

Sheep market channels and households market participation in Borana pastoral area, Southern Ethiopia

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Abstracts— *The study was conducted to analyze sheep value chain in Borana zone based on the survey data from 172 randomly selected households, 3 export abattoirs, 14 different live sheep level traders, 3 market regulators, revenues and cost office at adama and informant interviews. The result showed that there was four sheep market channel with no significant purchase price difference and non competition among the channels at the point of purchase. The core value chain actors include producers, collectors, brokers, small traders, big traders, export abattoirs, and live sheep exporters. There is no sheep value addition practice at production area. The main traders marketing function is to create place utility and export abattoirs exports mainly chilled sheep meat. The Tobit model used showed that female households, family size, sheep size, market information, use of veterinary services, and unit price of sheep positively and significantly affect sheep supply. Distance of household from market centre, and other livestock holding negatively and significantly affected households sheep market supply. The main sheep production problems identified include disease, feed and water shortage, limited inputs of production and lack of improved sheep breed at producers level. Market information and lack of purchase standard along value chain, lack of market regulation, and high market tax reported to be the main sheep market problems. The sheep market is characterized by many sellers and a small number of buyers, with no price competition. There is a little information about sheep price at export abattoirs due to different purchasing mode and traders at the area set minimum price to insure their profit. High operational cost, marketing skill and previous market linkage are the most hindering barriers in sheep trade at higher stage of sheep value chain. The main live and sheep meat export reported was lack of consistent abroad demand/order and lack of sheep quality and quantity during their peak seasonal operation. Adjustment of policy variables linked to sheep supply at household level, health related training, breed improvement, and market linkage improvement are recommended to improve sheep value chain.*

Keywords— *Borana Zone, Sheep market, Tobit model,*

I. INTRODUCTION

The Borana pastoral system of southern Ethiopia traditionally has been based on cattle husbandry for wealth Storage and milk production (Wang et al., 2022; Degen et al., 2024a), and small ruminants for quick cash income (Tolera A and Abebe A, 2007). Among many factors drought resulted in cattle asset erosion in the area forced pastoralists shifted to other livestock; camel production and increase small ruminant composition (Degen et al., 2024b). Small ruminants could benefit wealth accumulation, risk mitigation, food security, and environmental protection due to their unique adaptation to arid and semi arid areas (Leite et al., 2021; Ciliberti et al.,

2022). In drought prone areas keeping of small ruminants, rather than large species, has the advantage that more animals can be kept per unit thus spreading risk (Ben Salem and Smith, 2008). Economic advantages of small ruminant over large ruminant include low initial investment and correspondingly smaller risk of loss from individual deaths and regular cash income and an insurance against emergencies (Kosgey et al., 2008; Wodajo et al., 2020).

In Borana zone previous study by Feyyisa et al., (2018) focused on characterization of sheep management and breeding practice. There was also breed performance improvement intervention of local black head through

Crossing with Exotic Dorper sheep(Feyissa et al., 2023). However community livelihood diversification only is not enough to improve the livelihood of the community unless they derive a reasonable amount of income from the production. Past focused on production characterization ignores whether producers are benefiting or not from their produce. Even though sheep marketing was operating with no far less, it did not get research attention and the past research by Hussen et al., (2013) focused on goat value chain analysis.

Sheep supply from the Borana holds the third position next to goat and cattle in terms of volume and market demand. However, there is no information regarding sheep markets, market channels, actors involved and existing functional relationships among actors and related constraints. Sheep value chain analysis hence will hint point of possible policy intervention targeting to benefit especially producers among sheep actors. ICARDA aimed to access on small ruminant market data in 2014 in the zone but finally attention was given for goat value chain analysis as trade focus much on goat at time and sheep value chain analysis did not get research attention. However, there is high production and takeoff sheep from the area and needs to analysis to hint possible value chain development intervention targeting to benefit producers as sheep production in the area represents the option for risk

aversion to climate change risking traditional cattle dominated herd composition production system.

