Full Length Research Article

Preferences and Marketing of Afar Goats in Afar Region, Ethiopia

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Abstract

The aim of this study was to assess preferences and marketing of Afar goats in Aba'ala, Afar region, Ethiopia. Data were collected using questionnaire and PRA tools from purposively selected 90 goat producers in the village and randomly selected 100 goat buyers in Aba'ala central market. The data were analyzed with the Wilcoxon signed rank test and MS-Excel. Ranking indices were used to cascade selected animals. Milk yield, coat colour and appearance were the most preferred traits by goat producers to select breeding does while fast growth, appearance and coat colour were for breeding bucks. In the market, buyers' decision for purchasing breeding doe was influenced by the coat colour, overall appearance and age of the breeding doe. While body weight, coat colour and appearance were very important attributes for purchasing breeding buck. Market price was highly (P<0.01) affected by body weight of the marketed goat rather than coat colour. The market price of castrated buck had higher price compared to the breeding doe, female replacement, and male replacement. The most important production constraints were drought and feed scarcity. The current finding can be used to design interventions for productivity improvement of the goats and marketing system in the study area. Concerned bodies like governmental and non-governmental organizations should conduct detail and broad investigation on the customer preferences and marketing system for development of viable Afar goat value chain.

Keys words: Aba'ala; Afar goats; Coat color; Goat marketing.

1. Introduction

Livestock production in the developing world is an important economic activity. Livestock products are high-value products, especially when compared with crops. These can range from pastoral/grassland-based systems, which occupy most of the land area and have low human population densities (Herrero *et al*., 2013). Besides, livestock contribute in maintaining soil fertility by providing manure which is the only source of fertilizer for the poor rural farmers and in providing cow manure as energy sources. Livestock production is extremely important to economic development, poverty reduction, and environmental sustainability as well as for sustainable livelihood of poor rural communities (Thornton, 2010). Hence, livestock have a significant role in achieving food security and sustainable development.

Sheep and goats constitute the second largest Ethiopian livestock population that owns 30.698 million sheep and 30.20 million goats of which 1.729 million sheep and 3.461 million goats found in Afar Regional State (CSA, 2017). However, sheep and goat production and productivity in Ethiopia are generally low mainly due to low per capita production (i.e. productivity) (Solomon *et al*., 2010). Lack of appropriate feed and feeding, drought and shortage of water share the largest point. Small ruminants' production in Ethiopia is based on indigenous breeds. Adane and Girma (2008) reported that the feed resource base for sheep and goat production in Ethiopia is natural grazing and crop residues which demands an intervention of feed and feeding technologies especially for pastoral production systems where known feed scarcity persists. Lack of awareness about market information, limited access to local markets and immediate cash need are additional constraints to small ruminants and pastoral producers. Access to local market is the most important economic determinant to adopt technologies (Zelalem, 2007) and choice of production enterprises.

The Ethiopian Growth and Transformation Plan (GTP) strongly supports intensified production of marketable farm products for domestic and export markets, by small farm holders and private agricultural investors (Animut and Wamatu, 2014). Hence, the potential of small ruminants is not yet fully tapped. Despite the huge resource potential, production and export opportunities, goat and sheep production in Ethiopia is relatively undeveloped (Zewdie and Welday, 2015) though the indigenous breeds in harsh tropical environmental conditions have special adaptive features such

as tolerance to a wide range of disease, water scarcity tolerance and ability to better utilize the limited and poor feed quality (Kosgey and Okeyo, 2007). Pastoral and agro-pastoral producers in Aba'ala prefer to produce more goats than sheep and other livestock species. This is from the fact that goats have more adaptive traits to harsh environments in addition to their better foraging ability. Producers in Aba'ala pastoral areas tend to fulfill family needs like medication, clothing and food items by drawing their sheep and goats to local market. However, up to date complete information on preferences of goats and the overall marketing system is limited. Therefore, the aim of this study was to assess preferences, marketing, and challenges of Afar goats in Aba'ala, Afar region, Ethiopia.

