

Full Length Research Paper

Assessment of dairy goat production in Korahey Zone, Somali, Ethiopia; Constraints and opportunities

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Characterization of dairy goat production, constraints, and opportunities was the aim of this study. The study was conducted in selected districts of Korahay Zone, Somali Regional State. The weredas and populations (owning goat) were selected purposively to assess management practices, performance of dairy goat, and problems of goat production in selected districts of Korahay Zone. Parameters like milk production of goat, purpose of keeping of goat, and major constraints of goat production were collected. A semi-structured questionnaire was used to collect data. The collected data were analyzed using statistical package for social science (SPSS) version 20. The constraints faced by the respondents were ranked and analyzed by the ranking index. The current result indicates that the purpose of goat production by pastoralists in the study area was for income source (buck) and milk consumption (doe) purpose. According, to the result the dairy goat production were hindered with different constraints like feed shortage, land shortage, water shortage, lack of improved forage, feed cost enhancement, disease prevalence, lack of veterinary service, lack of improved goat breed, poor government attention and lack of market access to sell goat and goat products. Therefore, it is recommended that the government should give attention for pastoralists like provide proper veterinary service, improved breed, breeding system, implementing community based breeding and health management practice and adjust market access.

Key words: Dairy, constraint, production, opportunity.

INTRODUCTION

Ethiopia is the country that possesses a large livestock population in the tropics with an estimated number of 60 million cattle, 60 million sheep and goats, 4.5 million Camels, 52 million poultry, 10 million bee colonies and 7.2 million equines (Tegegne and Feye, 2020). Livestock are an important component of nearly all farming systems in Ethiopia and it provide milk, meat, draught power, transport, manure, hides and skin and it serves as a

source of cash income (Funk et al., 2012). The subsector contributes about 16.5% of the national Gross Domestic Product (GDP) and 35.6% of the agricultural GDP. It also contributes 15% of export earnings and 30% of agricultural employment. The livestock subsector also support and sustain livelihoods for 80% of all rural population (Leta and Mesele, 2014). Small ruminants (sheep and goats) have a unique niche among the small

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holders as they are relatively easy to manage, require comparatively less investment, have a shorter generation interval and are able to better utilize forages which are high in anti-nutritional factors besides graze on the slopes besides graze on the slopes which are otherwise inaccessible to large ruminants (Timon and Hanraha, 1986).

Goats are utilized for milk production by many producers in most pastoral (Fikru and Gebeyew, 2015) and some crop-livestock production system areas (Gebreegziabher et al., 2016). The milk production potential of Ethiopian indigenous goats has not been adequately studied in the past and most of the studies are done on-station. The milk from goats has also less concern as compared to camel milk and no different supplements provided for these dairy goats in the flock.

Such low management causes long kidding interval, less prolificacy and after long time decreases goat population in the area. In less populated goat inbreeding increase and variation among the flock decrease; this in turn makes improvement by selection difficult. And then dairy goat keepers access less benefit and also this cause economic loss at country level. In pastoral areas like Korahey zone, goats are important components of the farming system, which benefit small holder farmers in generating cash income as well as milk. Despite their potential in the area, productivity and management of goat remained quite low. The goat populations in Korahey zone have dual purpose (uses for milk and meat production). In study sites researches conducted were inadequate on dairy goat production management.

Therefore, it is crucial to systematically describe the management systems in order to plan and design appropriate research and improvement interventions that are relevant for goat production management. Therefore, this study was aimed to describe dairy goat production, constraints and bridge the information gap among communities.

