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GOAT PRODUCTION SYSTEMS IN PUNJAB, PAKISTAN

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ABSTRACT

The present study was conducted to explore the rural goat production system and know the involvement of rural families in this enterprise by using household surveys. The survey was conducted in six villages at two experimental sites (Bahawalpur and Faisalabad). Fifty five households from each village were interviewed using stratified random sampling method. Information about livestock inventory, production of goat, type of production systems and parameters, management of goat, and breeding strategies were recorded. Household heads were the incharge of farm activities at both sites in most of the cases (91.40% vs 91.97%). Interests in goat keeping were similar at both sites (83.11% & 80.15%). Flock sizes averaged 7.14 and 4.87 at both sites, respectively. Majority of the farmers kept goats mainly for home consumption (23.03% and 17.93% at Sites I and II, respectively). Main production system adopted in the spring (58.5% and 55.4%), summer (52.9% & 51.2%), rainy (57.7% & 52.9%) and winter (60.2% & 56.3%) seasons were intensive and semi-intensive at Sites I and II, respectively. Types of housing during day time were free range (47.9% & 35.3%) and during night confinement in sheds (87.0% & 72.9%) at Sites I and II, respectively. Most of the farmers' time was spent on marketing goats at Sites I and II (1.15 vs 1.95 Hrs), respectively. Main feeding regime was grazing and more farmers used grazing at Site-I (45.45%) as compared to Site-II (5.80%) while feed ingredients were used by the majority of farmers at Site-II (26.81%) as compared to Site-I (14.94%). Twice a day watering was common practice at both sites. It is suggested that long term policies should be made in the light of present findings to improve the productivity of rural production systems and facilitate the farmers to the maximum for improved goat production.

Key words: Goat production system, HH survey, production parameters.

INTRODUCTION

Goat keeping is an essential practice in rural areas as goats play an important role in the social setup and culture in rural areas as well as providing a potential source of employment and income. The large population of 64.9 million goat heads (GOP, 2012-13) is yet unable to supply the ever enhancing demand for red meat.

Generally speaking, goat keeping is a low input activity having multidimensional uses: provide the livelihood of a large proportion of rural farmers, landless poor lacking other means of survival, in clearing fodder and cash crop fields; the green foliage, tree leaves, agricultural residues and leftovers. Raising goats as sacrificial animals is still a different production system practiced in some areas of central and southern Punjab using intensive production system and are sold at a very high price on Eid-ul-Azha. Appreciable diversity among and within goat breeds therefore, exists in performance traits like morphological, growth, fertility and other traits. For instance adult body weight may vary from 20-70 kg with exceptional bucks quadrupling this range.

Production systems and socio-economic settings of goat farmers are continuously changing. Currently, both live goats and products are targeted for the export market. However, strategies to respond to the potential growth for domestic use and export of goat and goat products are non-existent. Basic information about valuable indigenous goat breeds, therefore, needed as is the capacity to prioritize, monitor and manage them at both scientific and farm operational levels (ILRI, 2011). To achieve this and other objectives, a regional project "Development and Application of Decision Support Tools to Conserve and Sustainably use Genetic Diversity in Indigenous Livestock and Wild Relatives" is being executed in four countries including Pakistan (Bangladesh, Sri Lanka and Vietnam) by ILRI. Breeding, genetics, socioeconomic and policy aspects of raising goat are being targeted along with capacity building of various stakeholders.

Household surveys are a key source of data on social aspects in the last few decades, providing the most flexible method of recording information and provide a cheaper alternative to censuses for timely data. Usually HH surveys are used for collection of detailed and varied socio-demographic data pertaining to the living conditions, wellbeing, activities of people, and their socio-economic setup. Any population-based subject can be investigated through these surveys and most of the time the surveys provide interesting and practical information. The present study was conducted to explore

goat production systems in Punjab through household surveys.

MATERIALS AND METHODS

Household surveys were conducted in two districts, Bahawalpur (Site-I) and Faisalabad (Site-II) representing southern and central Punjab in the present study under the project **"**Development and application of decision support tools to conserve and sustainably using genetic diversity in indigenous livestock & wild relatives"(www.fangrpk.org). Three villages were randomly selected from each district.

