Abstract

Goat husbandry remained as a basis of subsistence living of rural people for a long period in the agricultural system of Nepal. About 51% of Nepalese households have been engaged in goat husbandry. In the recent decades, the role of livestock in rural communities is changing rapidly and scientific goat farming has drawn attention of development agents as the means of rural poverty alleviation. Goats are increasingly used to augment cash income and enhance food security, thus serving as an important component in household's livelihood strategies, particularly marginal communities. The project aimed to promote three important components of goat farming- production system, organization and management, and linkages so that rural income would increase to support livelihood. The project was implemented in three VDCs of Sarlahi-Dhankaul, Harkathawa and Mahinathpur. A total of 45 groups of farmers, 15 in each VDC, with each group comprising 10 members, had been formed. The initial phase was characterized by village participatory approaches in the form of village meetings, focus group meetings, interviews with key informants, exploration of the area's natural resources through maps and transects walks, and stakeholder workshops. In order to evaluate socio-economic status, information was collected through questionnaires at the household level. The awareness in the benefits of participatory, gender-sensitive approaches and methods were created. The existing, incipient or potential community user groups were strengthened through capacity building, training and exchange of experiences. A range of activities related to small-scale goat production such as goat-breeding with Jamunapari bucks; promotion of stall-feeding; supporting a grant in the form of breeding stock, medicines, vaccines, Seeds/saplings of forages/fodders and a small cash payment for housing materials. The goat project brought about substantial changes by enhancing food security and diversifying the livelihoods of marginal farmers. Establishment of goat resource center can be taken as the major milestone of the project. In the foundation stock, there were 300 does and 10 bucks. The foundation goat stock produced 285, 515 and 370 kids in 1^{st}, 2^{nd} and 3^{rd} year of the project respectively. By the end of the project, 600 doelings were distributed in Harkathawa and Mahinathpur adopting passing on gift approach and 80 breeding bucks and 490 castrated male were sold to earn approximately 2.93 million (NRs.). The project distributed a range of forage seeds and encouraged farmers to grow suitable forage and a fallow land of 25 ha and grazing land has been developed in the area. A Revolving fund amounted to 113 thousands (NRs.) was established in the bank in order to crisis management in goat husbandry. All farmers (100%) adopted the technology of constructing scientific goat shed. Other technology adoption preferred by farmers include schedule deworming, pasture/forage establishment for feeding of improved forage, upgrading, concentrate/vitamin supplementation, stall feeding and practice of vaccination with 64.4%, 80.7%, 89.1%, 50.2%, 53.3% and 74.9% adoption rate respectively in the focal sites. Interest has been shown by non-participant members of the communities in the achievements of the participant groups and their stock it is too early to assess whether the model is 'scalable' in the sense of likely to be replicated widely which in turn increased their capacity to participate in social activities and household decision making. Practical options to enhance the contribution of goats to food security and income growth and priority interventions are recommended to service providers, development agents and policymakers in Nepal.

Key words: Livelihood, goat Resource center, capacity building, technology adoption

1. Introduction

1.1. Background

Nepal is one of the least developed countries in the world. Nearly 65% of the total Nepalese population is engaged in agriculture. It is estimated that 31% of Nepalese live below the poverty line and 17% are under absolute poverty. Poverty and food insecurity prevail across the country. Average land holding per farm household is 0.79 hectare and the number of rural landless households is 27,000 (CBS, 2004) in Nepal. Rural landless resource-poor farmers have to struggle hard for their survival. They lack access to agricultural land, are mostly illiterate, lack technical knowledge and access to microcredit. Their sources of income are typically daily wages and sometimes raising livestock.

Livestock sector contributes 30% of AGDP (FAO, 2005) and about 92% of rural households benefit from livestock sector (CBS, 2004). Farmers with a small land holding between 0.2 and 0.5 hectares land keep almost 25% of the livestock. People who have either no land or own less than 0.2 hectares possess about 11% of the livestock (FAO, 2005). The livestock sector has a significant potential for round the year employment generation particularly in rural areas. This provides subsidiary source of livelihood to the people living below the poverty line due to lack of sufficient agricultural land to sustain, particularly where crop production on its own may not be capable of engaging them fully. The development of the sustainable livelihoods approach has led to an increased interest in the role and impact of livestock in the livelihoods of the poor. In this approach, livestock is viewed as a form of financial, social and natural capital (McLeod and Wilsmore, 2001). Furthermore, livestock can enhance human capital and play a critical role in reducing malnutrition.

The world community has agreed to cut global poverty in half by 2015. An estimated 75% of the poor live in rural areas, and 600 million of these people keep livestock. Demand for, and production of, livestock and livestock products in less developed countries (LDCs) is expected to double over the next 20 years (Delgado *et al*., 1999). Livestock production has been growing faster than any other agricultural sub-sector, and it is predicted that by 2020 livestock will account for more than half of total global agricultural output in financial terms. The livestock sector has great potential to generate income and guarantee food security, especially for the rural poor.

Small ruminants are of economic importance particularly for small holder farmers in developing countries. Of the world's 475 million goats, 95% are located in developing countries. Number of Goat heads in Nepal is 8.47 million (DLS, 2010). It has been increased by almost 3.3% during the last decade. Goat species alone contributes 20% (48 thousand m.t.) of national meat production. Goat husbandry occupies a pivotal position in rural livelihood as well as national economy. Goat rearing is an age old economic activity for poor farmers under the mixed crop-livestock production systems that are commonly practiced in Nepal. It is a strongly rooted component of livelihood in agrarian folklore of Nepal. It is mostly confined to backward classes

and landless laborers who are unable to rear large animals. Small ruminants, particularly goats, have been raised all over the country for a long time in extensive systems with low productivity. Almost 85% of these people keep goats, and the goats contribute up to 50% of the resource-poor livestock keepers' (RPLK) livelihoods.

Goat is universally accepted as a profitable animal. It is a multifunctional animal and plays a significant role in economy and nutrition of landless, small and marginal farmers. Development and improvement of goat productivity offers the most significant and direct positive impact for improved family protein and energy intake, income as well as improved standard of living of the resource poor farmers (Peacock, 2001, Devendra, 1985, Ahuya, 2002). Goats are a critical source of cash income for small scale farmers, and income from goats is of utmost importance to sustain human nutrition and education, particularly in the rural areas where few alternative cash income options exist. They contribute to food security and can alleviate seasonal food variability and availability – directly through meat production and indirectly through cash earned from the sale of their products. Goats are often used for home consumption, ceremonial slaughters, but they also serve as a source of income or investment. Goat raising provides employment and income as a subsidiary occupation. The total income share of small ruminants tends to be inversely related to size of land holding. The demand for goat meat in Nepal is high as it is accepted by all people; however, the supply cannot meet the demand. Marketing of goat is comparatively more advantageous than other livestock species. In low cost of production, expensive meat can be produced under improved goat farming.

The rapidly growing demand for livestock products in the developing world is opening up opportunities for poverty reduction led by economic growth, provided the appropriate policies and institutions are in place. As goat enterprises are becoming increasingly popular for its minimum investment, rapid return and increasing demand of meat. However, most of peasants are rearing just for earning only some extra income. Goat rearing is an appropriate intervention in a capital scarce situation. Goats are considered as rural asset. Although not properly quantified, the contributions of goats to rural farming communities are well recognized. Goats have the potential for increased production in relatively short period of time. They require little capital investments, can utilize local feed resources, and provide opportunities for women and children to participate in building a sustainable livestock enterprise while ensuring food security for the family. Small stocks, especially goats, are a major livestock resource for women, children and landless livestock keepers. They are suited to the resource-poor smallholder system due to their high growth and reproductive rates and adaptive characteristics to high ambient temperatures, feed and water scarcity and disease tolerance. Goats have an important enterprise function and provide an ideal opportunity for rural development. There is already evidence to suggest that livestock is an important source of livelihood for the landless (Sreeramulu, 2001, Naidoo, 2001). As livestock do not always require ownership of land they may be one way for the landless to satisfy immediate cash and food needs. They also provide diversity and hence greater security in livelihood options and, because they gain value over time, may provide a route into owning other types of assets. Presently, realizing that goat production is a lucrative business, some richer people are showing interest in commercial goat production. The prospect of the project seems to be beyond the agenda of poverty alleviation. Goat rearing has seemed to attract large and progressive farmers, businessman and industrialists due to its economic viability

under intensive as well as semi-intensive systems of management for commercial production. The entry of resource-rich people, who have better access to technical knowledge, resources and markets, into this activity would help in realizing the potential of this enterprise. It would also encourage the aspirant commercial goat farmers who do not have access to grazing resources.

Subsistence farming and labor dominated status of Nepalese agriculture still exists. Poor infrastructure, underdeveloped markets, insufficient information and the lack of adoption of new technologies are among the factors contributing to poor performance. Traditionally, goat rearing has been a subsistence activity of resource poor rural people (Kumar and Deoghare, 2002). Goats are raised under traditional management with an open grazing system from the Trans Himalayan range to the Terai. In Terai region of Nepal, small ruminants are grazed year round, even though the availability of the forage is not sufficient at most times of the year. They receive only minimal stall feeding in form of crop residues and depend for their existence on meager grazing. The system of rearing is extensive, characterized by low investment, natural grassland, forest land and crop residues.

