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Participatory Assessment of Major Animal Health Constraints to Sheep Export from Afar Pastoral Production System

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Abstract: Sheep are an important component of pastoral production systems of Ethiopia. They play variety of important contributions in lives of pastoral households and national economy. However, the contributions to national and local economy are constrained by animal diseases. The aim of this study was to assess major animal health constraints to sheep export from Afar pastoral production system using participatory epidemiology tools. Information was gathered from 12 focus group discussions at four districts of Afar region, four quarantine stations and from various officials who have been involved in sheep value chain. In this study animal diseases were ranked as third most important constraint next drought and feed shortage in terms of impact on small ruminant driven livelihood at production level. Informants groups ranked peste des ptits ruminants (PPR), pasteurellosis, sheep pox, external parasite and ovine fascioliasis as top five highest ranking sheep diseases in terms of impact on livelihoods and trade. There was strong agreement between informants groups both at producers' and quarantines' level to rank major diseases which affect their livelihoods. Along the market chain pre-purchase inspection and selection for quality assurance and certification for live sheep were none existent. It can be concluded that most of the diseases reported at quarantines level were also the major diseases prevailing at the producer's level. Strategies are needed to improve veterinary service delivery by field staff and laboratories to reduce incidence of diseases at production level and to screen diseased animal along market chain.

Key words: Afar · Export · Health · Market Chain · Sheep

INTRODUCTION

Ethiopia has one of the largest resources of sheep among African countries, with an estimated number of 25.5 million sheep [1]. Of the total sheep population of the country, pastoralists own about 26 percent of sheep [2]. Small ruminants are an important component of pastoral production systems of Ethiopia. Sheep are valued for a variety of important contributions in lives of pastoral households. Thus, pastoralists raise them with several objectives to meet the socio-economic and cultural need. Sheep play an important role in financial security, women's empowerment and insurance. They are also important in a diversification strategy that aims to reduce market and climatic risks and optimize the use of available resources.

Beside variety of important contributions of sheep in lives of pastoral households, their contribution to Ethiopia's national economy is enormous. Of the total number of live animals exported 19% was sheep. In shoat marketing system, 95% of the exported animals were sheep [3]. Pastoral areas output underpins almost all of Ethiopia's live animal and meat exports [4].

Afar pastoralist kept small ruminants as one of on-farm diversification strategies. Sheep can be found across the region. Majority of Afar's live sheep were exported to Saudi Arabia, Dubai, Oman and Beirut markets. Afars' sheep are the most demanded by importers next Somali blackhead [5]. However, meat and live sheep exporters are complaining of shortage of supply and inferior quality of animals. These affect competitiveness of the country in the international markets and decrease its market share. Potential contribution is constrained by diseases and parasites, feed shortage and inadequate extension service delivery or lack of improved technologies, weak marketing system and inefficient use of potentially important breeds [6]. These resulted in continuing dismal low productivity that does very little to alleviate poverty, subsistence livelihoods and food security especially in the region.

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To improve the competitiveness of sheep export from this area, an active strategy to improve animal health, safety and quality requirements of importing countries are crucial. This is achieved mainly by reducing diseases incidence in value chains to acceptable level. However, in Ethiopian small ruminant value chain there is a lack of transmission within the marketing system of key information regarding attributes such as quality and health [7]. These hold back the ability of the country to meet ever-increasing requirements for food safety and sanitary and phytosanitary standards (SPS) requirement of World Trade Organization. Attempts to improve international market access for livestock producers in the developing world must include improving the capacity of these countries to operate within the SPS Agreement and the OIE's Terrestrial Animal Health Code in equitable, justifiable and effective way. These require changing the behavior of the people involved in the market chain. The chain actors are should be adequately informed of the importance of establishing source of origin, traceability mechanisms and related certification processes for marketed animals. Furthermore, they should appreciate the importance of issues related to food quality, the link between animal health, meat quality and safety and why documentation is fundamental in enhancing competitiveness in the global market.

Intervention along the chain should be based on transparent and evidence-based planning and decision-making. However, information regarding animal health constraints of sheep value chain for export from Ethiopia in general and afar in particular is highly scanty. There is a need for assessing major animal health constraints of sheep exported from Afar pastoral production system in participatory way so that to obtain the chain actors perceptions on the health constraints which are crucial in decision-making. Therefore the objective of this study was to assess major animal health constraints to sheep export from Afar pastoral production system.

MATERIALS AND METHODS

Study Areas: The study was conducted in two zones of Afar Regional State namely in zone 1 and 3. Afar is one of nine regional states situated in the North-Eastern part of Ethiopia. The altitude of the region ranges from 1500 meter above sea level in the western highlands to -120 meters below sea level in the Danakil/Dallol depression. The regional capital, Samara is located in zone 1 (Dubti Woreda) some 588 Kms North-east of Addis Ababa on the main Addis–Djibouti road. Afar is characterized by an arid and semi-arid climate with low and erratic rainfall. Temperature varies from 20°C in higher elevations to 48°C in lower elevations. Rainfall is bi-modal throughout the region with a mean annual rainfall below 500 mm in the semi-arid western escarpments decreasing to 150 mm in the arid zones to the east (Figure 1). There are 16 livestock markets in afar regional state in which only 75% (14) of them are functional. The most important livestock markets in the region used for live sheep marketing are Adiatu, Aysaita, Awash 7, Elewha, Chifra, Mille, Gedamayetu, Endufo and Logia.

