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.

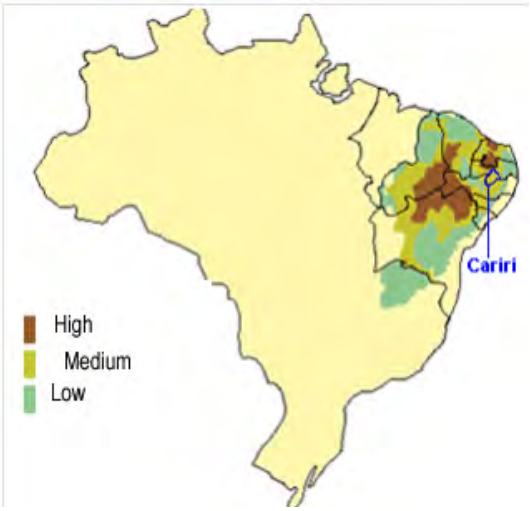
Representatives of several agencies and institutions from six Northeastern States have been interviewed to give a short presentation and information on development programs involving goats in the area according to the opened inquiry form.

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"

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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).

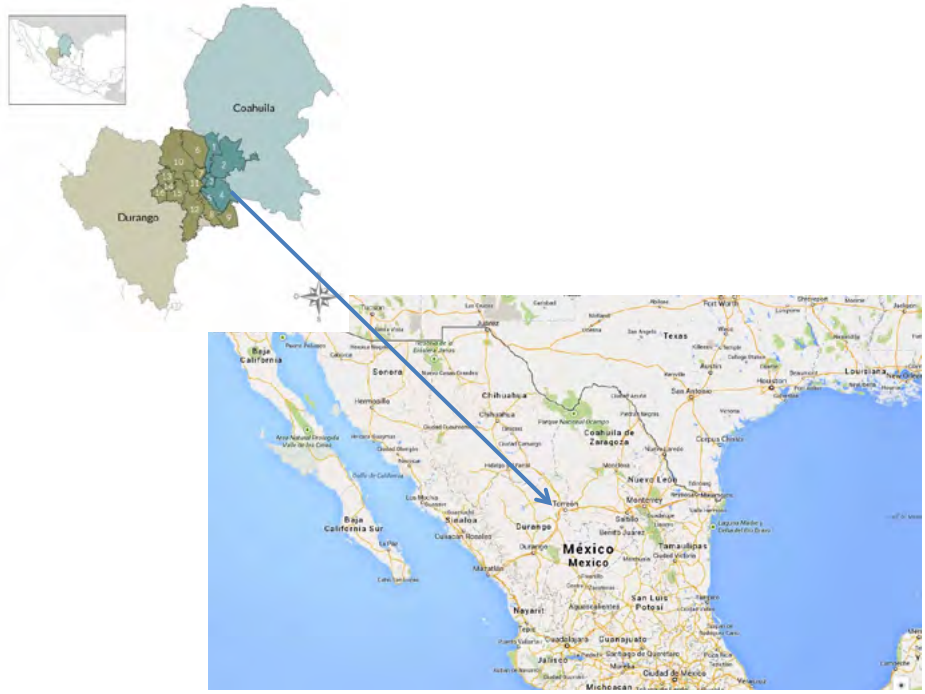
There are about 450,000 goats in the CL (Meza, 2011). The average herd size is 57 (ranging from 14-190 goats), with an average of 83% milking does in each herd (Escareño et al., 2011). The large land owners have invested in big dairy cow farms because they are more profitable, and require sizeable investments. 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

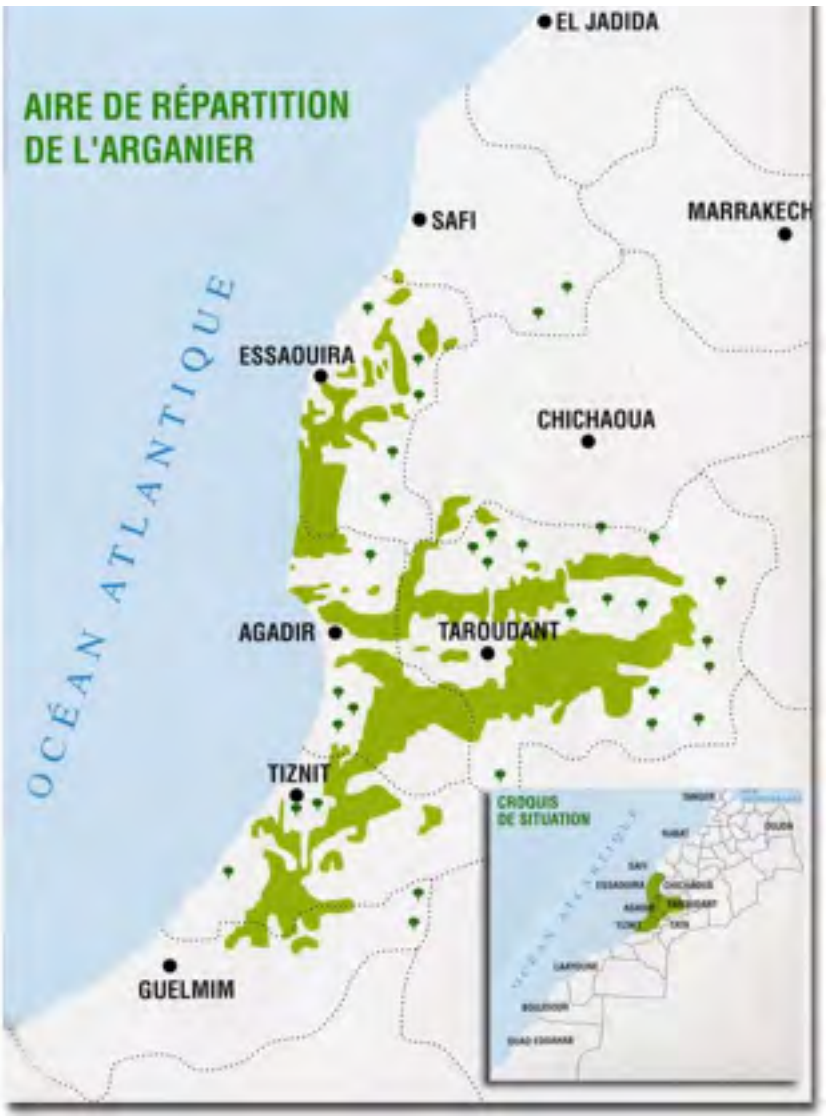
Other local dairy goat projects were developed in the oasis of Ourzazate area with the support of the NGO "Elevages Sans Frontières" and the ROSA Association, which is a local grassroots NGO. One cheese unit was created in Tamassinte near Ouarzazate. ROSA distributes dairy goats to very poor women, who 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”).

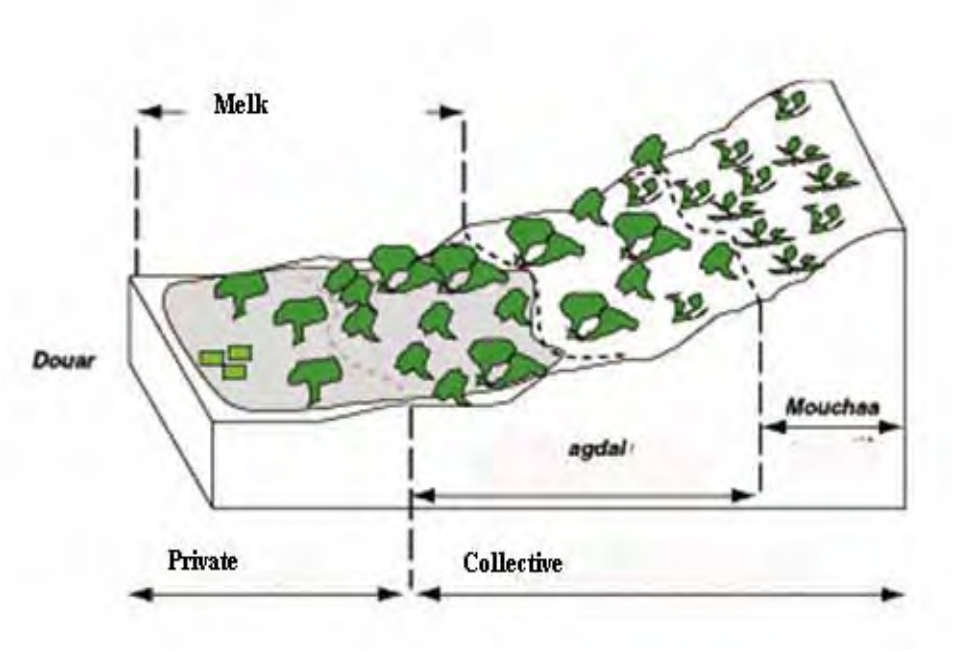


Figure 1. The model of land organization in the Argan forest (from Bourbouze and El Aïch, 2005)

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

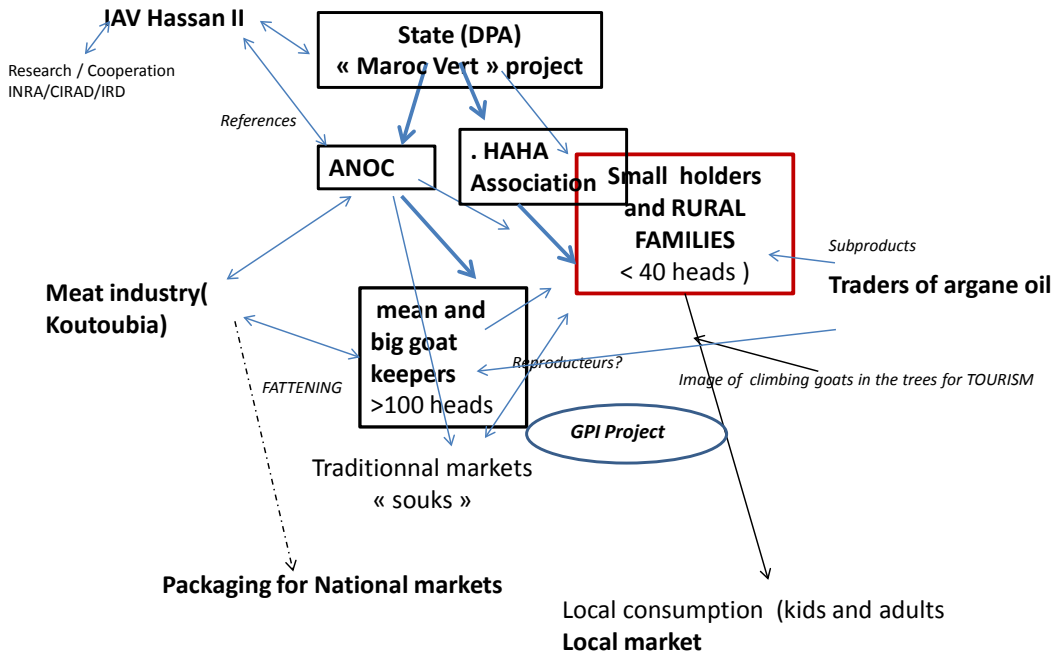


Figure 2a

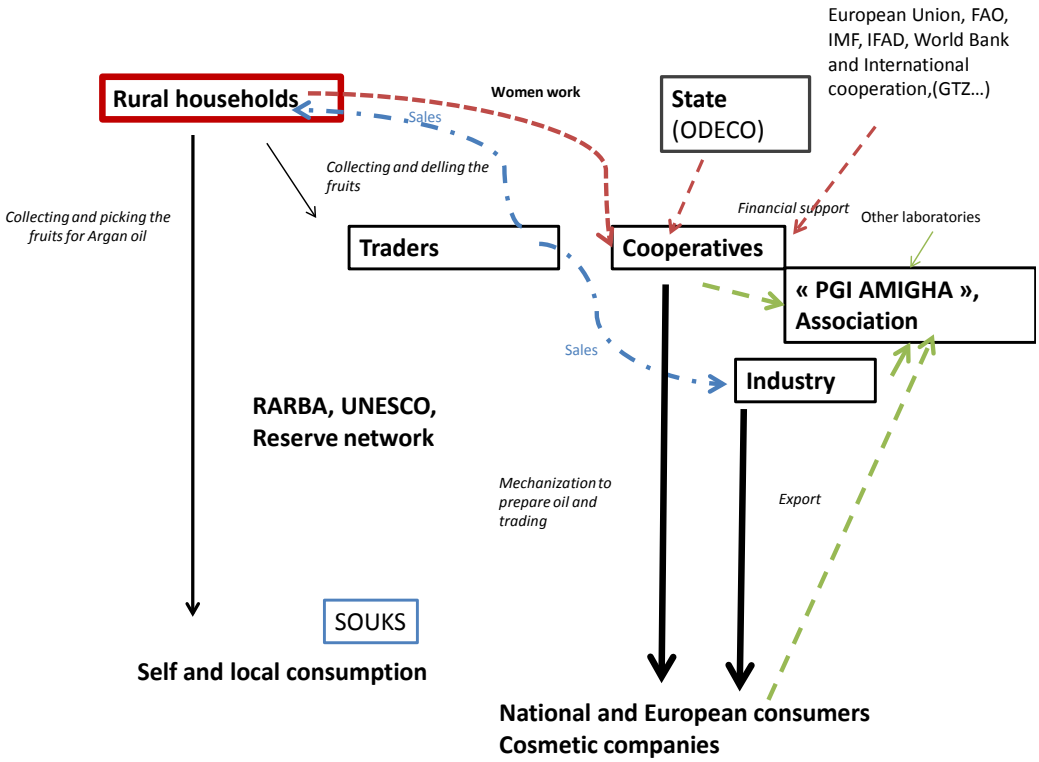


Figure 2b

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.