The household (HH) survey followed a stratified random sampling method, stratified by ownership of goats. In each village, from a complete list of households, goat owners were identified and random selection was conducted (n=55). Five "replacement" households were selected in case a household refuses to participate in the survey. A community leader was tasked to inform the selected households in advance of the survey to ascertain the willingness and availability of interviewer.

The data collected included: general household characteristics, farm activities and facilities, livestock inventory, production of goat, type of production systems, management of goat (feeding, watering, health care) and breeding strategies. The data were analyzed statistically with SPSS software (SPSS, 1999).

RESULTS AND DISCUSSION

Household survey showed that head of the house responded the survey in most of the cases while in some cases spouse or son/son-in-law appeared for the interview. Household head was incharge of farm activities in majority cases. In some cases spouse, head's father/mother and, son or son-in-law performed the activities of incharge. Number of younger farmers was greater than older farmers engaged in goat rearing in Bahawalpur and vice versa in Faisalabad. Majority of the farmers were men at both experimental sites and women also showed contribution in farming activities. Farm activities were performed by different persons; in majority cases head of HH played the major role (Table 1). Head usually headed the family activities and acted as a major decision maker in all activities of rural farming community.

Goat Inventory: Average number of goats kept by farmers at Site-I and Site-II was 7.14±7.39 and 4.87±5.89, respectively (Table 2). Farmers at Site-I kept more goats as compared to Site-II due to availability of more space for housing and browsing for animals (Table 2). At Site-I and Site-II, 87.12 and 78.33% heads of household owned the goats, respectively (Table 2).

Farmers at Site-I surpassed farmers at Site-II in rearing goats (83.10 vs 80.15%). Majority of farmers (>80%) at both experimental sites responded positively and showed interest in rearing goats. Only a small percentage of farmers negated to have interest in keeping goats at both sites though the percentage was higher at Site-II but the differences were non-significant (Table 2).

Table 1. Incharge (%) of farm activities at two sites.

Farm owner	Site-I	Site-II
	Mean ±SD	Mean ±SD
Head	91.40±5.51	91.97±4.66
Spouse	0.71±1.23	2.34±2.11
Head's father	0.78±1.35	1.36±2.36
Head's mother	0.71±1.23	0.68±1.178
Hired manager	0.00±0.00	0.00±0.00
Son/SIL	0.69±1.20	2.97±2.94
Daughter/DIL	0.00±0.00	0.00±0.00
[!]Other joint	0.78±1.35	0.00±0.00
[#]Others	4.94±5.36	0.68±1.18

SIL=Son in Law; DIL=Daughter in law; !=Other with HH member; #=Other than HH member

Table 2. Percentage of farmers keeping goats and average number of goats kept at two sites (%).

Keeping goats	Site-I	Site-II
Yes	83.11	80.15
No	16.89	19.85
Overall Mean ±SD (n)	7.14±7.39 (131)	4.87±5.89 (125)

Table 3. Percent ownership of goats at two sites.

Goat owner	Site-I	Site-II
	Mean ±SD	Mean ±SD
Head	87.12±3.47	78.33±3.82
Spouse	0.76±1.31	7.50±0.00
Household(all)	0.00±0.00	4.17±1.44
Head's mother	0.76±1.31	1.67±2.89
Son/Son-in-law	2.27±2.28	5.83±3.82
Other's joint	1.52±2.63	1.67±2.89
Others	0.76±1.31	1.67±1.44

!=Other with HH member; #=Other than HH member

On the average 23.03 and 17.93% farmers kept goats for home consumption at Site-I and Site-II, respectively. Other major reasons were sale of adults (5.42 vs 5.88%) and young stock (2.44 vs 3.64%) at two sites, respectively. On the other hand only a few farmers kept goats for sacrificial purpose (0.54 vs 2.24%), and other reasons (gifts) (0.81 vs 1.68%). Goats were reared for sale of milk (1.96%) on Site-II and as wealth status on

Site-I (0.27%). Average number of goats was 5.82 and 4.24 at Sites I and II, respectively (Table 4).