2. Materials and Methods

2.1 Description of Study Area

The Afar regional state is located in the Northeastern Ethiopia at about 250 km east of Addis Ababa on the highway to Djibouti. The study was carried out in Aba'ala district, zone 2 in Afar region, Northeastern Ethiopia, which is characterized by semi-arid type of climate receiving bimodal rainfall. The long rainy season is from mid of June to mid of September, while the short rains usually come in March and April. The annual precipitations of the area are about 600mm, and mean daily temperature is about 28°C, with maximum 38°C in June and a minimum 15°C in November (Tadele *et al.*, 2012). In general, the study area is hot with high diurnal temperature and it experiences severe heat, during the dry periods (May-June). The Afar communities engage in subsistence livestock production not only for its economic value, but also for the social and cultural values. Therefore, among the Afar pastoralists livestock is of high importance for their livelihood.

2.2 Study Site Selection and Sampling Procedures

In the study area, agro-pastoral and pastoral production systems are practiced, thus this study considers goat producers from both production systems. A rapid field survey was conducted by the research team and the respective agricultural office experts in Aba'ala district of Afar region to locate the representative study sites (kebeles). Six sites (three sites from each production system) were selected purposively based on their suitability for goat production and accessibility based on

discussion with Agricultural Officers and Development Agents of the district. For selection of respondents for PRA, owners' willingness and number of male and female breeding goats (at least five breeding does and one breeding buck) was also used as main respondent selection criteria. Female headed households who fulfill the selection criterion were included during sampling. However, the number of female headed households who fulfill the criteria were low compared to the number of male households. Following the purposive sampling technique, a total of Ninety (90) households (45 for each production system) including 69 male and 21 female household respondents was selected. To generate buyer preferences and marketing information from Aba'ala central market a total of 100 randomly selected respondents were interviewed.

2.3 Data Sources and Collection Methods

Relevant data for this study were collected using individual interview, participatory rural appraisal (PRA), group discussion and market information using questionnaire. Additional information was sourced from secondary sources (mainly from the Aba'ala District Office of Agro-pastoral and Agricultural).

2.3.1 *Participatory rural appraisal (PRA)*

Since PRA is a learning-by-doing which is a transparent and teamwork spirit, key informants were selected based on discussion with district agricultural experts. According to Bhandari (2003), PRA is a learning-by-doing which is a transparent, teamwork spirit which involves local communities as active analysis of their own situations whereby they estimate, quantify, compare, rank/score and list priorities of resources, constraints and opportunities based on their circumstances. Hence, a clear discussion how to rate the traits based on the merits and purposes of keeping was held with the PRA groups in the two production systems. Pre-identified traits were presented using different drawings and pictures for breeding doe and buck separately (Figure 1).
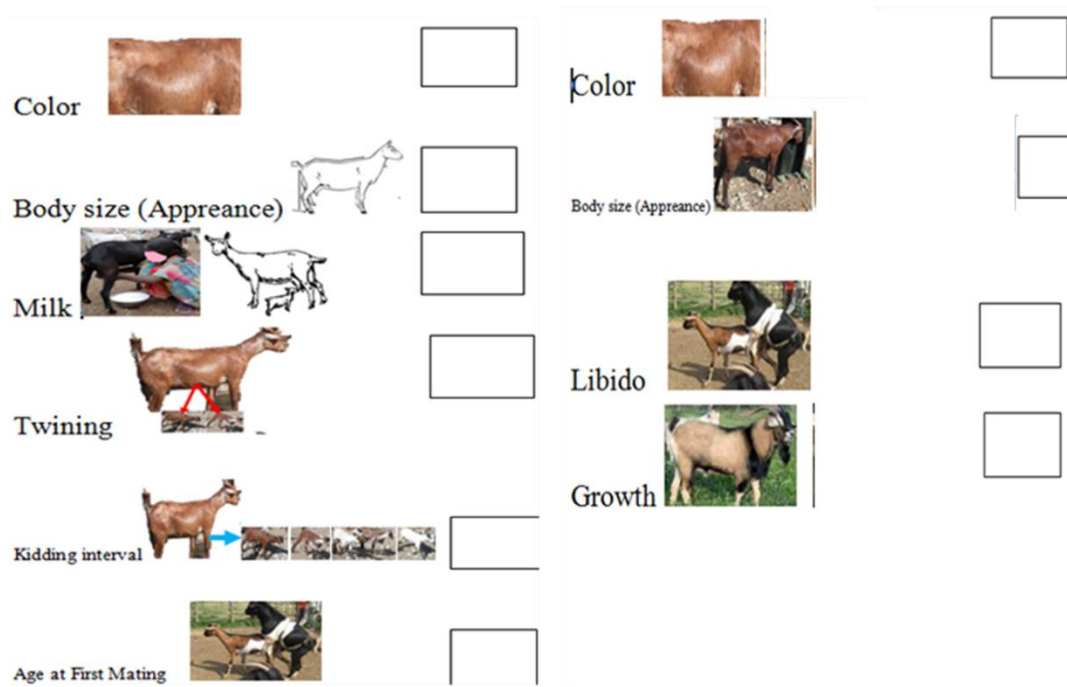
Figure 1. Illustrations of pre-identified traits during group discussion and PRA exercises (Left doe traits and right buck traits)