We extend our sincere gratitude to Dr. Shubh Narayan Mahato, Senior Managers Dr. Tirtha Regmi and Ms. Neena Joshi, PME Manager Mr. Prakash Karn and Regional Program Managers of Heifer Nepal Nepalgunj, Pokhara, Chitwan and Janakpur for their technical inputs, guidance, continuous support and encouragement during the entire process of the study.

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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:

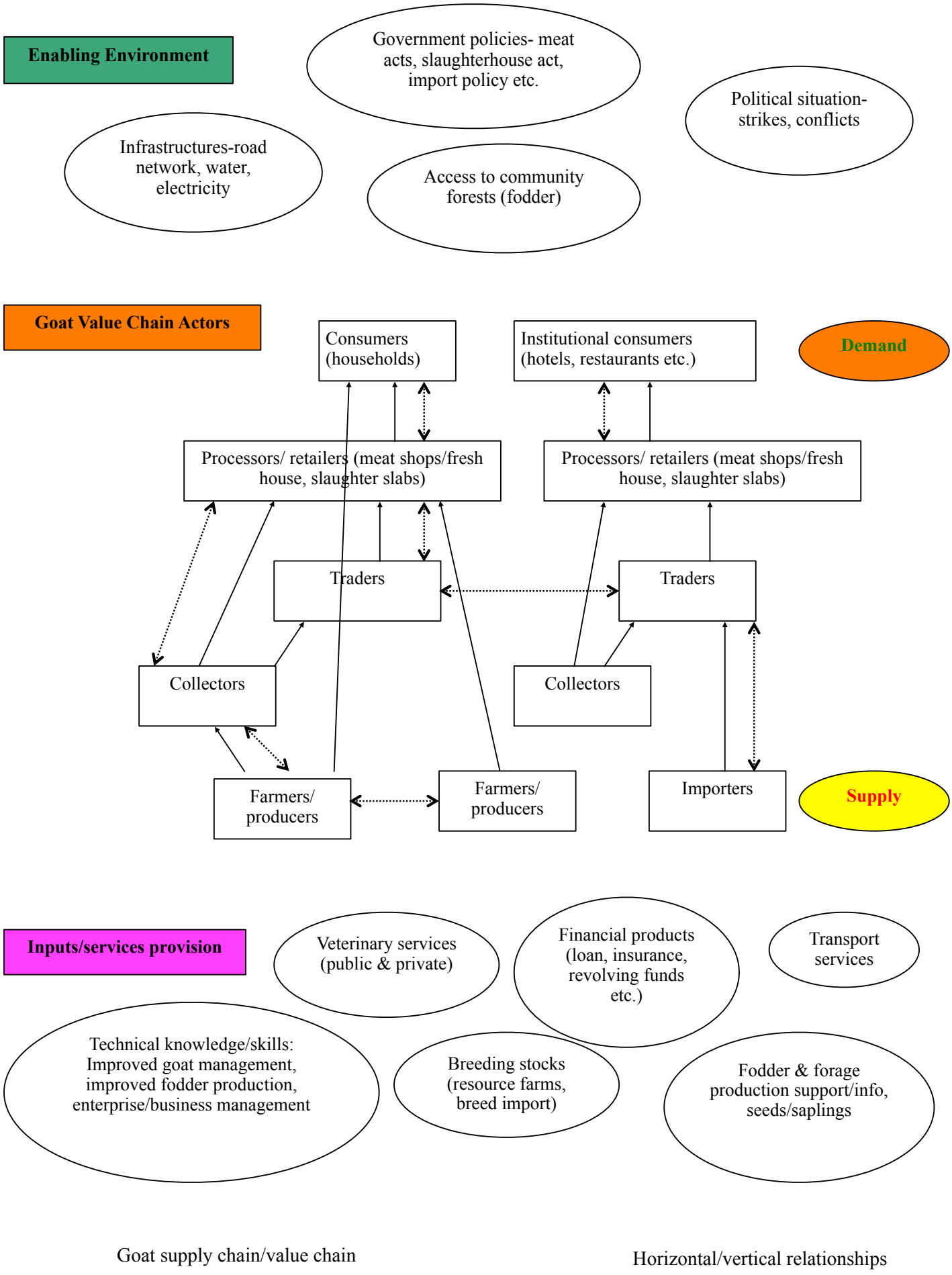


Figure 1. Goat Value Chain Framework

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%.

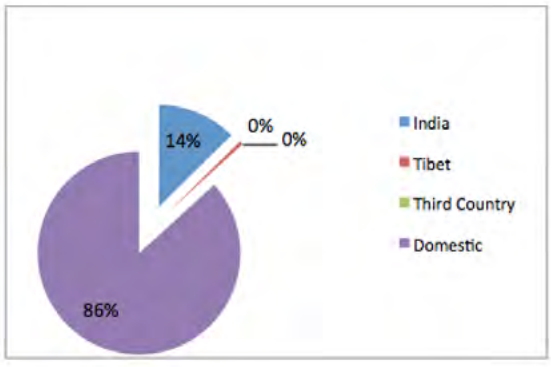


Figure: 2 Share different sources of total meat supply

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.

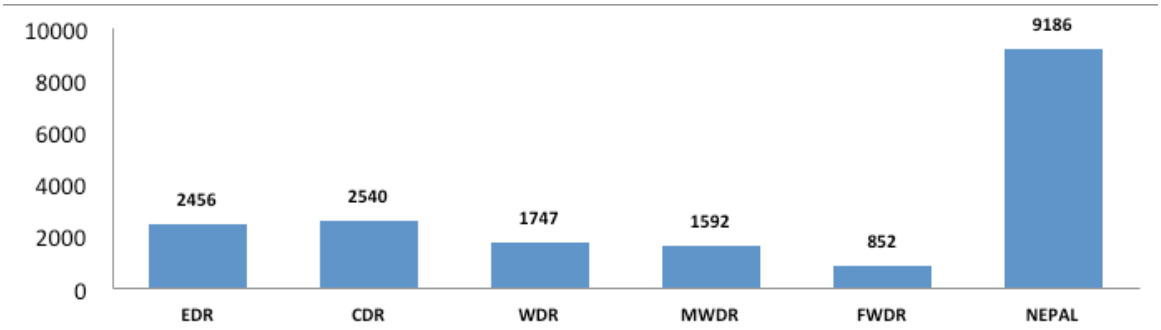


Figure 3. Goat Population (in 1,000 animals) by Regions (Adapted from ABPSD, 2011).

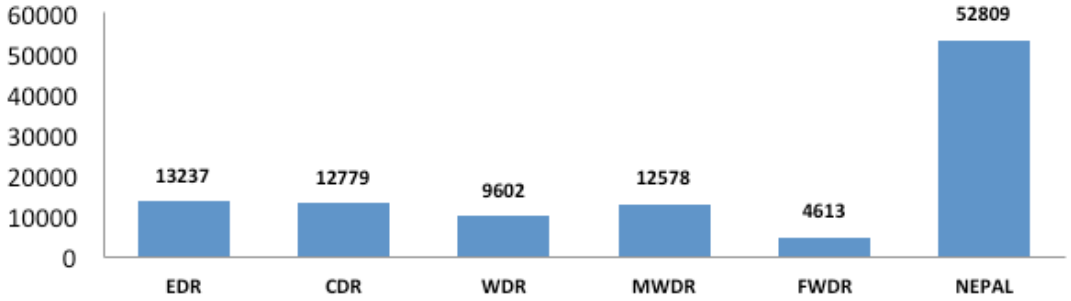


Figure 4. Meat Production (MT.) by Regions (Adapted from ABPSD, 2011)

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).

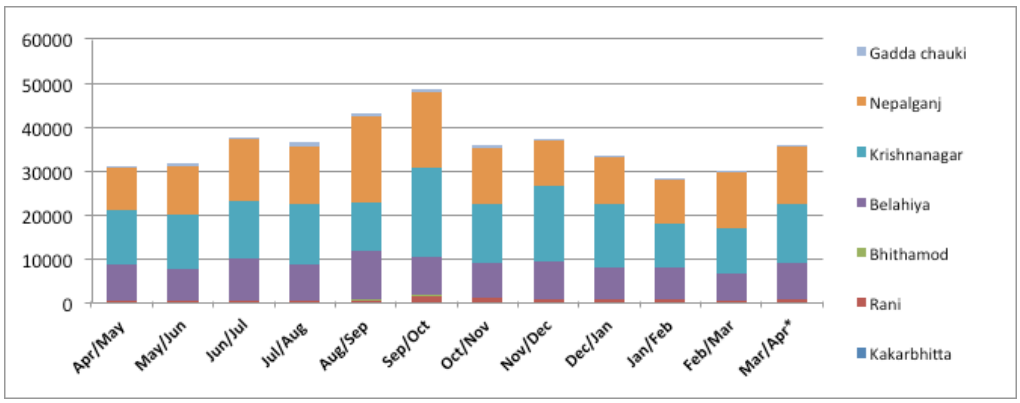


Figure 5. Goat import distribution by month : 2011-12.

Source: HPIN survey (unpublished data)

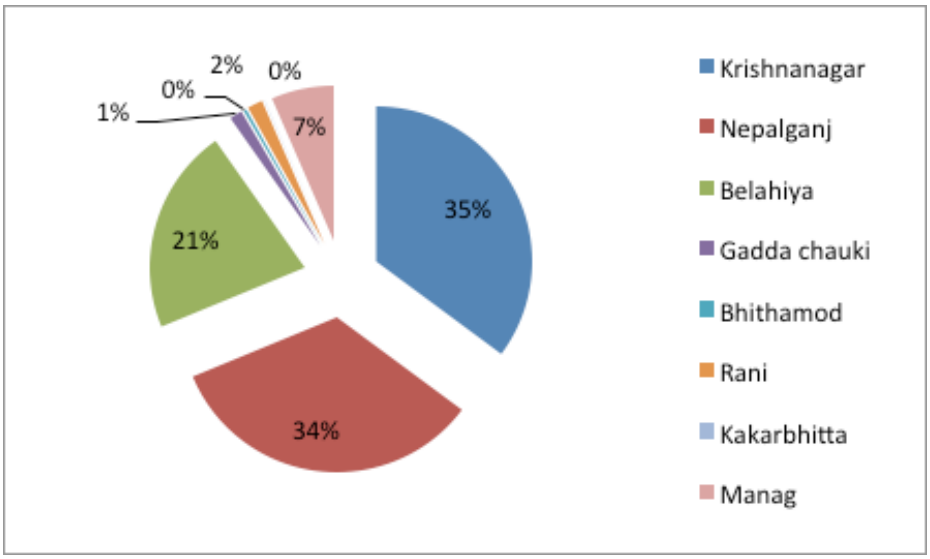


Figure 6. Share of Imported Goats from Various Customs

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.

