Market chain analysis of small ruminant value in TahtayAdyabo District, Tigray Region, Ethiopia

Abstract

The objective of this study was to examine market performance of small ruminant value chaininTahtayAdyabo District.Multi-stage random sampling technique was used to select representative small ruminant producer kebeles and sample households. Accordingly, 138 sample households, 6 large traders, 12 small traders, 8 collectors 5 butchers, 7 hotels/restaurants and 11 consumers were interviewed through a semi-structured questionnaire and from key informant interview.The data were collected from both primary and secondary sources. Primary data were collected from randomly selected sample households through semi-structured questionnaire and checklists were used for key informants' interviews. Secondary data were also collected from office of agriculture and rural development of the district. *The performance of small ruminant market was analyzed using marketing margins. Small ruminant farmers's share of the consumer's price was highest along producers – consumers, producers – farmers (for breeding purpose) and producers – small traders – consumers in both goat and sheep market channels. Similarly, Producer's share of the consumer's price was lowest along producers – hotels/restaurants – consumers and producers – collectors – large traders – hotels/restaurants – consumers in both goat and sheep market channel.*As the market channel becomes longer and involves more transactions between different actors, the producers' share of the final price decreases. Therefore, effort should be made to establish producers' cooperative, help farmers on giving training in appropriate technologies, marketing systems, working capital and information.

Keywords: Small ruminant, Market performance, TahtayAdyabo, Tigray, Ethiopia.

Introduction

Livestock sectors play vital roles in generating income to farmers, creating job opportunities, ensuring food security, providing different services, contributing to asset, social, cultural, and environmental values, and sustaining livelihood strategies of peoples [1]. The livestock

marketing system in Ethiopia is fragmented and disorganized and the supply chain linking smallholder producers with domestic consumers and export markets is long and extended. This decreased farm gate prices lead to low revenue for producers since a vast array of middle men tap a large proportion of the price paid by consumers and exporters. Numerous actors further characterize the entire livestock supply chain in the country. This makes the supply chain unnecessarily long with increased transaction costs and without significant value-added activities [2].

Demand for Ethiopian sheep and goat meat has dramatically increased after market promotion by development projects in close collaboration with the government. This has created an opportunity for sheep and goat producers to sell more animals at better prices[3].The increase in international demand for meat in general and the high demand for sheep and goat meat in the Middle East are another incentive for sheep and goat production in the country[4].

The rural/village and roadside markets operate periodically, where sellers of livestock meet to offer animal trade with collectors, aggregators, and negotiators with other buyers. Butchers or negotiators who convey animals to towns/cities or abattoirs are the principal buyers from farmers. The market structure includes producers, traders, retailers, food service providers, and consumers. Public, privates, inputs, service providers, and regulatory institutions that involve; taxation, licensing, and warranties, are part of the structures [5]. Small ruminants demand is driven by; the high population growth rate, rapid urbanization, increased income, health consciousness and a shift in consumption patter [6].

Market participation and trade among livestock keepers are expected to be an important pathway to reduce poverty [7]. Livestock markets play a fundamental role in livestock production and provide a platform for the exchange of property and wealth[8].

In enhancing productivity, small ruminant producers needto consider the market as a principal aspect of production.The marketing system must provide information flows fromthe consumer back to the producer [9]. Moreover, there should be improve the infrastructural facilities and

provide loan facilities at a low-interest rate to the trader that will boost the performance of small ruminant markets [10].

Small ruminant market performance is an important process that has not been investigated in the study area. Therefore, studies on small ruminant market performance become necessary to provide essential information on the operation of small ruminant marketing system, to aid effective research, planning and policy formulation. Hence, this study was carried out to examine market performance of small ruminant value chain.

Methodology

Study area: -The study was conducted in Tahtayadyabo district of North Western Zone of Tigray Region.

Data sources: -The data were collected fromboth primary and secondary sources. Primary data were collected from a randomly selectedsample households, large traders,small traders, collectors, butchers, hotels/restaurants andconsumers interviewed through a semi-structured questionnaire and from key informant interview.