Poverty is still pervasive and persistent in the larger portion of the population. Its concentration, however, in certain areas and among certain people signifies some specific social and spatial characters. The dominant notion in Nepal till very recent times has remained that poverty is largely concentrated in mountainous and hilly regions but the study undertaken by ICIMOD in 1997 has challenged the very notion. Measurement on the basis of three deprivation indices, i.e., child deprivation, gender discrimination and concentration of disadvantaged groups shows that significant portion of the Teraian population across the country have very low ranking on the poverty scale. There is an aberration in the light of the fact that the plain districts have higher agricultural productivity and better infrastructure for economic activities and development. However, availability of lower per capita income, access to natural resources, dense population and poor performance in social indicators are the major causes of teraian poverty. Poverty is deep rooted in marginalized, disadvantaged, untouchable, ethnic and socially excluded sections of the society. The livelihoods of landless and near-landless resource-poor livestock keepers are extremely precarious even without the losses; they are unable to grow all of their own food, and the cost of purchasing food uses up or exceeds the family's income, thereby placing them in greater debt. They suffer from discrimination and deprivation differently and more acutely in the poor societies because of their gender and ethnicity. This is obviously due to various social and cultural factors besides state's inadequate policies and programmes and suggests towards the need of more and more people's initiative.

Early attempts by the government to improve the livelihoods of the rural poor in Nepal were unsuccessful (Hamal et al., 1987). The Integrated Rural Development Programmes of the 1970s often resulted in an overall decrease in agricultural productivity, and employment opportunities

that were created were exploited by medium and large farmers at the expense of the landless (Hamal et al., 1987). More recently, government-run land leasehold, livestock exchange and village-level animal health programmes appear to have been more successful in reaching the poor. Indigenous knowledge is being increasingly accredited worldwide. This acknowledgement should be more relevant in developing countries where there is a wealth of indigenous knowledge in all aspects of life and more so in the field of livestock and range management and animal diseases. This field of knowledge should be further married with solid science whenever possible.

The geographical structure and climate is suitable for goats in Sarlahi. Sarlahi has been focused for goat meat production in APP. In mid 1990's, the Agriculture Perspective Plan (APP) was brought as a blue print of the agricultural development vision of Nepal that would work as a road map to all our plans for the next two decades. The Department of Livestock Services is working under guideline of APP. The project is in line with Government policy and APP to increase income of the rural farmers through goat raising program. DLSO, Sarlahi was the collaborator of the project. The collaborator has been working in the site for years to increase the productivity of the animals and to protect their health. In order to reduce the household poverty level of rural area of Sarlahi, this project was implemented with financial support of NARDF. The profound rooted household poverty prevailing in the locality has been reduced to an extent after the intervention of the project.

1.2. Project Purpose

The main purpose of the project was to reduce endemic poverty, enhance food security, and empower women, deprived and disadvantaged communities of Nepal through gender and socially inclusive development. The project aimed at improving the quality of rural life and creating rural home based employment particularly targeting to marginalized people by establishing and improving goat resource centers.

The specific objectives were to promote small ruminant livestock, particularly goats; to design and deliver services to ensure active participation, decision-making and benefit sharing by the deprived and disadvantaged groups; and to organize, train and institutionalize local community groups so that development would be locally owned, managed and sustained. The project aimed to Increase the goat productivity in the focal sites and improve the profitability of goat production in this areas; to enhance adoption of improved goat production technologies by smallholder rural farmers through action learning strategies; to develop a community-based selection and breeding system of goats that suits to rural farmers' resources and capacities for a continual genetic improvement and sustained supply of high quality goats; and to determine the productive and reproductive performance of improved goat genotypes raised under smallholder farm conditions. In addition, technical collaboration with local authority of government and

financial viability will assure its sustainability. The ultra-poor, vulnerable, marginalized and deprived groups were intended to increase the income and improve livelihood by increasing goat production at the local level. Furthermore, the project envisioned to develop linkages between the production sites and the urban markets to facilitate for marketing their produced goats. It was purposed to improve the levels of food security, nutrition, incomes, and employment through increased productivity of the livestock sub-sector in an environmentally sustainable and socially equitable manner, while enhancing the capacity of the people to manage an ongoing process of development themselves. The Sustainable animal husbandry is considered as positive future way out (Linet et al., 2003). Gender balance and improvement in the social status of the community were also the focal points of the project. The project also expected to increase the targeted family kids to join school for which they have no earlier economic support. Human Development Index (HDI) increment was the overall expectation of the project.

1.3. Constraints in Goat Production

Constraints facing landless goat keepers and goat keepers owning or with access to very small areas of land are not well understood. Many farmers want a technology package for raising goats that deals with various aspects of production: feeding, breeding, housing, animal health, and economics. While some appropriate technologies for improving goat production have been developed in the last few years, these technologies are region specific and need to be modified and expanded to meet the needs of all regions. Traditional goat production systems in Nepal are mainly extensive systems using natural plants as feeds. So, the incidence of under-nutrition, inbreeding and poor hygiene is still widespread in these village systems, as is infection with internal parasites. Therefore goats in these systems have low production, low reproductive and growth rates and high mortality. Lack of experience and knowledge, availability of credit, technical information and lack of productive breeds severely affect the rate and extent to which goat productivity can be improved. The overriding constraint is inadequate nutrition. Records are rarely kept which weakens producers' decision making capabilities. This is particularly important in culling strategies and may explain at least in part the presence of a large number of unproductive animals among producer flocks. Records showing mortality, morbidity, sales, returns, herd/flock management (births, services, conception, return to estrus, forage production, etc.) all assist in decision making.

The lack of and poor access to good quality breeding animals was a major constraint in goat production. Lack of record keeping and limited registration with the Stud Book is a serious constraint slowing down the formalisation of the improved goat genotype. The introduction of exotic breeds into Nepal has been problematic and haphazard. This is related to the absence of a proper breeding plan. The best animals, particularly males, from the traditional flocks are sold for slaughtering to traders/ butchers. That resulted in scarcity of good quality breeding animals. The absence of organized efforts for breed improvement of goats has been compounding this problem. Therefore it takes a long time to establish a good flock.

Animal diseases constitute one of major constraints to livestock production and the safe utilization of animal products worldwide. PPR outbreak and other diseases claimed a substantial loss of goats. Many economic diseases have been noted in several reports on goat in Nepal. These diseases include internal parasites (e.g. Liver flukes, tapeworms and roundworms), foot- and mouth disease and foot rot, external parasites (e.g., mange, lice, and ticks), PPR, pneumonia, brucellosis and others. High mortality in goats due to PPR, diarrhoea, pneumonia, tetanus, etc. in the middle of the project, was a major concern of the farmers. High mortality in goats was mainly due to lack of knowledge about package of practices of improved goat farming, poor prophylaxis, poor preparedness of the farmers, lack of personal attention of the farmers and poor access to veterinary doctor with experience of small ruminants. High mortality and poor growth in kids was a major constraint for farmers. Poisonous plants and predators also caused considerable problems.

There is a lack of adequate credit facilities for goat farmers in Nepal. Farmers cannot access credit due to lack of collateral; thus they do not have capital to scale up their goat enterprises. The availability of institutional credit was relatively easy for large goat farming projects, but was a major constraint for the small entrepreneurs and had limited capital for collateral security.

Another major constraint was realization of low prices for the surplus live goats. No structures had been established for the marketing of improved goats and market information was generally lacking for goats and goat products. The trade of live goats, which was unorganized and was in the hands of a large number of middlemen, traders and butchers, does not favor goat farmers. The live goats are always sold not on the basis of their body weight in the livestock markets; this resulted in under-estimation of the value of live animals. Before building the reputation as a producer of quality breeding goats, the farmers got very low price for their animals. In the absence of proper standards and specially-designed vehicles for transporting the live goats, the officials in collision with police harass the farmers for the welfare of the animals during transportation of the breeding stock from long distances.

2. Materials and Methods

2.1. Selection of project sites

Sarlahi is the teraian district of Nepal. It is situated at altitude of 61 to 808 m above sea level, covering an area of 1,259 km^2. Sarlahi extends from 26^0 45' to 27^0 10' North latitude and 85^0 20' to 85^0 50' East longitude. Tropical and temperate monsoon climate is its characteristics. The average annual rainfall is 1300mm.

