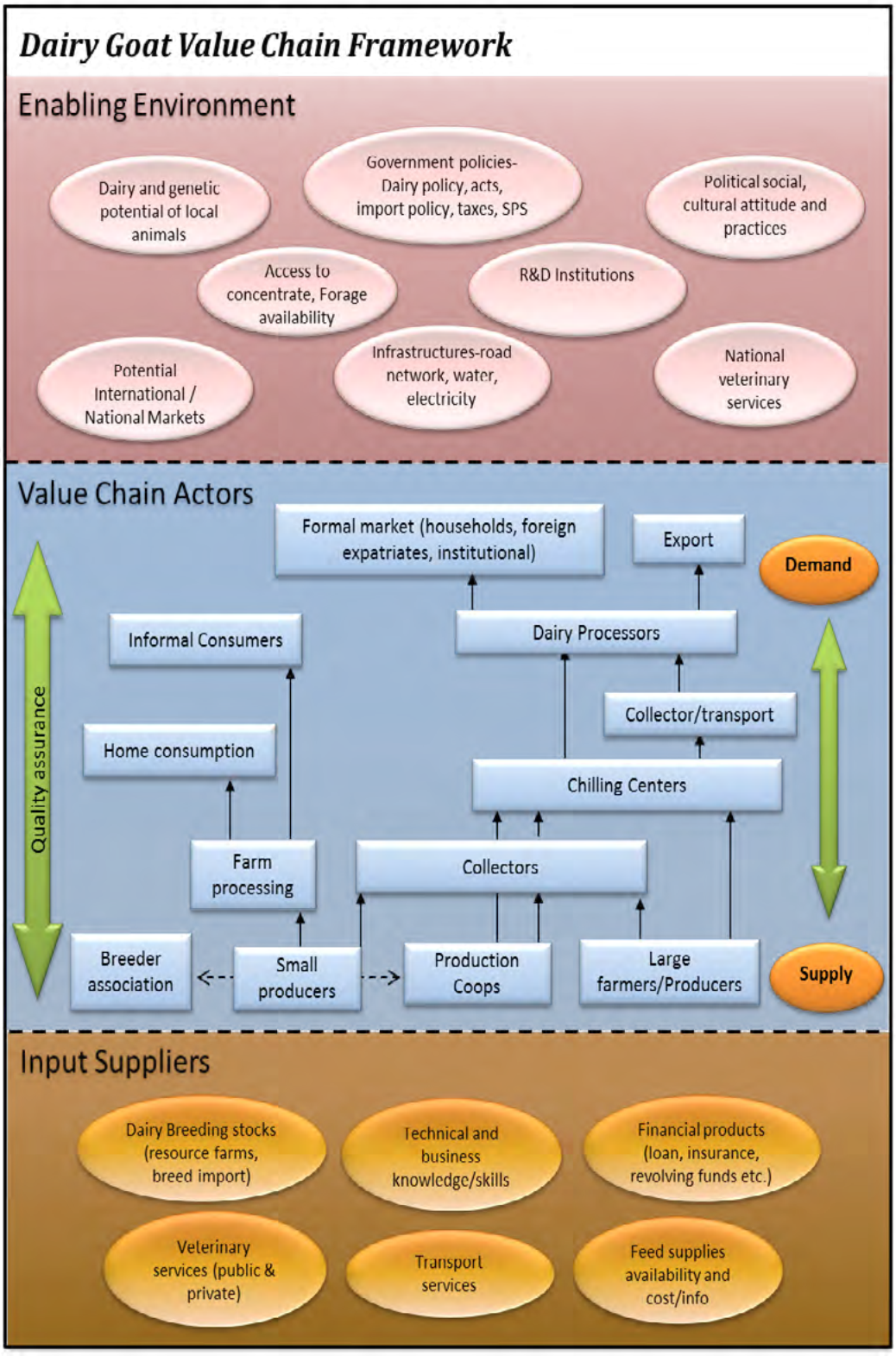

Figure 2: Dairy Value Chain Framework

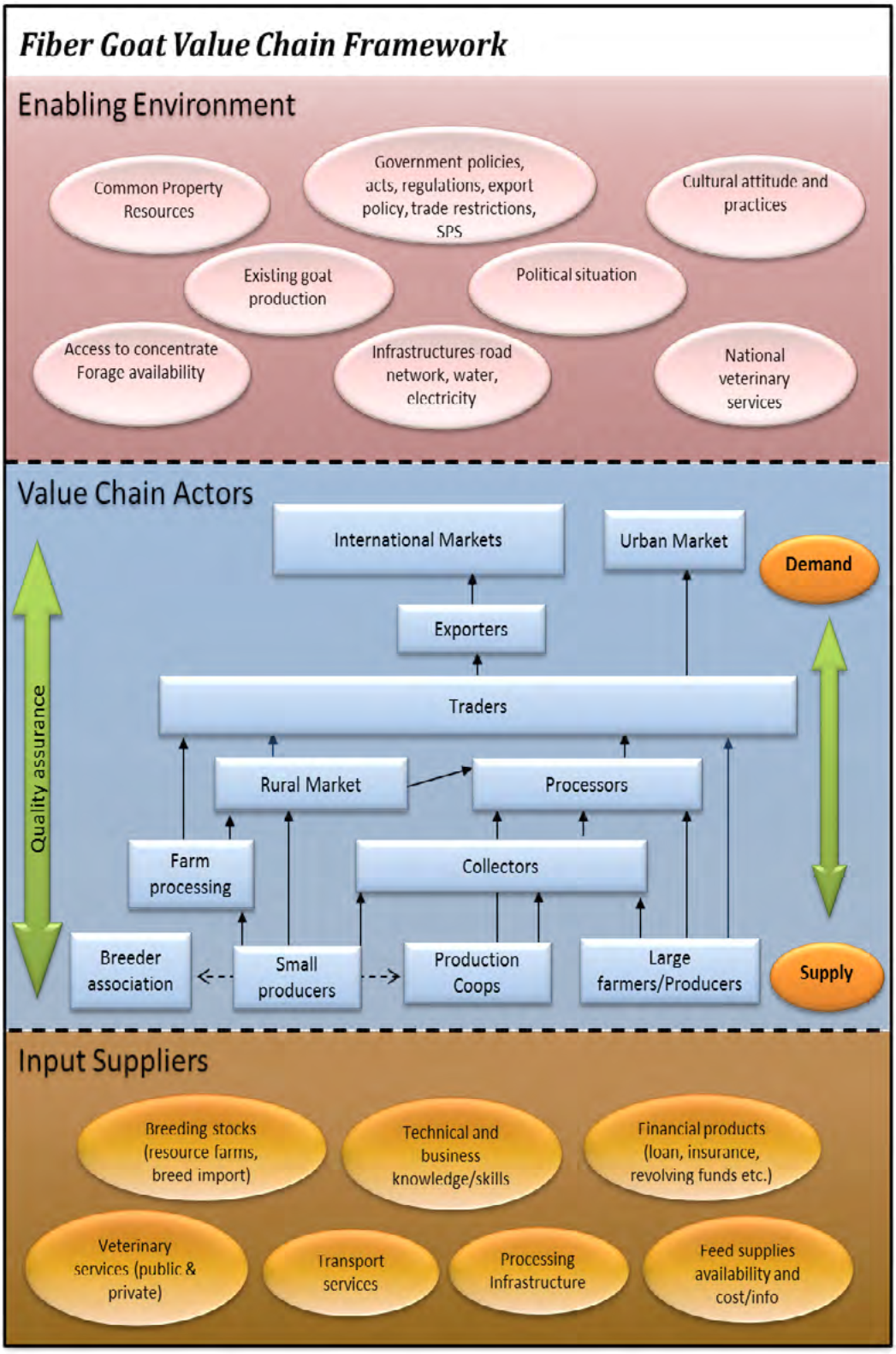

Figure 3: Fiber VC Framework

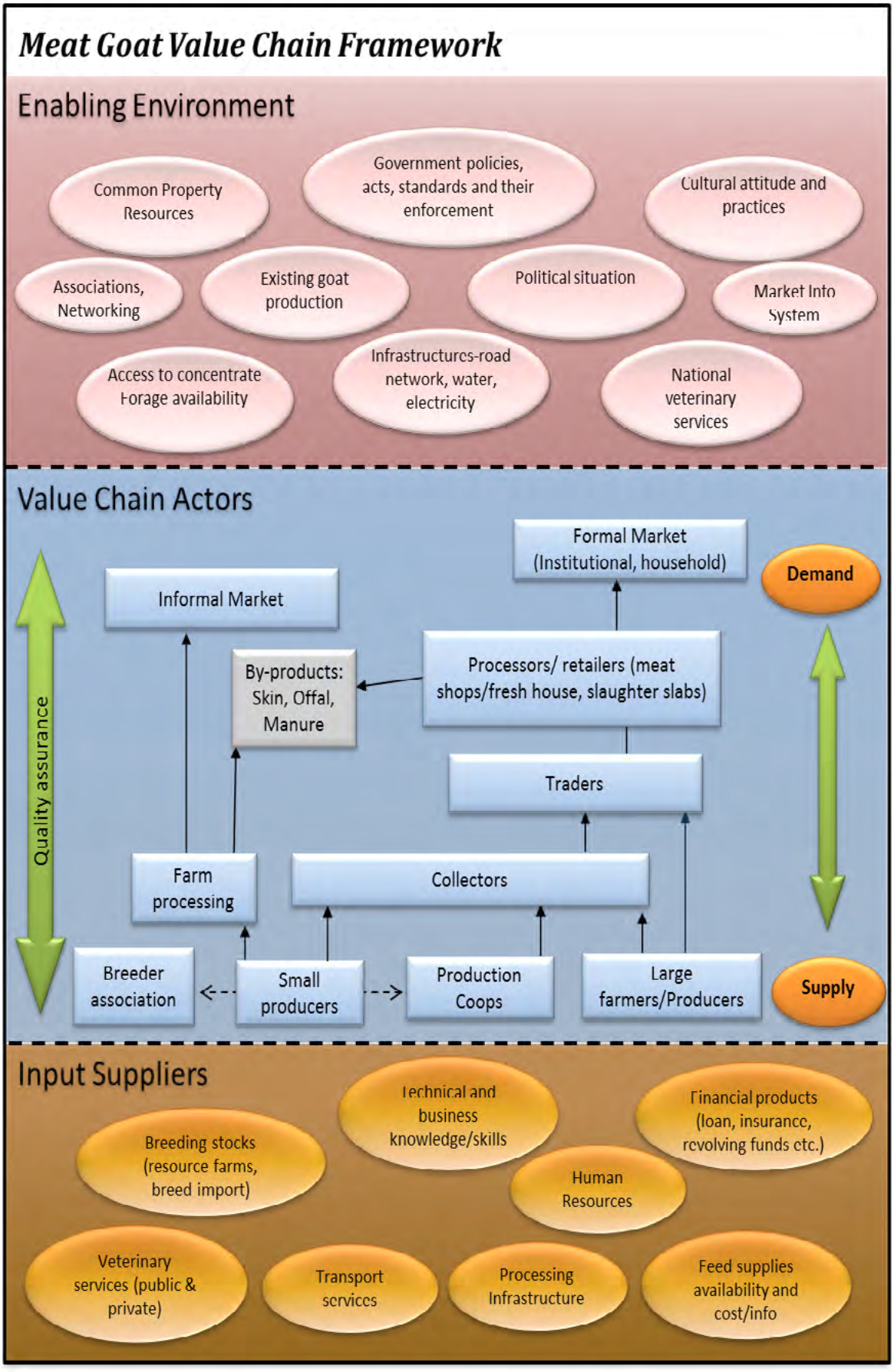

Figure 4: Meat VC Framework

Conducting a Goat Value Chain Study

In development, one of the most critical pre-project design steps can be the implementation of a value chain study. Whether the target is the vulnerable, smallholder producer or small-medium enterprises, it is essential to realize that the target beneficiary is only one piece of a closely integrated mechanism. Development work cannot be sustainable without understanding the full system of actors and relationships in the value chain.

Through conducting a value chain study, the actors and relationships described in abovementioned frameworks are thoroughly examined. A study will identify and examine the actors at each level of the value chain and what role they play, what stake they hold and what influence they wield. An economic analysis of the cash flow, investment and value addition is done at each level and with each actor. Likewise, the attitudes, preferences and relationships that guide the norms, trends and decision making in the value chain are also important drivers that require in-depth analysis.

An exhaustive value chain study will also include a wide-reaching review of the enabling environment. This will take stock of the existing resources available, including financial, capacity building, and input resources. The cultural norms and attitudes that guide the value chain are considered and government policies and practices are reviewed.

The design of the study can also be customized to consider specific issues based on the context of the area or needs of the researcher. For instance, in some South Asian and Middle Eastern countries, gender discrimination is a major issue and women's empowerment is often a goal of development projects. Therefore, a value chain study can be designed to target information about women's participation and benefit from the goat value chain. Likewise, involvement and share of particular marginalized groups can be a focus of the study.

To carry out a value chain study the first step is to identify the actors and relationships between those actors. A literary review of secondary sources is a logical first step; however, in the case of the goat sector, there is often a scarcity of information. For that reason, information from informal sources (through interview) is extremely important.

The following chapters outline of the types of actors and illustrative examples of the kind of information that should be considered for each one as well as suggested tools. Following that, a more extensive methodological discussion of the most potential research tools can be found.

Value Chain Actors

Input Suppliers

Suggested Tools:

Focus group discussions and stakeholders' meetings with input suppliers can provide deeper understanding of the major players. Direct observation is useful for ascertaining the common practices around inputs. A KAP survey is best used for analyzing the relationships among the players.

Input suppliers are often seen as the first link in the value chain and provide either materials or services to producers. Material inputs which will be needed by producers include breeders. Producers will need a source to purchase animals when starting to raise their own goats, and many may continue to need the services of breeding bucks kept by others in their community or AI services where available and appropriate. Though many producers grow or formulate much of their feed themselves, fodder seeds, some formulated feed and supplements may need to be purchased from suppliers. Vaccines and medicines are other supplies are often supplied by actors with specialized knowledge.

Some input suppliers provide services rather than physical materials. Financial services such as credit are especially important to smallholders who lack capital to invest in business enterprises. Such credit services may come from private banks, individuals or microcredit development organizations. Insurance schemes for animals are often unavailable to smallholders in developing countries. Capacity building services (both technical and business skills) may be available in some situations for goat producers and may come from government schemes, NGOs or private institutions. However, many producers may not have access to such services.

