

Small Ruminant Production and Marketing Practices in Harawa, Somali Region, Ethiopia

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Abstract

Small ruminant production is an essential component of agricultural activity for smallholder farmers. The aim of this study was to assess small ruminant production and marketing practices in the Harawa district of Somali Region, Ethiopia. For the study 90 households owning small ruminant were selected from three different towns of Harawa district. Information on sheep and goat ownership patterns, production objectives, and management and production constraints were collected from 90 households using semi structured questionnaires. The available feed resources are grass species, crop aftermath and legumes species are the common ones. The average family size was 5.78 ± 0.235 persons per household. Crop-livestock farming was the commonly used farming system with (62.75%) extensive and (27.25%) semi-intensive production system. The mean total land holding was 6.08 ± 0.24 ha per HH and was significantly ($P < 0.05$) varied across production systems. On average, the sample households owned 46.32 ± 1.22 sheep, 38.28 ± 1.40 goat, 4.85 ± 0.43 cattle, 4.15 ± 0.54 camel, 2.18 ± 0.19 donkey and 0.53 ± 0.20 poultry. The finding shows most of the respondents kept sheep and goats for insurance as ranked first. Feed shortage was ranked first as the main constraint hindering sheep and shortage of veterinary service, drought, disease, water shortage and poor infrastructure were the other major constraints of sheep and goat production in the study area. The major production and marketing constraints in small ruminant production in the area are disease and parasite (cadho), feed and grazing land shortage, low productivity, poor veterinary service and poor of infrastructure. Therefore, it is important to use modern production systems with improved technology in the area and improve traditional system through feed supplementation and better health care. As well as improving marketing efficiency through appropriate policy and provision of information is important.

Keywords

Constraints, Harawa, Marketing, Production, Small Ruminant

1. Introduction

Livestock is an essential component of agriculture, contributing for around 45% of overall agricultural output value and sustaining the lives of a huge portion of the people, more over 14 million families in Ethiopia, or 70% of the population, raise cattle, including several poor people [1].

There are several livestock species throughout the globe. In comparison to most nations, Ethiopia has the greatest livestock number in Africa, which contributes significantly for the country economics and people's lifestyle [2]. Ethiopia has around 6,535,000,000 cattle, 40,000,000 sheep, 51,000,000 goats, 49,000,000 chickens, and 8,000,000 camels [3].

Sheep and goat rearing is very essential in the lives of families in developing-nations. This is due to the fact that shoats can be the simplest and most easily obtainable financing option for meeting urgent social and financial responsibilities [4].

The majority of the Ethiopian shoat's population is reared by small-scale farmers, and sheep and goat production system is traditional [5].

One of Ethiopia's key economic sources is livestock production, which is also essential to rural communities. However, the contribution of this to the country and regional economies is very small, which is about 15% of GDP and 38% of total gross values of annual agricultural production. The Somali region is classified as a high livestock resources potential region in Ethiopia. In the region's high elevation and valleys parts, livestock production or pastoralism is the primary and necessary activity, followed by small mixed farming [6]. According to [3], the Somali regional state has 3,646,940 cattle, 9,188,394 sheep, 1,700,167 goats, and 613,235 camels.

In Somali region, Small ruminant production plays a crucial part in the life hood of smallholder farmers from livestock and an important component of agricultural activities. Sheep and Goat production kept for various uses including milk, meat, cash income and other cultural uses.

Harawa district livestock farming, small ruminants are essential part of the agricultural system that supports small-scale farmers by producing cash income during crop output failure periods. Due to rising costs, sheep and goat rearing is becoming more widespread in these agricultural systems, especially among young landless men and women. A precise explanation of the production and marketing systems, as well as assessment of the current production obstacles and possible productivity of small ruminants in the study area, is crucial to any action that will be developed and carried out to assist smallholders in the area. As information about sheep and goat production and marketing systems for Harawa district has not been recorded, the focus of this study is to analyze small ru-

minant production and marketing practices in Harawa, Somali Region, Ethiopia.

