



## Fattening Practice and Health Management of Small Ruminants in Dodota Woreda of Arsi Zone, Ethiopia

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### ABSTRACT

The purpose of the study was to identify small ruminant fattening practices and health management in the study area in Dodota Woreda of Arsi Zone of Ethiopia. Results are based on focus group discussions and a survey of 180 sample houses. According to flock distribution, the research area of Woreda was classified into three groups: Mixed flock sites, goat dominating sites and sheep dominating sites. Small ruminant fattening was completed in three and four months for the majority of respondents, 33.89% and 27.22%, respectively. The current studies' findings regarding the use of industrial byproducts suggest that farmers occasionally have better insight into the advantages of feeding their animals. Due to a strong market demand and improved prices, small ruminants were fattened over Easter, Christmas and New Year with an index of 0.380, 0.290 and 0.127, respectively. With indexes of 0.310, 0.200, 0.150, 0.131 and 0.130, respectively, the slaughter of fattening small ruminants for holidays, births in families, circumcisions, weddings and guests were the most relevant events of slaughtering in the study area. All locations stated that sheep and goat pox, fasciolosis, diarrhea, camel disease, pneumonia, pasteurellosis, listeriosis, anthrax and foot and mouth disease were the most frequent hazards to small ruminant fattening. The identification of disease causes and ways of management through proper policies and the provision of information are areas of interventions to help farmers with marketing issues and enhance health.

**Keywords:** Dodota; Ethiopia; Fattening; Small ruminant; Inter Tropical Convergence Zone (ITCZ); Sheep Dominant Site (SDS)

### INTRODUCTION

Ethiopia's economy is based on agriculture, which generates between 45% and 50% of its GDP. Livestock are an essential component of agriculture, contributing 35% to 49% of agricultural GDP, 37% to 87% of household incomes and 15% to 17% of the nation's foreign exchange revenues. Ethiopia has a population of approximately 42.9 million sheep and 52.5 million goats [1]. Small ruminants in Ethiopia provide 25% of

all domestic meat consumption and 40% of monetary income for rural households. The potential production is predicted to be 8.70 million sheepskins and 8.10 million goat skins, based on yearly off take rates of 31.1% for sheep and 35.4% for goats. Another reason to enhance sheep and goat production in the nation is the rise in global meat demand in general and the high demand for sheep and goat meat in the Middle East. Producers of sheep and goats have had the chance to sell more animals for higher prices. According to Gizaw, reviewed

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that small ruminants are typically owned by the poorer parts of the population, making farmers and pastoralists more dependent on them for a large portion of their livelihood than cattle [2]. Small ruminant farming is one of the key sources of income for farmers in our country and the majority of fatteners in rural, peri-urban and urban areas engage in seasonal fattening practices.

In order to attain targeted carcass growth and quality, intensive feeding of highly nutritious feed has been classified as fattening. To increase productivity per land and livestock value, fattening programs seek to achieve maximal growth rates and better carcass yields in the shortest period of time. It is known that small ruminant fattening in Ethiopia has the potential to be financially successful and increase smallholder farmers' income. According to success stories from the "improving productivity and market success of Ethiopian farmers" project, small ruminant fattening has improved household earnings for smallholder farmers in some areas of the Oromia region, which has resulted in a diversification of agricultural activities. These benefits have not, however, been realized on a larger scale due to the lack of genetic advancement, the scarcity of water, the high frequency of diseases and parasites and the inadequate veterinary services as a result of the limited attention small ruminant fattening has earned thus far. With a population of 24,991 goats and 27,658 sheep, Dodota Woreda is one of the areas where Arsi-Bale breeds of small ruminants are widely dispersed. However, there is no documented information about the fattening of small ruminants and lack of scientific activity in this area. In order to close this gap, this study was created. Therefore, a study was conducted to identify small ruminant fattening practices and health management in the study area [3].