MATERIALS AND METHODS

Study area

The study was conducted in selected Districts of Korahey zone which is located in Somali Regional State. Somali regional state of Ethiopia is the second largest region of the country following Oromia region by having a land cover of 350,000 Km². It has a border with Somalia, Djibouti and Kenya countries. Similarly, Somali region bordered with Afar and Oromia regions in West. Somali region has 93 woreda (districts), 11 zonal administrates, 6 town administration and 1224 kebeles in which Korahay is one of them. Korahay zone had a total population of 312,713; of 177,919 were men and 134,794 were women (CSA, 2007). Korahay zone located at 1004.1 km from Addis Ababa the capital city of Ethiopia. The topography is lowland plain. The zone climate characterized as tropical and semi-arid in which temperature ranges from 23 to 36°C. The area has bimodal rainfall pattern with two main rainy seasons in which the first is 'Gu' that occurs from mid-April to the end of June. The second rainy season is 'Deyr' occurs from early October to late December. Map of the study area is depicted Figure 1.

Sampling

Both purposive and random sampling methods were employed to select sample of households (HHs). The districts (Shilabo, Shegosh and Kabridahar) were selected purposively, based on the population of Goat and also the willingness of the people rearing Goat. Based on the above criteria the populations (owning goat) were purposively selected. Then cross-sectional survey was conducted prior to main survey to identify the distribution and kebeles with more potential of goat breeds in the study districts. Based on the cross-sectional survey and secondary information gathered from zonal, districts level of agricultural and pastoralist office, 6 kebeles were selected. Accordingly, the totals of 120 household heads (sample size) were selected (20 households from each kebele) randomly.

Method of data collection

A semi-structured questionnaire was used to gather information from the selected households. Data were collected from selected respondents on;

- 1) Socio economic characters of the respondents and the livestock demography and Goat demography in particular,
- 2) Purpose of keeping and economic benefit of goat,
- 3) Production and reproduction performance of goat,
- 4) Major production constraints and opportunities.

Data analysis

The data collected from each study sites was checked for any error and corrected during the study period, coded and entered into computer for further analysis by Statistical Package for Social Sciences (SPSS 20.0 for windows, 2013). The data were divided into qualitative and quantitative traits; qualitative traits are assessed using non parametric method (Chi square) while descriptive statistics are used to access the quantitative traits values of which are compared using one way ANOVA. While the means for the quantitative traits are compared using Duncan's Multiple Range Test and the values are considered significant at $P < 0.05$. The indices is calculated as follows Sum of (3 for rank 1 + 2 for rank 2 + 1 for rank 3) given for an individual reason divided by the sum of (3 for rank 1 + 2 for rank 2 + 1 for rank 3).

RESULTS AND DISCUSSION

Socio-economic and demographic characteristics of respondents

Sex, family size, and educational background of the respondent in three districts (Shegosh, Kebridahar and Shilabo) are presented in Table 1. The surveys have shown that the majority of the households in both districts were headed by a male which accounted 70, 67.5 and 57.5% in Shegosh, Kebridahar and Shilabo respectively. The mean ages of respondents were 50.875 ± 2.413 , 48.85 ± 1.998 and 43.725 ± 2.045 years for Shegosh, Kebridahar and Shilabo respectively. The age of respondents indicates that society was under a high productive age group. The highest proportion of the working age group is important to undertake agricultural activities (Tassew and Seifu, 2009). The average family

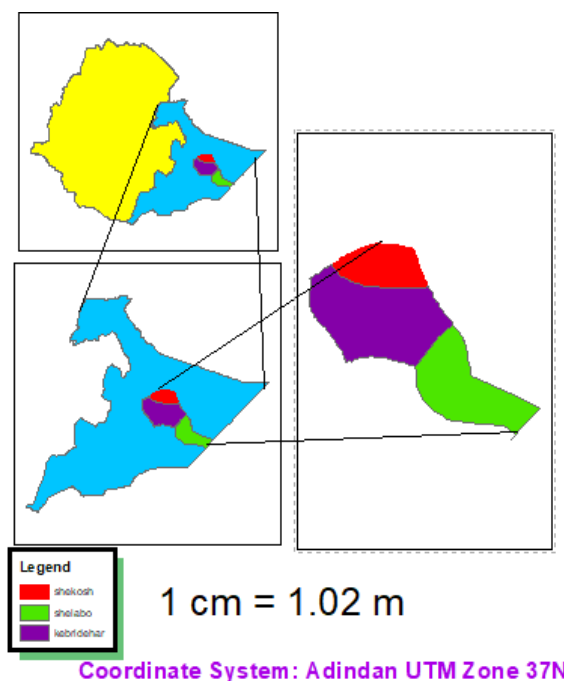


Figure 1. Map of the study area.
Source: Survey Result

Table 1. Socio-demographic characteristics of households.