Objectives the study

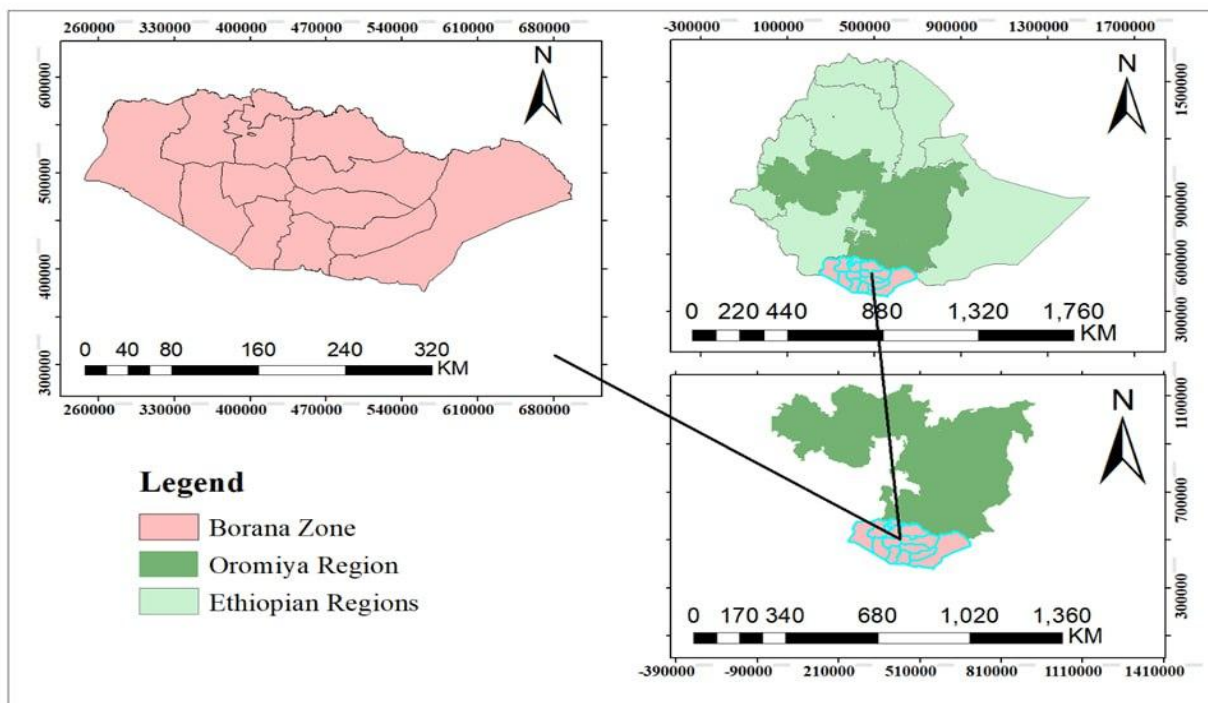
- To identify sheep value chain actors, their function and linkages in the study area
- Map sheep value chain
- To identify factors affecting sheep supply in the study area
- To identify existing challenges along sheep value chain

II. RESEARCH METHODOLOGY

Discription of the Study Area:

Borana zone is located at 563 km from Addis Ababa to the Southern tip of Ethiopia. It has

According to central statistical estimation (2007), the population of the zone was 966,467 of which 489,001 (51%) male and 477,466 (49%) were female. The area received a mean annual Rainfall 470.27 from1981-2018 with the driest 250.09 mm in 1984 and 750.64mm, 644.16 and 606.52 in 1997, 2011and 2006 respectively(Worku et al., 2022). The major livelihood of the zone is pastoralism and agropastoralism



Method of Data Collection and Source of Data: Both secondary and primary information was used in the study. Data from administrative kebele, revenue and custom office, review of literatures and documents used as secondary

data. The survey questionnaire and checklists used to collect primary data from producers, traders, exporters, and Additionally, Focused Group Discussions (FGD), and

key informants interview conducted to validate primary data.

Sampling methods and sample size: In this study, purposive sampling method followed by simple random sampling employed to select sample households. Districts were purposively selected based on sheep potential reported zonal Agriculture office. Then, two *kebeles* from each district again purposively selected based on production potential. Then simple random sampling

method used to select respondents from each *kebeles*. The size of sample constituted based on Yemane(2001) sample size determination formula at 8% error of margin.

$n = \frac{N}{1+N(e^2)}$ Where: n is the required sample size, N is population size in the study area, e represents level of accepted errors of margin. Accordingly, about 153 minimum households required for this study. Thus, 172 sample households randomly selected from each potential selected kebel of Borana zone.

Table 1. Proportional household sample

District	PA	Sample frame	sample	Total sample
Yabelo	Did yabelo	1134	28	59
	Dherito	1447	31	
Gomole	Surupha badiyya	714	26	48
	Harbora	673	22	
Taltaale	Gandhile	1184	29	65
	Kulcha	1951	36	

III. METHODS OF DATA ANALYSIS

In the data analysis, descriptive statistics, economic model and marginal analysis were used.

Disruptive statistics: mean, standard deviation, and percentage used to describe household charactersits

Econometric analysis: The common approaches of modeling market supply model includes OLS, and Tobit, models. Where dependent type is limited type data censord Tobit model is assumed to be appropriate than OLS as OLS fits continouse dependent variable to its determinants(Belete and Nigatu, 2023). The data in this study is of a limited dependent variable kind. Tobit model is hence suitable for this investigation. The level of producers sheep sell to market is censored at 1. In the tobit model the latent variable Ei^* cannot be observed

while the dependent variable is observed specified as follows. $E_i = \sum_{j=1}^n \beta_j X_j + V_i$, $Ei = \begin{cases} Ei^* & \text{if } Ei^* > 0 \\ 1 & \text{if } Ei^* \leq 0 \end{cases}$

Where Ei is volume of supply and Ei^* is the latent variable conditioned on explanatory variables with $E [Ei^*/X_j]$ equals $X_j\beta$. $V_i \sim (0, \delta^2)$ and β_j are the vector of parameters to be estimated. The X_j represents various households specific variables.