## MATERIALS AND METHODS

### Description of the Study Area

Arsi Zone is one of the 26 Woredas that constitute the Oromia regional state. Dodota is a Woreda in the Arsi Zone, which is part of the Great Rift Valley. It is 125 kilometers south of Addis Ababa, 25 kilometers from Adama and 50 kilometers from Asella town, the Zonal head. The Woreda covers 512 square kilometers and is located between latitudes 8°11' and 8°26' north and longitudes 39°2' and 39°29' east. The elevation ranges from 1343 to 2271 meters above sea level. The southeast is bordered by Lode Hetosa, the east by Sire, the north by Adama, the southwest by Hetosa and the west by Ziway Dugda Woreda [4]. The seasonal migration of the Inter Tropical Convergence Zone (ITCZ), which follows the position of the sun relative to the earth and the related atmospheric circulation, dominated the climate research area. Between Woyna Dega and Kola was the climate range. Various species of acacia trees, bushes, woodlands, forests and shrubs are the main vegetation types in the Woreda in terms of vegetation cover. As a result, vegetation is restricted to inaccessible locations. Chromic Luvisols, Mollic Andosols and Vitric Andosols are the three main types of soil found in the area

[5]. Additionally, Dystric Nitosols, Eutric Fluvisols and Orthic Acrisols found in small area of the Woreda FAO (Figure 1).

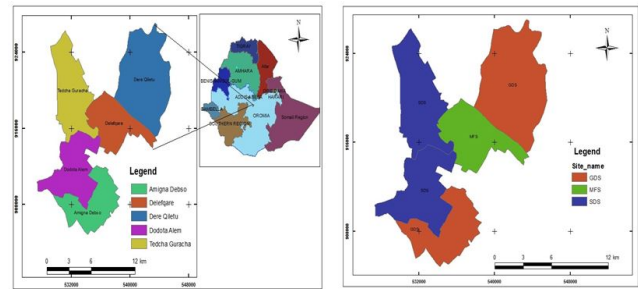


Figure 1: Map of the five study kebeles in the Dodota Woreda.

### Sampling and Sample Size Determination

In the study area, Kebeles were selected using a stratified sampling technique so that they could accurately represent the distribution of small ruminant's density. As a result, the study areas were divided into three groups: Sheep Dominant Site (SDS), Goat Dominant Site (GDS) and sheep-goat Mixed Flock Site (MFS) [6]. Households were selected for sampling based on the following criteria: willingness to engage in the study Kebeles; experience with small ruminant husbandry of at least one year and minimum flock size of the sites (two animals for SDS, three animals for MFS and three animals for GDS) (Figure 2).

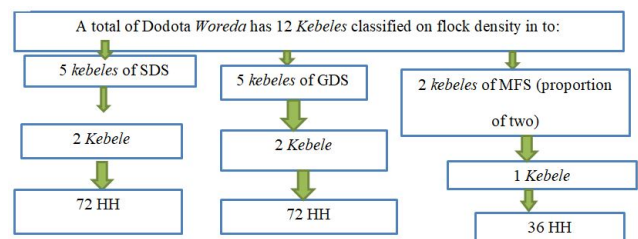


Figure 2: Stratification and acting of study kebeles and households.

The sample size was determined according to the formula recommended by Arsham as follows:  $N=0.25/SE^2$  Where, N=required sample size, SE=Standard Error (5%) and 95% confidence level. Accordingly, a total of 100 respondents were included; however, to increase the precision of the study sample size was increased by 1.8 folds and a total of 180 households from Woreda were proportionally selected from five Kebeles. The potential of the goat, sheep and combination of the two productions, as well as access to roads, were used to determine the selected Kebeles using secondary data from the Woreda livestock and fishery office. As a result, the following individuals from the research area were selected: Direkiltu and Amigna Debeso from GDS, Dodota Alem and Tedacha Guracha from SDS and Dilefayen from MFS kebeles. 180 households overall, 36 from each kebeles, were selected at random to actually participate in the diagnostic survey [7].