Veterinary services are especially important to goat producers. Private veterinarians may be available in some areas, though often prices are prohibitive to very poor farmers. Some governments provide networks of veterinarians or animal health workers whose services are provided at a subsidized rate. However, often there are gaps in services leaving many producers without reliable access to veterinary support.

When analyzing the input supply link of the value chain, it is important to consider quality and quantity, availability and access. The technical knowledge and business skills of each input supplier should be examined, as well as the vertical and horizontal relationships among the various actors.

Input supply is a potential area for intervention in the value chain for the benefit of the smallholder. Producers' cooperatives or associations can bring many inputs to their members for a cheaper price than when obtained individually. Such organizations can also use their influence to access additional services such as wholesale loans or technical trainings for their members.

St. Elmo's Dairy Goat Farm in Philippines, which has its own outlet to sell milk and .other dairy products

In Banke, Nepal, Community Agro-vet Entrepreneurs provide animal health services as well as supplies and imbedded services to build capacity on veterinary and agricultural knowledge for small-holder farmers.

Producers

Suggested tools:

Potential tools for assessing producers and their activities include individual farm household sample survey, focus group discussion, observations, review of secondary data on production, household production records, etc.

Producers are the most critical part of the entire goat value chain, but they are often the ones who face more challenges than any others in the chain. When we talk about smallholder goat producers in the value chain, they tend to have many constraints as compared to commercial goat raisers. Some of challenges of smallholders' are limited capacity and resources, inadequate access to inputs and services including technologies, lacking or weak network among the actors of value chain, limited knowledge and lack of empowerment. These constraints are common across the globe for goat raisers whether they raise goats for milk or meat or fiber.

These smallholders often buy inputs in small quantities which are not competitive and investing more than their larger competitors in production. Predominantly there is a lack of business skills among smallholders and they feel uncomfortable interacting with the formal market and with the larger goat farmers. Such farming is at subsistence level only and there is less priority on increasing their income .from goats

Important information derived from the value chain study from the production point of view relates to both technical and non-technical aspects of production. The information includes costs of production (fixed and variable costs), socio-cultural preference of goats and goat products and problems associated with production (feed, breed, disease, technical service available, market, price structure, etc.). Discussion with producers also gives opportunities to verify some of the information collected from the input suppliers as the producers are the end users of these inputs. Farmers have a wealth of information necessary to draw several conclusions in the value chain report. Depending upon the objectives and expectations of the value chain study, methodologies and parameters can be designed and can be tested before actual collection of data.

Processing

Suggested tools:

Direct observation is an important tool for understanding the facilities and norms of processing in the goat value chain. Key informant surveys and case studies are also good tools for gathering the quantitative information needed.

The dairy, meat and fiber goat value chains have a variety of unique processing actors. Dairy processors could include temporary chilling centers, liquid milk processors or processors of specialty items such as cheeses. Meat processors may be butchers at bazaars or wet meat stands/shops or they could be large scale brick and mortar businesses processing specialty cuts of meat or items such as sausages. Fiber processing consists of five main stages which can be carried out by as many or more actors and generally occur in varied geographical regions depending on available labor and technology, often including export to other countries.