Descriptive statistics:

Household characteristics: From the total 172 households sampled, 76.3% were illiterate, while 23.7% were literate. Most of the sample households were male-headed households, which constitute about 94.22% of the sample households, and only 5.78% of the sample households were female-headed

Table 2: Summary of continouse variables

Variables	Obs	Mean± Std. Error	Range
Age(years)	172	44.63±17.45	20-85
Family size	172	7.09±2.16	
Education Level(class)	172	0.58±1.24	0-7
Livestock holding(tlu)	172	7.42±10.53	0-99.17
Sheep holding	172	7.58±9.04	0-80
Distance to livestock market(km)	172	7.40±6.58	0.1-30
Distance to water(km)	172	8.85±6.47	0.16-40
Distance to veterinary clinic(km)	172	8.48±8.29	0.05-25
Distance to Veterinary Post(km)	172	10.41±8.17	0.1-25

Distance to Farmacy(km)	172	11.05±8.72	0.03-30
Crop income	172	188.21±758.82	0-7500
Kalo Size (hectare)	172	0.27±0.74	0-2
Summary of discrete variables			
	N	Yes	No
Received credit	172	49	123
Used Veterinary services	172	149	23
Use extension	172	40	132
Produce livestock product	172	22	150
Access to market information	172	108	64
Involve in off farm income	172	34	138
Participate in cooperative	172	97	75
Got aid	172	98	74

According to this survey results, sample households on average must travel 7.4 km to market their livestock. Where there is not enough supply and available village veterinary clinics is not functioning household suffers to gate alternative private veterinary service which is relatively far from them.

In addition to livelihood income, livestock plays household social rituals, identity and determines wealth status within the community(Dabasso et al., 2022). Sheep plays social duties and its fatty organ plays as medicine and oil for consumption. It is an important in wedding ceremonies and Gadamoji (Cultural festival). Sheep is the preferred gift parents offered for girls after giving birth at

son in law and slaughtered in honors of special guests. Among sampled households, 12.60% reported to have no cattle and shifted to sheep production. However, sheep is the most affected next to cattle than any other livestock from drought and disease.

Knowledge of reasons for keeping animals is a prerequisite for deriving operational breeding goals(Jaitner et al., 2001). Among sampled households, 20.93%, 49.42% and 29.65% produce sheep for consumption, sell and wealth respectively. About 54.65%, 22.09% and 23.26% sampled households gate sheep breed for production from market, gift and inheritance respectively. for production purpose.

Table 3. Sheep herd composition

Variable	Obs	Mean	Std. Dev.	Min	Max
Female Sheep	162	5.740741	5.923483	1	36
Male Sheep	121	3.090909	5.326037	1	50

The more female sheep in the herd shows the intention for more sheep production. Out of sampled households 27.54% do not have male sheep. They rely on their neighbour male sheep for mate. Sheep house, circle like roofless woody materials stand in the plowed ground, is

contracted from local available materials mean to prevent them from predators. However, sheep house is usually not separated from goat house and sometimes share same barn with cattle.

Table 4. Sheep production management

Separate sheep housing			Separate sheep feeding		Split sheep herding	
Participation	N	Percent	N	Percent	N	Percent
Yes	98	57.31	92	53.49	88	51.46
No	73	42.69	80	46.51	83	48.54

Herd splitting by age, and type found to be culturally practiced by pastoral households as risk management strategies (Wang et al., 2022). According to this survey nearly half households were not practicing split sheep herding, feeding and housing. Households used feed supplement as lifesaving than to make profit. Among sampled households only 9.3% of households selected from kulcha Kebele of Teltele reported to fattening to gate profit.

Sheep marketing: Among sampled households about 81.98% households sold their sheep while the rest do not.

Households who sell their sheep has on average 7.77 per households. They used to sell on average 4.5 which was 59.91% of their herds. Non sheep suppliers have less sheep compared to market participants. This may hint non sellers do have limited herds to market.. They count female sheep for production and prefer to sell male sheep. There is no household used to have male sheep without female sheep in the herd. This my hint that even though the preferred marketable sheep type is male there is no household to own male sheep to add value.

Table 5. Households sheep marketing

Sheep category	Production			Marketed			Commercial index (mean)
	N	Total	Mean	N	Total	Mean	
Female Sheep	162	767	5.74	10	21	2.1	36.64
Male sheep	121	889	6.77	121	612	4.3	63.56

Thus, female sheep in the herd is used for market and female sheep is used for production or replace herd than marketing.

Male sheep commercial index shows that households sold more male sheep than female sheep.

Sheep Market Chain Actors and Their Functions

Collectors: Are local business men involved in sheep purchase and sell to capture market place utility margin. They buy sheep potentially demanded by traders, which they are confident will give them a good margin on one market sale or they are ordered by traders to collect sheep from far areas specially Mega, and Dilo districts in prior negotiation on price and size of purchase. They serve for sheep transportation from all around, especially far from the market road.

Brokers: They were people with the ability to negotiate more importantly with producers and traders. There were no registered or licensed brokers in live sheep marketing or tax for their activities. They entered and exited the market based on their own speculation at any time.