Parameter	Shegosh	Kebridahar	Shilabo	χ^2	P-value
HH sex (%)				1.54	0.46
Male	70.00	67.50	57.50		
Female	30.00	32.50	42.50		
Age (mean \pm SE)	50.87 \pm 2.41	48.85 \pm 1.99	43.72 \pm 2.05		
Family size (mean \pm SE)	13.57 \pm 1.16	13.13 \pm 0.95	9.62 \pm 0.78		
Education status (%)				68.98	0.00
Illiterate(unable to read &write)	2.50	25.0	15.0		
Elementary(1-4)	0.00	15.0	10.0		
Primary(5-8)	5.00	10.0	20.0		
Secondary(9-10+2)	0.00	20.0	10.0		
Religious school	50.0	20.0	42.5		
TVET	0.00	10.0	0.00		
Elementary and religious school	12.5	0.00	2.50		
Primary and religious	27.5	0.00	0.00		
Secondary and religious	2.50	0.00	0.00		

Source: Survey Result

size was 13.575 for Shegosh, 13.125 for Kebridahar and 9.625 for Shilabo, where the large family size was observed in Shegosh. This is recognized to low awareness of family planning and they considered many members of the family as an assist and security in times

of retirements (Fikru and Gebeyew, 2015).

The majority of respondents were educated within Religious school in Shegosh (50%) and Shilabo (42.5%) and illiterate in Kebridahar (25%). Even if the education is religious, the better background of education might be

Table 2. Livestock composition (mean \pm SE).

Livestock composition	Shegosh	Kebridahar	Shilabo
Breeding does	24.15 \pm 2.33	26.9 \pm 1.62	22.22 \pm 1.07
Breeding buck	5.50 \pm 0.49	5.37 \pm 0.41	4.67 \pm 0.29
Castrated buck	0.45 \pm 0.14	0.75 \pm 0.24	2.42 \pm 0.43
Kids	4.67 \pm 0.56	6.30 \pm 0.47	7.90 \pm 0.49
Sheep	7.92 \pm 1.72	8.325 \pm 1.17	13.75 \pm 0.85
Cattle	4.20 \pm 1.29	2.95 \pm 0.49	4.05 \pm 0.28
Camel	6.62 \pm 0.85	12.70 \pm 1.25	10.27 \pm 0.72
Poultry	3.47 \pm 0.70	1.87 \pm 0.47	1.20 \pm 0.35

Source: Survey Result

Table 3. Purpose of keeping goat (Index).

Purposes	Index					
	Shegosh		Kebridahar		Shilabo	
	Buck	Doe	Buck	Doe	Buck	Doe
Meat	0.125	0.066	0.170	0.112	0.137	0.037
Milk	0.00	0.333	0.00	0.229	0.00	0.404
Ceremonies	0.033	0.020	0.020	0.008	0.008	0.00
Wealth status	0.020	0.016	0.070	0.079	0.170	0.145
Saving/live bank	0.237	0.166	0.245	0.229	0.125	0.083
Income source	0.358	0.1875	0.358	0.237	0.304	0.133
Breeding	0.225	0.208	0.133	0.104	0.254	0.195

Index = Σ of [3 \times number of household ranked 1st+ 2 \times number of household ranked 2nd+ 1 \times number of household ranked 3rd] given for particular valued feed source divided by Σ of [3 \times number of household ranked 1st+ 2 \times number of household ranked 2nd+ 1 \times number of household ranked 3rd] summed for all valued feed source.