Many times the act of processing is combined with another activity in the value chain such as in the case of farmers who do the hand dehairing of fiber or trader cum butchers who also serve as retailers through sale of warm meat to end consumers. For that reason, when assessing the value chain, actors may not fit neatly into a prescribed value chain map. In doing a study of processors, the researcher should also consider the different scale of processors as activities, norms and financial situation could vary greatly between processors (see Orissa Case Study).

Assessment of the processor should include an observation of the transport and processing facilities as well as knowledge and skills of the various processors. Quantitative indicators on number, volume and percent carcass yield should be gathered as well as a cost/benefit analysis.

When examining the processing stage of the value chain, special attention should be paid to hygiene and safety concerns. Often processing activities, especially in the meat and milk value chains face certain regulations or restrictions. However, in many developing countries, though regulations are in place, a system for enforcement is often sorely lacking. For that reason, there may be a good amount of space for upgrading the processing aspects of the goat value chain so that products are safer, more hygienic and of higher quality and value. This would also be an important intervention for ensuring safety and health of less wealthy consumers.

EXAMPLE

Case Study of Orissa India

In Orissa India, small traders cum butchers lack awareness surrounding hygienic conditions for slaughtering and disposal of waste.

Consumer preference towards fresh slaughtered meat is not promoting clean packaged meat.

The local traders/butchers complain that their profession requires extensive travel from village to village in search of goats, which increases their transaction cost and letting off of opportunity cost.

The existing commercial banking system does not consider local traders as potential customers because of their economic and social status.

As can be seen from the analysis below, the cost/benefit analysis shows that small traders have a much smaller profit margin than their large scale counterparts.

Cost/Benefit of Small Butcher

Sales per week	35 goats (meat of 10 kg) X 10 X Rs. 320/kg	Rs. 112000.00
Income from skin	35 goats X 200/piece	Rs. 7000.00
Income from head	35 goats X 50/piece	Rs. 1750.00
Purchase cost per week	35 goats (meat of 10 kg) X Rs. 3100/goat	Rs. 108500.00
Expense per week		Rs. 1500.00
Profit margin per week		**Rs. 10750.00**

Cost/Benefit of Large Butcher

Income from selling goats to other butchers	50 goats (@ Rs 3850/- , approx 5% margin on the procurement cost)	Rs. 183750.00
Sales of meat per week	50 goats (meat of 11 kg) X 11 X Rs. 340/kg	Rs. 187000.00
Income from skin	50 goats X 200/piece	Rs. 10000.00
Purchase cost per week	100 goats (meat of 11 kg) X Rs. 3500/goat	Rs. 350000.00
Expense per week		Rs. 7600.00
Profit margin per week		**Rs. 23150.00**

Figure 5: Case Study Orissa

Collection and Trading

Suggested tools:

Potential tools for assessing the collection, trading and transportation activities include market assessment, price information from various sources, stakeholder consultation

The Collection and Trading sectors of the goat Value Chain may consist of multiple actors at multiple levels, including individual collectors, transporters, cooperatives, larger scale traders, collection centers, etc. For instance, in the illustrative value chain below, traders and collectors are actors in three separate processes along the value chain. For that reason, it is important when gathering information on collection and trading to consider the differences between these actors and gather information regarding their role and relationship in different nodes of the value chain.

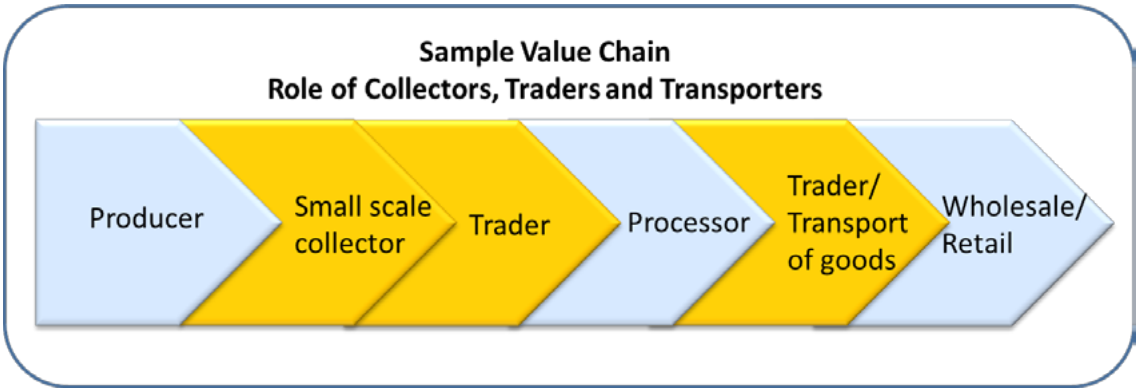

Figure 6: Role of Collectors throughout VC

When analyzing the collection and trading, various factors must be considered and listed such as those listed below:

Numberofcollectionactorsworkingateachnodeofthevaluechainandtheirhorizontallinkages.

Volume collected per unit time

Trend of collection over seasons and years

Profit margin (including weight loss during handling)

Price determination method

Collection and distribution location (live animal markets local market, wet markets)

In addition to these physical aspects it is important to consider intangible exchanges between actors, such as sharing of information. According to FAO, "equity can be skewed by governance and poor distribution of information across chains; for example, traders may have and retain better knowledge of consumer demands than producers so that traders can take advantage of premium markets without passing on benefits to producers."

When undertaking a value chain analysis for the purpose of bringing increased benefit to the poorest actors of the chain, the trader and transporter may be closely examined as potential intervention points for upgrading as there may be potential for increased information exchange between farmer and collector or increased entrepreneurial actions among the small-holder producer in order to take up an increased role in collection and trading activities.

In Orissa India, a large trader transports the animals in a truck which neither has proper facilities for animal transportation nor appropriate licensing causing the traders to shell out considerable amount as bribes. In addition, a significant number of goats die while in transportation.

Heifer India Goat Value Chain Study in Orissa, 2013

Retail/Wholesale

Suggested tools:

Though direct observation can give a good high-level picture of the market situation, key informant interviews or sample surveys will help to get a more detailed understanding of each category of actor.

The role of wholesale and retail may be undertaken by various stakeholders from the small farmer selling milk or meat at the farm gate, to the butcher selling meat directly from his abattoir, to the retail shop in urban areas selling mohair products.

To analyze the marketing aspect of the value chain, it is first important to identify which actors take up this function, including their number, practices and locations. Each actor's stake must be analyzed, including their sales volume, costs and profit margins.

In addition, analysis should be undertaken to see if wholesalers/retailers are held to any official quality or certification standards, how those are enforced etc. These actors may also impose certain standards of their own which greatly affect others in the value chain.

The role of retailer and wholesaler is critical in shaping strong, formal value chains as power is often concentrated among the few chain participants who coordinate market activity. These actors hold the majority of the consumer intelligence and product availability information leaving the disadvantaged producer with limited control. Therefore, retail and wholesale institutions may be an important section of the value chain to consider when planning pro-poor interventions, either to strengthen the vertical relationships among the actors to be more mutually beneficial, to assist in developing a more equitable spread of power and information distribution among the actors, or to consider local, more informal value chains in which the smallholder can take a stronger share.

Consumers

Suggested Tools:

Two types of tools can be used in sequence when analyzing the consumer/end-market of the goat value chain. Secondary tools can first be used within the larger context to give an idea of whether not a viable market exists for various products and, if so, where the most attractive markets can be found. In the second phase, primary sources direct observation, case studies, consumer surveys and consultation meetings) can pinpoint particular demands of the targeted customer groups. According to the USAID Value Chain End-Market Toolkit, "Primary End-Market Research should be used as a foundation for the Competitiveness Strategy to upgrade the value chain to build products and services for which clearly defined customer segments will pay premium prices."

The demands of the consumer tend to be a major driving force behind a functioning value chain. For that reason, comprehension of the complete picture of all potential consumers as well as their purchasing capacity and preferences. Potential consumers in the goat meat, milk and fiber value chains could be individuals, institutional entities or export consumers.

EXAMPLE

Consumer Preference in the Nepal Goat Meat Value Chain

The majority of the consumers were from urban areas. Some rural consumers were also interviewed. Rural and urban consumers differed in their attitudes / perceptions. Rural consumers – many of whom were also producers - were less bothered by mixing practices of the meat retailors. However, urban consumers had this concern in mind and therefore want to observe the slaughter and carcass dressing process. Urban consumers' concerns centered on improvement in hygiene and sanitation of meat retailers' shops, preferring slaughter in front because of fears of possible adulteration. The willingness to pay more for improved hygiene and sanitation conditions was not observed as only 11% of the respondents would be willing pay more. About 80 % of consumers were in favour of fresh meat and meat with skin, whereas 20 % favoured skinless, frozen meat. These consumer attitudes / perceptions are mainly arising from on-going traditional habits and from concerns that retailers mix she-goat meat in the bulk. Only 25 % of consumers expressed their willingness to pay more for choice cuts of meat. Nepalese goats were preferred over Indian goats by most of the consumers due to lean meat and flavour of the former.