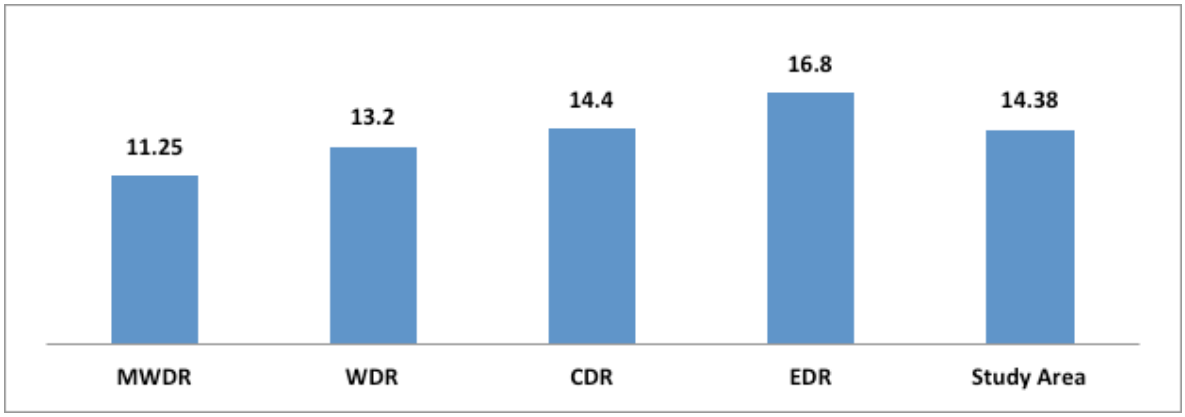


Figure 7. Urban Meat Consumption across Regions (kg /annum/HH). Source: Field Survey, 2012

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.

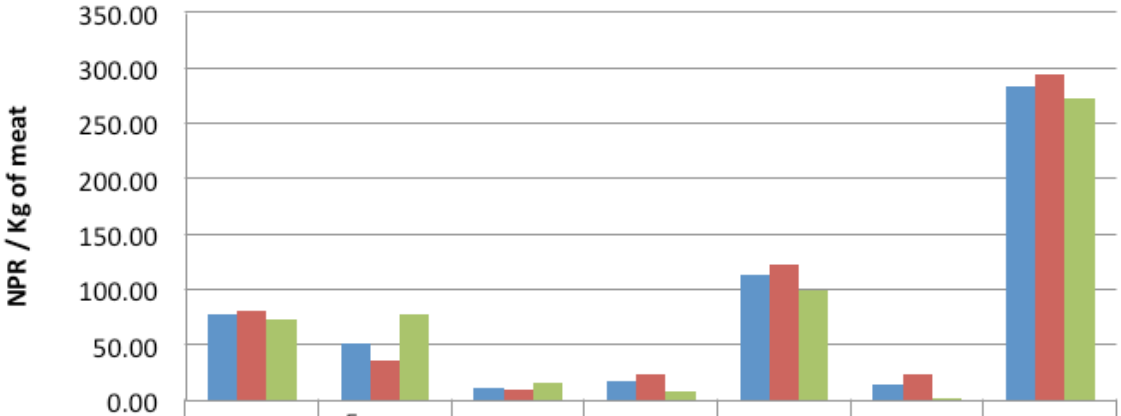
4.2 Goat production and marketing system

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.

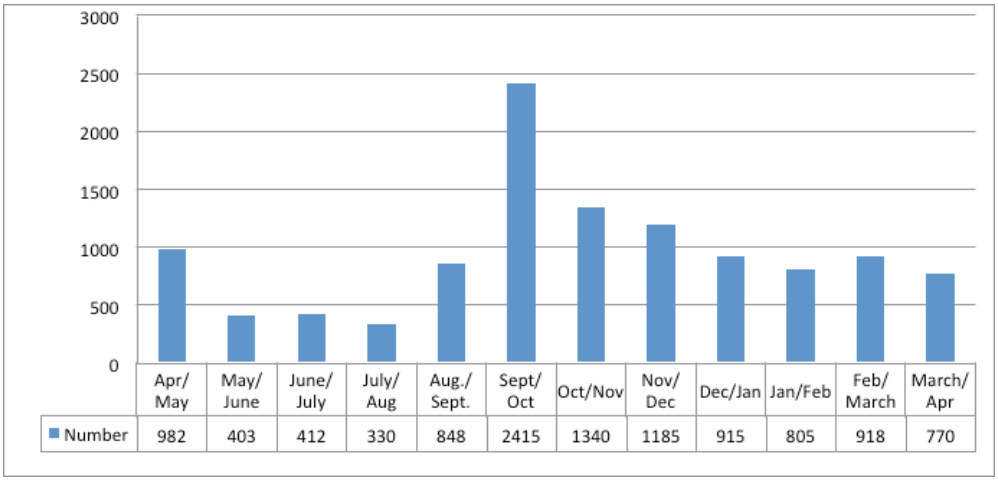


Figure 9. Monthly export of Goat from Narayani-east Area Source: HPN field survey, 2012.

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

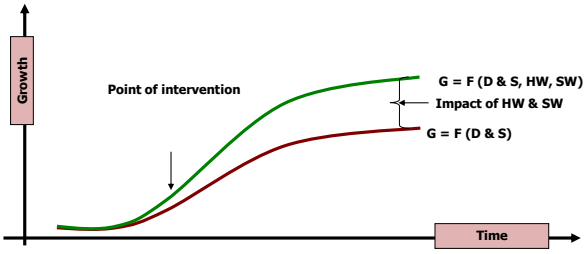
Pragatishil Multipurpose Co-operative Ltd. Dhakeri, Goat Resource Farm), Banke		
Income	**NRs**	**NRs**
Capital Share	147000	
Interest @ 15%		55000
.Goat sales Com		40606.5
Sub-Total		**95606.5**
Expenditure		
Salary @ 3500		42000
Rent @ 1200		14400
Sub-total		**56400**
Gross Income		**39206.5**

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.

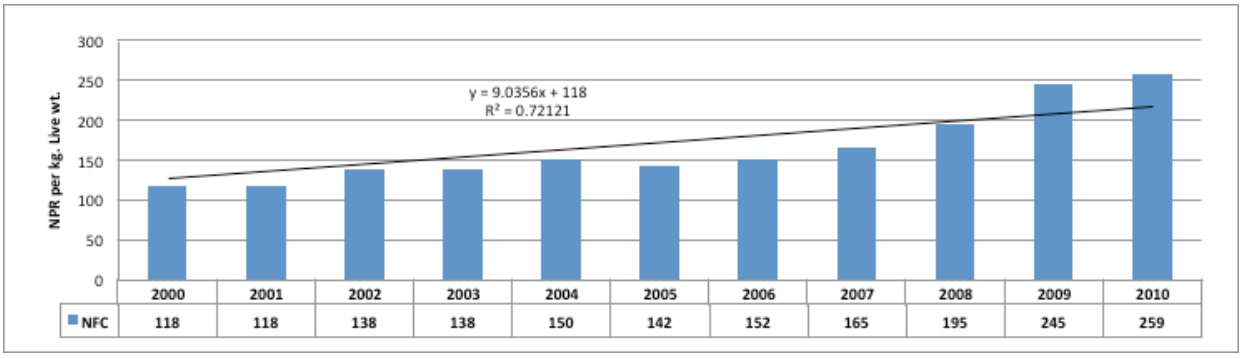


Figure 11. Nepal Food Corporation Sales Price of Live Goat. Source: NFC -2011

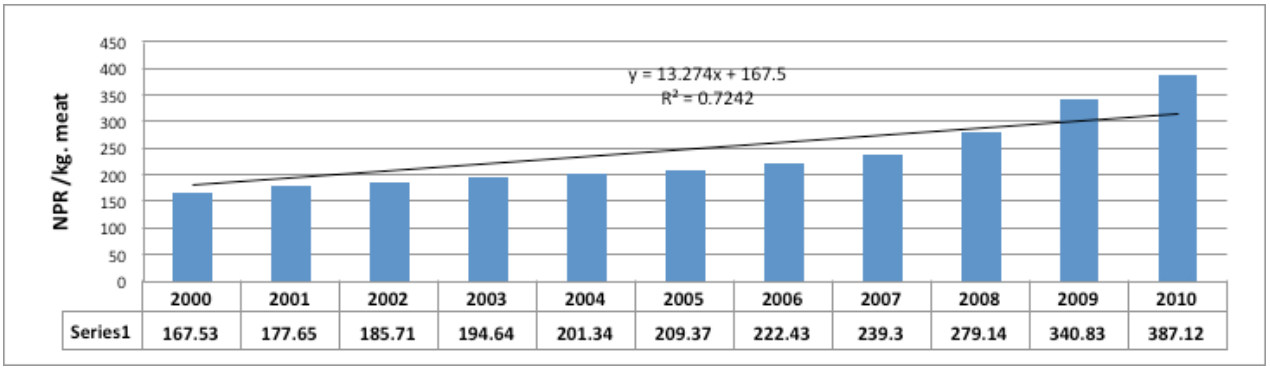


Figure 12. National Annual Average Consumer price. Source: MoAD -2011

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).