Production systems: Different production systems were adopted for keeping goats at experimental sites. In spring, summer, rainy and winter seasons the mostly widely used systems at sites I and II were Intensive and semi-intensive systems, respectively. Hence intensive system was the choice of most of the rural farmers (Table 5). Most of the farmers adopted intensive system in all seasons at Site-I but semi-intensive at Site-II in different seasons.

Table 4. Average number of goats of various age groups at two sites.

Age category	Site-I	Site-II
	Mean ±SD	Mean ±SD
# of goats	5.82±5.82	4.24±4.30
Doe	3.59±3.59	2.36±2.23
Buck	1.89±1.89	2.27±1.67
Wether	1.67±1.67	1.68±1.41
Young goat	1.68±1.68	2.21±1.66
Kids	2.74±2.74	2.20±1.44

Table 5. Goat production systems adopted by farmers (%) in different seasons.

	Production system (%)	Site-I Mean ±SD	Site-II Mean ±SD
Spring	Intensive	58.50±0.57	1.60±5.10
	Semi-intensive	35.70±2.33	55.40±4.44
	Extensive	4.10±1.77	42.80±0.00
	[l]Others	1.60±0.57	1.60±0.46
Summer	Intensive	52.90±1.67	0.00±0.00
	Semi-intensive	38.10±3.29	51.20±5.41
	Extensive	7.30±1.65	47.10±4.76
	[l]Others	1.60±0.46	1.60±0.46
Rainy season	Intensive	57.70±0.92	0.00±0.00
	Semi-intensive	35.70±2.63	52.90±5.41
	Extensive	4.90±1.44	45.40±4.76
	[l]Others	1.60±0.47	1.60±0.46
Winter	Intensive	60.20±1.72	0.00±0.00
	Semi-intensive	33.30±3.39	56.30±5.41
	Extensive	4.90±1.44	42.00±4.76
	[l]Others	1.60±0.46	1.60±0.46

[l]Other= no specific system

The type of housing during day and night time was different at both sites (Table 6). Majority of farmers preferred free range during day time and confined goats in the sheds during night time at both sites. The differences between sites were significant (Table 6).

It was found that most of the time spent was on marketing animals and products at both sites but longer hours were spent at Site-II as compared to Site-I. More feed preparation, feeding, watering, milking, processing, manure collecting and cleaning hours were spent at Site-II as compared to Site-I. More cleaning hours were spent at Site-II as compared to Site-I. More the time spent in cleaning is needed for more hygiene, hence lesser chances of outbreak of diseases (Table 7).

Table 6. Type of housing systems in different seasons at two sites.

	Housing (%)	Site-I Mean ±SD	Site-II Mean ±SD
Day housing	Free range	47.9±2.37	35.3±3.64
	Confined in sheds	0.00±0.00	19.30±1.76
	Confined in paddocks	1.60±0.462	2.5±1.44
	Confined fences	22.70±0.46	22.7±0.85
	No special housing	0.00±0.00	5.90±1.32
	[l]Others	27.60±2.86	14.3±1.27
Night housing	Free ranges	2.40±1.39	0.8±0.46
	Confined in sheds	87.00±4.46	72.90±2.72
	Confined in paddocks	1.60±0.46	2.50±0.85
	Confined in fences	6.50±1.27	11.80±0.46
	No special	0.00±0.00	6.70±1.01
	[l]Other	2.40±1.39	5.00±0.85

[l]Other= temporary arrangement using bamboo basket

Table 7. Time spent (Hrs) on different activities at two sites.