The participants were provided with twenty (20) pebbles/small stones individually to score and rank the trait categories of goats. The scoring process was done independently for each respondent to avoid the influence of respondent's decision by other respondents. Hence, in this study two different PRAs based on the two production systems were held. In the PRA procedures, elder and knowledgeable local people, female headed households, medium aged and young owners were included to ensure that stakeholders involved in assessing their resources, identifying opportunities for future development, defining constraints and suggesting possible solutions. Clear presentation and justification about how to prioritize and rank their flock trait were given to the PRA members before the actual trait selection event. The procedures included were:

- Identification and selection of goat traits, in which five traits for male and six traits for female goats were selected based on pre-conducted questionnaire.
- Based on this, the traits were represented and sketched.

- Each respondent was provided with twenty (20) pebbles to rate the trait categories to six and five functions of female and male goats, respectively following the procedure designed by Solomon *et al*. (2010) as indicated in Fig. 2.

- Score and ranks of the trait preferences by participants were recorded in prepared format.

Fig. 2. PRA procedures with scoring and ranking (top), and group discussion with PRA groups (bottom)

2.3.2 *Market information*

Aba'ala was the only central market for the zone two of the Afar Regional State, hence the marketing information for the goats were collected at Aba'ala market. The market study was designed to investigate buyer preferences, number of goats per market day, marketing frequency, age category, body condition, price, goats live weight, and coat colour of both sexes of goats. Data were collected using questionnaire and recorded in a prepared format.

2.4 Data Management and Analysis

The collected data were arranged, coded and managed in Microsoft-Excel spread sheet for further analysis. MS-Excel and Statistical Package for Social Sciences (SPSS 20.0 for windows, release 20.0, 2013) software were employed to analyze the data. Wilcoxon signed rank test was used to evaluate similarities between the ratings of paired doe and buck trait categories of the PRA following Solomon *et al*. (2010). Participants gave equal score/pebbles/ shows that they give equal value for the traits of considering that they treat the attributes equally in terms of both prestige and market value. The scores given for different characters were summed to determine the composite score for individual breeds. After completing the exercises, the PRA team sorted the trait functions of goats with regards to the breed characteristics (traits) and corresponding scores and then an average of the scores was computed. Buyer preferences were computed using Microsoft Excel as an Index (for example for three levels of rank I= sum of ranks (3 for rank 1 + 2 for rank 2 + 1 for rank 3) given for an individual reason (attribute) divided by the sum of ranks (3 for rank 1 + 2 for rank 2 + 1 for rank 3) for overall reasons, criteria or preferences.

3. Results and Discussion

3.1 Goat producers' trait preferences

During PRA discussion, participants gave maximum scores for milk yield of breeding does and for fast growth and body size/appearance/ of breeding bucks. The summary of trait preferences for breeding doe is presented in Table 1. The number in parentheses is the order of preference for the specific trait from the trait category by the group participants. Milk yield was the highest scored and ranked trait in both production systems. Participants ranked breeding goats with brown to dark brown and red plain with white spotted coat colours of breeding does are the primary preference goat owners in both study areas selected in second place followed by appearance (body size and over all conformation of the animals). Producers prefer goats with this coat colour to similarize with the field and escaping mechanism from predator that also fetch good market price when decided to sale. While goats with extra white coat colour are not preferred due to they could be recognized from far distances and are easy to be attacked by predators. But, goats with black coat colour have poor resistance to the harsh environmental conditions. Trait preferences for breeding buck are summarized in Table 2. Fast growth, coat colour and appearance were the top rated

preferred traits for selecting a breeding buck. The current participatory group discussions for selecting a breeding buck focuses on externally observable characters which was concurrent to Solomon (2014) for Abergelle and Western Lowlands goats that reported group ranking focused on observable characters like body size, body conformation and coat color take major ranking scores.