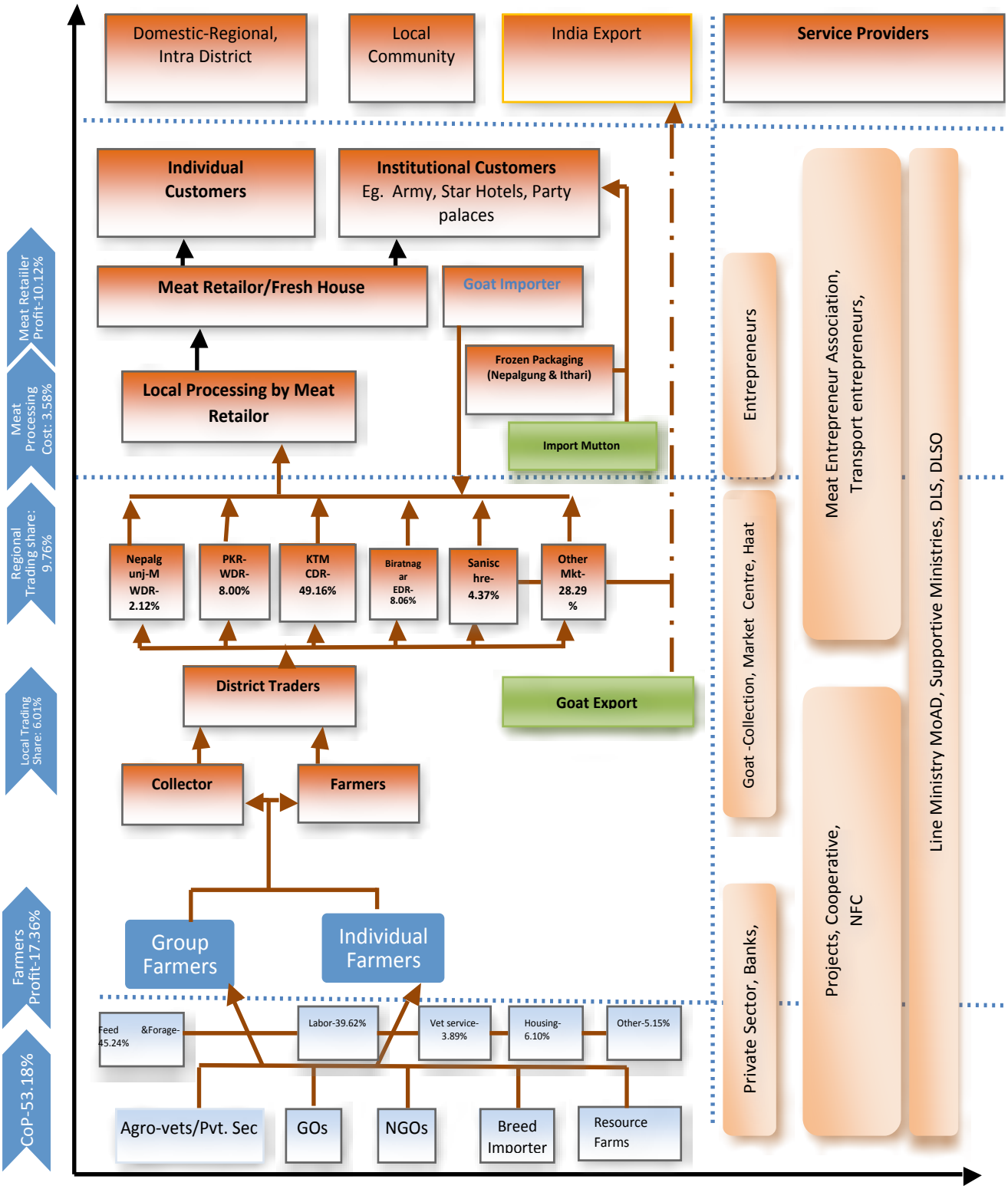


Figure 13. Goat Value Chain Map –Overall

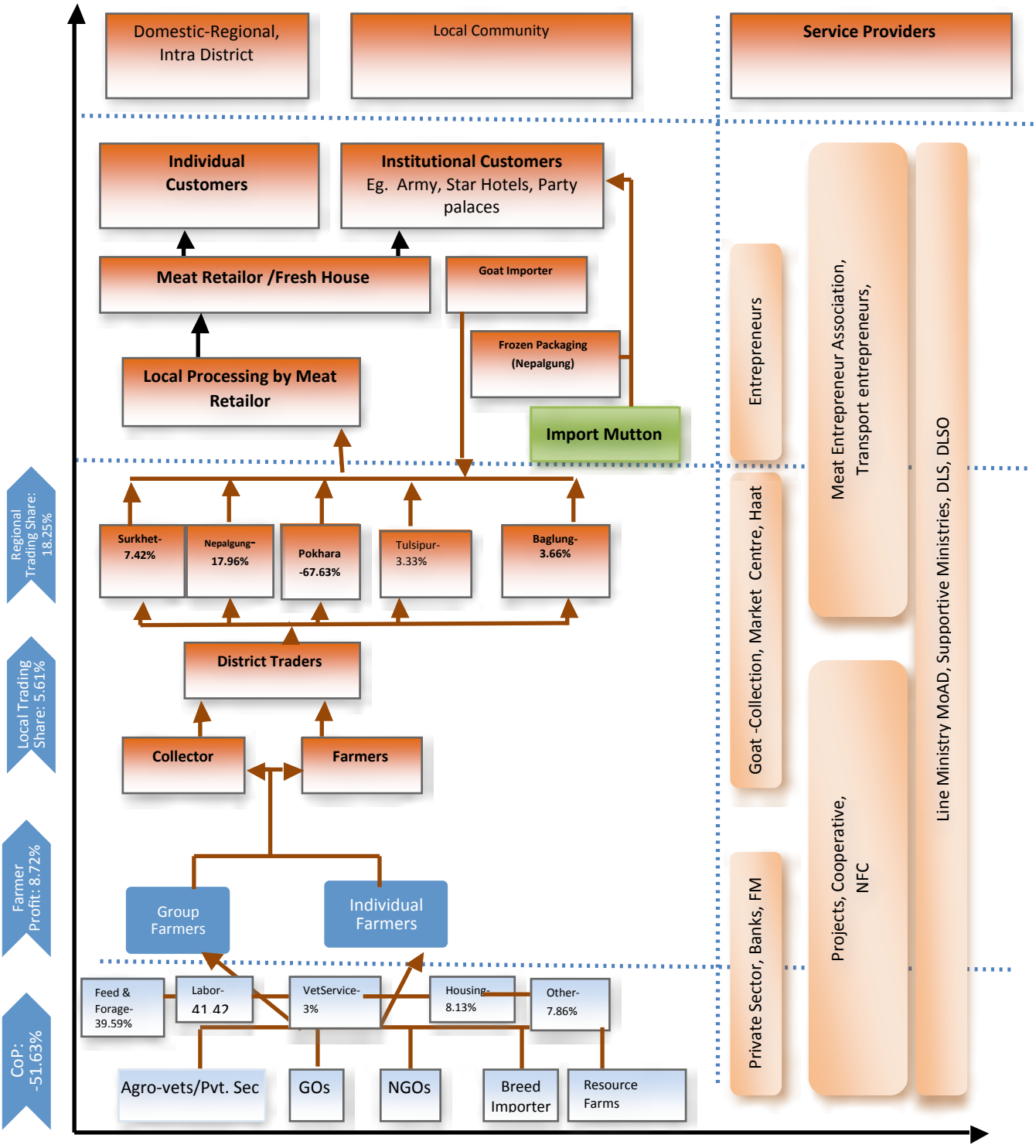


Figure 14. Goat Value Chain Map- N-W Sector NepalFigure 15. Goat Value Chain Map- N-E Sector Nepal

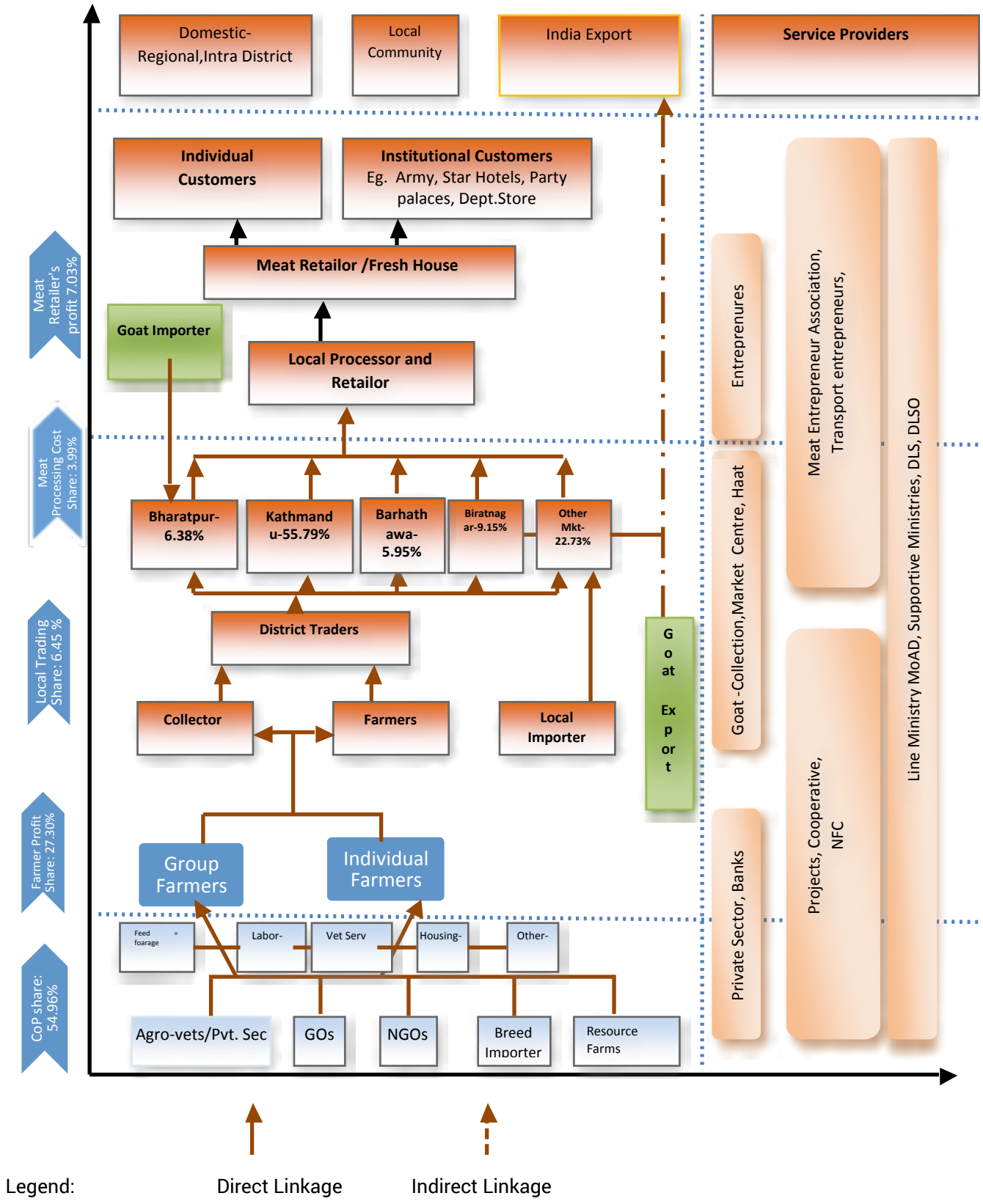


Figure 15. Goat Value Chain Map- N-E Sector Nepal. Source: Field survey 2012

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.

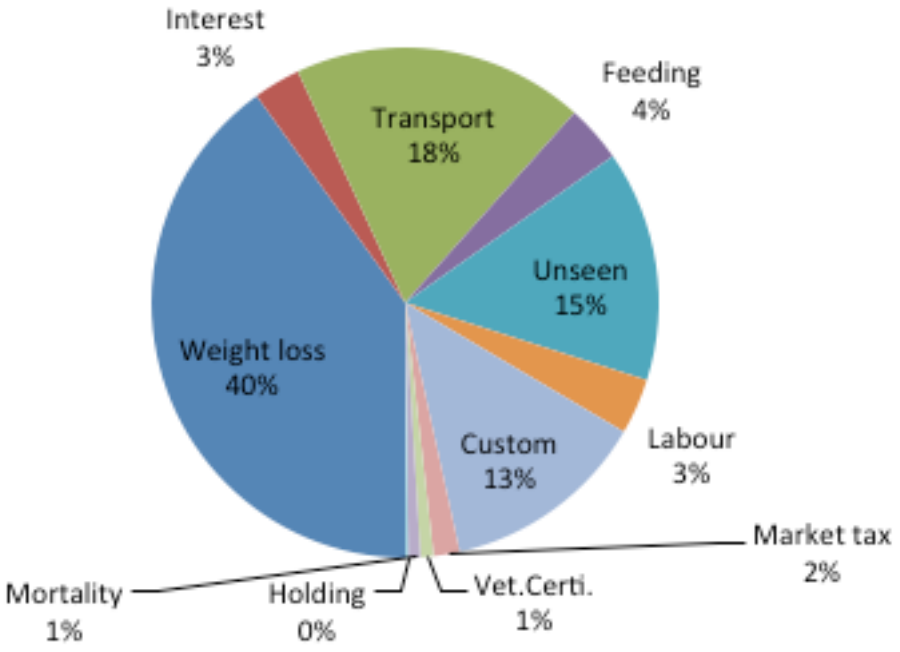


Figure 16. Areas of Importer Costs investment / kg of meat. Source: Field Survey, 2012

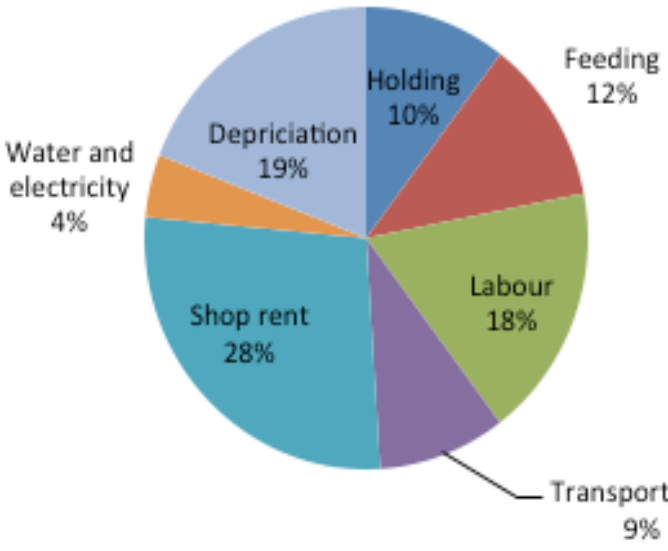


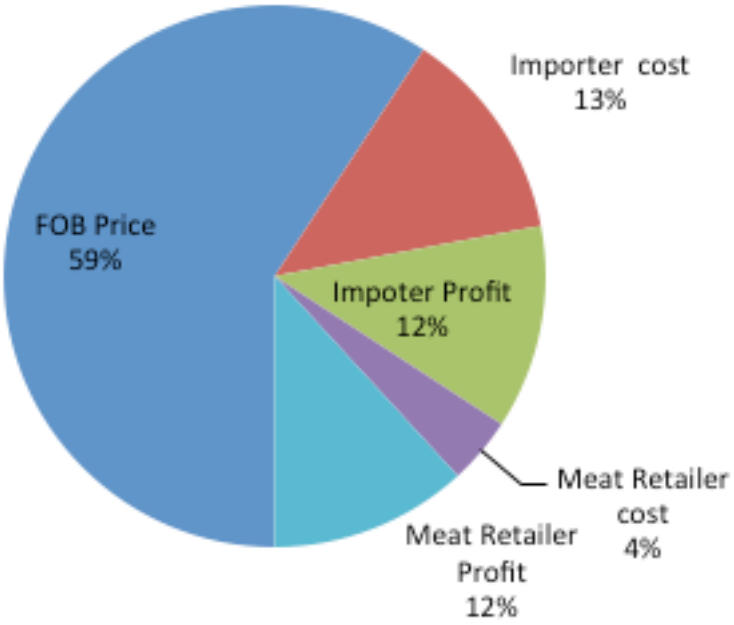
Figure 17. Meat Retailer costs/kg meat. Source: Field Survey, 2012

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.