2. Methodology

2.1. Description of the Study Area

This study was undertaken in Harawa, Somali region, Ethiopia. Harawa is situated in the Northeastern portion of the area bordering Northern Somalia and falls among 90° 18' and 100° 12' N Latitude and 420° 37' and 430° 26' E Longitude. It is around 64 kilometers northwest from Jigjiga, the main city of SNRS. It is flanked by Siti Zone in the Northwest, Awbarre district in the South, Awbarre district of Fafan Zone in the Southeast and Somalia in the Northern and Eastern.

2.2. Study Design

The survey approach was used for this study. In order to examine the specified goals both qualitative and quantitative kinds was used.

2.3. Sample Size and Sampling Techniques

In advance of performing the sampling process basic information on small ruminant production and production and marketing was obtained. The households of the three chosen kebeles are 6516 HHs (Harawa district rural development and animal health officer, pers. comm). Similarly, respective households of Darwanaje, Gogti and Armo kebeles 3261 HHs, 2082 HHs and 1173 HHs, respectively. Then, the sample size was chosen using the method provided by [7] with 92% confidence level and 8% precision level. Then, the sample size for this research was calculated as follows.

$$n = \frac{N}{1 + Ne^2}; \quad n = \frac{6516}{1 + 6516 \times 0.08^2} = \frac{6516}{1 + 41.7024} = 152.59; \text{ Therefore, } n = 153$$

where:

n : is desired sample size.

N : is total target population of the study.

E : is margin of error.

α : is degree of precision.

As inserted in the formula mentioned above the sample size was 153 households from the three kebeles. However for providing correct sample division for each kebeles proportionate, 90 samples were selected and this means 30 samples from each kebeles was taken.

2.4. Data Collection

The most essential tools that were used to collect meaningful information were through; semi-structured questionnaires with open ended and close ended questions, key informants' interview, focus group discussions and direct observations. The semi-structured questionnaire was divided in to three parts. Part one included questions about small ruminant production practices in the study area, part two encompassed questions related to small ruminant marketing practices

and part three included questions related to small ruminant production and marketing constraints.

2.5. Data Management and Analysis

Prior to analysis, data from primary sources were processed and analyzed using the Statistical Package for Social Sciences (SPSS version. 26.0) Software and the Microsoft Excel software; completed questionnaires were coded, inputted, and structured. After the conclusion of coding, all valid questionnaires were entered into the SPSS database in a consistent fashion. Lastly, the data was interpreted.

3. Results and Discussion

3.1. Socio-Economic Characteristics of the Households

The general characteristics of the people who participated in the study area were presented in **Table 1**. The study indicates that, about 25.5% of the participants were revealed to be between the ages of 18 - 30 years; 44.4% of participants were between 31 - 42 years of age; and 30% were between the ages of 43 - 55 years. The study reveals that, about 23.3% of the interviewed respondents were male; while 76.6% of the participants were female. On the other hand, about 72.2% of the interviewed participants were illiterate; while 27.8% and 5.6% of the participants were literate and educated completing their primary respectively. The result also shows that about 90%, 3.3% and 6.6% of participants were married, Divorced and widowed respectively. The family size intervals of participants were categorized by from 1 - 5, 6 - 10, 11 - 15 and greater than or equal 16 and the percentage is 31.1%, 58.8%, 10% and 0% respectively. In addition to this, the land holding per household in the area was 1 - 3 ha (90%) and 4 - 6 ha (10%).

3.2. Livestock Species Composition

The major livestock species in the area were goat, sheep, cattle, camel and donkeys. The mean average of livestock ownership per house hold by production system is reported in **Table 2**. On average, the sample households owned 46.32 ± 1.22 sheep, 38.28 ± 1.40 goat, 4.85 ± 0.43 cattle, 4.15 ± 0.54 camel, 2.18 ± 0.19 donkey and 0.53 ± 0.20 poultry. This implies that the goats and sheep were dominant livestock species in the area. The finding of this study is consistent with the result of [8].

3.3. Major Farming Activity

The major farming operations in the study areas are presented in **Table 3**. The major farming activities reported by respondents were livestock with crop production (83.3%) followed by livestock rearing (13.3%) and only 3.3% of the respondents reported crop production. This finding of this result is agreed with that of [9] in Gode zone of Somali region.

Table 1. Description of household characteristics.