Excerpt from A Study on Goat Meat Value Chain Nepal
Shah, Gautam, Paudel

Figure 7: Consumer preference on Goat Meat in Nepal

For all consumers, in addition to analyzing economic aspects such as volume, pricing and consumption patterns, it will be important to understand the socio-cultural factors guiding consumption patterns such as social norms, taboos, values, beliefs, etc. For example, the Department of Agriculture of South Africa reports that goat meat is not preferred in areas where mutton or beef are readily available and many have the perception that goats have an offensive odor, are the poor man's animal and are only used for traditional ceremonies or as pets .

Also important is to understand the consumers' tastes and preferences. For instance, in the meat value chain aspects such as specialty cuts, frozen vs. fresh meat, etc. must be considered (see box 1). In more formal markets, branding and packaging and certification may be another factor influencing consumer decisions. For fiber goats, preferences such as course versus fine hair products should be considered while in the goat milk sector, preferences among specialty products must be analyzed.

Schools, hotels, military forces and hospitals are examples of institutional buyers which may play a

major role in the consumer pool, especially in the milk and meat value chains. Factors such as their number and type, regulations of their feeding programs, and their institutional preferences may provide necessary information for understanding the dynamics of the value chain.

Some value chains may need to consider export markets in order to assess the full spectrum of consumers in the value chain. For instance, in the case of cashmere, two very distinct and separate markets emerge, with China dominating the low and medium-end market and European customers bringing in the high-end brands. In cases where export is considered, it is important to understand the quality specifications, certification requirements, trade laws and profit margins for reaching the foreign consumer. Likewise, it is also necessary to consider competing import products, including consumer preference, cost and specifications of such items.

Understanding the consumer is a key issue for designing intervention points to affect the existing value chain. Having the full picture of consumer interests could lead to interventions for producers, traders or others to customize the product to meet the demand. However, while consumption influences the backwards links of the value chain, the opposite can also be true. Influencing the consumer through advertising and awareness-raising can bolster the appeal of the product in two ways: extending reach (informing more people of the product's existence) and increasing value (connecting a product to a certain image or product). Therefore, an additional intervention point may be the consumer itself.

Analysis and Deriving Recommendations

A value chain analysis of the goat value chain information is more specialized and the use of a trained economist during the entire process is very helpful. It gives a more detailed understanding of the actors, activities, services, costs and opportunities related to the flow of particular goat products and the associated services, starting with the input suppliers, farmers and ending with the final buyers or consumers.

A full value chain analysis is very complex and time consuming. Depending upon the objectives of the value chain study, it can be focused on particular section of the value chain, or confining to a specific geographic location. A value chain study result in the report should highlight critical constraints and opportunities along the chain and should be helpful for designing interventions along the value chain especially through the value chain projects. The report also emphasizes the technology options, market options, product requirements/demands and organizational needs and any relevant policies that is affecting along the value chain. The information collected and analyzed through value chain study will play a critical role in preparing a business plan at different levels, from input suppliers, goat producers, collectors and traders.

1Value chain analysis can answer several important questions in designing development projects. The graphic below depicts some of the key considerations in program design which can be addressed through a thorough value chain analysis.

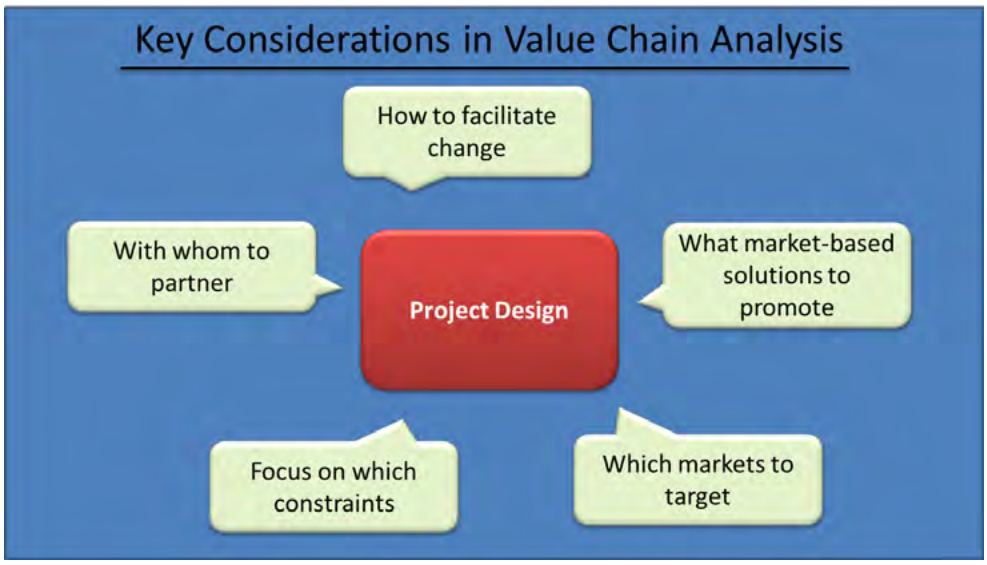

Figure 8: Key Considerations in VC Analysis

2The value chain study should be able to estimate the approximate amount of money that each actor makes and it typically reveals that smallholder should make more in an ideal goat project.

Figure 9: Stakeholder Shares in Goat Meat Value Chain, Nepal

3 It is important to know the production cycle in the existing value chain so that an intervention mechanism can be developed during the project implementation.

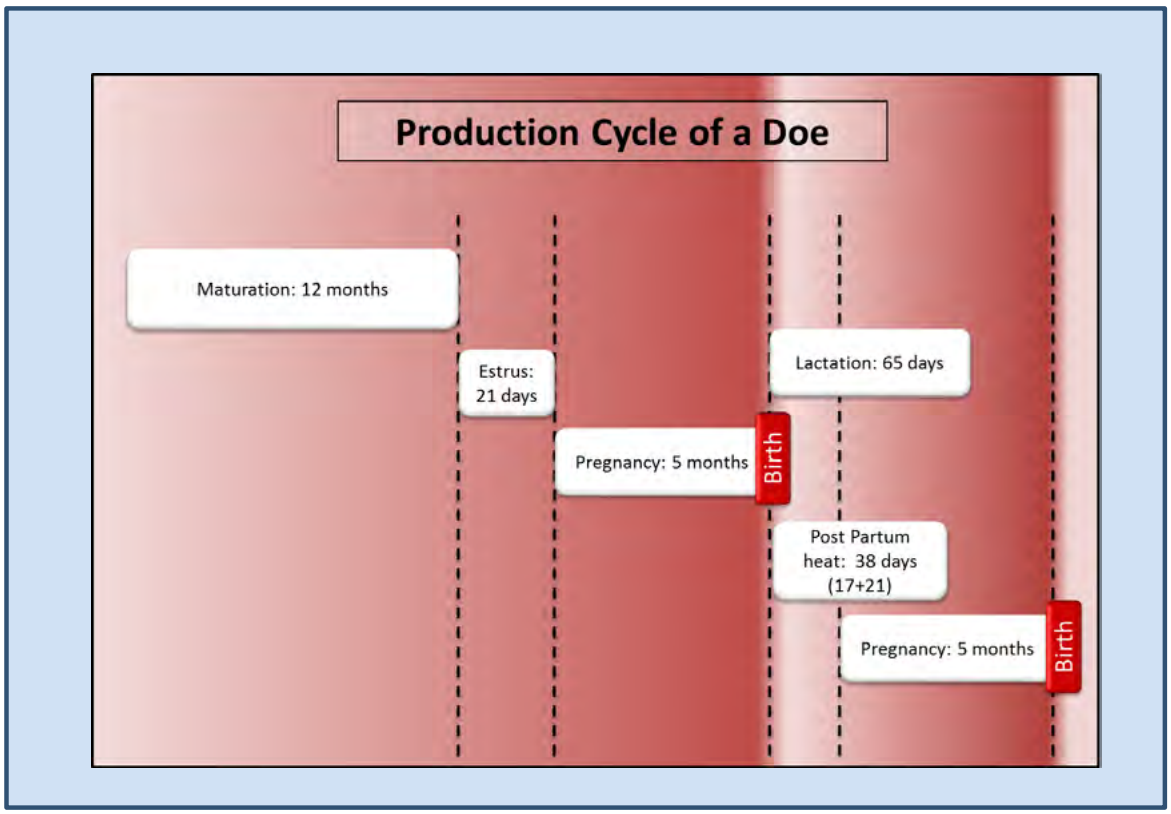

Fig-

Figure 10: Sample Production cycle of Goats

1. SWOT analysis: The weakness and opportunities outlined in the value chain study can inform strategies for project interventions if there is scope for developing projects in the goat value chain.