Sampling Procedure and Sample Size: - Multi-stage random sampling technique was used to select representative small ruminant producer kebeles and sample households. In the first stage, out of 18 kebeles of the district 10 small ruminant producer kebeles were purposively selected based on the level of production. In the second stage, from the 10 small ruminant producer rural kebeles, four sample kebeles namely Adi-Aser, Gemhalo, Mentebteb and Zban-Gedena were selected randomly. In the third stage, total of 138 sample households were selected randomly using probability proportional to population size-sampling technique based on [11]formula.

$$n = \frac{z^2 \, p(1 - p)}{e^2}$$

Where,

n is the sample size

p is the estimated proportion of small ruminant producersfrom the total population

z =1.96 and e = 0.05

$$n = \frac{1.96^2 \times 0.9(0.1)}{0.05^2} = 138$$

For this study, data from traders were also collected.The sites for the trader surveys were market towns in which a good sample of small ruminant traders are available.A total of 6 large traders, 12 small traders and 8 collectors were randomly selected constituting a total of 26 traders from Sheraro, Tekeze, Adi-Hageray and Shmelba markets. Furthermore, 5 butchers, 7 hotels/restaurants and 11 consumers were interviewed from the district by selecting randomly.

Methods of data analysis

Estimates of the marketing margins are the best tools to analyze market performance.Marketing margin was calculated by taking the difference between the final price paid by the consumer and the price received by the producer. Total gross marketing margin (TGMM) was computed according to [12], by relating the final price paid by the end buyer and is expressed as a percentage.

$$TGMM = \frac{Final\ Consumer\ \ price - \Pr oducer\ \Pr ice}{Final\ Consumer\ \Pr ice} \times 100$$

Where TGMM=Total Gross Marketing Margin

It is useful to introduce here the idea of "producer participation", "farmer's portion" or "producer's gross margin" (GMM) which is the portion of the price paid by the end consumer that belongs to the farmer as a producer. It should be emphasized that growers that as middlemen also receive an additional marketing margin. The producer's margin or share in the consumer price (GMMp) is calculated as:

$$GMM_p = \frac{Final\ Consumer\ \Pr ice - TGMM}{Final\ Consumer\ \Pr ice} \times 100$$

Where GMMp =Gross Marketing Margin of the producer

The consumer price share/portion of market intermediaries is calculated as:

$$GMM = \frac{Selling\ \Pr ice - Buying\ \Pr ice}{Final\ Consumer\ \Pr ice} \times 100$$

Where: GMM = Gross Marketing margin of intermediaries

According to [12], precise marketing costs are frequently difficult to determine in many agricultural marketing chains. The reasons are that these costs are often both cash costs and imputed costs, the gross and not the net marketing margin is advised to be calculated. In similar way, in this study, gross marketing margin was considered instead of net marketing margin, as it was difficult to estimate the implicit costs incurred during transaction of small ruminant.

Results and discussions

The performance of small ruminant market was evaluated by considering associated costs, returns and marketing margins.The analysis of marketing channels is intended to provide a systematic knowledge flow of goods and services from producers to consumers. The flow of small ruminant from the production centers to the consumer end depends on the distance and market proximity, availability of infrastructures and the need and purchasing power of consumers. In the marketing channel of goat and sheep the quantity sold to different actors and price of animals is different. Thus, the market channel and margin analysis was done separately on goat and sheep.

Goat marketing channels

Nine main alternative channels were identified for goat marketing. Small ruminant market participant of sample respondents were supplied 137.28 TLU(Tropical Livestock Unit) of goats to the market. Channel comparison was made based on total of goat that passed through each channel. Accordingly, the channel of producers – small traders –consumerscarry on the largest followed by producers – collectors – large traders – Sire hotel/restaurants– consumers; and producers – hotels/restaurants – consumers carry a quantity of 28.69 TLU, 21.96TLU and 18.8 TLU respectively.

I. Producers→ Consumers (**17.02 TLU)**

II. Producers → Farmers (for breeding purpose) (**10.71TLU)**

III. Producers →Butchers → Consumers (**14.3 TLU)**

IV. Producers → Hotels/Restaurants → Consumers (**18.8 TLU)**

V. Producers → Small traders → Consumers (**28.69 TLU)**

VI. Producer →Collectors →Small trader → Butchers → Consumer (**5.3 TLU)**

VII. Producers→ Collectors→ Small traders →Hotels/Restaurants → Consumers (**7.2TLU)**

VIII. Producers→Collectors →Large traders→Humera Hotels/Restaurants → Consumers (**13.29 TLU)**

IX. Producers→ Collectors →Large traders→Shire Hotels/Restaurants →Consumers (**21.96TLU**)

Each of the goat value chain actors adds value to the product as the product passes from one actor to another. In a way, the actors change the form of the product through creates place, time and form utility.Table 1 indicates different types of marketing cost related to the transaction of goat by collectors, small traders, large traders, butchers and hotels/restaurants; and the benefit share of each marketing actors.