Table 1. Group rating and ranking (in parentheses) for breeding female in the agro pastoral and pastoral production systems (PRA outputs)

Selection criteria	Agro-pastoral Mean±SD	Pastoral Mean±SD	Overall Mean±SD
Milk yield	5.000±0.58(1)	6.000±1.53(1)	5.500±1.23 (1)
Coat colour	3.200±1.79(4)	4.000±1.16(2)	3.640±1.49 (2)
Appearance	4.000±1.41(2)	2.710±2.14(4)	3.360±1.87 (3)
Twinning	2.430±1.27(5)	3.140±0.90(3)	2.790±1.12 (4)
kidding interval	3.430±1.51(3)	2.710±1.49(5)	2.710±1.49 (5)
Age at first mating	1.860±0.90(6)	1.430±1.13(6)	1.640±1.01 (6)

Table 2. Group rating and ranking (in parentheses) of breeding male attributes by production system

Selection criteria	Agro-pastoral Mean±SD	Pastoral Mean±SD	Overall Mean±SD
Fast growth	7.430±1.51(1)	6.000±2.58(2)	6.715±2.16 (1)
Appearance	5.000±2.83(2)	4.710±1.11(3)	4.855±2.07 (2)
Coat colour	4.570±2.23(3)	6.430±1.90(1)	5.500±2.21 (3)
Libido	3.000±1.83(4)	3.860±1.77(4)	3.430±1.83 (4)

Respondents reported that they do not practice selection of a breeding female up to the birth of the first offspring to evaluate her milk yield and offspring survival. They try to improve the weak performing breeding females by purposive mating with a breeding sire which is already selected

as a best breeder. Marketing of breeding females is the marginal point of the production. Best performing breeding males are shared among the flock owners of neighboring house and even at kebeles level. Breeding bucks that did not perform well are then either culled for home consumption, castrated or taken to the market for cash income.

3.2 Buyer preferences and marketing of Afar goats

The central market Aba'ala was visited to investigate buyer preferences for purchasing goats for breeding or other purposes. The marketing procedure is traditional i.e. they do not use weighing balance and no market information as well. As it is the most common practice in Ethiopia, price is determined by negotiation between the buyers and sellers. According to the respondents, the price of an animal is also heavily dependent on the season and cheaper during the dry season of the year. The visible characters of the goat take the major points of buyer decisions than what the owner/producer could describe about his/her goat. A breeding doe milk yield that is described by the flock owner did not influence the buyer's decision. Buyer's gave high value for coat colour, appearance, and age of does as first, second, and third, respectively for purchasing a female breeding goat (Table 3). Breeding doe with coat colours light brown to dark brown and red plain with white spotted were preferred as the first selection which is similar to the PRA findings. The reason for selecting based on its coat colour is buyer producers want to have a future flock with customized coat colour to the environment and society. This is different from Alubel (2015) that milk yield, coat colour, and body size/conformation/ traits were ranked as first, second, and third selection criterion for a breeding does in Tanqua-Abergelle smallholder goat producers.

Table 3. Buyer preferences for purchasing breeding does

Attributes	Doe (N of Ranks)					Overall, I	Rank
	R_1	R_2	R_3	R_4	I_2		
Coat color	28	9	1	0	0.370	0.340	1
Appearance	9	29	0	0	0.320	0.290	2
Age of doe	1	0	21	16	0.160	0.200	3
Milk yield	0	0	16	22	0.150	0.170	4
Total	27	27	38	37	1.000	1.000	

R1, R2, R3, … and R4= rank 1, 2….and 4 respectively. I= index.

During the market days, body weight followed by attractive coat colour traits influenced buyer's decision making for purchasing breeding bucks (Table 4). The colour preference was similar between goat producers and buyers for breeding goats. This could be due to the reason that most of the market actors/customers are goat producers from the Afar Region. In the market the most determinant factor was live body weight followed by coat colour and body conformation. However, live body weight is the main character that had high effect ($P<0.05$) on the market price compare to coat colour. Female goats with poor body weight and body condition had lower market price. Lower price estimation for some breeding doe with higher live body weights weredue to less attractive coat colour and old age. Overall, appearance (conformation and body size) and coat colour of an animal were the most important traits for determining the market price.