Prior to project site selection of the district, a list of all probable sub- district areas/ VDCs of Sarlahi was prepared. Secondary data of the probable areas of Sarlahi obtained from DLSO and CBS were analyzed. The selection of project sites/focal villages was based on biophysical and socioeconomic characteristics: (1) goat production recognized as economically important (2) commitment of the farmers (3) the potentiality of the site for goat production (4) accessibility (5) concentration of vulnerable families. The final site selection criteria were decided on the project's inception meeting. An inception meeting was held to discuss the project's concept, methodology, expected outputs, and other pertinent issues. Concerns such as criteria for site and farmer selection, data to be gathered for site characterization, data/information to be gathered during regular monitoring activities, roles/responsibilities of project partners, etc. were discussed and firmed up. Three VDCs, namely, Dhankaul, Harkathawa and Mahinathpur were selected as the focal sites of the project from the list after the study.

2.2. Survey

Assessing the socio-economic status of the households in the project area is important for understanding livelihoods, the potential for growth (resources available at local level) and change (capacity to utilize the resources). A door-to-door survey was done to collect information on the main sources of income for the households. Focus group interviews were conducted to understand the area further in terms of the way the people live, what problems they face, and what solutions they have for coping with the problems, how they manage crops and livestock, and how decisions are made in a household. Agro-ecosystem maps and transects helped to identify and understand the local agro-ecological resources and different niches that exist.

A semi- structured questionnaire was prepared to collect the information on the economic activities of farmers for goat farming and presented in a meeting of the experts. This questionnaire was revised on the basis of the feedback from meeting of experts and from the

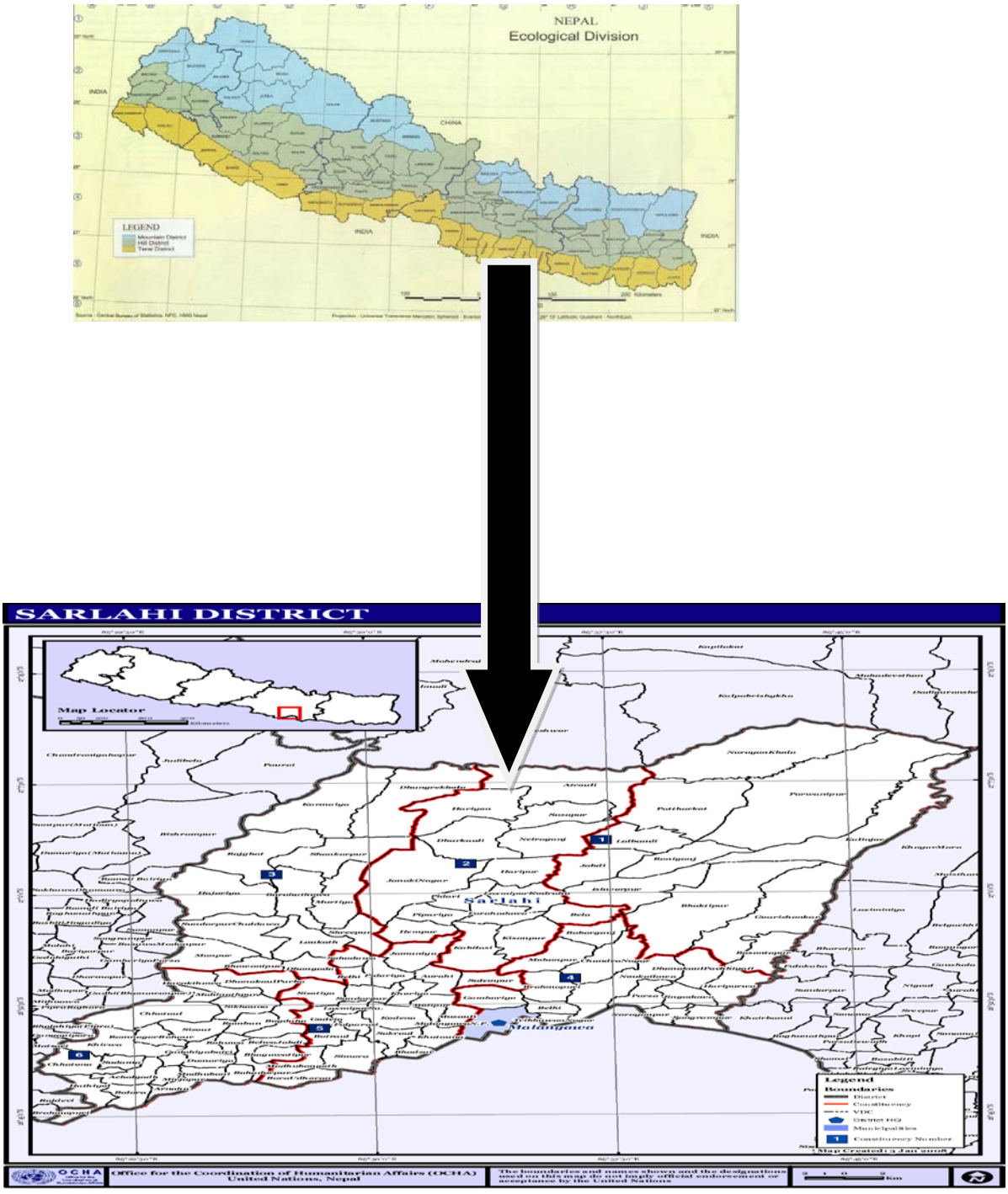


FIG- 2.1 : DISTRICT MAP OF SARLAHI

teams involved in the testing of the questionnaire. The methodology included initially a cross-sectional baseline socio-economic household survey. The household survey was carried out to provide information on the family size and age structure, household activities other than livestock production, land use, intra-household division of labor, as well as ownership patterns and production goals. The development of questions was guided by the underlying hypothesis that farmers would involve more in goat management, and thus achieve higher production and cash income from goats. A better understanding of farmer profiles, and interactions between goat management diversity and marketing patterns was needed.

The biophysical characteristics determined were climate, vegetation, soil type, topography, cropping pattern and others. The socioeconomic data gathered were average farm size, tenure status, per capita income, average household size, average age and educational level, contribution of livestock to household income, access to market indicators and others. On the characterization of the selected farmers, data/information collected were on household information, animal systems and labor allocation, crop/food feed systems, constraints to production, agricultural decision making, among others.

Group discussions have been held in all beneficiary villages with all socio-economic groups (Senior citizen, youth, women, farmer, artisans, landless class, business community, tribal, SCs and other minorities, etc. along with other educated and prominent people of the village. To establish the socio-economic level of the people a household survey had been conducted in all villages targeted. Group discussions have been organized with all concerned people to address the problems such as inadequacies related to the provisions of essential needs, strengthening of social infrastructure, filling up of critical gaps in the field of development infrastructure.

Primary data from the study site were collected through interview with key informants, and field observation. To ensure well-distributed representation, the selection of samples from the study area was done by a simple random sampling. Stratified random sampling was applied to select the household in the study villages.

The questionnaire was formulated and a survey was conducted with the Participatory Learning Approach (PLA) in the 3 VDCs of western Sarlahi to explore the most backward and poorest households. The farmers were interviewed for 30-35 minutes in their homes. The questionnaires were discussed with individual farmers using the local language. The farmers were interviewed about the benefits they obtained from the goat husbandry project, their general perceptions and any constraints they encountered. The percentage of farmers who gave similar responses to a questionnaire was calculated based on the total number of farmers who responded to each questionnaire.

Poor livestock keepers form an extremely diverse group. They depend on a wide variety of livestock products and services. In some households, livestock accounts for only a small portion of the economic activities, while, in others, livestock is the only source of livelihood. The degree of poverty among livestock keepers is therefore determined not only by the number of stock and the ability to meet basic needs, but also by the wider social and economic dimensions of the amount of access to resources and capital assets, the capacity to cope with risk and vulnerability and the degree of political marginalization. Poor livestock keepers are those livestock keepers who are economically or socially at risk and politically marginalized and whose animals, at most, provide subsistence or the minimum augmentation of daily nutritional requirements. To select the ultra-poor following criteria were considered:

a. More the family members, more the economic burden.
b. People with diversified occupation were considered less susceptible to economic problems and marginal people involved only in agriculture were considered more in economic problems.
c. Lower level of literacy was considered as associated with higher economic vulnerability.
d. Higher food deficiency was considered as associated with higher economic vulnerability.
e. Willingness to participate in the project.
f. Having not more than 10 goats per family
g. Positive receptivity to innovative technologies/development projects
h. Having some indigenous knowledge and understanding of feeds, animal performance, production/management systems, e.g. deworming, housing,etc.
i. Having less than 2 kattha land holding
f. Ethnic/ dalit/woman background in priority

2.3. Participatory approaches

The project followed a framework based on the premise that any development endeavor, to be truly participatory, must first and foremost takes into account the farmers' realities – their situation, aspirations, and capabilities. The project basically employed participatory approaches in identifying and grounding of interventions as well as in evaluating results. The specific approaches used were firmed up.