Activity (Hours)	Site- I Mean ±SD	Site-II Mean ±SD
Feed preparation	0.74±0.59	0.92±0.84
Feeding	0.35±0.29	0.42±0.97
Watering	0.33±0.26	0.40±0.98
Milking	0.33±0.22	0.55±0.34
Processing	0.25±0.00	0.67±0.29
Caring	0.94±0.97	0.92±0.73
Manure collection	0.43±0.26	0.92±3.86
Cleaning	0.56±0.43	0.81±3.28
Marketing	1.15±1.29	2.16±1.95

Farmers offered different materials for feeding materials to their goats. Majority of farmers grazed their goats and offered feed ingredients at Site-I and II, respectively followed by commercial concentrates at both the sites (Table 8). At Site-II rice straw was more frequently used as compared to Site-I. The differences between feed types were significant between two sites.

Feeding costs per head per year greatly varied at both the sites and averaged PKR 2439.6±3099.5 and 3260.5±5153.3 at Site-I and Site-II, respectively. Amount fed/day/head averaged 1.64±0.06 and 1.71±0.09 Kg at Site-I and sSite-II, respectively.

Farmers got feed from different sources: market (10.00; 9.09%), local shop (40.00; 39.39%), and others (50.00; 51.52%) at sites I and II, respectively.

Sources of water (%) in spring season were: river (21.14; 7.32), well (1.63; 2.44), pond (42.28; 2.44), pipe water (1.63; 0.00), hand pump (5.69; 78.05), and others (27.64; 9.76) percent at sites I and II, respectively. Sources of water in summer were: river (21.31; 7.26), well (0.82; 1.61), pond (42.62; 4.03), pipe water (1.64; 0.00), hand pump (5.74; 77.42), and others (27.87; 9.68) percent at Sites I and II, respectively. In rainy season farmers obtained water from river (21.14; 7.32), well (1.63; 1.63), pond (42.28; 3.25), pipe water (1.63; 0.00), hand pump (5.69; 78.05), and others (27.64; 9.76) percent at Sites I and II, respectively. In winter season farmers obtained water from river (21.14; 8.20), well (1.63; 1.64), pond (42.28; 2.46), pipe water (1.63; 0.00), hand pump (5.69; 77.87), and others (27.64; 9.84) percent at Sites I and II, respectively.

Table 8. Feed type used by farmers (%) at two sites.

Feed type	Site-I	Site-II
Rice straw	7.14	18.84
Wheat straw	5.19	6.52
Kitchen waste	5.84	6.52
Commercial concentrates	20.78	22.46
Grazing on cropland	45.45	5.80
Green fodder	0.65	13.04
Feed ingredients	14.94	26.81
Feeding cost (PKR)/ head/ year	2439.6±3099.5	3260.5±5153.3
Amount fed (Kg)/ head/ day	1.64±0.06	1.71±0.09

Water should be available ad lib to the animals. But most farmers usually provided water two times at both sites whereas only a few farmers offered water throughout the day at Site-II (Table 9).

Water was collected by HH head (22.41 vs 24.79%), spouse (30.17 vs 29.06%), all household (16.38 vs 17.09%), head's father (0.86 vs 0.00%), head's mother (0.86 vs 0.00%), son/daughter (16.38 vs 19.66%), hired labour (1.72 vs 0.85%), all or any (9.48 vs 6.84%), and other (1.71 vs 1.71%) at Site-I and II, respectively. Cost of water/year averaged PKR 52.85±117.4 and 90.48±240.6, at Site-I and II, respectively.

Table 9. Watering frequency at two sites.

How often watering (% farmers)	Site-I	Site-II
Once a day	3.33	22.13
Twice a day	72.50	58.20
Thrice a day	23.33	13.93
Through the day	0.00	1.64
Others	0.83	4.10

Majority of farmers replied in 'Yes" about provision of health care services at Site-II as compared to Site-I. Percentages of farmers who have no access to health service were 54.85±7.04 and 32.84±10.09 at Site-I and Site-II, respectively. Performance of health care activities showed the awareness of farmers about keeping their flock healthy. The number of such farmers who were well aware of these activities was virtually small at both sites (Table 10). Treatment by quack was common at Site-I as compared to Site-II. A small number of farmers at Site-II also applied local home-made herbal treatments.

Table 10. Health care service provided to goat farmers at two sites.