## Data Collection

Researchers used both primary and secondary data. Personal interviews were used to gather primary data while employing a clearly defined, organized questionnaire. Secondary data were gathered from books, journals, unpublished theses, statistical reports, livestock and fishery offices and published theses. In order to have a better understanding of agriculture in general and small ruminant fattening in particular, the Woreda was also visited. The survey was created and translated into the local language. The supervisors and Development Agents (DAs) who worked in the Woreda and spoke the local tongue were trained to gather the data with the researcher [8]. Seven to twelve persons participated in Focus Group Discussions (FGDs), which ranged between one and two hours. Key informants were also used in the study Kebeles. Both are employed to understand more specifically about the subjects covered in the structured interview and to determine whether the trends discovered in the households were confirmed.

## Data Analysis

The collected data were organized, summarized and analyzed using SPSS statistical package (SPSS, 2017 Version 25.0). For data involving frequencies, descriptive statistics and ranking were employed. The indices were calculated as suggested by Kosgey as  $\text{Index} = \frac{\text{sum of } (3 \times \text{number of household rank first}) + (2 \times \text{number of household rank second}) + (1 \times \text{number of household rank third})}{\text{sum of } (3 \times \text{number of household rank first}) + (2 \times \text{number of household rank second}) + (1 \times \text{number of household rank third})}$  for all causes in flock density [9].

**Table 1:** Small ruminants fattening periods.

Fattening Length	GDS				SDS				MFS			
	Direkiltu		Amigna Debeso		Dodota Alem		Tedacha Guracha		Dilfaker		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
3 month	12	33.33	10	27.78	14	38.89	10	27.78	15	41.67	61	33.89
4 month	8	22.22	11	30.56	10	27.78	12	33.33	8	22.22	49	27.22
5 month	6	16.67	8	22.22	5	13.89	9	25	6	16.67	34	18.89
6 month	7	19.44	5	13.89	3	8.33	4	11.11	4	11.11	23	12.78
7 month	3	8.33	2	5.56	4	11.11	1	2.78	3	8.33	13	7.22

**Note:** GDS: Goat Dominant Site; SDS: Sheep Dominant Site; MFS: Mixed Flock Site; N: Number of Household

## Feed Type for Sheep and Goat Fattening

The majority of those who responded to the interview supplemented their small ruminant fattening with various industrial by products. The use of industrial byproducts noted in the current studies may be attributable to farmers' occasionally enhanced understanding of the benefits of

## RESULTS AND DISCUSSION

### Fattening Length of Sheep and Goats

Most of the respondents, 33.89% and 27.22%, respectively, were finishing small ruminant fattening in three and four months. Few of them (7.22%) stayed for up to seven months, whereas the average fattening period ranged from three to seven months. However according flock distribution in three months, 33.33% from Tedacha Guracha kebele's sheep dominated site and 30.56 %from Amigna Debeso kebele's goat-dominated site had finished small ruminant fattening. This timeline was agreed upon with the Animut and Wamatu 3-12 months fattening period for small ruminants in different regions of Ethiopia [10]. The most range of small ruminants' fattening duration, according to Hailemeskel, was between three and six months, which is similar to the current findings. The period of fattening varies depending on the quality and availability of the feed, the amount given each and every day, the animal's ability to convert the feed, the environment for each area, the type of feed given, the animal's starting weight, its age and the management of the animal's health. This finding is related to that found in Animut and Wamatu's report, which stated that the length of sheep and goat fattening varies, mostly based on the availability of adequate and high-quality feed for fattening (Table 1) [11].

feeding their animals. In the study area, the most supplemented feeds for sheep and goat fattening were wheat middling, crop residues and salt/minerals. Oilcakes, linseed cakes and nougcake were low supplemented meals whereas wheat bran received medium supplementation. The current study supported the findings of in eastern Tigray, which showed that sheep and goats are prioritized whenever

supplemental meals are available. The supplementation of Noug seed cake was frequently used for small ruminant fattening, which was in agreement with the present finding [12]. In a previous study, it was reported that, when feed from all sources is depleted, approximately 57% purchase industrial by products, primarily wheat bran, for supplemental for goats fattening were agreement with the current result. Similar to

the most scientific studies by Animut and Wamatu, the different part of Ethiopians uses supplementary feeds for small ruminants fattening like nougat seed cake, wheat bran, salt and rice bran (Table 2).