2. Based on the stakeholder analysis, it is also possible to evaluate the relative importance of stakeholders and their roles in the value chain. That can be a basis for mobilizing all stakeholders of the value chain for the benefits of the smallholders.

3. The study also indicates the relationships between different stakeholders and their relative importance along the value chain, which also helps us design effective goat value chain projects.

4. The enabling environment must be examined at various points throughout the value chain. This will take into consideration various actors and forces that may impact the functioning of the value chain and include the following:

   Infrastructure

   Policies

   Cultural preferences and norms

   Access to resources (financial, veterinary, animal nutrition, etc)

   Market availability

   Research and Development

   Etc.

5. Mapping the value chain: After outlining the value chain framework, value chain mapping is a very important step. The following mapping may be useful for analyzing information and making conclusions and recommendations in the goat value chain:

   Core processes in the goat value chain

   Identifying main actors involved in the process, flows of production (meat, milk, fiber)

   Knowledge and flow of information

   Volume and number of products

   Geographical flow of products and services

   Relationships and linkages between value chain actors

   Constraints and potential solutions

Recommended Data Collection Tools

Here we summarize the prioritized tools and process for qualitative and quantitative information gathering for the goat value chain study to produce outputs as described in previous chapters. The data collection process mentioned in this chapter can be customized depending upon the volume and depth of information needs, time and resources available and also the objectives of the goat value chain studies. The tools described in this chapter are among the most useful approaches to providing required information.

Additional tools are provided for using both primary and secondary information once it has been gathered. These tools (such as SWOT and situation analysis) help to organize and analyze the mass of information collected so that it can be used to help inform decision-making regarding strategies and interventions in development work.

Data collection for situation analysis or preliminary information gathering:

Information should be collected on the key people involved in the goat sector, the market, and consumers; how chains may change over time (in the festival seasons) or variation in different market places.

Key items of the information to be collected are outlined below:

What are the products (milk, meat, fiber, hide, etc.)?

Who are the stakeholders? How are they involved and what are their roles; relationships between these stakeholders and their level of influence

Presence of the institutions focused on goat production and management, and marketing, their strengths, and their relationships. Are there any institutional gaps?

Practices along the goat production, processing, marketing chain.

Consumption trends: quality and quantity

Infrastructure in place.

Details to be included during the data collection are;

Identify all products (milk, meat, fiber, hide, etc.) and characterize them

Identify all stakeholders

Production, demand and supply of the products

Production, processing and distribution system analysis (define and map production system,

Perceptions of different stakeholders of goat value chain in terms of profitability

Pattern of trade and mapping of trade routes

The collection of socio-economic data is also very important in the process of value chain study to know the existing institutional arrangements and their interactions in the value chains. Information includes but not limited to

Financial and non-financial arrangements between stakeholders in exchange of product and services

Value, frequency of transection

Profit margins and sale volumes at different points in the goat value chain

Contribution of the value chain related activity to the household income at the goat producer level for other stakeholders

Certification, inspection, and regulations related to goats and its products and how credible they are in terms of implementation.

Capacities, resources and infrastructures at all level both individuals and institutions

The data collection for both production and socio-economies represents the base for conducting goat value chain analysis. However, we need to have additional information to see overall goat value chain in bigger picture.

Table 1: Potential Data Sources for Goat Value Chain Studies

Primary Sources	Secondary Sources
Individuals: • Input suppliers (types/levels) • Producers (types/levels) • Traders (types/levels) • Processors (types/levels) • Consumers (demand and preferences) • Goat value chain infrastructure providers (market workers, butchers, traders, transporters)	• Existing goat sector reviews • Statistics on human, livestock, goat population, market volumes and demands, etc. • Goat production related case studies, reports, projects, strategies Additionally the following sources of information are very useful • Country reports • Country Strategy Reports of the donors • Government planning documents • Living Standard Survey Report • Media reports editorials, • Policy review and analysis, • Price information either form farmers and traders or government system • Review of existing acts, rules, standards, directives • Trade statistics
Groups and representatives: • Input supplier associations • Producers association, SHGs, co-operatives • Traders associations • Marketing associations • Government departments	

During the goat value chain writeshop conducted in Nepal, the following data (qualitative and quantitative) collection and analysis tools were identified and discussed. These lists with brief explanations are by no means exhaustive; the value chain study team can identify other tools in their specific contexts.

1. Case studies

Case study refers to the collection and presentation of detailed information about a particular participant or small group, frequently including the accounts of the subjects themselves. A form of qualitative descriptive research, the case study looks intensely at an individual or small participant pool, drawing conclusions only about that participant or group and only in that specific context.

This is one of the widely used tools for conducting agricultural value chain analysis including that of livestock value chains. It is virtually impossible to outline any strict or universal method for conducting case studies as there are several variations in goat production practices and other issues associated the goat value chain from production to consumption. Several subsets of methods and approaches are utilized for obtaining a complete picture of the ongoing goat production practices. Some common methods include interviews with randomly or purposefully selected goat producers and other actors of goat value chain, field studies and direct observations of different stages of goat production, processing and marketing.

Case studies can focus on one participant or a small group of goat value chain actors depending upon the objectives. These participants can represent a cross section of the goat value chain. Since, several processes and methods are used in writing case studies, using such secondary information can give the goat value chain study group a variety of information on specific goat value chain components while reducing the time, resources and effort which would be required to collect the information first hand. However, credibility of the information may be questionable depending on who has prepared case studies and in what situation.

Using already available case studies will

Save time and resources of the project.

Provide valuable secondary information on goat production, marketing, consumer preferences and trade issues etc. depending upon the subject matter of case study.

Case studies are especially helpful for obtaining a micro-level perspective of the value chain. However, when using case studies, the researcher must be careful to remember that findings of one case study may not necessarily be generalized to all other similar actors in the chain.

EXAMPLE
In an effort to evaluate the performance of community animal health workers (CAHWs), the evaluation team used the case studies conducted by a reputed training service agency and also the situation of goat health status in the working area of the CAHWs in India through the Heifer International. Higher numbers of goats were dying due to internal parasites simply because drenching against internal parasites was not done strategically. Based on these case study results, the .training course was updated to address this issue

2. Consultation workshops/ meetings

The consultation workshops are designed to collect specific information needed during value chain study. Participants of the workshop are mainly experts on goat production, processing and livestock economics having extensive experience in the goat market from producers to consumers. During the process of the value chain study, a roster of experts can be prepared and consulted in groups by organizing small focused discussion. In the event that some experts are not available to participate, one-on-one meetings can also be organized. This method is applicable to all actors of the value chain. Such meetings and workshop are organized virtually as well if technology allows.

The consultation workshops/meetings can capture current goat production trends, strengths of goat-raising and problems associated with production. Similarly, such events can be organized separately for each stakeholder of the value chain to gather in-depth information on each segment. A combination of all actors can also be used, which helps the stakeholders learn and share their successes and challenges.

Thus, consultation workshops can be valuable at various points along the value chain or for getting a high level overview. However, it is important to weigh the time, resources, logistical support and other needs required for carrying out such forums and the researcher may need to be strategic in determining in which cases such an activity may prove to be most useful depending on the already available secondary information.

A value chain consultation workshop held in Can Tho City, Vietnam, with various stakeholders including NGOs, local authorities and subject matter experts

3. Direct observation

Observation is a way of gathering data by watching behavior, events, or noting physical characteristics in their natural setting. Observations can be overt (everyone knows they are being observed) or covert (no one knows they are being observed and the observer is concealed). The benefit of covert observation is that people are more likely to behave naturally if they do not know they are being observed. However, the researcher will typically need to conduct overt observations because of ethical problems related to concealing the observation.

Observations can also be either direct or indirect. Direct observation is watching interactions, processes or behaviors as they occur; for example, observing a goat shed, a butcher house, live goat market. Indirect observations are watching the results of interactions, processes, or behaviors due to the different stakeholders' involvement in goat value chain.

Direct observations are performed through the following steps with emphasis on goat production, processing and marketing and its relevant stakeholders.

Determine the focus; e.g. goat production, goat feeding practices, condition of butcher houses and slaughter hygiene, live goat markets, etc.

Develop direct observation forms depending upon the objectives of the study

Select the sites

Decide on the best timing of the observation

Conduct field observation and complete the forms. To gather as much data as possible, a team of experts can participate during direct observation and collect the information.

Analyze the data collected during observation

Check the data and other information for reliability and validity.

Observation is an important tool that should be used at each link of the value chain as it is simple, supplements already available information, is not subject to bias of the actors and can be used to validate other data sources. However, direct observation should not be used in isolation as situations may be complex and require corroboration by multiple sources of data.