Service provided	Site-I	Site-II
	Mean ±SD	Mean ±SD
Yes	45.15±7.04	67.16±10.09
No	54.85±7.04	32.84±10.09
Vaccination	20.61±6.06	14.40±2.40
[!]Other preventive method	0.00±0.00	1.60±0.462
Treatment of sick	14.50±2.68	24.80±7.56
[#]Others	32.06±4.25	17.60±2.57
Cost of service / household	743.41±899.11	697.95±1548.78

!=quack treatment; #=local herbal treatment

Cost of health service/animal/year averaged PKR 743.41±899.11 and 697.95±1548.78 at Sites I and II, respectively. Professional fee/animal/year averaged PKR 192.09±273.81 and 142.32±216.95 at Site-I and Site-II, respectively.

Different persons took care of the animals: adult males (37.50; 70.97%), adult females (40.00; 3.23%), children (0.00; 3.23%), hired worker (0.00; 0.00%), all or any adult (15.00; 6.45%) and any household member (7.50; 16.13%) at Site-I and Site-II, respectively.

The overall time consumed on various activities for managing goats at Sites I and II averaged 3.05±2.26 and 3.01±2.36 hours, respectively. The percentage of farmers who prepared feed at Sites I and II was 90.24 and 86.99, respectively. Percentages of different members involved in feed preparation were: adult males (57.66, 56.19%), adult females (23.42, 18.10%), children (0.90, 7.62%), all or any adult (12.61, 5.71%), and all or any household members (5.41, 12.38%), at Sites I and II, respectively. Farmers who fed the goats at Sites I and II were 81.87 and 91.07%, respectively. Adult males (54.05, 57.14%), adult female (27.93, 25.71%), children (0.90, 6.67%), any household adult (13.51, 5.71%), any household member (5.41, 12.38%) helped in feeding goats at Sites I and II, respectively. Percentages of farmers who offered water to goats were 98.37 and 86.99% at Sites I and II, respectively. Watering person

were adult males (43.80, 46.23%), adult female (34.71 vs 26.42%), children (1.65 vs 7.55%), any household adult (14.05 vs 6.60%) and any household member (5.79 vs 13.21%), at Sites I and II, respectively.

The 14.75 and 84.00% farmers milked their goats at sites I and II, respectively. Adult men (22.22 & 36.36%), adult females (5.56 & 0.00%), children (5.56 & 9.09%), any adult (50.00 & 18.18%) and, any household member (16.67 & 36.36%) milked the goats, at Sites I and II, respectively. Farmer who did not involve in milk processing numbered 97.56 and 3.25% at Sites I & II, respectively. Milk was processed usually by adult females and any adult. Adult males (37.50 & 73.33%), adult females (40.00 & 3.33%), any adult (15.00 & 6.67%), and any HH member (7.50 & 16.67%) acted as caring person for the sick goats at Sites I and II, respectively. A good number of farmers collected manure (62.60 and 49.59%) at sites I and II, respectively. Manure collection persons were adult male (54.79 & 59.32%), adult female (35.62 & 33.90%), children (1.37 & 3.39%), and any HH (8.22 & 3.39%), at both the sites, respectively. Shed cleaning was done by 69.11 and 66.67% farmers at Sites I and II, respectively. Cleaning persons were; adult males (50.65 vs 60.00%), adult female (44.16 vs 36.00%) and any HH (5.19 vs 4.00%), respectively. All the family members were involved in milking who were available at the spot at both sites.

Natural controlled and uncontrolled breeding methods were adopted at two sites. A total of 71.07 and 59.43% farmers used natural uncontrolled breeding of goats while 28.93 and 40.57% farmers used natural controlled breeding method at Sites I and II, respectively. The reasons for natural breeding were: ethical grounds (5.36 vs 5.05%), only method available (94.64 vs 91.92%) and high cost of artificial insemination (0.00 vs 3.03%) at sites I and II, respectively.