Small traders: They were involved in the sheep trade and transport to Bishoftu, Finfine, and Modjo. They also serve to feed secondary markets from primary market to gate market price margin. They have an experience acting as

agents for other actors above the vertical value chain stage. This traders is the most subjected to currency loss from unwritten verbal agreement of sell on credit to above sheep value chain actors.

Transporters: Many collectors use live animal transporters, motors and passengers vehicles.. This type of transporter requires a per-animal payment. The other transporters use vehicles like ISUSU or FSR to transport animals from the area to central markets. Some export abattoirs also have animal transporting vehicle themselves and help their regular customers who meet their renting criteria in request.

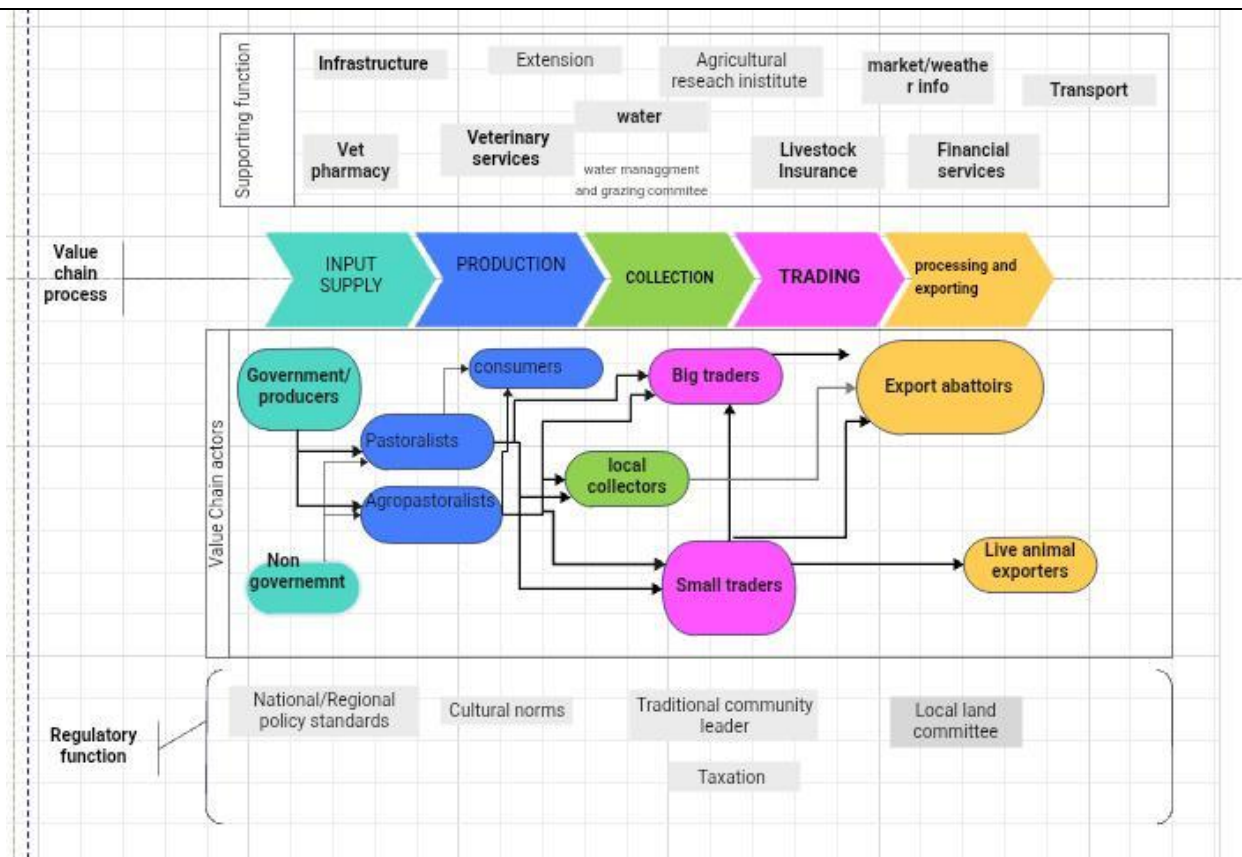
Big Traders: They have strong relations with traders and export abattoirs. They have their own animal resting place waiting orders from export abattoirs. They usually receive sheep in advance from small traders located at Borana with after slaughter payment on unwritten agreement. These traders arrange transportation logistics and play as buffer for animal exporters and export abattoirs during unmated abroad order. Some export abattoirs however reported as these type traders are not adding value.

Export Abattoirs: They process chilled sheep meat export to the UAE, Saudi Arabia, Dubai, Djibouti and Qatar. Their purchasing size from Borana on average is 20-30percent.

Table 6. Export abattoirs demand and potential operation

abattoirs	Actual /potential Operation	Demand	Destination	Purchase mode	Challenge
Modjo modern	≤50%	Male 1-2 years	UAE, KSA, Dubai	Carcass weight	Supply problem, producers have no contact

Luna Export	≤25%	Male no age limit(12-17kg)	Saudi, KSA, Local used	Carcass weight	Quality supply, Seasonal abroad demand, Abroad price stability and no abroad contract
Organic export	≤20%	Male ≤1 year(5-14kg)	KSA, Qatar, Bahrain	Kuwait, UAE, Carcass weight	Quality Supply, Informal trade(Somali-Kenya), due to cheap boat price



Sheep Live exporters: They are located in Finfine city, and a few are in Adama Town. Some of

them reach Borana to purchase the type they need from local traders and pastoralists at Bake, Elwaye, and Dubluk, and others purchase through orders at their operation. They do have no contract live animal customers from abroad at all. But they wait order from their abroad customers. Their major destination is Yemen, Djibuti, Bahrain, and Oman.