**Table 2:** Types of feed supplemented for sheep and goats fattening.

Types of supplementary feed	Flock classification			
	Sheep		Goat	
	N	%	N	%
Wheat bran	13	7.22	11	6.11
Oil cakes	3	1.67	5	2.78
Linseed cake	6	3.33	7	3.89
Wheat middling	73	40.56	46	25.56
Crop residues	42	23.33	62	34.44
Salt/mineral	35	19.44	30	16.67
Fodder leaves	3	1.67	15	8.33
Nougcake	5	2.78	4	2.22

**Note:** N=number of household

### Fattening Season Based on the Market Target

The majority of respondents per household did not practice the fattening based on market targeting. Respondents in the study area practiced fattening during pick demand such as Easter, Christmas and New Year with an index of 0.380, 0.290 and 0.127, respectively (Table 3). Due to a lack of markets, primary fattening activities are seasonal. It can happen around the holidays because there is a demand for sheep and goat products [13]. The practice of fattening small ruminants to fetch better prices during holidays was an agreement with the report of Edea in the Southern part of Ethiopia. The major

seasons of marketing of small ruminants during the New Year, Meskel and Easter holidays were also in line with the report of Tadele in Chench and Mirab Abaya districts. Similar to Animut and Wamatu, Ethiopian farmers have long engaged in the practice of fattening small ruminants with the goal of increasing sales during holiday seasons. Due to a lack of a market, the majority of small ruminant fattening activities are currently seasonal, which is in line with the findings of Mohammed.

**Table 3:** Fattening season of the market targeted.

Parameters	Ranked			Index
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	
New year	6	3	18	0.127
Easter	32	13	4	0.38
Christmas	13	25	7	0.29
Meskel	3	8	14	0.12
Ed al fetir	1	6	11	0.08
Arefa	0	0	1	0.003



### Seasons of Slaughtering Small Ruminants in the Study Area

The major events of slaughtering small ruminants in the study area were presented in **Table 4**. The interviewed households slaughter small ruminants for holidays, birth in the family, circumcision, wedding and guest and these events were the most relevant events of slaughtering small ruminants in the study area with an index of 0.310, 0.200, 0.150, 0.131 and 0.130, respectively [14]. According to key informant and discussant in the study area slaughtering of male sheep and goat was common. The slaughtering of female small ruminants was low. This might be due to females were primarily kept for breeding and seldom slaughtered.

The current finding of the proportion of households who slaughter small ruminants during the religious holidays was larger than the other events and this finding was in line with the result of Tesfay in the eastern Tigray. Similarly, the current finding of the major slaughter during festivals, births in the family and wedding events was in line with the report of Fikru and Gebeyew in the Degehabur zone. Unlike the current study, Fikru and Gebeyew in the Degehabur zone reported that the interviewed households slaughter either male or female animals only based on availability [15].

**Table 4:** Ranking of households for slaughtering small ruminants.

Parameters	Ranked				
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	Index
For festival	117	19	6	6	0.31
Whenever slaughter animals are available	1	24	30	34	0.067
Wedding	23	23	23	23	0.131
Birth in family	21	53	42	22	0.2
For guest	9	36	22	40	0.13
Circumcision	7	24	55	49	0.15
At funeral	2	1	0	0	0.006
Others	0	0	2	6	0.006

### Small Ruminant Health Management Systems

**Table 5** shows the primary disease losses of small ruminants fattening in the study area. Each disease has its own symptoms and manifests itself at a particular season or month. All locations stated that sheep and goat pox, fasciolosis, diarrhea, camel disease, pneumonia, pasteurellosis, listeriosis, anthrax and foot and mouth disease were the most frequent hazards to small ruminant fattening. The majority of respondents in the study area 58.33% that sheep and goat pox (Finnoo/Kiftina/Gifira) occurred between September and July seasons and was characterized by symptoms including high fever, papule and vesicle eruption, pus development and scab formation around the mouth and nose. In another way, some of them, such as the camel disease, were brought on by the lack of feed in the bordering Woreda camels as they moved from place to place in quest of

food during the months of December, January, February and May. Focus group discussions and key informant interviews revealed that at this time, camel salivation was left on the feed, which made sheep and goats susceptible to the disease when they ate it [16]. Camel disease (Dhiibee Gaalaa) symptoms include mouth breathing and difficulty breathing with dilated nostrils. According to Mekuriaw, in the Amhara region and Tadele in the Chench and Mirab Abaya districts, sheep pox, fasciolosis and pneumonia were the most common threats to flock health diseases that caused mortality and morbidity were in agreement with the current findings. Similar to the current study, Hassen, found that sheep pox and pasteurellosis were the two most common diseases in the Chifra district of the Afar area in terms of prevalence and morbidity [17].