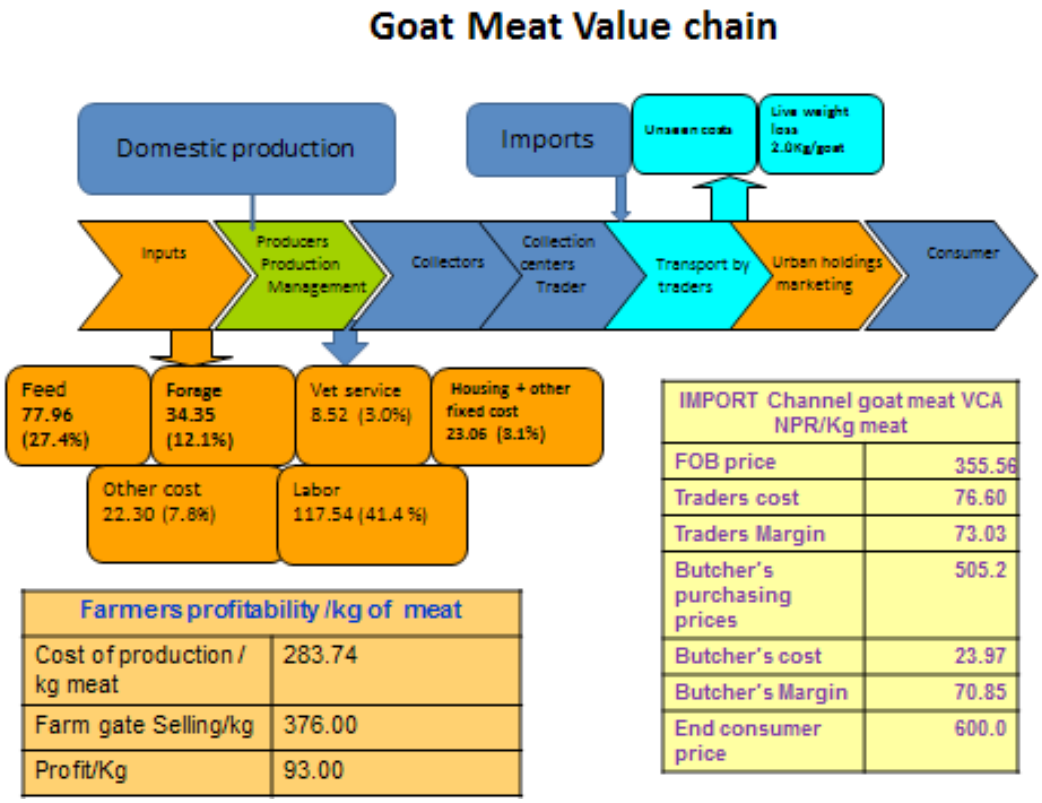


Figure 19.

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.

References:

ABPSD, 2011: Statistical Information on Nepalese Agriculture, MOAD, GoN
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CBS, 2006: Central Bureau of Statistics, GoN 2001/02
CBS, 2011: Nepal Living Standards Survey 2010/11
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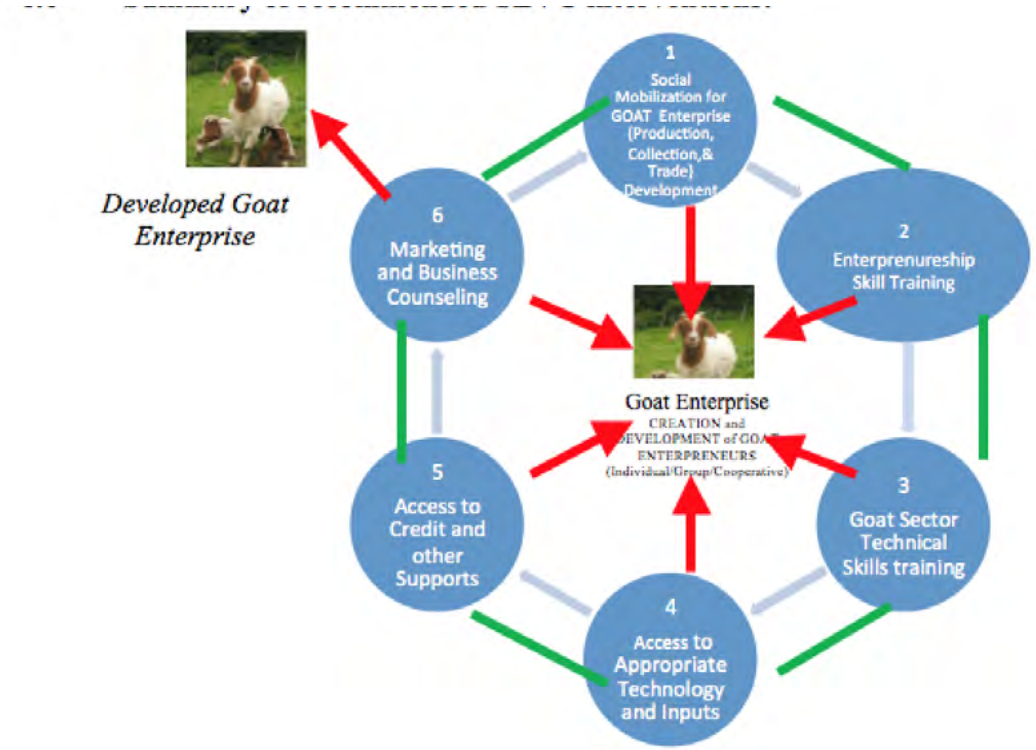
MOF, 2011: Economic Survey 2010/11
NPCS 1995, Agriculture Perspective Plan, National Planning Commission Secretariat
Premi, 2011. Final desk study on goat: a review, DLS

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,

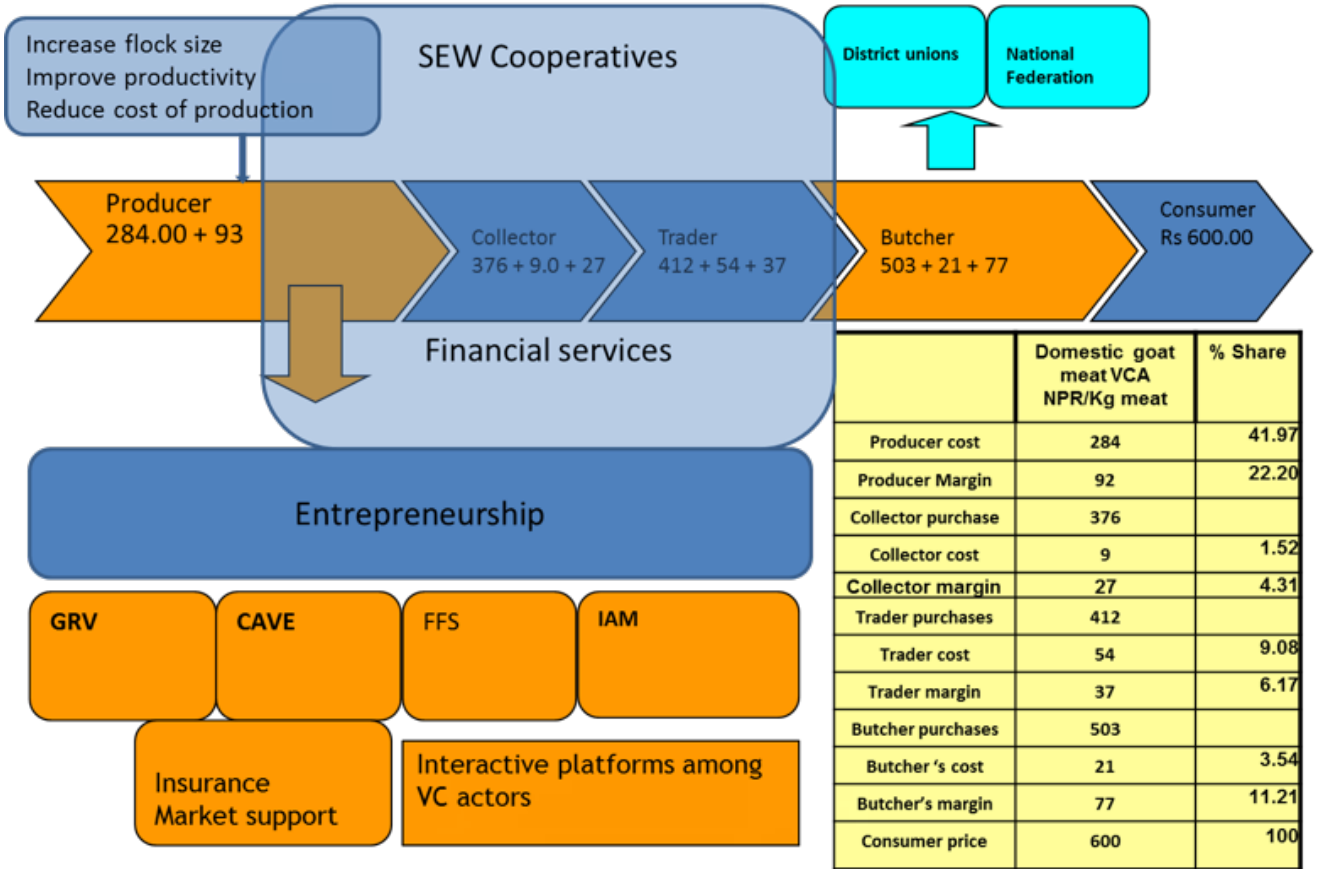
• Goat sub-sector will decrease other burdens to the nation (subsidy distribution),

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

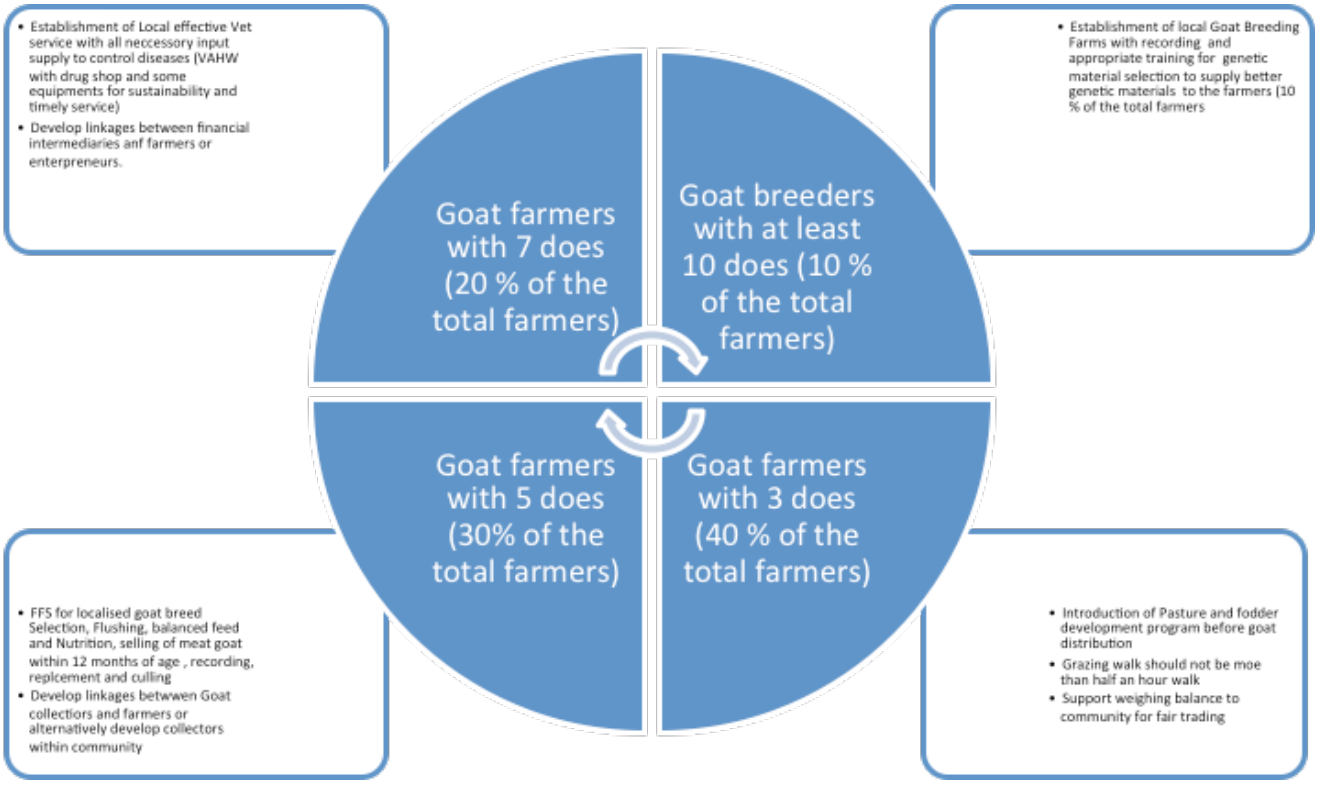
• Goat sub-sector contributes to one of Nepal's international commitments (MDG'S),