Consumers: Sheep is slaughtered for culture related ceremonies, and households also slaughter sheep to gate its fatty use as butter especially for women after giving birth. The fatty from sheep tial reported tob used as medicine during commoncolds, and constipation. But sheep is not usually used for meat in the area believed to cause daytime weakness and sleepiness. what consumers purchase in the market during our market survey recorded with collaboration of market regulators is much smaller than what is purchased by other actors.

Sheep market route: The main sheep market route operating in the area is formal sheep market. Sheep purchased from the area transported to difrent market through different route. However, the market volume of these different route is not constant as traders from the area has no contract agreement and prefers to sell based on market day negotiation. Traders sometimes seek for option to sell to those who offers relatively more price and can change thier sell distination causing the volume of these market route share is unstable. The final distination of

traders from the area is finfinne, Modjo and Adama markets use addis to moyale asphalt road.

Sheep market Channel

Channel I:Producers → producers/consumers: This channel is where producers gate breed for production and others purchase for slaughter purpose related to culture especially for women after child birth. Among sampled households 54.65% households got breed from market

purchase. Thus, improvements of market will not only contribute to households benefit from market price, it will also contribute to breed sustainability and improvement. This market share is but only 0.7% of the market volume and hence insignificant.

Channel II: Producer → collectors → small traders → big traders → export abattoir

This market channel is the longest and usual market channels where export abattoirs gate sheep. Traders stay at local area communicates, purchase sheep and send via transporters to big traders at Modjo, Adama, and Finfine. Big traders involved in to supply sheep to export abattoirs are sometimes not purchase sheep from small traders but negotiate to sell and share the benefit/risk as the purchase at export abattoirs changed to carcass weight based purchase. Small traders of the area must discourage local market area as they do not know the final carcass weight. This channel share is 28% of market volume in the area.

Channel III: Producer → Collectors → small traders → live exporters

This channel is the major channel where almost all the sheep supplied to market exported abroad. This channel operates during live animal exporters reaches the production areas and involve in secondary market of Borana zone through their agents. They use small traders located in Yabello to organize sheep purchase in advance. Live animal exporters are financially strong to arrange transport logistics to pastoral areas but their transportation service is still not animal transporting vehicles. This channel shares the most market volume (63.30%) of sheep trade in the area and sheep from Borana thus more transported in live to abroad. At national level, among other livestock exported to abroad sheep

Channel IV: Producers → Small traders → Big traders → Export abattoirs

This market channel operates mainly during peak market supply of sheep. As local small traders easily gate their demand from market they do not use collectors and directly purchase from producers. This market channel share was about 8%.

Sheep Pricing: Pastoralist fears for high exit market tax for unsold sheep will sell to collectors at farm gate. Producers have no price bargaining power and their final choice is to sell to what price traders and other market agents offered in the markets.

Entry Barrier: Entry barriers arise from capital to enter to animal trade. To inter in sheep trade requires experience in negotiations with other actors and have to well known to others. Lack of appropriate government marketing service, lack of animal warehouse, limited input supply, and local security problem are barrier to inter sheep trade in the area.

Marketing Margin along Each Live sheep Market Chain

Marketing margin, the ratio of difference of selling and buying to final consumer price, shows the percentage of gross marketing margin fall under particular market participants. It is one of the approaches to measure marketing performance. In this analysis the main cost incurred in animal trading was exit tax, permit tax(levies), transportation cost, broker commission, loading and unloading cost, resting cost (feeding and health management), guard fee and other service costs. Export abattoirs purchase is based on carcass weight at their operation unit and visual estimation standard/livewieght is used at primary or secondary market. Hence, other channels that connect with export abattoirs excluded from this analysis due to difficult to gate unit price. This analysis used only the channel of final price of live sheep trade from costum and revenue office at Adama city.

Table 7. sheep market margin at different market actors

Actors	Chane III	
Producers	Selling price	2760
	Production cost	600
	Marketing cost	46
	profit	2114
	Gross margin	76.60%
Collectors	Purchasing cost	2760
	Cost of marketing	147
	Selling price	3160
	profit	253

	Gross Margin	8.06%
Small traders	Purchasing cost	3160
	Marketing cost	599
	Selling price	4247
	Profit	488
	Gross Margin	11.49%
Big traders	Purchasing cost	4247
	marketing cost	730
	Selling price	5,700
	Profit	723
	Gross margin	12.68%

Determinants of sheep market Participation and market Supply:

The variables expected to have influence ,sheep keeper household’s supply volume includes: household age, sex, family size, education, extension

contact, credit, other livestock holding (tlu), sheep herd size, distance to live market, crop income, off farm income, sheep herd size, aid, other livestock holding, household private land for livestock (kalo size)