**Table 5:** Common disease of small ruminant in the study area.

Local name	Veterinary equivalent	N	%	Species affected	Symptoms	Season/month happened
Finnoo/Kiftina/Gifira	Sheep and goat pox	105	58.33	S,G	High fever, the eruption of papula and vesicles,	Sep-July

						development of pus, scab formation around the nose and mouth	
Malullaa/ Dodo'oo	Facsiolosis/ Liver-fluke	13	7.22	S,G		Swelling at the submandibular area (bottle jaw), emaciation, diarrhea and depression	Sep, Oct, Dec, Feb, March, Apr, May and June
Albaasa/Baallee	Diarrhea	20	11.11	S,G,C		They have a watery, whitish-yellow or greyish diarrhea that is known as white scours, back legs are dirty with droppings and lambs/kids usually die as a result of dehydration	Oct-July
Martoo/Jaanjoo	Circle disease/ Listeriosis	2	1.11	S,G		Lack of coordination, salivation, facial paralysis and circling in one direction	Jan, Feb and March
Dhiibee Gaalaa	Camel disease	24	13.33	S,G		Difficult of breathing with dilated nostrils and mouth breathing.	Dec, Jan, Feb and May
Maasa	FMD	1	0.56	G,C		Lameness and oral lesions, foot lesions/leg paralysis along with the coronary band or interdigital spaces and lesions on the dental	Jan, Feb and March
Furroo	Pneumonia	8	4.44	S,G		Smelling diarrhea and pus can be seen around the nostrils. Increased respiratory rate, coughing and abnormal breathing sound on auscultation	Jan, Feb, Mar, May, Jun and Aug
Garagalcha/ Abba sanga	Anthrax	2	1.11	S,G,C		High fever, widespread signs of edema, protrusion of rectum, exudation of blood from natural orifices of	Oct and Nov

Fanxaaxaa	Pasteurellosis	5	2.78	S,G	cadaver/dark blood may ooze from the mouth, nose, anus and sudden death	Oct, Nov, Jan, Feb, Mar, May and June
					Drooling of saliva, swelling of tongue, symmetrical swelling of the throat	

**Note:** S=Sheep; G=Goat, C=Cattle, N=number of household, FMD=Foot and mouth disease

The study found that when small ruminants became sick, only 4.40 % employed traditional medicine, compared to 93.3 % of the families that were interviewed who used to take their sick animals to veterinary clinics (Table 6). Nearby veterinarian services were available to about 89.4% of the respondents [18]. According to key informants and focus group discussions the average distance between the farmers' homes and the veterinary clinics was 5.34 kilometers. The main issues, according to key informants, were a lack of sufficient medications and a shortage of veterinary specialists. In line

with current finding, Nigussie described how traditional medicines and equivalent veterinary services were used in eastern Ethiopia. Kassahun reported the current finding that the average veterinary distance of the homes was greater than 4.70 kilometers. In contrast, Abebe stated that the current average distance for veterinary services in the Burie district was less than 6.0 kilometers.