Table 1: Goat marketing costs and benefit share of actors

Items (Birr/goat	Producers	Collectors	Small traders	Large traders	Butchers	Hotels/ Restaurants
Purchase price	325	870	938	1043	1062	1085
Production cost						
Feed cost	151	-	-	-	-	-
Labour cost	77	-	-	-	-	-
Herding cost	50	-	-	-	-	-
Veterinary cost	85	-	-	-	-	-
Total production cost	688					
Marketing cost						
Feed cost	-	4	22	16	-	-
Labor cost	-	5	5	5	40	50
Herding cost	-	-	11	7	-	-
Veterinary cost		5	9	8	-	-
Transport cost	15	-	12	42	5	5
Rope	-	2	2	2	2	2
Tax payment	-	-	5	5	5	5
Slaughtering cost	-	-	-	-	30	30

Cost of spices	-	-	-	-	43	89
Injera cost	-	-	-	-	52	105
House rent	-	-	-	-	7	11
Total marketing cost	-	16	66	85	184	297
Total cost	703	16	66	85	184	297
Sale prices	910	965	1132	1255	1517	1690
Selling price of hides and skins					23	23
Total selling price	910	965	1132	1255	1540	1713
Gross profit	207	79	128	127	294	331
% share of profit	17.7	6.8	11	10.9	25.2	28.4

Compared to producers, other actors (collectors, small traders, large traders, butchers and hotels/restaurants) operating expense was 48% but their gross profit was higher than producers. That means by simply buying from the farmers and selling to consumers, other actors took 82.3% of the total gross profit.While producers, doing all the work of producing goat and bearing the associated risks, took 17.7% of the gross profit margin. This was because of lack of adequate services like training on marketing system, technology, working capital and information

Marketing Margins of goat in different channels

The margin calculation was done to show the distribution throughout the various actors as small ruminant move from production to collectors, small traders, large traders, butchers, hotels and restaurants and finally to consumers. The relative size of various market participants' gross margins can indicate where in the marketing chain value is added or profits are made. In order to calculate the marketing margin of an agent, the average price of small ruminant for that particular agent was taken.Marketing margins of goat in the nine channels for each group of market player are shown in Table 2.

Table 2: Marketing margins of actors in different marketing channels of goat

Marketing margins	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
TGMM	0	0	40	46.1	19.6	40	46.1	40	46.1
GMMp	100	100	60	53.9	80.4	60	53.9	60	53.9
GMMc	-	-	-	-	-	3.6	3.2	3.6	3.2
GMMst	-	-	-	-	19.6	11	9.9	-	-
GMMlt	-	-	-	-	-	-	-	19.1	17.2

GMMb	-	-	40	-	-	25.4	-	17.3	-
GMMh/r	-	-	-	46.1	-	-	33	-	25.7

Note: TGMM is total gross marketing margin.
GMMp, GMMc, GMMst, GMMlt, GMMb and GMMh/r are gross marketing margins of producers, collectors,small traders, large traders, butchers and hotels/restaurants, respectively

The total gross marketing margin (TGMM) was found highest in channel IV, VII and IX, which is about 46.1%. Producer's share (GMMp) of the consumer's price was found to be highest along producers – consumers and producers – farmers (for breeding purpose) market channels (marketing channel I and II) followed by producers – small traders – consumers (marketing channel V) which is about 80.4%. Producers earn the most through this channel because of having direct access to consumers and shorter market channel.

Producer's share (GMMp) of the consumer's price was found to be lowest along producers – hotels/restaurants – consumers market channel (marketing channel IV) and producers – collectors – large traders –hotels/restaurants – consumers market channel (marketing channel IX), which is about 53.9%. As the market channel becomes longer and involves more transactions between different actors, the producers' share of the final price decreases.Similar to the study done by [13], which showed that, the longer the marketing channel the lower the pastoralists' share in the total gross marketing margin.