The project aimed at benefiting individual poor farmers by reaching them through a group approach. The group extension approach was chosen because of its various advantages and the long, traditional existence of farmers' groups in the communities. Nepalese women form groups to exchange labor support on farming plots in times of need and to mobilize savings and credits for self-help and for private, social and ceremonial functions. A participatory approach is an effective way of promoting technology adoption in resource-poor communities. The group approach plays a key role in problem solving and fund generation. Non-participant farmers also started to adopt the technologies being tested by the trial participants. Inputs contained in the project for distribution to farmers were local goats, cross bred goats and exotic goats, veterinary drugs and fodder /forage seeds.

2.4. Strategies

A strategy is the combination of processes (plans, decisions and acts) that an individual or a group of individuals (a firm, a family, etc.) develop purposively, and which aims at changing their social, economic and/or physical environment. Such processes combine resources and/or techniques and/or knowledge and know-how. Development strategies are those proposed activities, which if implemented can help in improving the problems under investigation. A development strategy is said to be sound if it meets the three criteria namely: minimize the risk, make use of the locally available resources and exploits future opportunities. If it is required to pursue several strategies at the same time in order to change the environment, these strategies will form the basis for the development.

Different strategies had been adopted to increase the production and productivity of goats. Animal feed resources, breeding, and technical support services were the major interventions applied in the project. The major strategies were as follows:

- Training of farmers' groups on scientific goat farming.
- Initiating a range of activities related to small-scale livestock production such as goat-breeding with Jamnapuri bucks ; promotion of stall-feeding and zero-grazing techniques; and monitoring the environmental and social impacts of these activities;
- Raising the awareness in the benefits of participatory, gender-sensitive approaches and methods. Strengthen existing, incipient or potential community user groups through capacity building, training and exchange of experiences.
- Establishment of goat resource centers
- Establishment of revolving funds
- Providing support and technical guidance for forage/fodder production,
- Facilitating exchange of information and lessons learned
- Producing field documents: pamphlets, audio-visuals and other communication materials for application within the participating countries and regions
- Passing on gift the offsprings of goat

2.5. Project activities

A total of 45 groups of farmers, 15 in each VDC, with each group comprising 10 members, had been formed. Farmers in the villages with common interests were united into groups and registered as active groups of DLSO and were strengthened with financial inputs, veterinary and extension services. The program was conducted in three centers as per the ease of group members.

A VDC level elementary workshop was organized in the beginning of implementation of the project. Stakeholders from DLSO, local NGOs, VDCs and farmer groups participated in the workshop. Improved goat farming was initiated using training tool and social mobilization for capacity building of the farmers.

Different strategies have been adopted to increase the production and productivity of goats. Animal feed resources, breeding, and technical support services are the major interventions applied in the project. Planting of fodder trees, the cultivation of different fodder species including winter and perennial grasses and legumes are the attempts to improve and increase animal feed resources.

The project worked with the poorest, most deprived and economically weak farmers in the communities. It encouraged DAG/dalits/women to voluntarily and actively become involved in the goat improvement program. The members of the communities were encouraged to participate in all aspects and all level of project implementation.

Feed and fodder production is the main aspect of goat husbandry. Fodder trees - Badahar, Epil Epil etc.and forages –stylo,oat, napier etc were planted in the three VDCs. One demonstration plot of forage production established in each VDC. Fifteen demonstration plots established in 2 kattha land in each VDCs of the project area. It is an ecologically compatible activity. A 3-day spot fodder/forage cultivation training was conducted 6 times in a year in order to develop skill in the farmers.

Housing for goat husbandry is comparatively less expensive than other species. Farmers constructed total 450 low cost sheds using local inexpensive materials in the project VDCs. The project financially supported the farmers for the activity. The farmers were encouraged to adopt the stall feeding system.

Three goat resource centers were established in the targeted VDCs. Initially 300 goats and 10 breeding bucks made available to 150 farmer families in Dhankaul VDC. Two breeding does were allocated to each family of the groups. Goat purchasing took place in local market, ideally in the presence of the recipient, the development agent, a representative of the group and livestock officer of DLSO. In case of high local prices or preferences for certain type of goats, purchasing from more distant markets was considered. Jamunapari bucks were distributed so that a wider area and more farmers with crossbred goats achieved in a less expensive manner and in a shorter time frame. The buck was kept in a rotational basis in the groups. Initially, farmers were hesitant to pay in cash for mating services. The benefits were not yet highly realized and cash for such a purpose was hard to come by. In Harkathawa and Mahinathpur, the same number of goats and bucks were distributed in the following year as the gift from farmers of Dhankaul. The farmers had been sensitized and trained in different aspects of goat husbandry. Basic scientific techniques and skills of goat farm management discussed in the training. Regular

monitoring and supervision had been adopted to notice the activity of the farmers at the grass root level.

The Revolving fund for insurances, drugs and replacement of unproductive goats had been established. Some part of fund was used to run a small dispensary. Basic veterinary drugs were purchased for the deworming, dipping and providing mineral-vitamin mixture using the fund. In the fund, farmers had paid insurance premium of their goats. The part of the fund was mobilized as a compensation for loss of goat due to PPR on the basis of decision of farmers. That helped in the replacement of the goats.

To disseminate technology of goat husbandry 1000 leaflets, 2000 pamphlets and 500 booklets on scientific goat farming were published and distributed among farmers. A final output dissemination workshop was organized in the district level. In the workshop, 35 participants actively involved. The outcomes of the project and suggestions were exchanged which would be diffused in future in more area.

During the implementation of the project, some activities were delayed. Distribution of goats in Harkathwa and Mahinathpur could not be completed within timeframe due to goat mortality. The farmers who had already obtained the goats werte handing over the goats to the remaining farmers who had not obtained until the final month of the project.

3. Results and Discussion

The outputs of the project have been achieved and have contributed to improving the livelihoods of resource poor small-scale livestock keepers. The first output was the determination of the appropriate improvement levels and goat management technologies for resource poor farmers. The project has therefore contributed to improved goat production and an increased income for poor livestock keepers in this production system and has actually pulled them out of poverty in certain extent. Results showed that some attempts to solve problems of the villagers failed because of the way they were introduced.

3.1 Socio-economic status

The rural poverty is firmly associated with social discrimination, dominance, inequality ethnicity, culture and gender issues. The study of social strata of the farmers of the focal sites of the project showed that the dalits in Dhankaul, Harkathawa and Mahinathpur were 51.4%, 29%, 41.2% respectively. The disadvantaged among the surveyed farmers in the corresponding VDCs were 44.8%, 58.8%, 53.8% respectively. Only 3.8% in Dhankaul, 12.2% in Harkathawa and 5 % in Mahinathpur were socially in the higher strata (table 3.1).

Table 3. 1. Social strata in the project sites:

S.N.	Category of farmers	Dhankaul (n=500)	Harkathawa (n=500)	Mahinathpur (n=500)
1	Dalits	257 (51.4%)	145 (29%)	206 (41.2%)
2	Disadvantaged	224 (44.8%)	294 (58.8%)	269 (53.8%)
3	Others	19 (3.8 %)	61 (12.2%)	25 (5%)

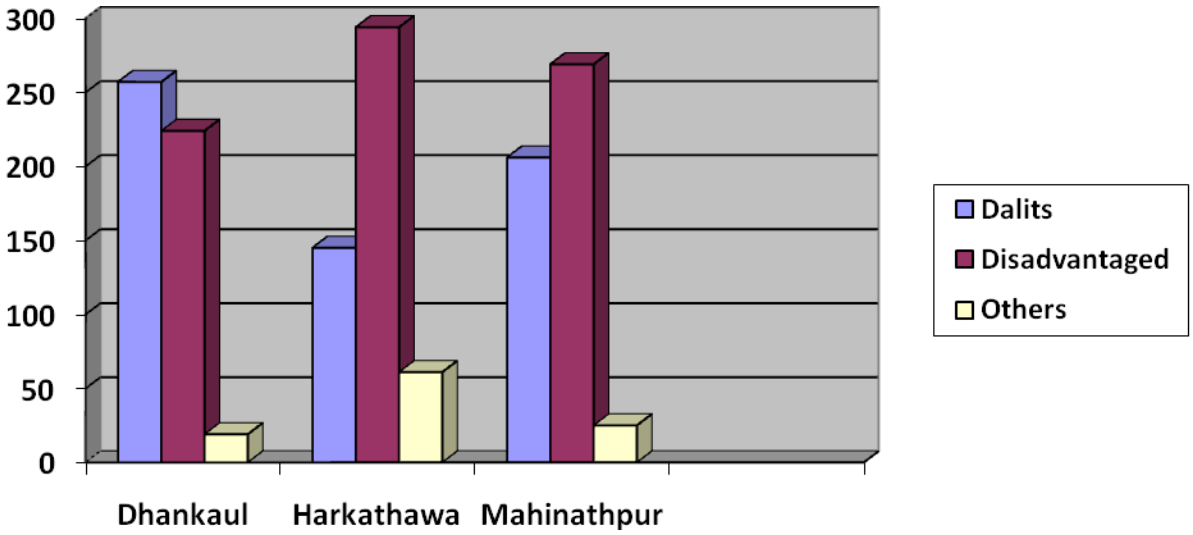


Figure 3. 1. Social Strata in the Project sites.