Table 8. *f* factors affecting households sheep market supply

Variables	Coef.	Std. Err.	t	P>t
Sex	-2.51*	1.31	-1.91	0.06
Age	-0.01	0.04	-0.29	0.77
famlsiz	0.51*	0.27	1.87	0.06
EduLevel	-0.50	0.43	-1.17	0.25
Other livestock holding tlu	-0.08*	0.05	-1.69	0.09
sheep	0.16***	0.06	2.58	0.01
ReceiveCredit	-1.91	1.22	-1.57	0.12
ExtensionServ	-0.37	1.27	-0.29	0.77
DistMarketPl1	-0.08*	0.04	-1.82	0.07
offincomep	-1.34	1.32	-1.02	0.31
cropin	0.0002	0	0.27	0.79
Aid	-0.96	1.06	-0.91	0.36
kaloSiz	-0.89	0.7	-1.28	0.2
UseVetservice	3.07**	1.56	1.97	0.05
MktInf	1.90*	1.01	1.88	0.06
UnitPriceSoldSheep	0.001**	0.00	2.48	0.014
_cons	0.64	4.1	0.16	0.88

Out of 16 variables assumed to be the factors of households market supply 8 variables turned to be significant factors and discussed as follows

Sex of households: Sampled male households are less in sheep market participation and sell less than their female counterparts. Thus, being male households, negatively

affect sheep market supply at 10% significant level. As the household is turned to be being male, sheep sell will decrease by the factors of 2.5147 being other factors constant.

Family size (famlsiz): Households being large family size have more sheep market supply. Large family size

needs more household cash needs for family expenditures than less family size households. This finding indicated that an increase in unit person in family size will increase market participation and intensity of market participation by the factor of 0.5109 being other factors held constant.

Other livestock holding (tlu): Bing household have more livestock apart from sheep, they will gate other alternative to source for their cash needs. Goat, for example, plays less cultural related activities than sheep. Thus households having more other livestock can source their income alternative to sheep sell and supply less than other households with limited other livestock type sell option. This findings showed that households with more units of other livestock holding in tropical livestock unit will increase sheep supplt by the factors of 0.0894 being other factors constant.

Number of sheep owned (sheep): The number of sheep owned (flock size) has a positive significant effect on the number of sheep sold in the market at 1% significant level. Increase of sheep by one sheep will increase the number of sheep sell by a factor of 0.1606, ceteris paribus. The finding is in line with Zelalem G. Terfa (2012) and Abate and Addis (2021), who found that the number of sheep owned significantly and positively affected the intensity of sheep market participation.

Distance to the nearest market (DistMarketPI1): Households who have to trek the animals to markets for days, the monetary value of time spent is high, raising the marketing costs that would discourage more active market participation((Lutta et al., 2021). The number of sheep sold in the market would decrease by a factor of 0.09 if the distance between the household’s home and the nearest market increased by 1km, ceteris paribus. This finding is consistent with Kibara (2019); Kibona and Yuejie (2021); Tilahun et al. (2023) who found that the availability of

livestock market access had a direct and significant effect on the level of livestock market participation but contradicts with (Abate and Addis, 2021) who founds access to market negatively affected sheep market supply.

Use of veterinary services (UseVetservice): Households use of veterinary service contributed for sheep herd health benefit to produce more and hold more sheep than those who do not use veterinary services. Thus, users of veterinary services supposed to have more sheep herd surplus to market. This finding showed that households being use of veterinary services for their sheep health issues will positively affected market participation and intensity of market participation by the factors of 3.0761 being other factors constant.

Market information(MktInf): Access to market information positively and significantly contributed to houshold’s sheep supply. The finding is consistent with Kibara, (2019); Abate and Addis, (2021); Kibona and Yuejie, (2021) who found positive relation of market information to households livestock supply.. However, producers have no reliable source of information but to adjust their price to existing information. Market information source household use includes own observation, neighbours, traders, customers, and brokers.

Market price(price): Increase in unit price(Birr) of sheep will increase sheep supply by the factors of 0.001 at 5% significance level. This findings holds the law of supply “the higher the sheep price is, the higher the number of sheep supplied and sold in the market” and consistent with the findings of Abate and Addis (2021)

Sheep value chain Constraints: Pastoral group discussion with 11-20 members held at two kebel from Yabello and Teltelle districts to prioritize sheep production problems. Constraints identified include problems at production, transportation, and marketing stages.