**Table 6:** Taking action when the small ruminants become sick.

Variables	Small ruminant density groups							
	MFS		SDS		GDS		Total	
Action	N	%	N	%	N	%	N	%
Slaughter	0	0	0	0	2	2.8	2	1.11
Take to veterinary center	36	100	68	94.4	64	88.9	168	93.33
Use traditional medicine	0	0	2	2.8	6	8.3	8	4.44
Others	0	0	2	2.8	0	0	2	1.11
Veterinary service								
Yes	34	94.4	62	86.1	65	90.3	161	89.4
No	2	5.6	10	13.9	7	9.7	19	10.6

**Note:** MFS: Mixed Flock Site; SDS: Sheep Dominate Site; GDS: Goats Dominate Site, N: Number of Household

### Role of Family in Small Ruminants Management

The Table 7 below illustrates how the various household members in the area divide their labor (Table 7). The husband was in charge of building the shelter and selling the small ruminants (mostly household heads). Wives and girls cleaned barns for small ruminants about 94.4% and 50.6%, respectively. Husbands sold about 87.8% of the small ruminants [19]. Girl and hired labor had no authority to control how animal sales proceeds were spent. However, 88.3% and 95% of the money made from selling animals was

decided by the husbands and wives, respectively. The husbands handled about 80.6 % of caring for sick flocks and transporting them to veterinary facilities. In agreement with reports by Abebe, in the Burie district and Tadele in the Chench and Mirab Abaya districts, the current study's result that husbands have a larger proportional role in selling and treating sick animals. In contrast to the current study, the majority of women were working to care for the sick animals that Lakew reported in the Wolayita Zone. Contrary to what is currently known, Zahra found that women's roles included feeding, watering and tending to sick animals.

**Table 7:** Labor division and the role of the family in small ruminant management (%).

Particulars activities	Responsibility				
	Husband	Wife	Boys	Girls	Hired Labor
Herd and/or tether	77 (42.8)	103 (57.2)	113 (62.8)	72 (40)	9 (5.00)
Feeding animals	81 (45)	101 (56.1)	106 (58.9)	68 (37.8)	10 (5.60)
Take to water points	84 (46.7)	104 (57.8)	110 (61.1)	69 (38.3)	9 (5.00)
Clean sheep and goat barns	27 (15)	170 (94.4)	26 (14.4)	91 (50.6)	0 (0.00)
Take care of lambs and kids	57 (31.7)	150 (83.3)	55 (30.6)	54 (30)	2 (1.10)
Take care of sick animals	145 (80.6)	77 (42.8)	30 (16.7)	11 (6.10)	0 (0.00)
Fattening managements	48 (26.7)	31 (17.2)	14 (7.80)	7 (3.90)	1 (0.60)
Construction of shelter	155 (86.1)	27 (15)	78 (43.3)	6 (3.30)	1 (0.60)
Sale animals	158 (87.8)	77 (42.8)	14 (7.80)	2 (1.10)	0 (0.00)
Decides on income	159 (88.3)	171 (95)	8 (4.40)	0 (0.00)	0 (0.00)

## CONCLUSION

This study's goals were to identify small ruminant fattening practices and health management in Ethiopia's Dodota Woreda of the Arsi Zone. Small ruminant density groups were created for the Woreda and the corresponding Kebeles and households were selected using stratified sampling techniques. Focus group discussions and individual interviews with small ruminant producers and other key informants were used to carry out the survey study. Some farmers may fatten their animals in order to meet market objectives over the holidays, especially if small ruminants are in high demand and command high prices. Small ruminant meat was consumed on a variety of occasions in Dodota Woreda. However, the time is typically limited for festivals, family births and circumcisions; weddings and guests were the most frequent occasions. High fever, emaciation, diarrhea, depression, coughing, foot lesions, appetite loss, abnormal breathing sounds on auscultation and sudden death with bleeding in openings were the symptoms of the disease that affects small ruminants in the area. Therefore, it was discovered that one of the most significant factors affecting the fattening of small ruminants was health care. So, it is important to thoroughly study diseases that affect small ruminant fattening, identify the microbiological origins of these diseases, identify their epidemiology and create the most effective development interventions. To handle market issues and improve local small ruminant fattening, government and non-government organization contributions should be planned for fattening packages.

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## AUTHOR CONTRIBUTIONS

Abera Geleta Sime: Methodology, Investigation, Data analysis, Writing-original draft. Belete Shenkute Gameda: Conceptualization, Methodology, Writing-review and editing. Shimelis Regassa Degefa: Methodology, Writing-review and editing.

## CONFLICTS OF INTERESTS

The authors declare that they have no conflicts of interest.

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