Table 3.2 showed that out of 450 focal farmer families, only 67 (15%) families were headed by women. Women are more disadvantaged than men because they are less mobile and have household and child-raising responsibilities, and in many regions there are strong cultural and religious barriers against women leaving their homes. All decisions related to the production and sale of goats were taken by the male household head. Female members used to consult to Male before the selling. In female-headed households, the woman had control and access over the resources and all decisions regarding their allocation. The focus group also revealed that the man, as the head of the household, had access to and control over all resources such as land, family labour, livestock and its products and income from crops and livestock. In terms of labor, mothers and daughters were generally more involved than fathers. They provided more of the labor for feeding, herding, and watering than other family members.

The impact of the activities among woman-headed households was especially significant. Women are often perceived as effective agents of development. Some authors argue that women are more prone to the early adoption of new technologies than are men and are therefore better catalysts for technological change. Perhaps agricultural productivity would be rising more quickly if more resources were made available to women. The incomes of women are more likely to be spent on food for the household and the education of the children than are other incomes. Small-scale livestock activities involving women thus have a significant impact on the nutritional status and livelihoods of smallholder households. Women play important roles in livestock keeping, and experience shows that, in the provision of livestock services and the design of livestock development programmes, a targeted approach improves the overall impact

in terms of poverty reduction. Efforts to secure women's access to and control of productive and natural resources such as land, livestock and credit are strengthening women's influence and social empowerment. In general, women have the greatest role in mixed farming production systems and carry out the majority of the tasks related to livestock.

Table 3. 2. Participation of male and female Farmers as the head of household.

S.N.	VDC	Male	Female
1	Dhankaul	125(83.3%)	25 (16.7%)
2	Harkathawa	130 (86.7%)	20 (13.3%)
3	Mahinathpur	128 (85.3%)	22 (14.7%)
4	Total	383 (85%)	67 (15%)

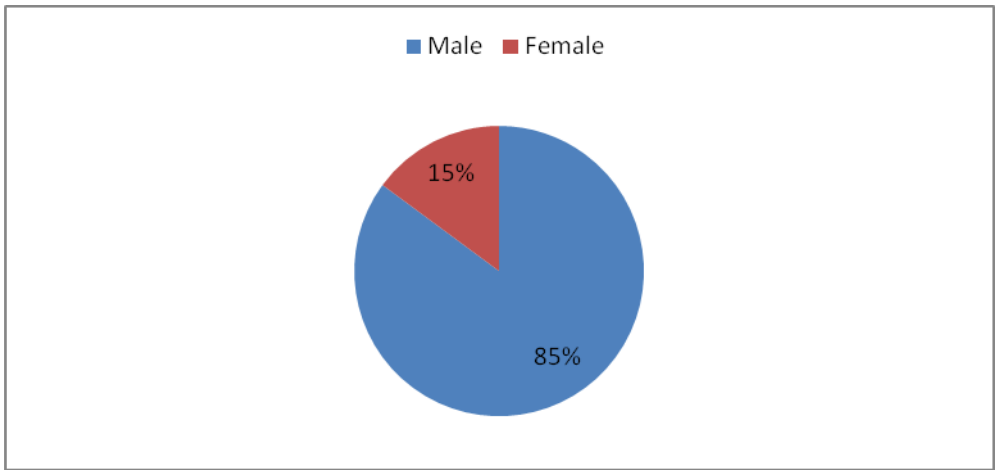


Figure3.2 Participation of male and female Farmers as the head of household.

Before the intervention of project, the farmers with annual income less than 25, 000 (NRs.) were 56.8%, 45.6% and 50.4% in Dhankaul, Harkathawa and Mahinathpur respectively. The remaining percentage of the farmers of the corresponding sites had annual income more than NRs. 25000 but less than NRs.50000. The average family size was 5.72 members and their average land holding was 2 kattha per family.

Table 3. 3. Annual family incomes of farmers before intervention of the project (n=500):

S.N.	Project Sites	Earning<25000/Year (NRs)	25000<Earning<50000(NRs)
1	Dhankaul	284 (56.8%)	216 (43.2%)
2	Harkathawa	228 (45.6%)	272 (54.4%)
3	Mahinathpur	252 (50.4%)	248 (49.6%)

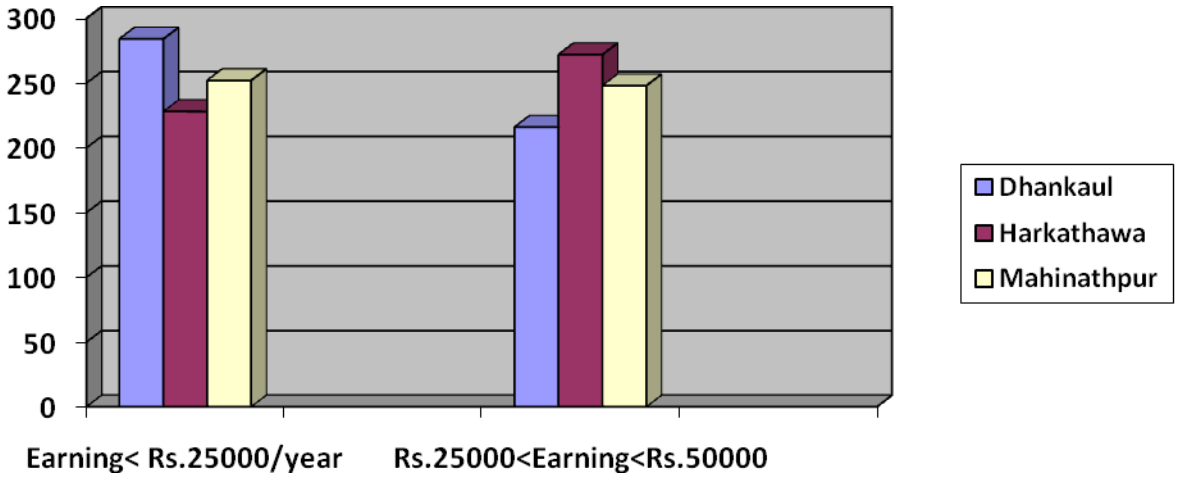


Figure 3. 3. Annual family income of farmers before intervention of the project (n=500)

Before launching the project, the most of the farmers had flock size of goats ranged 1to 5 (Dhankaul-76.6%; Harkathawa-83.3%, Mahinathpur- 73.7%). The farmers without goats were 16.7%, 13.3% and 16 % in Dhankaul, Harkathawa and Mahinathpur respectively. Only 6.6% of farmers in Dhankaul, 3.4% in Harkathawa and 10.7% in Mahinathpur had flock size 6 to 10. Education had a positive influence on goat ownership. Household heads with a basic level of education (literate) kept more goats, especially those with secondary education. Across goat flock size categories illiteracy was highest for households with small flocks. However, the effect of education on livestock holding categories and flock size categories was not significant

because traditionally rural people of higher social and economic status have shown inhibitions in undertaking the goat keeping activity due to social stigma.

Table 3.4. Goat flock size in the project site before intervention of the project (n=150).

S.N.		Dhankaul	Harkathawa	Mahinathpur
1	Farmers having no goats	25 (16.7%)	20 (13.3%)	24 (16%)
2	Farmers having 1-5 goats	115 (76.7%)	125 (83.3%)	110 (73.3%)
3	Farmers having 6-10 goats	10 (6.6%)	5 (3.4%)	16 (10.7%)

3.2. Establishment of Goat Resource center

A number of technologies are available for productivity improvement of goats. Technological and management options are the only alternatives to accelerate growth in the productivity of goats, which is low in the traditional system of production. Establishment of goat resource center can be taken as the major milestone of the project. In the foundation stock, there were 300 does and 10 bucks. The foundation goat stock produced 285, 515 and 370 kids in 1st, 2nd and 3rd year of the project respectively. By the end of the project, 600 doelings were distributed in Harkathawa and Mahinathpur adopting passing on gift approach and 80 breeding bucks and 490 castrated male were available for sale. During the project period, 51 does and 5 bucks of the foundation stock and 43 kids died died of PPR and other diseases.

There is a great potential in goat production in Nepal, but this is currently not exploited. Most farmers have neither the capacity nor the incentive to invest in goat management and therefore remain with low goat productivity. Farmers with small flocks in particular face highest goat mortalities, although they depend most on the benefits from goats. To achieve greater benefits from goats, development interventions must combine capacity building in goat management, sustaining committed farmers in flock building and improving market opportunities that will stimulate farmers with sufficiently large flocks to increase off take. Interactions between the components and their impact on goat production need to be considered. Climate specific differences reflected in the variability of management investments should be taken into account.

Animal health and housing for effective health management, farmers should be able to diagnose, prevent and treat the most common animal diseases. However, it was observed that farmers were often unable to identify diseases and causes as well as to determine appropriate treatment. This shows a critical knowledge gap and need for improved access to basic information on the most common diseases and their seasonal prevalence.