Table 9. Households sheep production constraints (pair wise ranking)

1	Dida Yabello kebele									Gandhile kebele					
	No	Problems	1	2	3	4	5	score	rank	1	2	3	4	5	score
1	Drought		2	3	1	1	2	3 rd		2	3	1	1	2	3 rd
2	Disease			2	2	2	4	1 st			2	2	2	4	1 st
3	Water /drink				3	3	3	2 nd				3	3	3	2 nd
4	Improved breed					4	1	4 th					4	1	4 th
5	Low Price						0	5 th						0	5 th

Drought resulted from failed fift consecutive rainy season resulted in high herd loss due to feed/water shortage during this work. The feed situation worsens

during this survey period and resulted in many sheep loss. More Sheep and goat also sold purchase grass and other concetrates to feed cattle in prolonged drought of 2021-

2023. Disease is the most problems and result in herd loss in drought season.

Disease incidence	Treated sheep(veterinary drug)	Died sheep(treated)
NO 6(3.49%)	17(10.24%)	88(59.06%)
Yes 166(96.51%)	149(89.76%)	61(40.94%)

The main disease household reported is liver diseases, respiratory disease, intestinal and skin diseases. Households gate livestock treatment services through veterinary professionals (23.49%), CWHs (8.72%), and own treatment (64.43%). Despite government effort to curb through vaccine and other aid at Kebele level, sheep disease is reported to the most challenging. Households worry availability of effective drugs and access to

veterinary pharmacies near to them once sheep disease breaks out. Among the causes of sheep death reported disease shares 65.39%, drought shares 32.77% while other reason (pests and beast) related death shares 1.84%.

The entire production depend on sole range land. Except minerals and drugs there is limited inputs for sheep production. Exporters do not engaged to trade livestock feed and other input even at critical times.

Table 12. Sheep market problmes recorded at different actors

Problems	Opportunities
Unstable demand and market price	High female sheep holding
Quality and quantity supply	Growing investments in export abattoirs
Death during travel/ at animal warehouse	Increased dollar(50%) for export abattoirs
Purchase/sell on credit result in loss of currency	Plan for ranch to buffer feed shortage
Limited value addition	Government investment(underground water)
High market and permit tax	
Reliable market information source	
Less market regulation	
Different purchase standard	
Security problem	

Limited coordination among actors, poor information sharing, and inadequate market data, insufficient forecast techniques or other security related uncertainties are existing in sheep value chain. There was also some additional non legal payment request reported at some security check points on the roads.

Traders complain for high government market tax per animal head supplied to market and the tax different from one market place to other market for same animal irrespective of market services. Producers fear/fails to able to pay exit tax with their unsold sheep from market place may sell their sheep at whatever price traders willing to afford outside market.

Reliable information about price and demand is the major challenge. In addition, the purchase mode at primary market mostly carried out by visual estimation and some traders used live weight. Apart from these export abattoirs used to pay after sheep slaughter based on carcass weight.

Price per sheep at the final market is thus unknwn and local price must be set to the point it will assure traders to gate profit. This process further may creates market information linkage gab.

IV. CONCLUSION AND RECOMMENDATIONS

The study was conducted to identify sheep market channel, determinant factors of household market participation, and supply level based on data from 172 randomly selected households from three potential districts, other market actors and market experts. Market analysis showed there were four sheep market channels with non observed price difference. Producers have no channel choice that will maximize their price share. Among four channel, the channel that links collectors, small traders, big traders and live sheep exporters shares the major sheep market volume.

There were only about 81.98% sample households participated in their sheep sell while other households do not sell their sheep during the production year of the survey period. Tobit model result showed, among other variables included to be sheep market supply, market information, use of veterinary services, unit price of sheep, family size and size of sheep herd positively contributed to market participation while being male households, other livestock size, distance to market negatively and significantly affected sheep market supply. Sheep Producers suffers in sheep herd loss during feed and water shortage due to drought, disease and improved sheep to resist this case.

Sheep marketing along the sheep value chain has different purchase standard caused some traders failed to wait for payment after sheep slaughter from export abattoirs and per sheep price is unknown.

High operational cost, marketing skill and previous market linkage are the most hindering barriers in sheep trade at higher stage of sheep value chain. The main live and sheep meat export reported was lack of consistent abroad demand/order and lack of sheep quality and quantity during their peak season operation.

Government Sheep health intervention, access to market and market information will contribute to household sheep supply level. Feed and Water for livestock intervention, purchase standardization, market linkage improvement and developing rules and regulation in sheep trade will contribute to sheep value chain.

Government should Investment to develop drought resilience and mitigation strategies, drought cycle modelling for early warning, and range land management will help sheep producers.