Table 4. Buyer preferences for purchasing breeding bucks

Attributes	Buck (N of Ranks)					Overall, I	Rank
	R_1	R_2	R_3	R_4	I_2		
Body weight	38	0	8	2	0.350	0.360	1
Coat colour	0	36	2	10	0.260	0.270	2
Appearance	2	0	38	8	0.190	0.190	3
Age	8	12	0	28	0.200	0.180	4
Total	48	48	48	48	1.000	1.000	

R_1, R_2, R_3, … and R_4= rank 1, 2….and 4 respectively. I= index.

Coat colour of male goats in the market did not affect the selling price of the animal. But price was highly significantly ($P<0.01$) affected by body weight with positive correlations (Table 5). Market price of castrated buck had higher price with statistical significance of ($P<0.01$). Owners drawn different numbers of goats per market day. The average number of female goats drawn to market from the agro-pastoral was 7.87±6.58. While respondents from pastoral kebelles drawn an average of 12.57±7.95 goats per market day. More goats were drawn from the pastoral kebeles of Aba'ala to the central market. This could be due to the fact that pastoral producers solely depend on their goat to purchase all necessities to the family members. Average number of goats per market day per respondent was 9.6±7.4 does and 9.6±6.5 bucks. Marketing of female kids was not common in Aba'ala market. High market demand was observed for above three months age male kids. Market

price of male goats was statistically significant (P<0.01) among the age categories (male kids, male replacements, breeding bucks and castrated bucks).

Castrated males were observed with high live body weight and high marketing price during the market days. Most of male kids and breeding females were purchased by producers from Aba'ala while buck and male replacements which have the highest market population, castrated males and old females were purchased by merchants that take the highest proportions for meat purpose.

Table 5. Comparison of market selling price (Mean±S.E) of different male goats and average number of goats per market day by production system

Character	Agro-pastoral Mean±S.E	Pastoral Mean±S.E	P
Male kid (< 6 months)	375.450±30.85	325.50±35.05	*
Male replacement (6-12 months)	455.560±33.09	450.55±30.10	ns
Breeding buck (> 12 months)	1374.170±154.85	1260.10±123.65	*
Castrated	1692.860±87.19	1090.75±81.20	**
Price *buck coat colour	-	-	ns
Price*BW	-	-	**
Number of goats per market day			
- Breeding doe	7.87±6.58	12.57±7.95	*
- Breeding bucks	6.19±4.17	13.68±6.53	**

BW= Live body weight measured in the market days, significances (**=P<S.001, *=P<0.01, ns = P>0.05)

Season is the primary reason followed by holydays and fasting for price fluctuation of goats. Goat price fluctuation was commonly observed particularly in long dry season, fasting and diseases outbreaks (price reduction); while wet seasons, holidays, food aid to people (price induction) mainly for the male replacement kids which has also the highest number per market days. Most of the market agents were from agro-pastoral areas. This is due to the fact that pastoralists live very far away from the Aba'ala town (central market) and were not familiar with market exchanges. Agro-pastoralists collect especially male replacement and castrated bucks from the pastoral and sell them to traders for profit making. Overall, lower body weight and lower price of goats were observed at market which reflects most owners drawn the poor animals to market except the castrated ones. Hence, the strong and good performing goats were

kept for production and reproduction which is positive. Thus, future breed improvement interventions designed for goats in Aba'ala should consider better marketing systems and market linkages for the producers to get the right price for their animals.

3.3 Challenges related to Afar goat production

Table 6 presented the list of constraints mentioned by the PRA key informants in the study area with their possible causes and suggested solutions. As many as production constraints were listed and ranked by goat owners. Among those frequent drought and feed shortage were ranked as first and second priorities in both agro-pastoral and pastoral district. Disease occurrence and water shortages were the third important constraints in agro-pastoral and pastoral production systems, respectively. The largest index value for drought constraint (Table 7) indicates almost all production constrains were the consequences of drought that affected the livestock production. The slight difference in indices value of water shortage, disease occurrence, and predator in the agro-pastoral production system showed the effect of the later attributes was greater for goat production. While in the pastoral areas, goats were affected more by disease and predator than thief. Similarly, feed shortage, disease prevalence, and water scarcity were reported by Markos (2006) for Central Highland sheep breeds, Getahun (2008) for small ruminants in Highlands of Ethiopia, and Solomon *et al*. (2010) as the most important constraints of small ruminant production in Ethiopia. Similar production constraints was also reported by Anwar and Yayneshet (2014) for Chifra district, Zone which is one of Afar Regional State. Lack of legal market competitors was also another constraint in the study area as the main actors were from the agro-pastoral and midland of South-Eastern zone of Tigray Region. Similar, the legal market competitors had been reported by Tesfaye (2009) for goats raising around Metema district region in northern Ethiopia.