Source: Survey Result

good potential for implementation of improving management practice. However, illiteracy will have a negative effect on the development of the different agricultural sector (Tassew and Seifu, 2009).

Livestock composition

The major livestock species in the study area were goats, sheep, cattle, camels, and poultry (Table 2). Goats have the highest death rate of any livestock species in the study area. This might be due to the fact that goats can highly adapt to the hot environment, could serve as an immediate source of income, have a fast generation interval, high prolificacy, thrive well under drought and extensive grazing land, and there is higher encroachment of grass land by bushes which are used as feed for goats. In line with the current study, the composition of livestock varies depending upon the type of climate, with a high proportion of goats adapted to moist Kola than moist Dega and moist Woyina Dega (Assefa, 2007).

The number of goats in this study is relatively higher

than that reported by Tsegaye (2009), who reported 19.76.6 in Metema wereda. The average number of breeding does was higher than any other class of goat in the study area. This might be due to the fact that lowland pastoralists keep the female goats (does) for milk consumption purposes only.

Purpose of keeping dairy goat

Table 3 summarizes the purposes of keeping goats (buck and doe) and the ranking of their purposes across the three districts. The practice of keeping goats in pastorals in general and in the study area in particular, was widespread. The respondents reared the goat for different purposes, such as meat, milk, ceremonies, wealth status, saving/live bank, income source, and breeding. The most ranked purpose of keeping a buck across all districts was as an income source, with index values of 0.358, 0.358, and 0.304 for Shegosh, Kebridahar, and Shilabo, respectively. The primary purpose of keeping goats for cash income in this study

area was in agreement with the reports of Arse et al. (2013) in Adami Tulu, Arsi Negelle and Fentale districts; Belete et al. (2013) in Meda Walabu, Sawena and Rayitu; and Fikru and Gebeyew (2015) in Deghabour district. Additionally, Shenkute et al. (2010) and Assefa (2007) reported that small ruminants are reared in many parts of the country mainly for income generation.

Does in this study area are kept as sources of milk consumption in both districts (Table 3). This is due to the fact that pastoralists keep their livestock for household consumption in general and their goats as a source of milk in particular. According to the respondents, goat milk is believed to have medicinal value for children and contribute more to the well-being of a human baby (Belete, 2013). In agreement with this study, Ethiopian goats in the lowlands are highly valued and reared mainly for milk and meat production (Kassahun and Solomon, 2008).

Production and reproduction performance of goat

The average market age of goats in Kebridahar and Shilabo districts was good as compared to Shegosh district. This may be due to management differences. The report indicated that it does reach market age earlier than the buck. This finding was in contrast with a report by Belete et al. (2015), which stated that the mean marketing age for goats in the Bale zone was 11.670.38 months for males and 12.33 months for female goats. But the average culling age due to old age was earlier for bucks when compared with does. This may give a chance for breeding bucks and does to produce more offspring.

The average age at sexual maturity (age at first mating or service) of goats in the study areas was earlier in Kebridahar when compared with Shegosh and Shilabo districts. This performance had no significant difference when compared with the reproduction performance of goats in the southern region of the former Sidama zone (Wonsho, Dale and Loka Abaya districts), where the overall average age at first mating of goats was 9.76+0.24 months (Assefa et al., 2011).

As indicated in Table 4, about 65.0% of the people in Shilabo district have twin birth types and 55.0% of the birth types in Shegosh district are single and twin types. Because there is no competition for sharing doe milk, single birth is advantageous for faster growth. This is good not only for offspring, but also for households using goat milk. But, under extensive management of low input with a long kidding interval, genetic variation is low and improvement by selection is a problem. The twin birth type can favor an increase in the goat population and diversification. But, since there is competition for milk between kids, there is a low growth rate and also less milk for goat keepers. For all these problems, better management is an unconditionally imperative solution.