REFERENCES

- [1] Aa, F., K. Kk, and A. N. 2018. Characterization of Sheep Management and Breeding Practice under Resource Poor Extensive Production System in Borana low-land, Southern Ethiopia. *J Fisheries Livest Prod* 06(01). doi: 10.4172/2332-2608.1000264.
- [2] Abate, D., and Y. Addis. 2021. Factors affecting the intensity of market participation of smallholder sheep producers in northern Ethiopia: Poisson regression approach (P. González-Redondo, editor). *Cogent Food & Agriculture* 7(1): 1874154. doi: 10.1080/23311932.2021.1874154.
- [3] Belete, A.A., and A.G. Nigatu. 2023. Determinants of market participation among smallholder teff farmers, empirical evidence from central Ethiopia. *Environmental Development* 48: 100929. doi: 10.1016/j.envdev.2023.100929.
- [4] Ben Salem, H., and T. Smith. 2008. Feeding strategies to increase small ruminant production in dry environments. *Small Ruminant Research* 77(2–3): 174–194. doi: 10.1016/j.smallrumres.2008.03.008.
- [5] Ciliberti, M.G., M. Caroprese, and M. Albenzio. 2022. Climate resilience in small ruminant and immune system: An old alliance in the new sustainability context. *Small Ruminant Research* 210: 106662. doi: 10.1016/j.smallrumres.2022.106662.
- [6] Dabasso, B.G., A.O. Makokha, A.N. Onyango, and J.M. Mathara. 2022. Beyond nutrition: social-cultural values of meat and meat products among the Borana people of Northern Kenya. *J. Ethn. Food* 9(1): 46. doi: 10.1186/s42779-022-00160-5.
- [7] Degen, A.A., D. Boru, M. Schwartz, S. El-Meccawi, and M. Kam. 2024a. Borana Cattle Pastoralists in Southern Ethiopia Are Diversifying Their Livelihoods by Cultivating Land and Raising Camels. In: Degen, A.A. and Dana, L.-P., editors, *Lifestyle and Livelihood Changes Among Formerly Nomadic Peoples*. Springer Nature Switzerland, Cham. p. 45–85
- [8] Degen, A.A., D. Boru, M. Schwartz, S. El-Meccawi, and M. Kam. 2024b. Borana Cattle Pastoralists in Southern Ethiopia Are Diversifying Their Livelihoods by Cultivating Land and Raising Camels. In: Degen, A.A. and Dana, L.-P., editors, *Lifestyle and Livelihood Changes Among Formerly Nomadic Peoples*. Springer Nature Switzerland, Cham. p. 45–85
- [9] Emanu, B. 2006. Livelihood Diversification in Borana Pastoral Communities of Ethiopia Prospects and Challenges.
- [10] Feyissa, D., M.A. Ahmed, and A. Yonas. 2023. Evaluation of improved sheep breeds in pastoral areas of Yabello district, Southern Oromia, Ethiopia. *Int. J. Livest. Prod.* 14(2): 37–43. doi: 10.5897/IJLP2022.0796.
- [11] Hussen, N., S. Kumsa, A. Haile, K. Hikuepi, and G. Legese. 2013. Analysis of goat value chains in Yabello district, Borana zone, Ethiopia.
- [12] Jaitner, J., J. Sowe, E. Secka-Njie, and L. Dempfle. 2001. Ownership pattern and management practices of small ruminants in The Gambia — implications for a breeding programme. *Small Ruminant Research* 40(2): 101–108. doi: 10.1016/S0921-4488(00)00221-2.
- [13] Kibara, M.J. 2019. Household-Level Livestock Market Participation among Southern Rangeland Kenyan Pastoralists. Proceedings of the 3rd Central European PhD Workshop on Economic Policy and Crisis Management. University of Szeged, Doctoral School in Econom.
- [14] Kibona, C.A., and Z. Yuejie. 2021. Factors that influence market participation among traditional beef cattle farmers in the Meatu District of Simiyu Region, Tanzania (S. Clegg, editor). *PLoS ONE* 16(4): e0248576. doi: 10.1371/journal.pone.0248576.
- [15] Kosgey, I.S., G.J. Rowlands, J.A.M. Van Arendonk, and R.L. Baker. 2008. Small ruminant production in smallholder and pastoral/extensive farming systems in Kenya. *Small Ruminant Research* 77(1): 11–24. doi: 10.1016/j.smallrumres.2008.02.005.

- [16] Leite, J.H.G.M., D.A.E. Façanha, J.V.D. Bermejo, M.M. Guilhermino, and L.A. Bermejo. 2021. Adaptive assessment of small ruminants in arid and semi-arid regions. *Small Ruminant Research* 203: 106497. doi: 10.1016/j.smallrumres.2021.106497.
- [17] Lutta, A.I., O.V. Wasonga, L.W. Robinson, M.M. Nyangito, and J. Sircely. 2021. Determinants of livestock market participation among pastoral communities of Tana River County, Kenya. *Environ Dev Sustain* 23(5): 7393–7411. doi: 10.1007/s10668-020-00922-8.
- [18] Tilahun, Y., B. Tadesse, E. Gebre, K. Haile, M. Bayu, et al. 2023. Factors influencing the intensity of market participation of smallholder livestock producers in southwest Ethiopia. *Cogent Economics & Finance* 11(2): 2258672. doi: 10.1080/23322039.2023.2258672.
- [19] Wang, X., C. Liao, S. Brandhorst, and P. Clark. 2022. Sedentarization as an adaptation to socio-environmental changes? Everyday herding practices in pastoralist communities in southern Ethiopia. *E&S* 27(3): art39. doi: 10.5751/ES-13503-270339.
- [20] Wodajo, H.D., B.A. Gameda, W. Kinati, A.A. Mulem, A. Van Eerdewijk, et al. 2020. Contribution of small ruminants to food security for Ethiopian smallholder farmers. *Small Ruminant Research* 184: 106064. doi: 10.1016/j.smallrumres.2020.106064.
- [21] Zelalem G. Terfa. 2012. Sheep market participation of rural households in Western Ethiopia. *Afr. J. Agric. Res.* 7(10). doi: 10.5897/AJAR11.747.