Variables	Frequency	Percentage
Sex		
Male	21	23.3
Female	69	76.6
Age		
18 - 30	23	25.5
31 - 42	40	44.4
43 - 55	27	30
≥56	-	-
Educational status		
Illiterate	65	72.2
Literate	25	27.8
Primary	5	5.6
Secondary	-	-
Marital status		
Married	81	90
Divorced	3	3.3
Widowed	6	6.6
Family size		
1 - 5	28	31.1
6 - 10	53	58.8
11 - 15	9	10
≥16	0	-
Land holding size		
1 - 3.5 ha	81	90
3.6 - 6 ha	9	10

Table 2. Households having Sheep and goat in the study area.

Livestock species	Mean ± SE
Sheep	46.32 ± 1.22
Goat	38.28 ± 1.40
Cattle	4.85 ± 0.43
Camel	4.15 ± 0.54
Poultry	0.53 ± 0.20
Donkey	2.18 ± 0.19

Table 3. Household farming activities in the study area.

Farming activities	Frequency	Percentage
Livestock production	12	13.3
Crop production	3	3.3
Both	75	83.3

3.4. Sheep and Goat Production System

The result shows that 94.4% households in the study area used extensive shoat's management style while 5.6% and 0% used semi-intensive and intensive respectively as indicate **Table 4**. Based on the findings of the research, intense production systems are not viable owing to overall bad management. According to [10] study, production systems are often classified as intense, semi-intensive, or extensive depending on the development of inputs and the intensity of output.

3.5. Purpose of Keeping Sheep and Goat

In the study area, small ruminants are kept for different purposes including income generation, saving, meat, milk and social and cultural purposes as shown in **Table 5**. As this study reveals sheep and goat were mainly kept for revenue creation via sale of animals. Similar to this finding, are reared in many parts of the country mainly for income generation. Similar to the reports of [11] [12] [13] small ruminants are raised in various regions of the country primarily for income creation. The second most important motive for raising small ruminants in the study region was to save (0.25%) money. The third, fourth, and fifth most significant reasons for keeping sheep and goats were milk (0.19%), meat (0.20%), and social function (0.07%).

3.6. Feeds and Feeding of Small Ruminants

As shown in **Table 6** in wet season 63.3% households used feed in the area was natural pasture while 26.6% and 11.1% were used crop residues and Wastes chat left over respectively. Also in dry season 47.7% households used feed was natural pasture while 34.4%and 17.1% were used crop residues and Wastes chat left over respectively. In the study area the study finding of key informants shows that the maximum time for grazing were 8 - 12 hrs in a day. Result in the above table also indicates that the vast majority 65% of respondents graze sheep and goats together. 12% and 14% of the respondents keep sheep and goat alone respectively while those who graze sheep and goats with other livestock constitute 7.7%. This finding is partially in line with the reports of [14] [15] [16], who revealed that the major basal feeds were a natural pasture, crop residue and kat residue. This is due to that area is mountainous and sheep and goat graze and browse a very steeply areas where other livestock cannot climb.

3.7. Supplementary Feeds for Sheep and Goat

As indicated in **Figure 1**, around 54% of households in the study area provide

Table 4. Management system of sheep and goat in the study area.

Character	Frequency	Percent
Extensive	85	94.4
Intensive	0	0
Semi intensive	5	5.6

Table 5. Reasons kept for sheep and goats in the study area.

Reason	Rank			Index
	R1	R2	R3	
Income	54	21	14	0.29
Saving	23	36	18	0.25
Meat	12	29	23	0.20
Milk	13	25	19	0.19
Social and cultural functions	-	12	9	0.07

Table 6. Major feeds of sheep and goats in the study area.

Particulars	Frequency	Percentage
Feeding in wet season		
Natural pasture	57	63.3
Crop residue	24	26.6
Wastes chat left over	9	10
Feeding in dry season		
Natural pasture	43	47.7
Crop residue	31	34.4
Wastes chat left over	16	17.7
Grazing hours		
6 - 8 hrs	17	18.8
8 - 12 hrs	73	81.1
Grazing type		
Sheep alone	11	12
Goat alone	13	14
Both	59	65
Together with other livestock	7	7.7

Supplemental feed, whereas 46% do not supply any supplementary feed to their shoat. This finding is consistent with a research conducted in the Awbarreby [14].