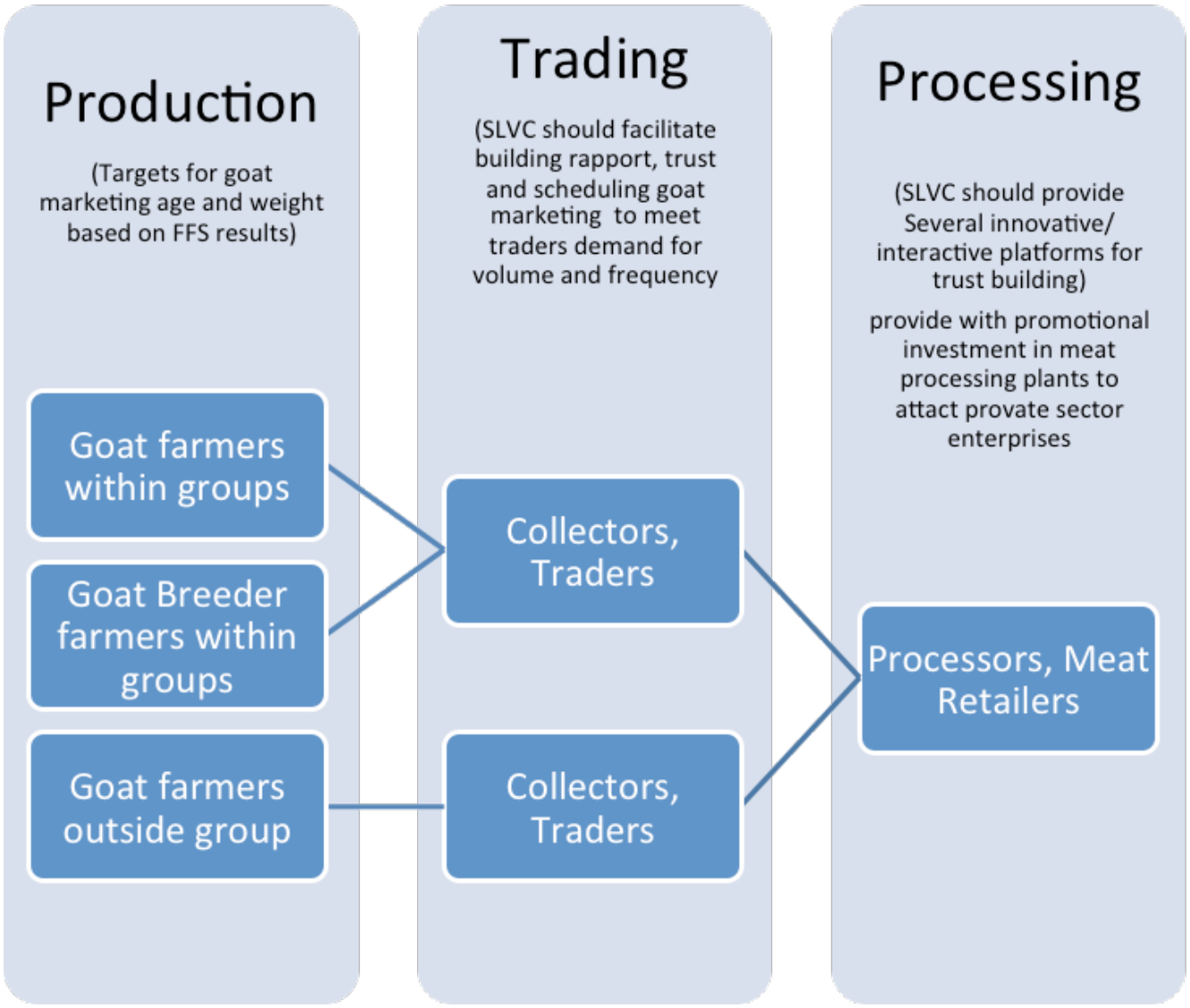
• Goat sub-sector will attract youth resources and skills from those who had previously chosen to migrate to the gulf.

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).

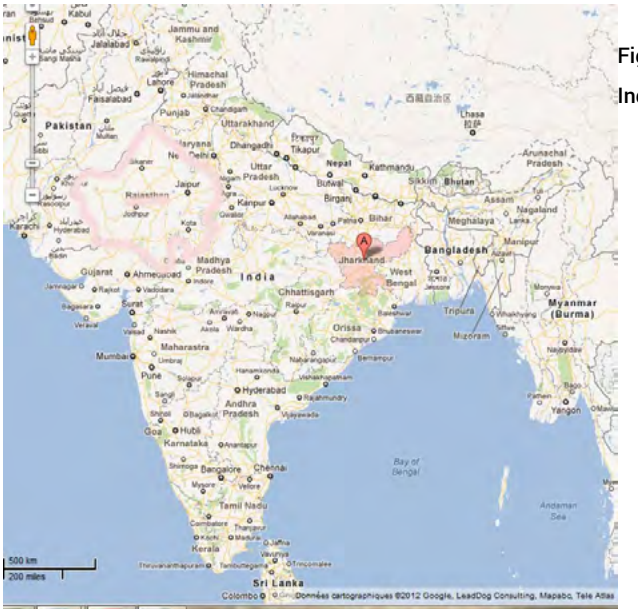

Figure 1. Map of India and localization of the imGoat project in India (Source: imGoats, 2011)

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.

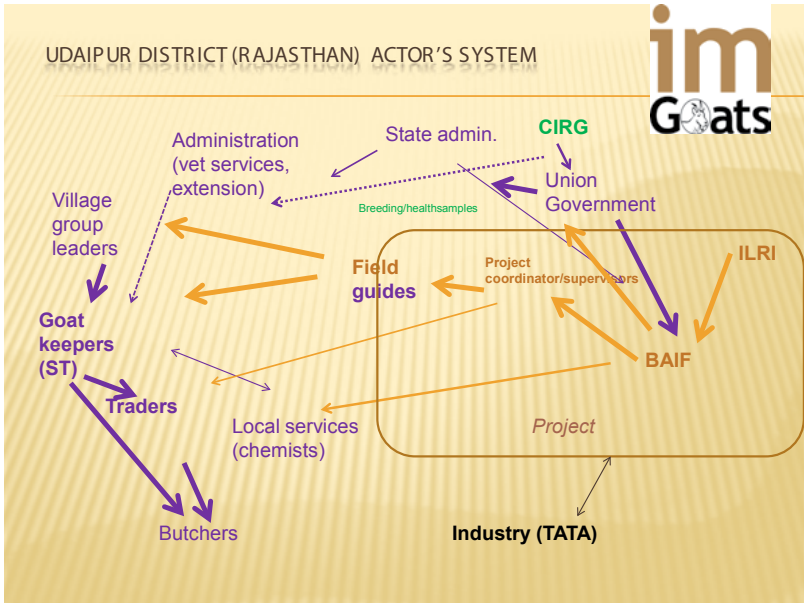

Figure3- The representation of the actors' system; this representation has been drawn from the several interviews. Tata Inc. is the main industrial group in India and is involved in meat and skin industry. CIRG is the Central Institute of Research on Goats.

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.

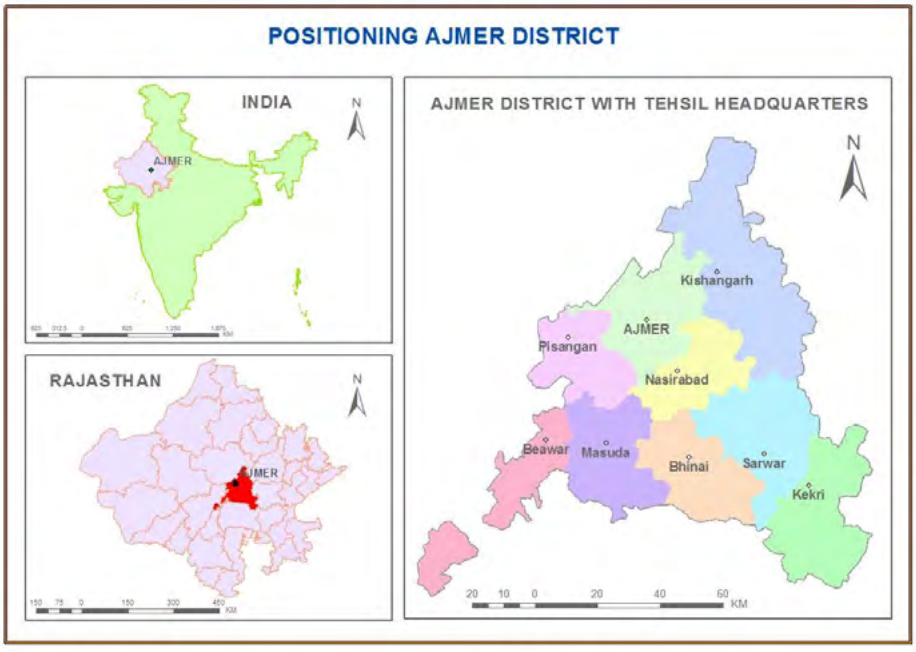

Figure 4. Source: Sharma et al, 2011. The situation described by Sharma and Bendapudi, 2011

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

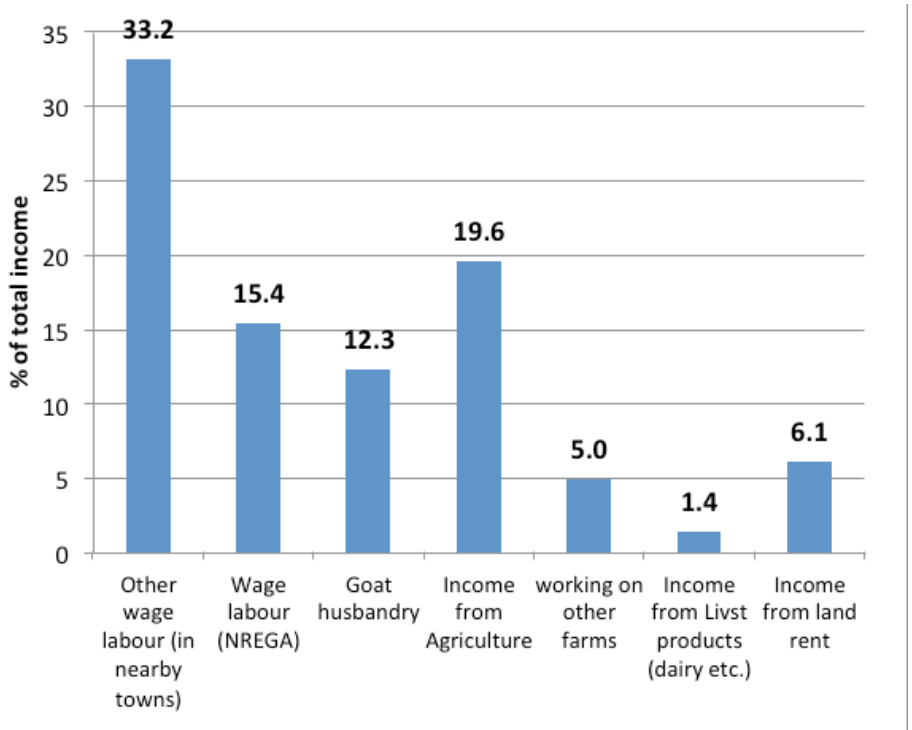
Sampling framework for baseline survey

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)