The average kidding interval of goats in study areas was indicated in Table 4. This performance was earlier

when compared with Metema goats, found to be 13.6±2.44 months as reported by Tsegaye (2009) in the Amhara region. This difference may be due to genetics and management. The average kidding interval reported by respondents indicated that goats in the study areas could give birth to offspring three times per two years on average. Goats in Shilabo district show little delay relative to Shegosh and Kebridahar districts. This kidding interval was not due to lack of breeding bucks because flock structuring by separation is unknown or bucks and does are herded together in study areas that favor year-round mating. But, it is management practice that plays a crucial role. This kidding interval was less than that of goats in the Bale zone reported by Belete et al. (2015).

Constraints of goat production

Identification of major constraints to goat production in a given area is a prerequisite to planning appropriate management strategies for improving production and productivity of dairy goats. Hence, dairy goat owners were asked to indicate the most important production constraints of goats in their respective districts (Table 5). According to the findings, various constraints in the study area hampered dairy goat production. This includes a lack of feed, a lack of land, a lack of water, a lack of improved forage, a lack of feed cost enhancement, disease prevalence, a lack of veterinary service, a lack of improved goat breeds, a lack of government attention, and a lack of market access to sell goats and goat products.

Water shortage and feed shortage were ranked as the first and second identified constraints in Shegosh and Kebridahar weredas. However, feed shortage is the first and water shortage is the second problem in Shilabo district. Water shortages are a common problem for both humans and livestock in lowland areas. Restriction of water may result in poor nutrition and digestion. Feed scarcity limits small ruminant productivity, which has worsened due to drought and a lack of awareness and practice of feed conservation techniques. Hence, it is obvious that there is a serious problem in exploiting the genetic potential of the animals due to the lack of good quality year-round feed. Pastoralists also identified drought-related shortages of drinking water and feed as the major problem for their animals.

The major goat rearing constraints discovered in this study area were similar to those discovered by Markos (2006) and Gizaw (2010), who reported that the major goat production and productivity challenges in communal production systems include feed scarcity, water scarcity, and disease prevalence. Similarly, Fikru and Gebeyew (2015) reported that the seasonal variation in the quantity and quality of feed in the Degehabur zone of the Somali region was the acute problem of sheep and goat production. The occurrence of periodic drought and scarcity of water were the higher ranked problems that

Table 4. Production and reproduction performance of goat **values across the rows are significantly different at P<0.01.

Variable		Shegosh	Kebridahar	Shilabo
Average market age in month (mean ±SE)	Buck	9.4±0.38	7.23±0.23	7.88±0.33
	Doe	8.73±0.31	6.25±0.24	7.6±0.24
Average culling age due to old age in year (mean ±SE)	Buck	5.53±0.16	5.28±0.2	7.35±0.38
	Doe	7.12±0.2	8.2±0.29	9.55±0.33
Average age at sexual maturity (mean ±SE) in month	Buck	9.58±0.29	8.17±0.23	8.93±0.33
	Doe	8.7±0.29	7.15±0.26	8.53±0.29
Average age at first kidding (mean ±SE) in month		12.7±0.23	11.8±0.25	12.3±0.3
Average kidding interval (mean ±SE) in month		6.1±0.15	5.9±0.22	7.63±0.29
Average reproductive lifetime of does in year		8.65±0.18	9.75±0.29	7.8±0.3
Average number of kids per doe life time		11.1±0.23	12.5±0.24	11.6±0.3
Birth types (%)		X ² =21.26		P=0.002
Single		35.0	42.5	25.0
Twin		10.0	22.5	65.0**
Triple		0.00	2.50	0.00
Single, twin		55.0	32.5	10.0

Source: Survey Result

Table 5. Constraints of goat production.