Breeding bucks were obtained from different sources: from own farm (25.62 & 17.14%), specific buck in the village (23.14 & 24.76%), and any buck in the village (51.24 & 58.10%) at sites I and II, respectively. Breeding females were obtained from own farm (100 vs 95.05%), specific animal in village (0.00 vs 2.97%), and any animal in the village (0.00 vs 1.98%) at Sites I and II, respectively. Breeding decision were made by household head in most of the cases (92.71 vs 83.53%), but spouse also made decision in some cases (3.13 vs 9.41%) at both sites, respectively. In some cases (2.08 vs 2.35%) herdsman or farm worker made the decision while sometime other persons made this decision (2.08 vs 4.71%), at Sites I and II, respectively. Farmers reported different breeding objectives at sites I and II, respectively as improvement/maintenance (100 vs 69.05%), enhanced meat productivity (0.00 vs 11.90%), enhanced milk yield (0.00 vs 7.14%) and others (breed conservation) (0.00 vs 11.90%). Different mating controlling strategies were adopted by the farmers at two sites: mating best male to best female (72.97 vs 69.23%), avoided close relative mating (21.62 vs 10.26%), gift/loan of high quality (0.00 vs 2.56%), and exchange of high quality male (5.41 vs 17.95%) at Sites I and II, respectively. Reason for replacement included unsatisfactory performance (7.32 vs 14.29%), health problems (4.88 vs 34.29%), getting better progeny (9.76 vs 20.00%), inbreeding (31.71 vs 0.00%), old age (14.63 vs 28.57%) and others (31.71 vs 2.86%), at Sites I and II, respectively.

The mean conception rates at Sites I and II were 1.40±0.98 and 1.95±1.80, respectively. Replacement age averaged 4.23±1.98 and 4.27±2.51 years, at sites I and II, respectively.

Majority of farmers reported no breeding problem at Site-I as compared to Site-II. Majority of farmers at Site-II reported unavailability of breeding male. The reasons were: unavailability of pure breed (50.00 vs 38.89%), low male fertility (25.00 vs 5.56%), and low female fertility (25.00 vs 0.00%), unavailability of good known quality breeding animals (0.00 vs 11.11%), sexually transmitted disease (0.00 vs 11.11%), and others (0.00 vs 33.33%). Higher response of farmers reporting 'no problem' showed ignorance of breeding plans and practices.

Natural service was provided to greater number of animals at Site-II as compared to Site-I. Cost of breeding per service averaged PKR 166.67±57.74 and, 236.84±123.43 at Sites I and II, respectively. Number of does served in last 12 months averaged 1.33±0.58 and 1.71±0.59/household, at both the sites, respectively.

House hold surveys provide ample firsthand knowledge about activities of households and help make appropriate guidelines for the betterment of communities. Household surveys provided useful data about goat production system, role of goat in livelihood and involvement of family members in goat farming activities.

Farmers keep goats for a number of reasons like lesser investment, less expenditure and ease of keeping and potential source of income, and most probably an alternative source of agriculture farm income. Marketing of livestock and their products was a problem for the small holders. Sustainable land management and utilization is essential for increased productivity from animals (Zuryak *et al.*, 2001). Present study however, revealed land utilization and ownership to some extent, and supported other studies. Shrinkage of grazing land is responsible for lower productivity and forcing the farming communities towards intensive farming system. This also affected the flock sizes and resulted in reduced flock's sizes. Hence farmers tend to keep small number of animals according to their resources and needs.

Ownership showed a remarkable contribution of women but their involvement was not to the level as reported by other studies in other countries (Jaitner *et al.*, 2001). Average number of animals owned by the farmers