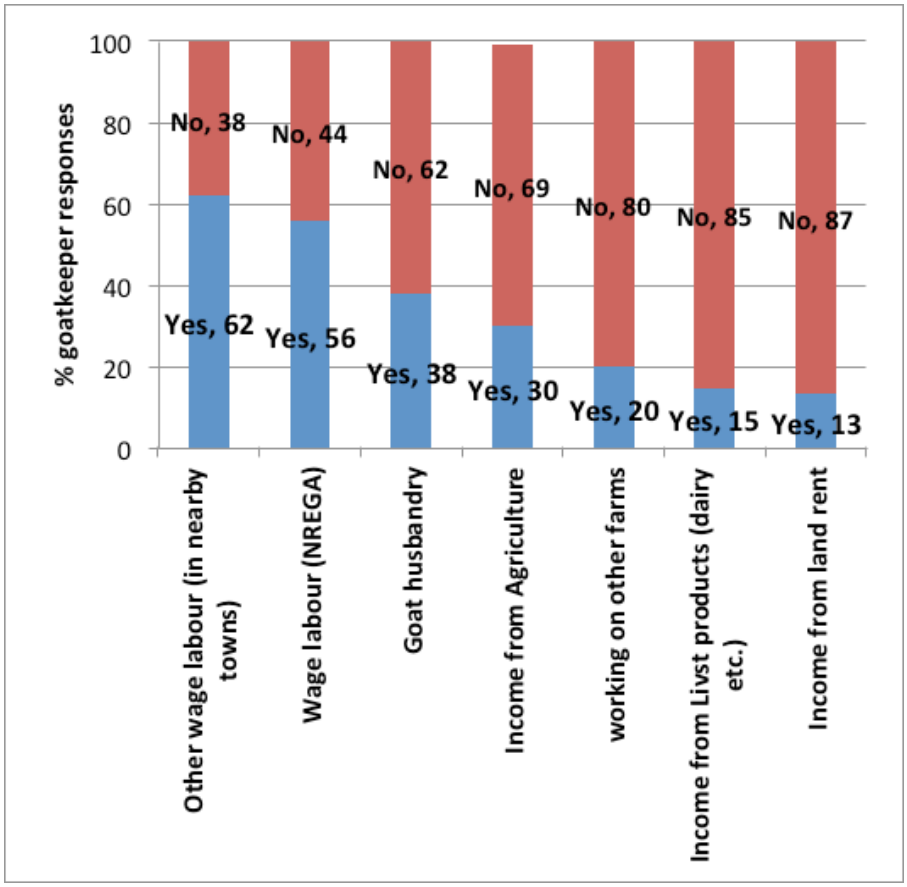
Goat keeper characteristics

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



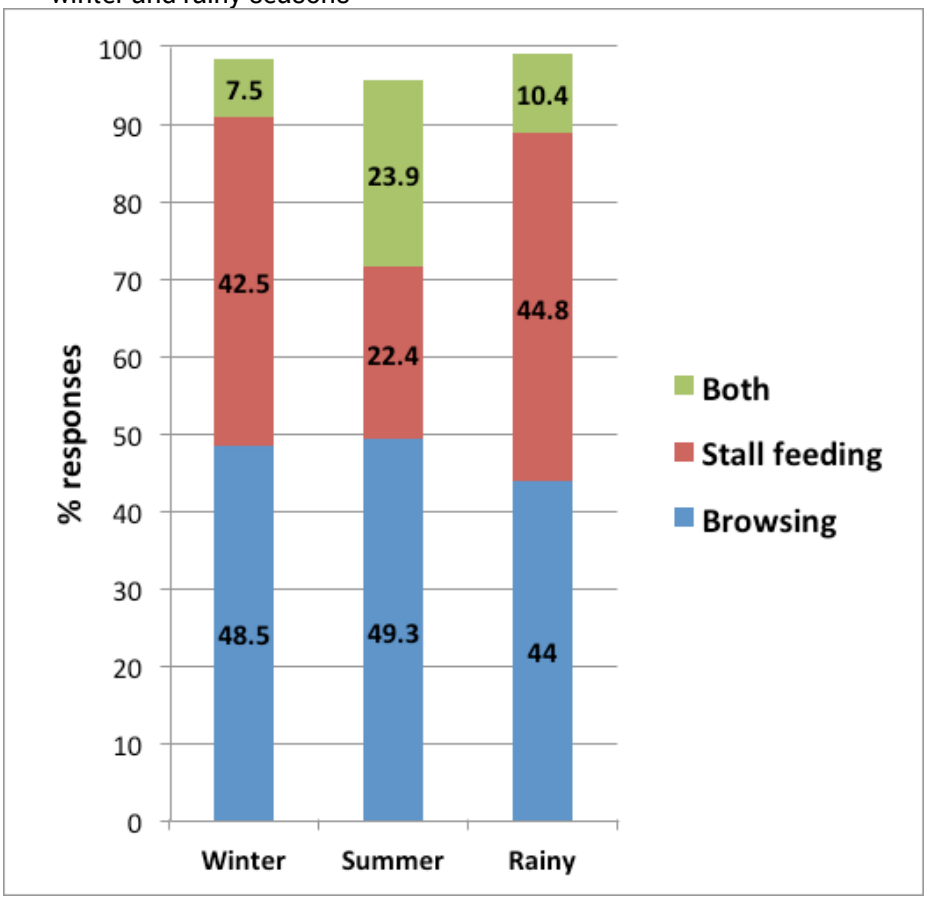
% contribution to total annual household income

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

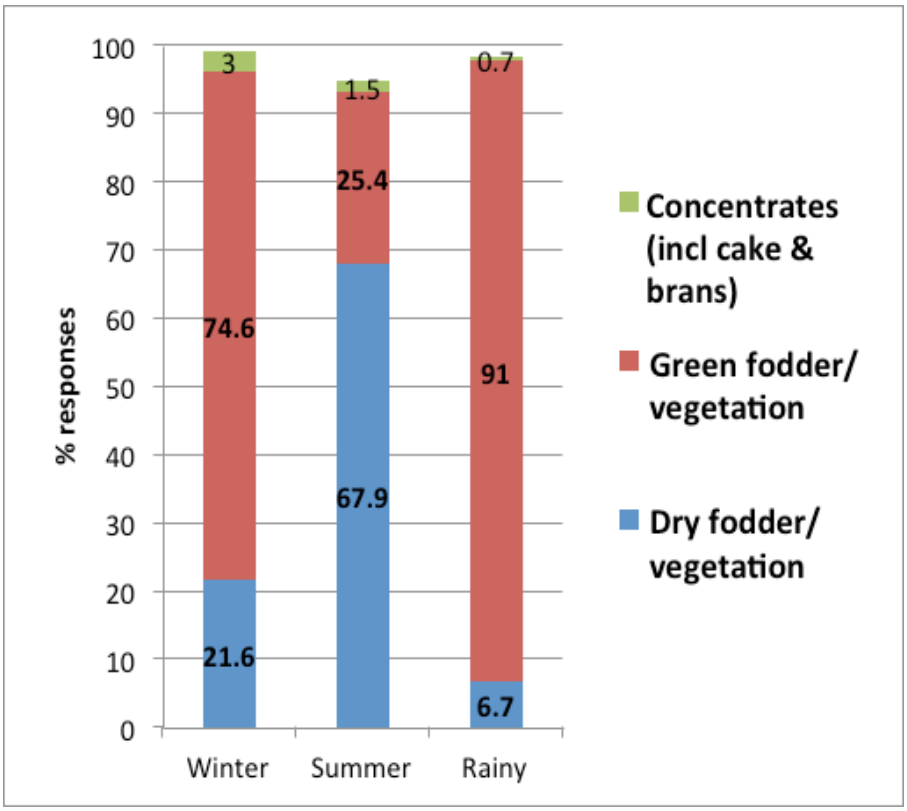
Goat keepers use a combination of open browsing and stall feeding

Stall feeding is done more out of necessity due to standing crop in the fields, especially during the winter and rainy seasons



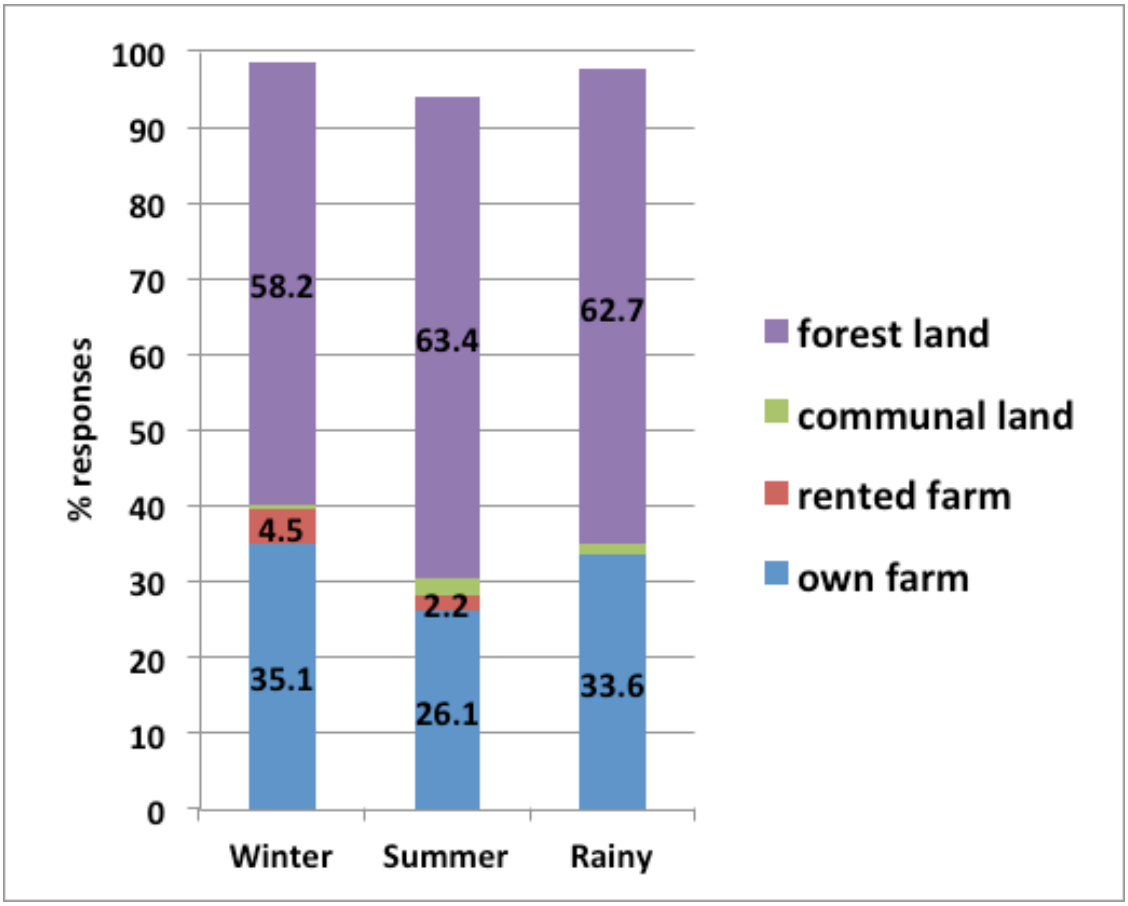
Types of feed

The part of concentrates is very low.