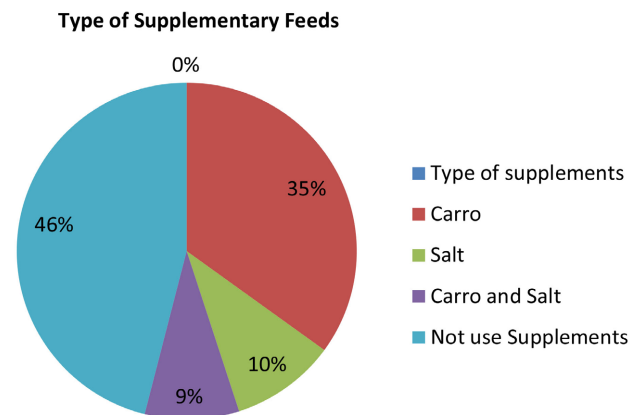


Figure 1. Supplementary feeds for sheep and goats.

3.8. Water Sources and Watering of Sheep and Goats

Sources of water and watering frequency of sheep and goats during wet and dry season are described in **Table 7**. All of the participants were responded that the main sources of water in dry season were well water. On the other hand, the main (63%) water sources of shoat in rainy season was well water followed by stream water (30%) and 6.6% of participants were stated valley water as least source. The finding of this result is in contrast with the report of [9] who reported that the main water source for sheep in Godey and Ber'ano districts were river. The difference might be due to the availability river in that area.

3.9. Housing of Sheep and Goats

As indicated in **Table 8**, about, 54.4% of the participants was used an open tightly fenced with the severely thronged plenty acacia trees against predator and theft while 28.8% was used stone walls covered by wood at night. 16.6% was used sheltered kind of house use open kraal fenced with stone walls. Housing was often a covered shelter connected to or distinct from the owner's home. The shelter walls were constructed from a mix of sticks, spineless cactus, and acacia branches. This is close to the study done in awbarre district by [14]. In addition to that Harawa district was part of Awbarre district during that preview study was done.

4. Breeding Management

Type of breeding system and source of breeding rams and bucks are shown in **Table 9**. The study revealed that the breeding type of shoats were different. In case of sheep, controlled mating was practiced, while in the case of goat, uncontrolled mating was common. According to key informants and focus group discussions, sheep are less tolerant to drought than goats, and sheep are bred to lamb during the rainy season or when there is plenty of forage. This present result is in agreement with the results of [17], who stated that controlled mating was practiced in the Awbarre district.

Table 7. Water sources and drinking interval for sheep and goats in different seasons.

Particulars	Frequency	Percentage
Water source (dry season)		
Well water	90	100
Stream	-	-
Valley	-	-
Water source (wet season)		
Well water	57	63
Stream	27	30
Valley	6	6.6
Drinking duration		
Watering frequency (dry season)		
Every day	15	17
One day interval	35	39
Two days interval	40	44
Three days interval	-	-
Watering frequency (wet season)		
Every day	85	94
One day interval	5	6
Two days interval	-	-
Three days interval	-	-

Table 8. Housing and housing type.

Particulars	Frequency	Percent
Place kept shoats at night		
Shelter (in the house)	15	16.6
stone walls covered by wood	26	28.8
Open wood but fenced	49	54.4
Housing type		
Goat Alone	46	51.1
Sheep Alone	21	23.3
Both together	23	25.5
Together with other animals	-	-

Table 9. Breeding type and source of breeding rams/bucks in the study area.

Variables	Frequency	Percentage
Breeding type for sheep		
Controlled mating	68	75.6
Uncontrolled mating	22	24.4
Breeding type for goat		
Controlled mating	11	12.2
Uncontrolled mating	79	87.8
Source of breeding rams		
Born in the flock	76	84.4
Neighbor	14	15.6
Source of breeding bucks		
Born in the flock	72	80
Neighbor	18	20

On the other hand, about 84.4% of breeding rams and 80% of breeding bucks were reported to be born in the flock. This indicates that most of the participants own their breeding rams/bucks and those who have no breeding males mated their female animal by using neighbor male. The study showed that the breeding rams were born in the flock. This indicates that the flock's animals are closely linked to one another and have limited interactions, which results in inbreeding [18].