Sheep marketing channels

Nine main alternative channels were identified for sheep marketing. Small ruminant market participant of sample respondents weresupplied 107.25 TLU of sheep to the market. The channel of producers– small traders –consumers carry on the largest followed by producers – collectors – large traders – Humera hotels/restaurants – consumersand producers – consumers; carry a quantity of 24.9 TLU, 19.04 TLU and16.1 TLU respectively.

I. Producers → Consumers (**16.1 TLU)**
II. Producers →Farmers (for breeding purpose) (**5.9 TLU)**
III. Producers →Butchers → Consumers (**5.7 TLU)**

IV. Producers →Hotels/Restaurants → Consumers (**5.15TLU)**

V. Producers →Small traders → Consumers (**24.9 TLU)**

VI. Producer →Collectors→Small traders → Butchers →Consumer (**7.8 TLU)**

VII. Producers→Collectors →Small traders → Hotels/Restaurants →Consumers (**9.26 TLU)**

VIII. Producers→Collectors→Large traders→Humera Hotels/Restaurants →Consumers (**19.04 TLU)**

X. Producers→Collectors→Large traders→ Shire Hotels/Restaurants →Consumers (**13.4TLU)**

Sheep value chain has the same value adding behavior as goat value chain.Table 3 indicates different types of marketing cost related to the transaction of sheep by collectors, small traders, large traders, butchers and hotels/restaurants; and the benefit share of each marketing actors.

Table 3: Sheep marketing costs and benefit share of actors

Items (Birr/sheep	Producers	Collectors	Small traders	Large traders	Butchers	Hotels/ Restaurants
Purchasing price	312	815	890	965	1020	1035
Production cost						
Feed cost	165	-	-	-	-	-
Labour cost	77	-	-	-	-	-
Herding cost	40	-	-	-	-	-
Veterinary cost	85	-	-	-	-	-
Total production cost	679					
Marketing cost						
Feed cost	-	4	26	20	-	-
Labor cost	-	5	5	5	40	50
Herding cost	-	-	7	3	-	-
Veterinary cost	-	5	9	8	-	-
Transport cost	15	-	12	42	5	5
Rope	-	2	2	2	2	2
Tax payment	-	-	5	5	5	5
Slaughtering cost	-	-	-	-	30	30
Cost of spices	-	-	-	-	29	71
Injera cost	-	-	-	-	31	81
House rent	-	-	-	-	7	11
Total marketing cost	15	16	66	85	149	255
Total cost	694	16	66	85	149	255

Selling prices	864	938	1045	1138	1375	1512
Selling price of hides and skins					28	28
Total selling price	864	938	1045	1138	1403	1540
Gross profit	170	107	89	88	234	250
% share of profit	18.1	11.4	9.5	9.4	24.9	26.7

Compared to producers, other actors (collectors, small traders, large traders, butchers and hotels/restaurants) operating expense is 45% but their gross profitwas higher than producers.This indicates that by simply buying from the farmers and selling to consumers, other actors took 81.9% of the total profit margin.While producers, doing all the work of producing sheep and bearing the associated risks, took 18.1% of the gross profit margin. This was because of lack of adequate services like training on marketing system, technology, working capital and information.

Marketing Margins of sheep in different channels

Marketing margins of sheep in the nine channels for each group of market player are shown in Table 4.The total gross marketing margin (TGMM) was found highest in channel IV, VII and IX, which is about 42.8%. Producer's share (GMMp) of the consumer's price was found to be highest in marketing channel I and II followed by marketing channel V,which was about 82.7%.Producers earn the most through this channel because of having direct access to consumers and shorter market channel Producer's share (GMMp) of the consumer's price was found to be lowest in marketing channel IV, VII and IX, which was about 57.2%. As the market channel becomes longer and involves more transactions between different actors, the producers' share of the final price decreases.

Table 4: Marketing margins of actors in different marketing channels of sheep

Marketing margins	**I.**	**II.**	**III.**	**IV.**	**V.**	**VI.**	**VII.**	**VIII.**	**IX.**
TGMM	0	0	37.2	42.8	17.3	37.2	42.8	37.2	42.8
GMMp	100	100	62.8	57.2	82.7	62.8	57.2	62.8	57.2
GMMc			-	-	-	5.4	4.9	5.4	4.9
GMMst	-	-	-	-	17.3	7.8	7	-	-
GMMlt	-	-	-	-	-	-	-	14.6	13.2
GMMb	-	-	37.2	-	-	24	-	17.2	-

GMMh/r	-	-	-	42.8	-	-	30.9	-	24.7

Note: TGMM is total gross marketing margin.