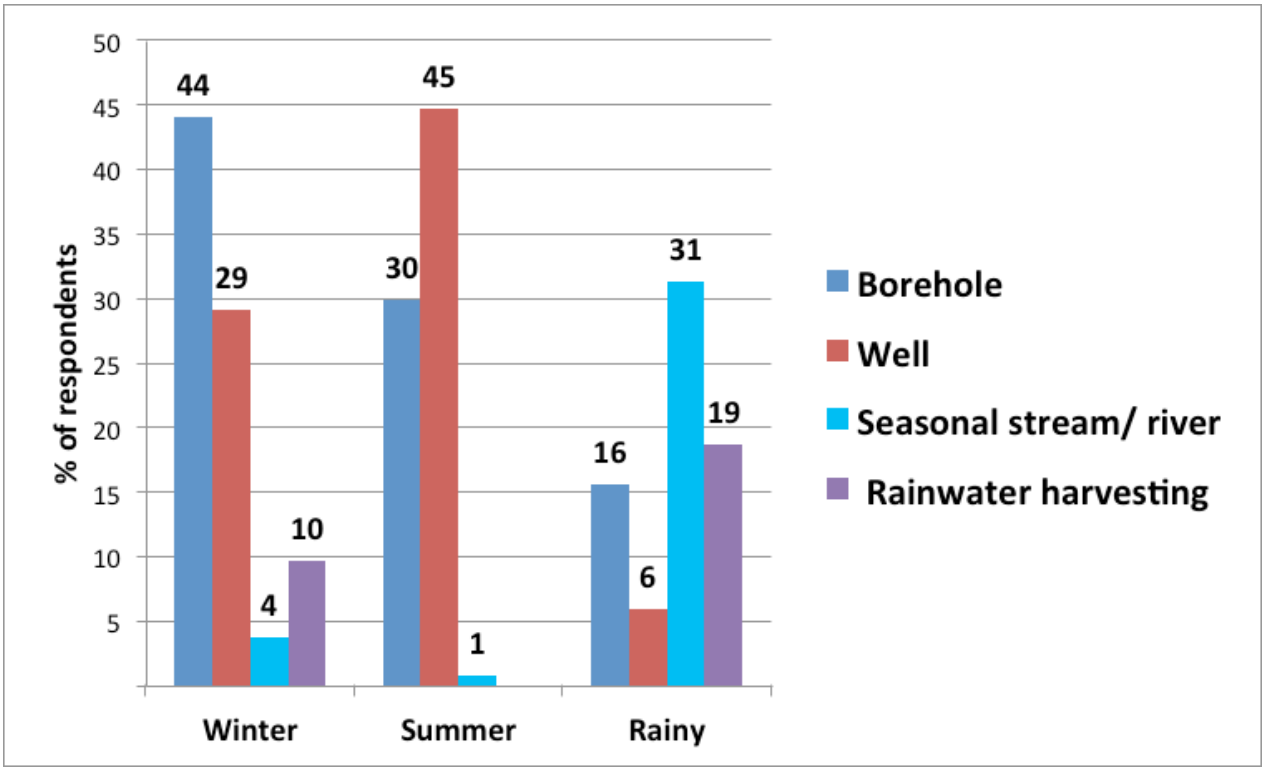
Feed source

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

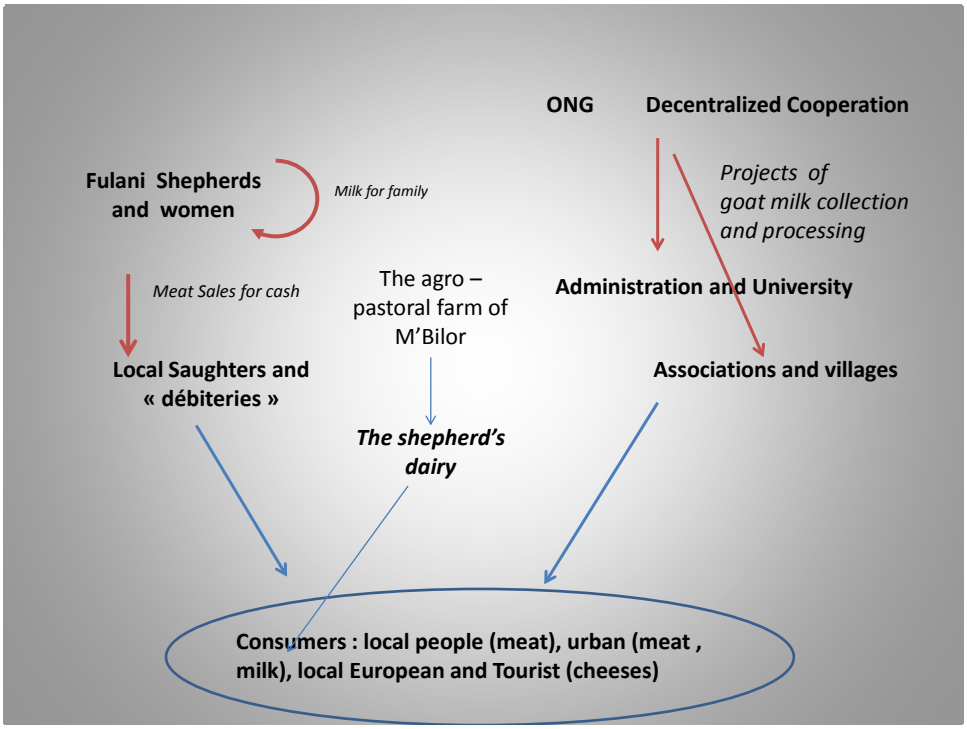


Figure 1. The main actors involved in the dairy sector and related to the project

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

4 Institut sénégalais de la Recherche agronomique

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).

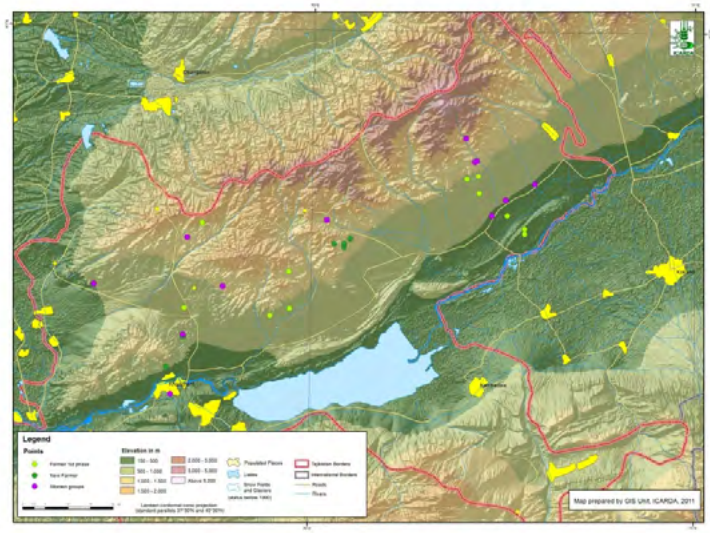

TOTAL

KNOWLEDGE HARVESTING IN TAJIKISTAN:

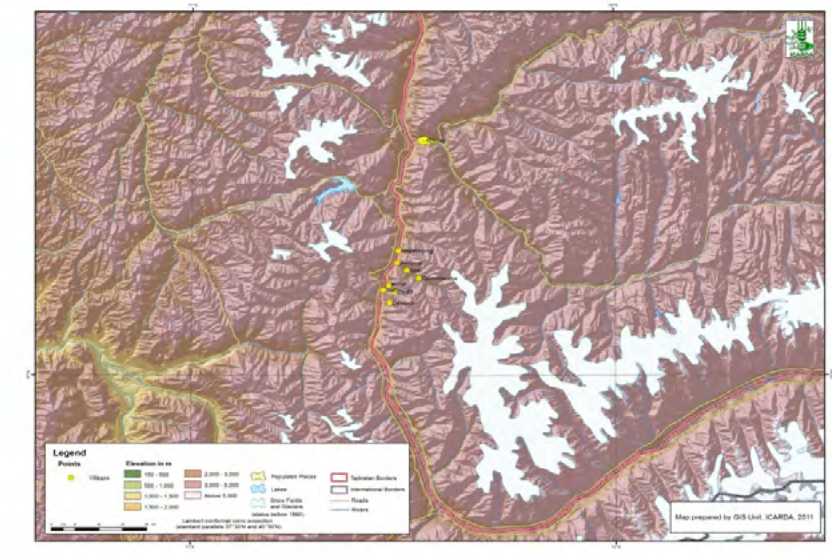
Improving livelihoods of small farmers and rural women through value-added processing and export of cashmere, wool and mohair

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).

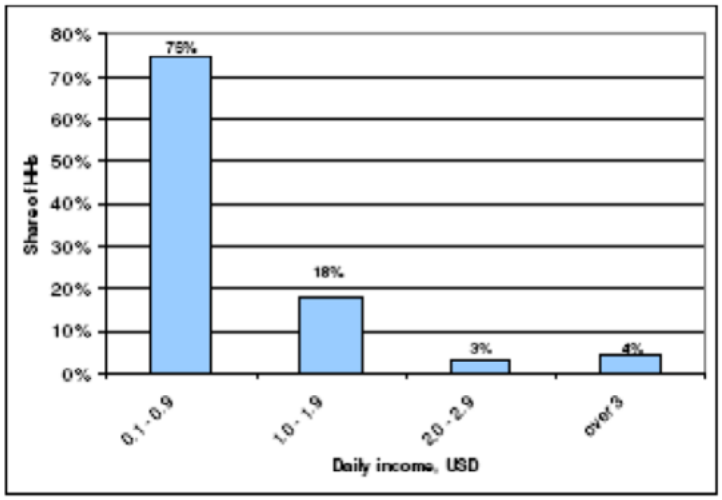


Figure 1. Per Capita Income Distribution

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

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- 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

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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.

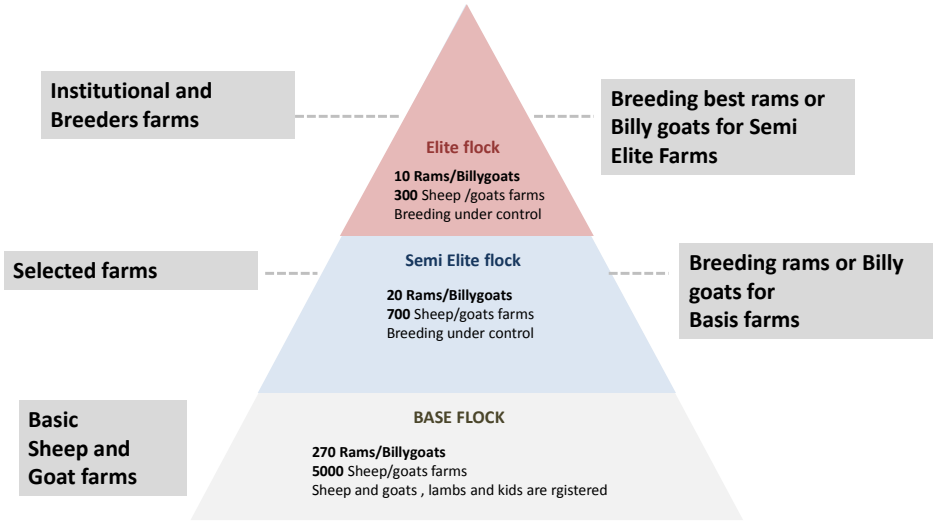

Figure 1. Sub projects design (Daskiran and al., 2014)

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.

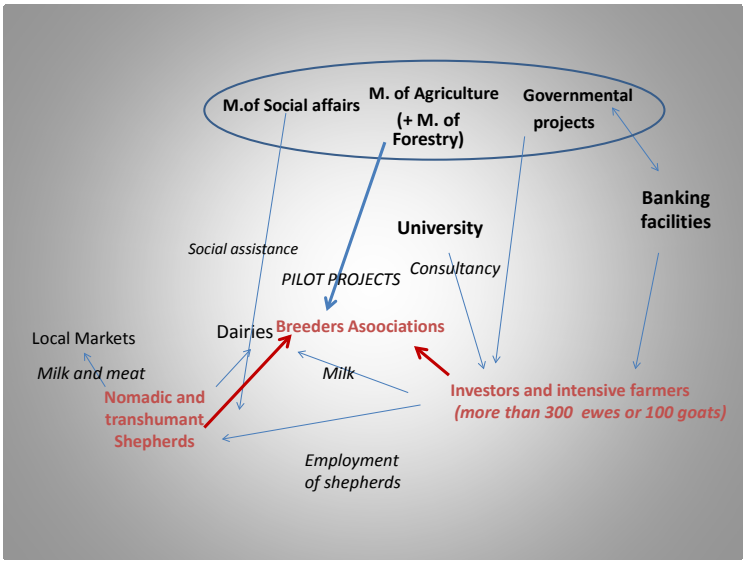

Figure 2. The actors' system and development project of sheep and goats in Turkey

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