as found in the present study matched with finding of Jaitner *et al.* (2001). Breeding males are reared in the same flocks, housed inside at night under shelter, kept free at daytime, and supplementary feeding was not common. As far as vaccination was concerned the reports differed from the present study. The differences might be due to availability of vaccines and vaccinators, cost of vaccines, and other reasons. As regards the ownership, most of the farmers kept goats because of less risk involved. Women were also keeping goats. The findings of Dossa *et al.* (2008) partially matched with present findings where they reported women majority as goat owners. Jaintner *et al.* (2001) also gave similar results showing that women played leading role in small ruminant production especially in housing and feeding. A majority of women owned goats (67%) with lower average number of animals. Most of the breeding males were farm born in their respective flocks. Animals were left free in dry season and tethered or flocked in rainy season and housed during night. Supplements were not usually provided. Vaccination was partly carried out. These findings partly matched with present findings but it appeared that our goat production system had somewhat better situation. Finan (2011) revealed the participation of women in goat keeping, supporting present findings to some extent. Udo *et al.* (2011) found that keeping small animals was a secondary activity in rural household or essential source of small income for the poor. These animals serve to increase the income of the family.

Dossa *et al.* (2007) found that goats were kept for sale (cash requirement). The most important problems faced by the farmers were disease outbreak (mortality), poor housing and feed shortages. Bosman *et al.* (1997) reported that cassava products and maize offal were the most commonly used feeds in Nigeria. Such feeds did not show good growth. They suggested a change in amount and type of feed for optimum results. Ambruster and Peters (1993) reported that management, flock and season had significant effects on performance traits. Free roaming flocks performed better showing positive effects of grazing and browsing on performance. Kids born in rainy season had poor growth showing need of improvement in flock health care. Kid mortality was also quite high than that of adults.

According to Bett *et al.* (2009) provision of marketing services were ranked first followed by veterinary services. Wilson (2007) reported unknown genetic potential, poor management, inadequate nutrition and minimal health care as major problems of livestock farming. Kosgey *et al.* (2008) found that only 18% farmers kept goats for regular cash income, meat, manure, milk and sale in emergency. Regular cash and cash in emergency were the highest priorities. Income from sale was spent on school fee, purchase of food, farm investment, medication, off-farm investment, social activities and purchase of animals. These findings were supported by the present findings.

Zaibet *et al.* (2004) identified flock sizes which were larger than those found in the present study. It was natural that income generation depended on flock size and increased with increase in flock size. Kumbhaker (1989) reported home consumption of the own production and these findings also matched with the present findings. Most of the activities were performed by farmers themselves. Farmers were involved in purchasing animal feed from local market to substitute grazing activity. Hence there was increase in farmers' expenses to a great extent. Their findings contradicted present findings. It was found that goats were kept in small groups while individual households housed in shelters during nights. Purposes of raising goats were nearly similar everywhere. The main management system was free ranging during the day and penning at night. According to Kirk (1996) small ruminants are easy to cash assets and they reduced market and climate risk and optimize the use of available resources (Ellis, 1998). The age and gender of the farmers are important factors when looking at livestock ownership. Study of Jaitner *et al.* (2001) contradicted the present findings that small ruminants are not pooled household resources and are independently owned and managed by household members who were often females. The present findings contradicted the findings of Bett *et al.* (2009) about the sex of owner of the farm. Most of the parameters to access to veterinary services differed from the findings of Bett *et al.* (2011). Decision making for selling or purchasing of animals was mostly done by the household head, matched with the findings of Ayenew *et al.* (2004).

Present findings supported most of the findings of Jaitner *et al.* (2001) regarding keeping of goats, size of flock, breeding males, production and housing system. Flock sizes and reason for keeping goats partially matched with their findings. Household head, their sex, animal ownership and type of production system adopted also matched with the present findings. Our results supported the results of Dossa *et al.* (2007) regarding ownership pattern, reasons for keeping goat, breeding practices and for other important traits. Reasons for keeping goats were also not in-line with present findings. Flock size as found in our study was similar to the findings of Gwaze *et al.* (2010) while breeding management differed partially. Purpose of keeping goats slightly matched but findings about production systems were not similar the present findings.

Conclusion: Household surveys proved as useful tools in understanding the goat production system in rural areas and involvement of rural household in such activities. Production systems were intensive, semi-intensive and extensive but intensive system was more widely used. Housing types were free range during day time, and

confined in houses at night. Goat keeping was source of income and employment for rural communities. Goats appeared integral part of household business and day to day income support activity.

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