EXAMPLE

An example of structured direct observation was an effort to identify constraints in the smallholder goat production systems. The value chain study team prepared a direct observation form covering the housing, feeding, health care and management practices smallholder goat raisers .are using in Nepal in different locations

The team identified several innovative practices smallholder goat farmers are using like elevated floors, use of feeding racks, provision of locally made salt licks, etc. Most of the goats assessed during the observation were within the acceptable body condition scores (BCS). Moreover, practices of castration and selection of does and buck for breeding purpose was not uniform which .required immediate attention for increasing goat production and productivity

4. Focus Group Discussion

A focus group discussion (FDGs) is a group of ten or more people, led by a facilitator in a group interview format and brought together to discuss a particular topic or issue. Focus groups provide a forum for an organization to discuss issues and explore subjective matters with their stakeholders, such as service expectations, attitudes, feelings and experiences.

Key characteristics:

Held with a group of ten to twelve people

Participants are homogeneous but unknown to each other

Led by a facilitator (usually two) in a group interview format

Of 1 ½ to 2 hours in duration

Used when largely qualitative information is required

The goal is not to reach a consensus, solve a problem or make a decision

Seek to obtain insights into attitudes, perceptions, beliefs and feelings of participants

Questioning route uses predetermined, sequenced, open-ended questions

Frequently a brief questionnaire is used during the focus group interview as a method of structuring feedback and obtaining more precise data such as priorities and preferences.

FGDs can be used to explore the meanings of survey findings that cannot be explained statistically, the range of opinions/views on a topic of interest and to collect a wide variety of research and policy, FGD can be useful in providing an insight into different opinions among different parties involved in the change process, thus enabling the process to be managed more smoothly.

FDGs can be used well with the smallholder goat producers, collector, traders, slaughter house owners, input and service providers and also with the consumers to know the strengths, weaknesses, consumer preferences, goat health issues, availability of inputs and services, etc. This is the most widely used method in any of the livestock value chain studies.

Focus Group Discussion with Goat Meat Value Chain Stakeholders in Nepal

5. Structured interview/ survey

A structured interview, also known as a standardized interview is a quantitative research method commonly employed in survey research. The aim of this approach is to ensure that each interview is presented with exactly the same questions in the same order. This ensures that answers can be reliably aggregated and that comparisons can be made with confidence between sample subgroups or between different survey periods[1].

The interviews are conducted with goat value chain participants at all levels of the chain, and are designed to:

identify the primary actors in the value chain, their roles, and interrelationships

1 http://en.wikipedia.org/wiki/Structured_interview

identify market channels and trends within the value chain

identify constraints and opportunities that are holding back growth and competitiveness

Different types of surveys can be designed to meet the objectives of the study using the structured interview questionnaires. An example of this is the household survey to compile the data on goat meat consumption habits, production processes, productivity and goat health. Surveys in markets can be done with consumers, butchers, traders etc. to gather data on trading process and patterns, and prices at different levels and volumes of goat. Some of the information in the survey can be collected through direct observation during interview process.

Structured interview/surveys are extremely valuable when there is a need to produce quantitative data which can be organized and analyzed in a scientific way. One constraint of this method is the time and resources required to obtain a significant sample size for drawing extrapolative conclusions. Thus the researcher will need to be strategic based on the availability of information through other sources and the goals of the survey when determining when a structured interview is appropriate

A set of questionnaires used for goat value chain study can be found in appendix 2.

6. Gender analysis tools (Harvard Analytical Framework)

The Harvard Analytical Framework, also called the Gender Roles Framework, is one of the earliest frameworks for understanding differences between men and women in their participation in the economy. Framework-based gender analysis has great importance in helping policy makers understand the economic case for allocating development resources to women as well as men. This framework is a grid for collecting micro-level data and is a useful way of organizing information. This method can be adapted to many situations within the smallholder goat production system. The Harvard Analytical Framework has four main components.

I. Activity Profile: This tool identifies all relevant productive tasks and answers the question, "Who does what in smallholder goat production system?"

II. Access and Control Profile: This tool enables users to list what resources people use to carry out the tasks identified in the Activity Profile. It indicates whether women or men have access to resources (goats), who controls their use, and who controls the benefits of a household's (or a community's) use of resources. Access simply means that you are able to use a resource; but this says nothing about whether you have control over it.

III. Influencing factors: This tool allows you to chart factors which influence the differences in the gender division of labor, access, and control as listed in the two Profiles (Tools 1 and 2). Identifying past and present influences can give an indication of future trends. These factors must also be considered because they present opportunities and constraints to increasing the involvement of women in development projects and programs.

IV. Project Cycle Analysis: This consists of a series of questions. They are designed to assist you to examine a project proposal or an area of intervention from a gender perspective, using gender-disaggregated data and capturing the different effects of social change on men and women.

Gender analysis will be especially important in developing countries where gender discrimination is one of the factors contributing to poverty or low HDIs, particularly when development interventions post-survey will be geared towards women.

An example of this tool used in goat production practices in Rajasthan, India is summarized below.

Table 2: Harvard Analytical Framework for Gender role in Goat farming.

Tool: Activity Profile

Activities	Women/ girls	Men/ Boys
Production Activities of goat farming		
Activities:		
1. Sale and Purchase of goats,		Yes ✓
2. Sale and Purchase of fodder/feed,		Yes ✓
3. Fodder Cultivation	Yes ✓	
4. Shed Construction	Yes ✓	
5. Veterinary Care (medicine and vaccination)	Yes ✓	Yes ✓
7. Care and Management of Goats	Yes ✓	
8. Grazing/Feeding of goats	Yes ✓	
Others:		
Socially Reproductive Activities in Goat Rearing		
Activity 1.Where a Shed should be constructed?		Yes ✓
Activity 2. Who will construct the shed or take care of the goat?	Yes ✓	
Activity 3. How many goats will be reared, where it will be purchased and what flock size will be kept.		Yes ✓
Activity 4. Food Preparation:		
Activity 5. Childcare:	Yes ✓	
Activity 6. Health related (Family members)	Yes ✓	
Activity 7. Cleaning and repair of Shed:	Yes ✓	
Activity 8. Market Related:	Yes ✓	
Others :	Yes ✓	Yes ✓
	noncommercial mar-) (ket activities	(commercial)

Table 3: Harvard Analytical Framework for Gender role in Goat farming. Tool: Access and control profile

	Access		Control	
	Woman	Man	Woman	Man
(Resources (goat related				
Land	Yes	Yes		Yes
Goats	Yes	Yes		Yes
Labor returns for goat rearing	Yes	Yes		
Cash from selling of goats		Yes		
Training and Skill development				Yes
Other	Yes	Yes		Yes
Benefits from goat rearing				
Outside Income	Yes	Yes		Yes
Asset Ownership	Yes	Yes		Yes
Milk or Meat produced from goat	Yes	Yes		Yes
Education/ Cloth/ basic needs from money generated from goat rearing	Yes	Yes		Yes
Other				

7. Resource Mapping

Resource mapping exercises as used in a Participatory Rural Appraisal (PRA) activity not only provide the evaluator with information about the physical characteristics of the community, but can also reveal much about the socio-economic conditions and how the participants perceive their community. The maps are usually drawn by a group of villagers either on the ground using chalk or on a large sheet of paper. The exercise often attracts much attention and generates useful debate among the mapmakers and the onlookers. The final map is then recorded by the PRA team to use in subsequent discussions.

Various thematic maps can be developed depending on the focus of the evaluation. In case of the goat value chain study, resources mapping will add value and provide substantial information on the number goats, goat housing situation, and availability of fodder/forage or pasture land, slaughter houses, etc. within a short period of time. It also provides information on particular household-level characteristics-relative wealth, levels of resource use, labor available for goat raising, membership/ involvement in a community group or goat producers' association, and so on.

This technique can be done as part of a group discussion, to generate a consensus view of the community's engagements in goat production, technologies in use for goat raising, market for goats and pricing mechanism etc.

General resource maps prepared by Cambaro Barangay in the Eastern Visayas, the Philippines

8. Key Informant Interview

A key informant interview is a loosely structured conversation with people who have specialized knowledge about the topic you wish to understand. Key informant interviews were developed by ethnographers to help understand cultures other than their own. Key informant interviews let you explore a subject in depth. The reciprocal nature of these interviews can result in the discovery of information that would not have been revealed in a survey.

Key informant interviews have some advantages over other forms of data collection. They are easier and less expensive than focus groups since they involve only one respondent and one interviewer. However, the researcher should realize that it may be difficult to generalize results to the larger populations unless many informants are interviewed (which would result in a greater requirement of time and resources).

Before conducting key informant interview, the interviewer should know the purpose and make necessary preparations based on the specific focus on the interview. It can be targeted to a model farmer who has made tremendous progress through goat raising, or a trader engaged in long-term goat trading or with an animal health technician/veterinarian to know overall health and husbandry practices for improved goat production. It is also important that when developing the questions for such interviews, the researcher designs them in such a way to elicit the most revealing and relevant information from the informant.