Constraints	Shegosh		Kebridahar		Shilabo	
	Index	Rank	Index	Rank	Index	Rank
Feed shortage	0.255	2	0.253	2	0.298	1
Land shortage	0.02	9	0.008	9	0.00	9
Water shortage	0.288	1	0.26	1	0.18	2
Lack of improved forage and pasture	0.003	8	0.025	8	0.033	7
Feed cost increase/enhancement	0.046	7	0.04	7	0.031	6
Diseases prevalence	0.071	4	0.105	3	0.156	4
Lack of veterinary service	0.05	6	0.096	4	0.031	6
Lack of improved breeds	0.126	3	0.045	6	0.018	8
Poor government attention	0.071	4	0.061	5	0.071	5
Lack of market access to sell goat and its product	0.066667	5	0.105	3	0.17	3

Index = Σ of [3× number of household ranked 1st+ 2× number of household ranked 2nd+ 1× number of household ranked 3rd] given for particular valued feed source divided by Σ of [3× number of household ranked 1st+ 2× number of household ranked 2nd+ 1× number of household ranked 3rd+....] summed for all valued feed source.

Source: Survey Result

sheep and goats faced in lowland agro-ecological zones than in highland and midland agro-ecological zones (Ebrahim and Hailemichael, 2012). Shortage of feed is not only a problem in the lowland areas but is also ranked the first most important constraint that afflicts sheep and goat production in the highland and midland agro-ecological zones of Ethiopia as reported by Seare (2007) and Ebrahim and Hailemichael (2012). However, Tsegaye (2009) reported that feed shortage problems are ranked low in cotton and sesame-based farming systems

due to the availability of enough feed or good range conditions. Diseases of small ruminants were the major production constraints, followed by feed and water shortages, in the Yabello district (Tesfaye and Tamir, 2015).

Opportunities of goat Production

Goat production is significantly important for keepers,

which can be used for milk consumption and income. Goats were used as a milk source, income source and measure of wealth status, as well as saving and meat consumption in selected study area. In pastoral areas, goats are more important animals than other livestock, next to camels, because goats are highly adaptive animals to harsh environmental conditions and can resist feed shortages in this area. Goats play an important role in reducing unnecessary expansion of bushes and shrubs by browsing on them, and they help to maintain natural balance in pasture lands and this is considered as best opportunities for pastoralists. Adoption of new technologies at different times which improve the production and productivity of goats, increasing the consumption rate of goat milk and meat, and urbanization are the good opportunities for goat production in the study area. At the federal government level, there is a pastoral standing committee and non-governmental organization (NGO) which works on improving the lives of pastoral communities through improving the production and productivity of goats and reducing the challenges of goat production.

Conclusion

An assessment of dairy goat production and management practices was conducted in a selected district of Koraheyy Zone, Somali, Ethiopia to assess the dairy goat production and management systems and identify and prioritize the constraints of the goat production. According to survey results, goat production by farmers in the study area was for meat, milk, ceremonies, wealth status, saving/live bank, income source, and breeding. The most ranked purpose of keeping a buck across all districts was as an income source (buck) and for milk consumption (doe) purposes.

Pastorals keep their livestock for household consumption in general and their goats as a source of milk in particular. The various constraints in the study area hampered dairy goat production. This includes a lack of feed, a lack of land, a lack of water, a lack of improved forage, a lack of feed cost enhancement, disease prevalence, a lack of veterinary service, a lack of improved goat breeds, a lack of government attention, and a lack of market access to sell goats and goat products. Goats play an important role in reducing unnecessary expansion of bushes and shrubs by browsing on them, and they help to maintain natural balance in pasture lands.

Recommendations

1) The government should give pastoralists some attention, like providing proper veterinary service, improving the breeding and breeding system and marketing system.

2) Pastoralists should be encouraged to discuss and take decisions together with researchers, development experts, and decision makers.

CONFLICT OF INTERESTS

The authors have not declared any conflicts of interests.

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