4.1. Health Management

Health problems of shoat found in the study area are described in **Table 10**. Infectious diseases and external parasites (cadho) were indicated as major problems by 13.3% and 23.3% of the participants, respectively. Lack of veterinary service (30%), Lack of veterinary profusions (15.5%) and lack of veterinary institution (7.7%) was stated as source of small ruminant health problems.

4.2. Marketing

As **Table 11** shows that 41.1% were sold their shoats in the past 12 months but 58.8% of the respondent not sold. Among the respondent 33.3% were bought sheep and/or goat in the past 12 months while 66.6% not purchased. As result revealed all respondent 43.9% and 56.1% of the respondent were sold their goat in local market and at Woreda's Market. As these studies revealed that all (100%) of the respondent were said that they sold their shoat in Darwanaje livestock market (district market). Also information about access to market information average price of shoat study time was collected. As study indicates the district market average sheep price was 1200 - 3500 was goat price was 800 - 300. 76% of household respondent were get market information from middle men while rest 24% were get market information from Fellow livestock owner as below figure indicates.

4.3. Constraints of Sheep and Goat Production and Marketing

The main constraints of sheep and goat production in the study area are given in **Table 12**. The study revealed that feed shortage, shortage of veterinary service, drought, disease, water shortage and Poor infrastructure were the primary constraints of small ruminant production in the study area. Feed shortage was ranked first as the main constraint hindering sheep and goat production in the

Table 10. Major health problems of sheep and goat in the study area.

Major problems	Frequency	Percent
Infectious disease	11	13.3%
External parasite (<i>cadho</i>)	21	23.3%
Lack of veterinary service	27	30%
Shortage of veterinary drugs	7	7.7%
Lack of veterinary profusions	14	15.5%

Table 11. Marketing information.

Parameter	Category	Frequency	Percentage
Have you sold your sheep and/or goat in the past 12 months	No	53	58.8%
	Yes	37	41.1%
	Total	90	100%
Have you purchased sheep and/or goat in the past 12 months	No	60	66.6%
	Yes	30	33.3%
	Total	90	100%
Where do you sold your animals	Darwanaje livestock market	90	100%
	Middle Man	68	76%
Where do you get market information	Fellow livestock owners	22	24%
	Media e.g. Radio, TV etc.	-	-

Table 12. Major constraints of sheep and goat production in the study area.

Major constraints	Rank			Index
	R1	R2	R3	
Feed shortage	58	37	19	0.28
Drought	38	19	11	0.17
Shortage of veterinary service	44	28	24	0.23
Disease	16	21	26	0.15
Shortage of water	9	18	17	0.11
Poor infrastructure	-	14	12	0.06

study area whereby sheep and goat rely on foraging natural grasses which are poor in nutritional quality and their nutritional content decline mainly in the dry season. Similar to this, [14] found that feed shortage was the main constraint of small ruminant production in Awbarre district.

5. Conclusion and Recommendations

As results show that the main reason for keeping small ruminants in Harawa was for income generation, saving, milk production, meat production, social and cultural functions as well. They are a source of risk mitigation, security, investment, saving and socio-economic and cultural functions. Majority of household farming activities are both livestock production and crop production. Sheep and goat production system was extensive type. Most common source of feed in the area was natural pasture, crop residue and kat residue. However, the major production and marketing constraints of sheep and goat in the area were disease and parasite (*cadho*), feed and grazing land shortage, low productivity, poor veterinary service and poor of infrastructure. Therefore, in order to improve traditional production systems through the promotion of fattening schemes, artificial inseminations, and the introduction of improved drought tolerant animal species, the concerned institutions (governmental and non-governmental) should collaborate in order to bring about a sustainable in general livestock development and in particular small ruminants in the area. Feed shortage was the main constraints of small animal production in the area, therefore; systematically utilization of seasonal available feeds through preservation of grass, crop residues and strategic supplementation with low-cost alternatives should be done. As diseases and parasites which were one of the major constraints in small ruminant production, so, this should be studied in depth. Quantitative aspects of marketing (supply, demand, prices, producer and consumer behavior) require further study to provide complete marketing information.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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