Table 3.5 Goat Stock Developed in the project site

S. N.	Goatstock	Year 1 2007-2008	Year 2 2008-2009	Year 3 2009-2010
1	Foundation Does	300	249	249
2	Foundation Bucks	10	5	5
3	Replaced Bucks	-	5	4
4	Doelings	140	250	210
5	Bucklings	145	265	160

The formal sources of information on goat nutrition are limited and poorly accessible to farmers. Goats in particular make efficient use of grass and tree leaves obtaining up to 64% of their forage from non-grass plants. There is a high need for expanding training and extension services in goat nutrition. The curricula should address basic goat nutrition principles as well as agronomy of forage production, processing and conservation. Improving feed and fodder production would open up new cash income opportunities for farmers without livestock as well.

Improved breeding in a communal setup would be most effective through selection for high quality bucks. The most common husbandry practice was castration, although this was done for meat quality rather than breeding purposes, especially by farmers with larger flock sizes. Castration, as a way of selecting good-quality bucks, needs to be promoted and can be an entry point for training in goat production and marketing. In rural communities where most farmers are not in a position to purchase quality bucks, a breeding program that supports preservation of few high-quality bucks and regular exchange with external breeding material is required. Selection of does for improved flock performance can be achieved through culling. However, mainly households who already have sufficient goats to cover their basic needs could adopt this practice. Preserving goat lines proven for high reproduction and longevity, and sustained by improved management, can substantially contribute to upgrading flock performance. Progeny history, recording the performance of does and their offspring, is recommended as an effective method for farmers to monitor flock productivity. These recommended husbandry practices are simple and accessible to all groups of farmers at minimum cost and without external material.

Above all, they strengthen local knowledge generation and effective use of available resources for all goat farmers.

Table 3.6. The Total Income from direct sale of Goats

S. N.	Sale	No. of goats	Average Rate (NRs.)	Total Income (NRS.)
1.	Breeding Bucks	80	Rs. 6000/buck	4, 80, 000
2.	Castrated male goat	490	Rs. 5000/ goat	24,50,000
3.	Total	570	-	29, 30,000

Farmers' capacity to source animal health inputs and pool their resources needs to be strengthened in order to reduce the costs involved and achieve greater responsibility and ownership in animal health programs. Concerted vaccination programs are important to avoid uncontrolled spread of diseases and reduce the costs involved in treatment. More emphasis needs to be placed on the development of cost effective distribution systems of veterinary supplies, especially to the rural areas. Reducing the high mortality rates is the most effective and quickest means to sustain farmers in production, increase goat productivity and provide more goats for the market. Reducing the number of goats lost would immediately impact the farmers' asset base, as these goats would remain available for reproduction and other use values. Securing available goat assets preserves farmers' livelihoods, and is therefore a good starting point for development interventions aimed at improved goat production. Highest goat mortality rates occurred in the dry season, indicating a requirement for time-specific interventions. According to local experience, kids are highly susceptible to the cold and often die of weather-related diseases. For kids, special emphasis should therefore be on proper housing. The fact that mortality was highest for farmers with small flocks, which also form the largest group of households, indicates the need to improve goat management skills particularly for resource-poor farmers. The other way of sustaining and increasing goat flocks is to improve goat reproduction rates. Interventions that improve the body condition of does before this period, for example through supplementary feeding, could achieve higher conception and kidding rates, thus leading to higher reproduction rates. Interventions in high goat mortality and low birth rates should focus on sustaining flock growth. Interventions in low goat mortality and high birth rates should place more emphasis on enhancing off take.

3.3. *Expansion of Forage and Feed Production*

The Project substantially increased supply of seasonal and perennial feed through cultivation of forage in communal and private lands, and over-sowing landslide and roadside areas. It distributed a range of forage seeds, undertook field demonstrations, encouraged farmers to grow suitable forage, and supply forage seed locally. Out of 9 species of forage/fodder tree introduced, stylo, oats, berseem, Badahar and kimbu were most commonly adopted. A fallow land of 25 ha

and grazing land has been developed in the area. About 30% of the animal feed requirement was met from the forage program. DLSO also helped to establish a forage and seed in the area. Fodder/forage development activity has increased the productivity level of the goats through improving the nutritional status and has improved the environmental status of the locality.

Through the goat improvement model, farmers have been better enabled to manage their environment and have more understanding of the need to plant fodder trees for their livestock. The model encouraged and promoted growing fodder crops for goat feed. The fodders and forages were planted for the goat including indigenous trees which provided fodder for the goats and also fuel-wood for domestic use. By planting different plant species farmers are creating and maintaining environmental diversity within their communities. The direct environmental benefits of implementing the model include manure for increased crop production due to improved soil fertility. Goat manure is regarded as being superior to chemical fertilizers and being organic, it helps in replenishing soil with depleted nutrients as well as restoring soil texture. Farmers have also learnt how to improve their farm production through manure use. By growing fodder trees and using manure on crops makes a good balance and interaction within the mixed crop-livestock production systems. With increased plant species, there is enough pollen to be used by bees for enhanced pollination of crops. Most groups have therefore maintained tree nurseries to ensure that seedlings are available. With improved environmental conservation, the general population have been benefited from good quality air in the environment and a responsible society.

The fodder/forage available in the area helped in the sustainability of the goat farming. The direct environmental impacts of the project include promoting growing fodders and replenishing soil with depleted nutrients as well as restoring soil texture. Fodders and forages are planted for goats including indigenous trees which provide fodder for goats and also fuel-wood for domestic use. By planting different plant species farmers are creating and maintaining environmental diversity within their communities. Furthermore, the model encouraged and promoted growing fodder crops for goat feed. By planting different plant species farmers are creating and maintaining environmental diversity within their communities. The goats are fed through cut and carry with the resultant manure being used to fertilize farms. With increased plant species, there is enough pollen to be used by bees for enhanced pollination of crops. This helps to conserve the environment for the benefit of posterity.

Planting forages in individual cropping fields could be another way to reduce the impacts of seasonality of feed supply and provide higher quality feed than the rangelands can supply. Access to information and technologies, and the availability of labor and land might however restrict broader adoption. Improving the local availability and quality of feed resources needs to be combined with developing a reliable distribution of supplementary/emergency feeds during droughts. This would sustain the survival of key goat categories, primarily does, and is a cost-effective intervention to keep farmers in production.

3.4 Fund Generation

A Revolving fund amounted to 113 Thousands (NRs.) was established in Nepal Bank Limited (Sarlahi Branch). The fund was injected by the project into credit and saving scheme of the farmers' groups. The fund will be useful even after the end of the project for the specific and emerging needs of the groups. The entire process induced the spirit of teamwork among the participants. Monthly depositing of money in the bank encouraged the habit of saving in these people and brought about a change in their lifestyle and attitude. The by-product of this program has increased knowledge and self-confidence among the farmers. Sense of security in the farmers had accelerated their participation in the project activities. The farmers expanded their activities and took goat husbandry as their occupation to become self employed, self-help group.

3.5. *Adoption of Improved Technologies by Goat Farmers*

Turning new knowledge into a change in practice often means learning new skills. These might be practical or manual skills, or they might be mental skills, such as calculating how much fodder is needed for animals at different stages of lactation. Some changes may only be possible if more fundamental skills are already in place: keeping records, for example, is only possible for people who have learned to read and write. Learning new skills takes time and practice. We develop confidence in our new skills by being able to try them out, seeing them work and getting helpful feedback when they go wrong.