GMMp, GMMc, GMMst, GMMlt, GMMb and GMMh/r are gross marketing margins of producers, collectors,small traders, large traders, butchers and hotels/restaurants, respectively.

The performance of small ruminant market of the study area analyzed that the longer the marketing chain, the lower the producers' share in the TGMM.

Conclusions and Recommendations

Small ruminant in this area passes throughcollectors, small and large traders, hotels/restaurants and butchers. The study indicates that the area has ninemarketing channels of small ruminant.The analysis of market performance showed that, the intermediate buyers obtain the animals from the farmers at a lower price and they sell to the consumers at a higher price. This was because of traders were well connected to markets offering good prices and most producers were obliged to sell their goats through the channels they controlled. But if producers were to strengthen inter- and intra-group linkages by organizing into cooperatives rather than acting as individuals, they could have greater control over the supply of small ruminant to the markets.

Producer's share of the consumer's price was highest along producers – consumers, producers – farmers (for breeding purpose) and producers – small traders – consumers in both market channels. Similarly, Producer's share of the consumer's price was lowest along producers – hotels/restaurants – consumers and producers – collectors – large traders –hotels/restaurants – consumers in both goat and sheep market channel. As the market channel becomes longer and involves more transactions between different actors, the producers' share of the final price decreases. Producers can shorten the market chain by cutting out the intermediaries' actors and increasing the number of activities they undertake themselves such as rearing, fattening, transportation and trading. But vertical integration can bring benefits and adding activities to the farmers production system. Therefore, effort should be made to establish producers' cooperative, help farmers on giving training in appropriate technologies, marketing systems, working capital and information.

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

Reference

1. Mohammed, A. (2019).Production of hide and skin in Ethiopia; Marketing Opportunities and Constraints. A review paper Cogent Food & Agriculture, 5(1).
2. Negassa, A. Rashid, S and Gebremedhin, B. (2017). Livestock Production and Marketing. Ethiopia Strategy Support Programme II (ESSP II) Working paper 26, Addis Ababa, Ethiopia.
3. Legese, G. and Fadiga, M. (2014). Small ruminant value chain development in Ethiopia: Situation analysis and trends. ICARDA/ILRI Project Report, Nairobi, Kenya.
4. Hassen, A. Ismail, A. Haile, A and Legese, G. (2015). Analysis of sheep and goat value chains in Shinelle District, Somali Region, Ethiopia.
5. Kassoh, F. Abdulai, J. Nabay O and Bockarie, R. (2017) "Determinants of Inlet Choices of Sheep and Goats Traders in Ghana: A Case Study of Kumasi and Tamale." Journal of Agricultural Science 9(7).
6. Armson, B Ekiri, A. Alafiatayo R and Cook, A. (2021) "Small Ruminant Production in Tanzania, Uganda, and Ethiopia: A Systematic Review of Constraints and Potential Solutions." Veterinary Science, 8 (5).
7. Lysholm, S. Johansson Wensman, J. Munyeme, M and Fischer, K. (2020). Perceptions and practices among Zambian sheep and goat traders concerning small ruminant health and disease. PLoS ONE, 15(6),
8. Onduso, R., Onono, J. & Ombui, J. (2020). Assessment of structure and performance of cattle markets in western Kenya. Tropical Animal Health and Production, 52(2), 725–732.
9. Gambelli, D. Solfanelli, F. Orsini S and Zanoli, R. (2021)"Measuring the Economic Performance of Small Ruminant Farms Using Balanced Scorecard and Importance-Performance Analysis: A European Case Study." Sustainability, (13) 3321.

10. Fallah S, Kwasi O, Fred N, Ibrahim L, Raymond M. (2021). Market Performance of Small Ruminant in Kumasi and Tamale of Ghana. American Journal of Economics 2021, 11(3): 84-94
11. Cochran, W.G. (1977). Sampling techniques, 3rd Edition. John Wiley &Sons, New York.
12. Mendoza, G. (1995). A primer on marketing channels and margins. In. Scott G.J. (ed.), Prices, products and people: Analyzing Agricultural Markets in Developing countries. International Potato center, Bowlder, London.
13. Gebremariam G and Yemiru T. (2015). Market chain analysis of live goats: Asaita District, Afar Regional State, Ethiopia. IIED Country Report. IIED, London.