A community agro-vet entrepreneur (CAVE) describing the goat health situation in a project area in Pyuthan, Nepal, as a Key Informant

9. Knowledge, attitude and practice (KAP) survey

A KAP survey is a representative study of a specific population to collect information on what is known, believed and done in relation to a particular topic — in this case, goat production. In most KAP surveys, data is collected orally by an interviewer using a structured, standardized questionnaire. These data then can be analyzed quantitatively or qualitatively depending on the objectives and design of the value chain study. A KAP survey can be designed specifically to gather information about goat production and management related topics, but may also include questions about general goat production practices and consumer preferences.

A KAP survey can be conducted at any point during improved goat production activities, but is most helpful if conducted in the early phases of a project, after the overall programmatic objectives have been determined (such as the implementation of new approaches or interventions to address specific challenges like frequent mortality of goats or cases of poor production but high market potential) and before extensive project planning has been completed. In this scenario, data from the KAP survey can be used to orient resource allocation and project design, and to establish a baseline for comparison with end of project objectives that are focused on improved goat production.

10. Market assessment (observation, interview, discussion)

Market Assessment is the evaluation of the market for a product or service including the analysis of the market trends, assessing the competition and conducting market studies. It is very important that before implementing any large size goat programs in any country or region, an assessment is undertaken of the goat and goat products market including demand and supply, consumers taste and preferences, goat export/import situation, major market centers, price trends etc. through different means. A market assessment is a critical activity for all goat value chain studies.

An example below gives an idea about the market infrastructure, other facilities essential in the market place, ownership and management of the market in selected district of Nepal compiled during Goat Value Chain Study in 2012.

EXAMPLE

Table 4: Infrastructure status of the Existing Market Centers in selected Municipalities of Nepal

Name of the sites	Infrastructure						Other facilities				Ownership and management	
	Market yard for collector (MYC)	Meat Retailers shop	Slaughter Slab	Wt. Facilities in MYC	MIS	Shed for goat	Canteen	Bank	Toilet and Bathroom	Common holding places	Land Ownership	.Management
Nepalgung	No	Yes	No	No	No	Individual	No	No	No	No	Municipality	Municipality
Butwal	No	Yes	No	No	No	No	No	Near-yes	Yes	No	Municipality.	Municipality
Pokhara	yes	Yes	No	yes	yes	yes	Yes	Near-yes	yes	yes	Private	Market Mgmt. Committee
Dharan	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Municipality	Market Mgmt. Comm.
Biratnagar	No	Yes	No	No	No	No	No	Near-yes	No	No	Municipality	Municipality
Birtamod	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Municipality	Municipality

11. Situation analysis

A Situation Analysis is an examination of the broad context or external environment in which the goat production system is operating. It is sometimes called context analysis.

A Situation Analysis includes the following elements:

- An analysis of the state and condition of goat and its ecosystem (including identification of trends and pressures)
- Identification of major issues related to goat production and its ecosystem that require attention
- An analysis of key stakeholders – groups of farmers and institutions who are engaged in different stages of goat value chain.

Situation analysis is recognized as the first step in the goat value chain study and a necessary step to undertake before making a final recommendation on goat project design and strategy.

The basic steps involved in Situation Analysis include but are not limited to

- Define the boundaries of the area to be included in the analysis.
- Research and describe the current state and condition of goat production and ecosystems in the identified area.
- Identify the major significant issues or areas requiring attention.
- Identify key stakeholders, including key institutions working on or involved with the goat production and/or areas requiring attention and change.
- Assess stakeholder interest, potential impact, power and influence.

12. SWOT analysis

SWOT Analysis is a structured planning method used to evaluate the Strengths, Weaknesses, Opportunities, and Threats (SWOT) involved in the goat sector. A SWOT analysis can be carried out for different goat production systems, input suppliers, marketing, consumer preferences, etc. separately or altogether.

The analysis of strengths, weaknesses, opportunities and threats is a pre-requisite for the formulation of a foolproof strategy for development of each sector including the goat subsector in this case.

Below are the examples internal and external (market, production and socio-economics related) SWOT analysis of Nepal's goat sector; and another example from dairy goat industry in the Philippines.

EXAMPLE

Table 5: SWOT analysis for Nepal's Meat Goat Sector

Internal strengths	**Internal weaknesses**
Markets related:	
• Domestic demand for goat meat is increasing • Huge gap between domestic demand and supply • Frozen meat trading is emerging • Organized and regular goat market is present in Narayani–east sector • Private sector investment is emerging • There are opportunities for increasing economic scale of production • Goat-specific transport trucks are slowly increasing • Sole involvement of private sector in trade • Private sector network for input supply exists • Large number of cooperatives exists in goat production areas. • Export potentials exist for goat meat in Gulf countries. • Entrepreneurs' associations are emerging	• Organized and regular goat market (Hatiya) is absent from Western, Mid-western and Far western regions • Selling on a live wt. basis is absent at the producer level and most of the other trading levels (even in end markets) • Price information linkages are poor • Inadequate facilities at regular market centers • Goat trading is based on bargaining • Slaughter houses / slabs are either absent or underutilized. • Market tax is too high in contracted out markets • Limited number of goats for completing a full truckload of goats • Collective holding places are absent or underutilized. • Role of cooperatives in goat trade is missing

Production related:	
• Forestry sector provides room for increased goat production. • Vast area of CPR (Twice more than Ag. Land) • Favorable environment for forage and fodder production • Technologies for increasing production and productivity are available • Genetic potential exists to increase goat productivity. • Favorable environment to increase doe population • Preventive and strategic control measures are available • Commercial farming is slowly emerging • Low capital investment is required as compared to other livestock production.	• Inadequate control of diseases / predators • Lack of resource farms for desired goat breeds • Local breed selection program is inadequate • Goat productivity potential is not optimized • Vet. input supply is inadequate and untimely • Inadequate commercial farms • Lack of awareness about potentiality of locally stabilized breeds • Inadequacy of mass scale forage and fodder dev. programs • Aged male goat rearing and selling practice • Inadequacy of forage seed production • Inadequacy of fodder saplings production • Distant grazing movement causing lower growth

Socio-economics related:	
• Under employment of Ag. labor in rural areas • Availability of unemployed vet. paraprofessionals in rural areas. • Manpower development institutions are present • Preference of consumers' for local breeds • Contribution towards food and nutrition security • Quick disposable assets and wealth of poor farmers • Transportation safety net provision is emerging • Health conscious /quality control issues emerging • Meat inspection act 2055 BS exists.	• Goat husbandry is not considered as an enterprise. • Lower hygienic conditions in trade and production • Demanded quantity of local breed is not available • Transportation safety-net provision is not enacted Low economic scale of production by small farmers • Inadequate goat specific training centers. • Meat inspection act is not enacted

External Opportunities	
Market • Export potential exists • Organic produce demand is high • Organized regular markets are there • Well-developed marketing channels • Oligopolistic market system • Well-developed price information system • Well-functioning goat meat transportation • Higher international price of goat meat **Production** • Continuous advancement in research and technology • Adoption of latest technologies **Socio – Economic** • Awareness about importance of organic meat	**Market** • Trans- boundary animal diseases • Dumping of imported meat in market • Illegal trade • Technical barriers for trade • Sanitary and phytosanitary requirements for trade **Production** • Low cost of Boer goat production • Increasing African commercial farm production • Certificate of origin and regular health inspection • Certificate of residue free status **Socio - Economic** • Goat meat is not accepted by certain races

Table 6: SWOT Analysis for Isabela Dairy Goat Industry in the Philippines

Strength	Weaknesses
• The presence of institutions that will provide both technical and extension assistance to the raisers to include department of agriculture • Milk processing is a common activity in the province, hence market is assured • presence of ready markets for the products either in raw milk form or processed • presence of established processing center	• Inefficient dairy production management • Lack of forage materials • Absence of breeding plans • Low milk production
Opportunities	**Threats**
• Accessibility to bigger markets in Cebu, Bohol, Negros Occidental and Oriental and Metro Manila	• Unpredictable weather condition, which can be unfavorable for dairy production • High market price of goat's milk