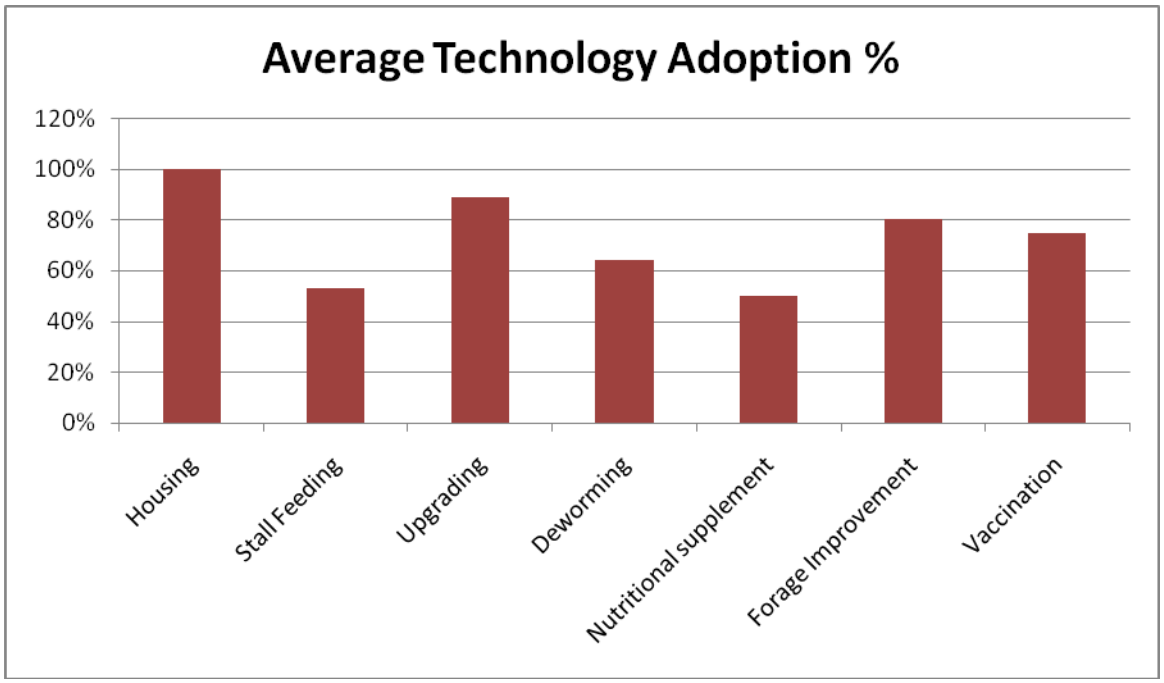
Technological and management options are the only alternatives to accelerate growth in the productivity of goats, which is low in the traditional system of production. An increased level of adoption of technologies and availability of good quality breeding stock would be essential to make the goat farming more profitable. The farmers had very low level of awareness about improved technologies before the intervention of the project. The level of adoption of recommended package of practices and technologies was encouraging during the project period. Adoption of constructing scientific goat shed was 100% in all project sites (Table 3. 7). Farmers confirmed that establishment of housing provided easier and more convenient raising of goats. Animals were also protected from rain, adverse weather conditions, and natural predators, and minimize social problems such as destruction of crops.

The average adoption of stall feeding in all three sites was moderate (53.3%, table 3.7). But the average adoption of forage improvement was encouraging (80.7%). This is due to the popular belief that goats can be economically maintained only under semi-intensive and extensive systems with a provision of grazing in commons. Unlike traditional flocks, the expenditure on feed and fodder was the major component of the cost of goat rearing on stall feeding and it

accounted for 59 percent of the total variable cost. The concentrate feed and dry fodder accounted for 58 per cent and 25 per cent of the total feed cost, respectively.

Table 3.7. Adoption of Technology by Goat Farmers

Technology Options	Number of farmers (N=150) and Percentage			
	Dhankaul	Harkathawa	Mahinathpur	Average %
Housing/ construction of goat shed	150 (100%)	150 (100%)	150 (100%)	100%
Stall Feeding	86 (57.3%)	80 (53.3%)	75 (50%)	53.3%
Upgrading	140 (93.3%)	135 (90%)	126 (84%)	89.1%
Schedule Deworming	112 (74.6%)	102 (68%)	76 (50.6%)	64.4%
Vitamin/Mineral/concentrate supplement	90 (60%)	72 (48%)	64 (42.6%)	50.2%
Forage/Pasture improvement	124 (82.6%)	96 (84%)	114 (76%)	80.7%
Practice of Vaccination	120 (80%)	112 (74.6%)	105 (70%)	74.9%



On stall feeding, animals were confined or semi-confined and fed cut-and carry with available fodder resources. Farmers learned that with stall feeding reduced parasite infestation, hence, lesser mortality rates due to internal parasitism and better performance of goats. The farmers adopted a communal area for pasture establishment and development as source of forage for browsing as well as cut and carry supplemental feeding. However, some individual farmers also established their own forage area. However, Feed shortages were a concern for most farmers during lean period and most of the farmers did not utilize alternative feed resources in addition to grazing. Nearly 50% farmers were not prepared to invest in improved goat nutrition. The average adoption rate in supplement of mineral/vitamin/concentrate was only 50.2%. Improved feed and fodder production would reduce the pressure on the rangelands, particularly during the dry season, when herbage quantity and quality is low. Improved rangeland management is critically important in order to preserve and increase the productivity of natural grazing as well as to restore degraded grazing areas. Community-based grazing management was evaluated as poor before the intervention of the project, but now it has been turn to greenery. To govern seasonal land use, institutional development, integrating traditional leadership and formal administration, is necessary. Such initiatives could have a positive impact on both livestock and the rangelands. Supplementary feeding provides alternative feed resources during periods of nutritional bottlenecks and reduces pressure on the rangelands, thereby allowing the rangelands to recover (Holness, 1999). Crop residues (legumes more than cereals) are very important in ensuring the survival of goats. Cut and carry practices (pods and grasses) provide quality nutrition for goats, and also depend on communal resources. Apart from identification and documentation of high value plant species, rules and regulations for their utilization need to be developed.

Upgrading of the breeding stocks is the indispensible technology for goat farming. In average 89.1 % (table 3.7) farmers practiced this technology. Farmers noted improved fertility of does, with an increase in the number of kids born at each kidding, compared to does kept under traditional management. The major initial investment was found on the purchase of breeding stock and construction of sheds and structures. In the traditional flocks, 75-80 per cent of the total investment was made in acquiring the breeding stock. Breeding within flock selection, conservation and utilization of local breeds, rather than introducing exotic breeds, can be done as a starting point in long-term breed improvement strategies. Selection for locally adapted breed types enhances flock productivity at low investment cost. Local breeds are known to be better at coping with heat, walking long distances and surviving feed shortages in the dry season. Breeding programs should therefore ensure the *in situ* conservation of indigenous well-adapted animal genetic resources to be sustained by good feeding, health and housing strategies. Seasonal breeding should synchronize the demand of goats to the naturally available resources. Through controlled mating farmers can ensure optimal nutrition for does and kids during the reproduction cycle and lactating period. The kidding during wet season when there is good herbage, together with improved housing to avoid exposure and external parasite control, reduces goat mortality.

The use of vaccines such as PPR, HS and FMD and medication for internal as well external parasites were recommended and adopted for effective prevention of diseases and improved productivity. The average adoption of deworming, and vaccination were 64.4% and 74.9% respectively (Table 3.7). On some occasions, farmers could not use vaccines/medication due to their poor concern and access. Most of the farmers were eager to adopt the improved technologies, but the absence of timely support system to provide quick access to the latest information and technologies and weak input delivery system resulted less than 100% adoption.

3.6. Impacts of the Project on poverty and Livelihood

In rural areas, there is a low population density, low productivity, and a very low level of investment. It is difficult to stimulate the rural economy. The few jobs that can be created will be in the primary sector. The issue of rural development is a multidimensional problem. However, it is clear that agriculture is a key lever to this direction. Goat farming is very likely to continue the role of engine, continuing to support the existence and progress of humans.

Table 3.8 DIFFERENT Benefits from the project

S. N.	Type of Benefits	Benefits
1	Human benefits	Capacity building through increase in knowledge and skills
		Improved health and nutrition of malnourished children through animal protein consumption
		Education of children
2	Social benefits	Community empowerment through groups
		Increase in farmers' self- confidence and self-respect
		Empowerment of women
3	Financial benefits	Income from sale of goats, manure, fodder seeds
		Revenue from breeding services
		Employment for CAHWS and Social mobilizers
4	Physical benefit	Improved housing of farmers
5	Environmental benefits	Increase in soil fertility through goat manure
		Good quality air through plantation of trees
		Enhanced pollination by bees

The goat sector in Nepal has always had a strong connection with rural areas. This sector was always effectively utilizing the natural resources of the rural areas, this primarily including the

indigenous vegetation, for the production of valuable goods. However, the level of income from farming of livestock mainly depends on the size of the flock, irrespective of the animal's productivity (Apostolopoulos and Rogdakis, 1996). Farmers rely more on the increase of the flock size which results in increasing family income from subsidies and other compensations, rather than increasing production efficiency. On the other hand farmers are more interested in improving labor efficiency rather than making capital investments (Spathis et al., 1998).

Goat production in these areas played a successful role in rural prosperity given its various agri-product possibilities and its socio-economic benefits including food security, income generation, nutrition, and farm system stability. The project has brought substantial changes in enhancing food security and diversifying the livelihoods of farmers. The target farmers were economically empowered, developed greater control over their resources, and increased their capacity to participate in household decision-making and to engage in other social activities.

Once a household completed the goat transfer to the counterpart in the second group, the sale of excess goat stock became common practice. It is clear that the income from goat sales has had a substantial impact on the rural poor by enabling them to secure their food supply and improve their livelihoods. Providing the farmers with goats enhanced their ability to provide adequate nutrition to their families via the direct use of goats meat, or through the use of cash derived from the sale of live animals or their products. Cash income became especially important for families to pay for education or to buy other household or farm necessities. The sale of excess livestock and livestock products also had a beneficial effect on the region's economy. Improvements in housing condition of farmers were observed.