Table 6. Constraints to goat rearing, possible causes, and copping strategies in Aba'ala district, Afara region Ethiopia

Problems	Possible causes	Suggested solutions to constraints
Feed shortage	Due to frequent drought, fail to produce crops, long dry season, increase in flock size, no forage development strategies, no crop residues and crop aftermath	Conserving and constructing water holding structures, adjusting flock size according the available resource, feed preservation and introducing improved adaptive forage species.
Disease and veterinary services	Outbreak contagious diseases, poor water quality, salty water, long dry season, internal parasite, external parasites like shoat pox, and ORF, poor awareness about animal health, very far from veterinary service centers.	Nearby veterinary services, owners' awareness creation about small ruminants' diseases prevention, train and establish districts health specialists, traditional treatments should be supported with scientific treatments.
Poor water quality and no water sources	Early limited water sources, overcrowding on watering points, salty and water completion.	Constructing water wells by government and interested organization for clean water,
Poor market price	Decrease in feed variety and availability, poor health, poor body condition of animals.	Create awareness on marketing of small ruminants /market-oriented production system/, drawn more amounts of small ruminants to market, and low government attention on pastoral community should be renewed.

Table 7. Major production constraints of goats in Aba'ala district by production system.

Attributes	Pastoral							Agro-pastoral							Overall I	Rank
	R_1	R_2	R_3	R_4	R_5	R_6	I_1	R_1	R_2	R_3	R_4	R_5	R_6	I_2		
Drought	4	0	2	0	0	0	0	3	0	9	0	0	0	0	0.2	1
Feed shortage	2	38	5	0	0	0	0.24	9	28	8	0	0	0	0.24	0.24	2
Disease	0	0	32	6	7	0	0.17	0	17	0	21	7	0	0.17	0.15	3
Predator	0	7	0	2	32	4	0.11	0	0	21	9	9	6	0.14	0.15	4
Water	0	0	2	2	6	1	0	0	0	7	9	2	0	0	0.1	5
Thief	0	0	41	11	0	30	0.09	0	0	0	6	0	39	0.06	0.06	6

R_1, R_2, R_3, … and R6= rank 1, 2….and 6 respectively. I= index (ranking of goat disease).

4. Opportunities related to Afar goat production

The increment in population size and increase for need of livestock products by human being is a promising opportunity to increase livestock products production. Short generation intervals of small ruminants and good government future attentions for pastoral producers are also additional opportunities to small ruminant production. Adaptive reproductive traits, disease resistant breeds, most available market system, diverse livestock feed resources, low production costs for milk and meat products are some of the opportunities for small ruminants in Aba'ala. According to Adane and Girma (2008), annual domestic consumption of sheep and goats is 1,078,000 and 1,128,000, respectively, which implies a way forward to increase the production potential. Despite the huge resource potential, production and export opportunities, goat production in Ethiopia is relatively undeveloped (Zewdie and Welday, 2015) which is also an additional opportunity to invest in this. Considering the opportunities of goat resources in Aba'ala area commercialization and improvement of Afar goats could have a positive impact on the livelihood of poor farmers' who are dependent on them.

5. Conclusions

The PRA results revealed that milk yield, appearance and coat colour were the top preferred to attributed of a doe by goat producers while fast growth, appearance and coat colour were for the buck. While buyers preferred breeding doe with attractive coat color, good appearance and young age and breeding buck with heavy body weight, attractive coat colour and a good body appearance. Among the constraints that hamper the goat productivity are recurrent drought, feed shortage, disease and predator, and water shortage ranked as first, second, third and fourth, respectively in both production systems. Therefore, commercialization of Afar goat is needed by designing breed improvement coupled with improvement in husbandry practices. Concerned bodies like governmental and non-governmental organizations should conduct detailed and broad investigation of the customer preferences and marketing system for development of viable Afar goat value chain.

Conflict of Interest

The authors declare there is no conflict of interest.

Acknowledgement

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