Appendices

Appendix 1: Participants of the goat value chain writeshop

3-6 February, 2013

	Name	Designation	Organization	Address	Email
1	Dr. Jean-Paul Dubeuf	Past President	International Goat Association	INRA -LRDE Campus Grossetti F- 20250 CORTE, France	Jpdiga.goats@gmail.com
2	Dr. Krishna Paudel	Senior Resource Mobilization Manager	Heifer International Nepal	G.P.O. Box 6043, Kathmandu, Nepal	Krishna.paudel@heifer.org
3	Puja Singh	Communication and Networking Officer	Heifer International Nepal	G.P.O. Box 6043, Kathmandu, Nepal	puja.singh@heifer.org
4	Prakash Karn	Planning, Monitoring and Evaluation Manager	Heifer International Nepal	G.P.O. Box 6043, Kathmandu, Nepal	prakash.karn@heifer.org
5	Buddi Khatri	Training Manager	Heifer International Nepal	G.P.O. Box 6043, Kathmandu, Nepal	buddi.khatri@heifer.org
6	Dr. Keshav Shah	Animal Well-Being Manager	Heifer International Nepal	G.P.O. Box 6043, Kathmandu, Nepal	keshav.shah@heifer.org
7	Raj Kumar Adhikari	Program Officer	OXFAM Nepal	Jawalakhel, Lalitpur Nepal	rajkadhikari@gmail.com
8	Dr. BKP Shaha	Freelancer/VC consultant		ICIMOD Tole, Lalitpur-15, Nepal	shahabkp@yahoo.com
9	Maggie Thomas	Program Assistant	Heifer International	World Avenue 1 Little rock, AR, 72202 USA	maggie.thomas@heifer.org
10	Dr. Dilip Bhandari	Program Officer	Heifer International	World Avenue 1 Little rock, AR, 72202 USA	dilip.bhandari@heifer.org
11	Dr. Abhinav Gaurav	Training Officer	Heifer International India	P-5, 208, 2nd Floor, Ocean Plaza, Sector-18, Noida, Uttar Pradesh 201301 India	abhinav.gaurav@heifer.org
12	Shyam Paudel (facilitator)	Director of Training and Extension	Department , of Livestock Services	Harihar Bhawan Lalitpur, Nepal	Shyampdl1961@gmail.com

Appendix 2: Checklist of goat value chain analysis

Topic	Subtopics	(Questions (broader
Personal Information	Name Address Contact	We can ask and fill in the form or can obtain a business card
Type of goat business	Physical function Value addition Experience	• How does the respondent add value to the goats and its product? • Where is this in the value chain? • Does s/he change its form (processor), move it (transporter), store it (wholesaler), sell it (retailer) or consume it?
Demand	Quantity Type of buyer Seasonality Variety Consumer preferences Price data	• Quantity sold normally, e.g., per day/ week • To whom do you sell? • Do the volumes of sale change over time? • Are there different varieties? • If so, what is their respective demand or preference? • What is the price variation as per differences in varieties? • Do changes in prices occur over time? • If so, why? • Are there problems selling the products? • If so, what are they?
Supply	Source by area Source by type of person Price Quality	• Where are your supply areas (geographically)? • Who do you buy from? • Where do you buy from? (meeting point) • At what price do you buy the variety? • Does the price change over time? If so, why? How? • Do you have problems getting products? If so, what are they?

Quality	perishability Post-harvest issues	• What is the quality of the product along the chain? • What is the product's shelf life?
Storage	Quantity Time Storage problems	• How much do you usually store? • For how long? • Do you have storage problems? • Do you experience storage losses?
Marketing costs	Forms Proportions	• What are your marketing costs? • What is their proportion?
Grading and sorting	Grading Incentives	• Do you grade or sort? • Do better grades fetch higher prices?
Marketing information	Sources Spatial arbitrage	• Do you get market information, e.g., on prices? • If so, who from and how? • Is there a relationship between prices in different areas at given times?
Price Information	Market power	• Who determines the price? • How is the price determined? • If the firm or individual is a price taker, find out why
Institutional and legal framework	Associations	• Do you belong to an association? • Are there any market regulations? If so, what are they and how do they affect your business?
Market structure	Competition	• Number of sellers • Is there price competition? • Is there non-price competition? If so, what for?
Credit availability	Sources and type	• Are there any credit institutions? • Do you use them? • What are their rates of interest?

Source: Ferris, Mundy and Best (2009). Getting to Market: From Agriculture to Agroenterprise, Catholic Relief Services, USA, pp28-29

Appendix 3: An Example of Terms of Reference (TOR) for Meat Goat Value Chain Study

Background:

The study will analyse and document the goat meat value chain in (country Name) considering different goat production systems under various domains and their cost of production along with the existing goat marketing channels to the end markets. Primary data needed for this study will be generated from target districts/counties. Thus collected data will be collated and interpolated with available secondary data to meet the study objectives of identifying options for interventions (along with their pros and cons) for strengthening competitiveness of in-country goat meat production and marketing system. The study will identify key areas of interventions in goat value chain to enable smallholders to become one of the important actors capable of receiving benefit/proportionate share of the trade margins across the value chain in the target areas.

Objectives:

The specific objectives of the study include:

Analyse consumer and traders' perceptions/attitudes towards safe and hygienic meat and make recommendations for increased consumer awareness. Identify quality issues/ concerns of consumers across the goat value chain regarding goat meat, quality, price etc.

Analyze current supply and demand system of goats (formal, semi-formal and informal), including marketing volumes, market sheds and seasonality trends. Based on this information, develop options for year-round marketing strategies.

Analyze the various existing goat value chains by production systems and geographical regions (domestic and import from other countries). Calculate cost of production, associated costs and value additions across the entire value chain tiers from production functions to end market dynamics.

Examine the strengths, weaknesses, opportunities and threats of the current goat meat marketing systems along the vertical tiers. Suggest efficient options considering the associated costs and value additions, including the need for cash float in key parts of the value chain.

Compare prices and margins along the goat value chain focussing on competitiveness of in-country goats vis a vis imported goats considering both production quantity and quality.

Briefly examine and assess infrastructure at existing goat collection/marketing sites and identify measures to improve them leading to their sustainable management. Include consideration of how other stakeholders (government, private, etc.) may be involved.

Examine existing live animal and animal products transport systems and suggest practical measures to improve animal welfare conditions.

Give an account of weight loss (in case of meat goat) and other associated cost at all transit points of existing live animal transport system. (from the farm gate to end market)

Assess the concerns and quality of relationships among actors along the vertical and horizontal linkages of the goat value chain including dynamics among the various interest groups (e.g., local government units, municipalities, market operators, traders, importers,

entrepreneurs, processors, etc.). Contributing factors such as ethnic, caste, tribal and socio-economic dynamics should also be considered. Suggest key project interventions/ areas for building trust, capacity, reciprocity and business relationships among these value chain actors in favour of smallholders.

Identify potential enterprises of goat value chain (services/trade) in the vertical and horizontal linkages where smallholders can have the decisive role and stake across linkages of the goat marketing channel thereby eliminating or minimizing opportunities for exploitation by other stakeholders. Also assess employment positions created per unit volume of goat traded.

Suggest strategies for attracting private sector to make larger investment in goat value chain enterprises.

Methodologies:

Generally the value chain study team proposes the methodologies and approaches and later agreed by both parties.

Detailed timeline:

Timetable for the study is prepared together depending upon the urgency of the study and resources available

Detailed budget:

The study team will prepare and propose budget for the entire process agreed by both parties

Reporting format:

An organization conducting value chain study can recommend basic minimum requirements in the value chain report with page limits.

Appendix 4: Template of Goat Value Chain Study Report

Cover Page
Table of Contents
Lists of Tables
Lists of Figures
Abbreviations
Acknowledgments

Abstract (Executive Summary)

Chapter 1: Introduction

May contain the background/rationale/objectives/expected outputs of the study

Chapter 2: Methods, Approaches and Scope of the Study

Chapter 3: Overview (goat sector in the specified region/country)

May contain the following -history of the Industry (if available); demographics; demand-supply; location map (classified into smallholder, commercial); production systems; volume of production; opportunities and challenges of the industry; etc.

Chapter 4: Study Results (per Value Chain segment)

May contain profile/characteristics/costs and margins on/along the VC segments

consumer/market; retailers/traders; transport-logistics; processors/cold chain/bulking/aggregating

producers/production volume/technologies

smallholders associations/coops/private; input suppliers like feeds, forage/seeds, equipment, Business Development Services (BDS), Artificial Insemination Services, Credit/Loans, etc.

Enabling environment (policies, local laws/ordinances; government support; incentives); product variants/attributes; costs/prices/margins along the value chain

Current interventions along the value chain segment (private or government led), etc.

Chapter 5: Discussion/Analysis of Findings

May contain: opportunities, challenges/constraints/gaps, strengths, weaknesses per Value Chain segment;

Current and projected supply-demand; market growth projection; etc. and how smallholder goat producers will be affected or can maximize the opportunities of the industry; whether the industry will be profitable over time which will support the viability or sustainability of the dairy enterprises of smallholders; competitiveness; etc.)

Chapter 6: Recommendations

May include: all interventions necessary for each value chain segment to become viable/

profitable/sustainable/competitive;

interventions in increasing smallholder goat production and income of smallholder producers (costs/prices/margins)

interventions in moving smallholder farmers' organization up the value chain (like marketing and/or processing)

processing, marketing/trading/logistics interventions

input supplies and support services interventions

Laws/ordinances/incentives interventions; etc.

References
Appendices

Further Reading

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Heifer International
1 World Avenue Little Rock AR
72202 United States

International Goat Association
12709 Grassy Drive Little Rock
AR 72210 United States

International Fund for
Agricultural Development
Via Paolo di Dono, 44 00142
Rome, Italy