In the community, 80 breeding bucks, and 490 castrated male goats were sold to generate, in toto, NRs. 2.93 million by the ending of the project (Table 3.6). One explanation could be that these farmers kept their goats instead of selling them to have a source of capital that can be liquidated for immediate cash needs. Farmers who mainly sell in distress need support programs to protect their small flocks from sale. Farmers who sell for immediate cash needs need strengthening in planning skills and facilitation of options for reinvestment. It is important to note that all farmers sold live animals and no value-adding activities were reported. This is due to limited facilities in urban and rural areas and a general lack of awareness and knowledge about value addition.

The goat project improved family welfare in small scale mixed farming systems by improving the productivity of goats. The project reduced poverty level by enabling marginal farmers to make sustainable improvements to their wellbeing through more effective management of their human and natural resources. Farmers increased their income, improved nutrition of the family, stability of the household and self reliance. Goat farming by marginalized, ethnic groups and women of the community for improving their economic status created great interest in the peripheral communities. Small holder farmers had few options to improve their lives and the

lives of their children. Many demands are placed on family incomes for food, clothing, school fees and healthcare. Goats became the only assets of the family in the time of trouble or for cash.

The Capacity building in goat husbandry has improved farmers' understanding of local and national issues, making them better able to defend their rights and manage their natural resources. The emphasis on group approach also ensured that farmers were empowered to express their many concerns, have bargaining power, and gain access to improved market information and the information flows. They could also provide community leadership on various issues including health and the environment. Knowledge and skills in production and management of improved goat genotypes has reduced malnutrition among farmers' children. Community empowerment through group approach has led to increased self confidence among farmers who are therefore able to make informed decisions.

When the goat improvement programme entered their area, the **e*xtremely vulnerable*** people, who were originally targeted for a goat improvement programme, received goats, training (skills & knowledge) and fodder tree seedlings and benefited from group credit. This enabled some to move out of extreme poverty into the moderately poor class. The ***extremely dependent*** (elderly and disabled) could probably not keep goats themselves, but benefit indirectly, from increased meat in the community which 'trickles-down' to them from their neighbours and maybe increased.

3.7 Diffusion of Technology and Establishment of Linkages

The group approach helped in ensuring that the model is used and spread among many farmers within a very short period. Through participatory approaches farmers quickly developed ownership which enhanced sustainability. Outputs have also shown farmers capacity to own and spread information and knowledge for enhancing adoption and spread of the model. Output has also shown that even poor farmers, when properly facilitated with skills and new technologies can adopt, implement and spread the model fast enough within the community. Participatory approaches are also good for the community farmer led goat improvement model. Establishment of strong linkages with collaborators and service providers to ensure the model is adopted and used effectively while emphasizing capacity building.

Non-participant resource-poor landless farmers perceived the goat enterprise is an appropriate source of income generation requiring limited cash investment. The community formed a goat-raising group, and non-participant, resource-poor landless farmers showed interest in building improved shed and to adopt the other technologies. Participants and others became aware of hygienic conditions, improved housing, balanced rations and proper disposal of urine and excreta produced from goats.

The project outputs were disseminated in almost 500 families beyond project area. The dissemination of the output helped in the further sensitization of the other families of the peripheral zone. The project led to improved information flows between farmers (horizontal links) and between farmers and researchers and extension agents (vertical links). The majority of farmers had linkages with traditional extension services. Farmer to farmer dissemination practices developed complement existing public and private sector services.

For effective implementation of programmes and rural development, the need to improve linkages with the stakeholders and the farmers is crucial. A stakeholder linkage is the interaction between two stakeholders which allows for exchange or transfer of information, resources or power. Such a linkage may be formal or informal. Informal linkages could be in the form of joint activities or even personal contacts or friendship whereas a formal linkage may be institutionalized with direct supervision or authority, a joint working committee or a liaison person linking stakeholders together. Most linkages among other stakeholders are positive but there is still scope for establishing strong linkages among many of them which are currently non-existent.

4. Conclusion and Implication

Goat production is playing an increasingly important role in the improvement of the income of poor farmers and is contributing significantly to poverty and hunger alleviation in Nepal. Goat farming technologies are economically, socially and technically viable in rural context. Improved management strategies should integrate different management components, namely animal health and housing, feeding and watering, mating and breeding together with goat marketing. It provides a framework on the environment, management components and interactions, which need to be considered by support systems that aim at improving farmers' capacity in goat production. Strategies for improved goat management need to be generated in local contexts, and facilitated by appropriate networks and feedback systems to achieve the expected benefits. Realization of the expected benefits in the form of higher goat production and higher income from goat sales is considered an incentive for farmers to invest more in goat production technologies and enhances sustainability in developing the goat sector.

Social inclusions, participation of local stakeholders, efficiency in service delivery are the major guiding principles of goat production system in the rural area. Community level planning should address the socio-economic issues of the farmers. Creation of income opportunities in the community could be effective instrument to engage the youth in farming. It will impose long term positive impact on the development of nation. Many development workers argue that there are no simple prescriptions to complex problems. Projects must be tailor-made and adapted to specific conditions depending on the local resources available, education level of the people, income levels, cultural and religious factors.

Goat raising is the family business which involves all members of the family. Sustainable household livelihoods will depend on making the local mixed farming system more economic through introduction of modern farming methods, providing quality planting stock/seeds, effective training and extension services, processing, agribusiness development, and linking farmers to markets. There were a number of factors that acted against goat keeping by small scale resource poor farmers- lack of grazing and feed resources due to limited land, lack of water, inappropriate land tenure systems, poor management systems and practices, high prevalence of animal diseases, low genetic potential, inaccessibility of cost of farm inputs, lack of access of to technical information or extension services, lack of market information, and poor infrastructure.

People at the research station used to do research, publish the results and believe that their job is finished. The people at the extension say that they require some tangible thing to convince the people and the literature only will not serve their purpose. On the other hand the people of the development machineries regard themselves as master of all trade and do not seek the opinion of the experts of the field. This demands a system approach in which the entire component should work towards the development of the goat enterprise as a whole. Further the role of the farmers should be acknowledged and their participation should be ensured and it is only possible through bottom-up approach. The resource-poor farmers have the potential to improve goat production and increase off take levels, making use of locally adapted resources -genetic and natural.

The key entry point in improving goat production and off take levels needs to be on strategies that reduce goat mortalities and ensure higher reproductive rates among existing flocks. This can be achieved through developing farmers' awareness and their capacity to effectively use and improve technologies for animal health care, dry season feeding, nutrition, housing and breeding. In implementing these interventions farmer support and facilitating organizations (NGOs and government support services) need to demonstrate the benefits of proactive goat management.

Technology dissemination pathways need to emphasize farmer learning and practice through initiatives such as farmer field schools. In order to train farmers in conducting and evaluating their own experiments in goat production, simple record keeping is recommended (progeny history, flock dynamics, goat body condition scoring). In this view, this learning approach will contribute to sustainable impacts on goat production and marketing.

The lack of good quality breeding stock being a major constraint in goat production, the farms managed on scientific lines should be encouraged to become the centers of production of superior quality breeding animals. Stall-feeding should be encouraged due to shrinkage of pastureland. Goats are often blamed of destroying natural resources which could be changed by adopting management practices. Fodder trees should be planted around the house. Scientific lopping practices should be practiced.

A lesson that can be learnt is to develop projects together with farmers; involving them in the decision making process would help in creating a sense of ownership. Better still if there is a smooth transfer of ownership to a farming community that has a clearly defined management committee with clearly spelt out roles, would help in having sustainable development projects.

Interested educated unemployed youths should be targeted, trained and given financial assistance to start the production of the small stock. Then these youth can provide employment to the poorest of the poor. Various government departments dealing with farmers require a better co - ordinating mechanism for optimal use of scarce financial resources which are otherwise spread thinly over the farmers by each department. Financial and resource management of farmers

should be strengthened to improve ownership and the production capacity. This in turn will further decrease the dependency on the government.

There are no major policy implications but national, regional and district administrations should include policy options that provide producers with information on the benefits of making more efficient and maximum use of local resources.

On the basis of performance experience of the project, the following recommendations are prescribed:

- Participatory approach is the suitable option to reach to the poor communities.
- Superior germplasm of identified goat breeds is lacking in nepalese breeding goat market, so seed animals should be developed in order to increase goat productivity per unit animal.
- Goat marketing problems faced by Nepalese farmers is serious in border area due to imported low cost Indian goats. Government should make a policy to control the market so that local production will be promoted.
- "Passing on gift approach" is although popular in some context, it is not recommendable in terian ultra-poor communities. It is difficult to hand over goat from one farmer to another free of cost. Farmers are not friendly in the approach.
- Specific strategies to control goat TADs and other goat diseases should be developed in the changing microbial activities and environmental context.
- Veterinary Service delivery system should be reformed and upgraded so that it will be accessible to the ultra-poor section of the communities.
- Increased involvement of young population in the farming makes it more effective and sustainable. Commercial goat farming could be possible by using the energy of this generation.

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Finally, I hope that the outputs of this project will also prevail to help to improve livelihoods of other rural communities of Nepal.

November, 2010 Dr. NARAYAN PRASAD BASAULA

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