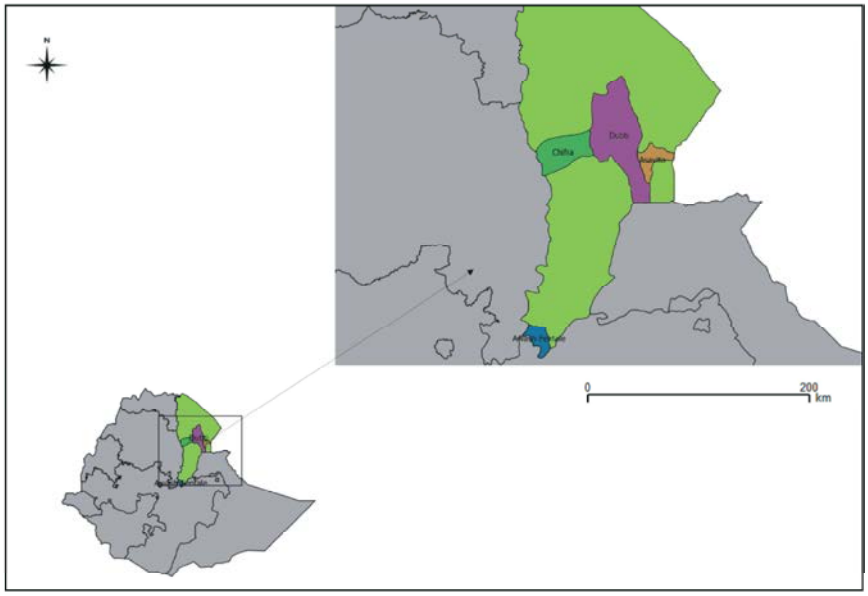

Fig. 1: Study areas

Study Design and Source of Information: Information was gathered from actors in the sheep export market chains from June 2013- June 2014. At producers' level, four districts of afar pastoral region namely Aysaita, Dubti, Chifra and Awash Fentale were selected purposely from the afar regional states based on their relative importance of export quality shoat, relative importance of domestic vs. export market outlets, their geographical location and socioeconomic characteristics. Three focus group discussions were conducted in each district with group size varied from 3-12 pastoralists. Informal interviewwas also conducted with key informants along sheep market chains. Four quarantine stations were used for to generate information about health and quality problems and selection and certification system along the market chain. Personal direct field observations were also performed in each month in one of main market day found in each selected districts for a period of one year to observe selling, buying, inspection and certification system.

Semi-structured Interviews: A semi structured or informal interviews guided by separate check lists for producers and quarantine centers were used to collect information along market chains. At producers' level, pastoralist was asked to list types of livestock kept, uses of small ruminant, constraints for sheep production and marketing and sheep diseases encountered. The interviews also collected descriptions of the clinical presentation of five prioritized diseases of sheep at production level. Quarantine center owners and their veterinarians were interviewed about major constraints which affect their business, major diseases which challenges their business, buying and selling system inspection and certification system along market chains.

Key Informant Interviews: The interviews were conducted with various officials who have been involved in sheep market chain to collect information on inspection and certification system along market chains, veterinary health services, sheep marketing problems. The key informants include: veterinarians, para- veterinarians, livestock marketing experts, traders and pastoralists.

Simple Ranking and Pair-Wise Comparison: Participants were asked to list, prioritized and rank the most important sheep diseases which affect their livelihood. Diseases were introduced into discussion with their local names and represented with easily memorable objects with of course frequent check of memory and understanding. This procedure was repeated for major constraints which affect sheep production in the study areas. Pair- wise ranking of each listed sheep diseases were conducted to identify locally perceived clinical signs and risk factors.

Matrix Scoring: Matrix scoring was used to score the five top ranking diseases against a list of clinical, epidemiological, production and market indicators at producers' level. The matrix scoring was adapted from the methods described by Catley [8]. The identified diseases were presented using by beans and placed along the top of X-axis of the matrix. Each of the five diseases in the matrix was scored against a list of 12 clinical signs and 3 risk factors. The symptoms and risk factors were illustrated along the Y-axis of the matrix. For each indicator, informants were asked to score each disease by dividing piles of 25 beans against the five diseases. The level of agreement between informant groups was assessed using the Kendal's coefficient of concordance (W) calculated using the Statistical Package for the Social Sciences (SPSS). Evidence of agreement between informant groups was categorized as 'Weak', 'Moderate' and 'strong' according to published guidelines on the interpretation of "W" [9] and the p-values assigned to "W" by SPSS software. Accordingly, agreement was termed weak for $W<0.26$, $P>0.05$; moderate for $W=0.26–0.38$, $P<0.05$ and strong for $W>0.38$, $P<0.01$.

Data Management and Analysis: Data was classified, filtered, coded using Ms Excel 5 and was transferred to Statistical Package for Social Sciences software version 20 (SPSS software V.20).Thereafter analyzed according to the different variables. Agreement among the scores of informant groups was assessed using Kendall coefficient of concordance (W) (Siegel and castellan, 1994). In all the analyses, confidence level (CI) was at 95% and $P = 0.05$ was set for significance.

RESULTS

Major Problems at Producers' Level: Afar pastoralist reported that recurrent drought was number one problem which affect small ruminant driven livelihood. Animals' diseases were ranked thirdly next to drought and feeds shortage in terms of impact on small ruminant driven livelihood. Table 1 summarized major problems perceived by pastoralist. Strong agreement ($W = 0.959$, $P=0.000$) was found between 12 informant groups to rank major problems which affect sheep driven livelihood.

Table 1: Pastoralist perception of major problems that impact small ruminants-driven livelihood

Problems	Mean rank	Std. Deviation
Drought	1.25	0.452
Feed shortage	2.33	0.651
Animal disease	2.42	0.793
Inadequate vet. Service	4.17	0.389
Market	4.92	0.515
Shortage of water	6.33	0.778
Inadequate ext. service	6.92	0.669
Lack of technologies/inputs	7.58	0.669
Predator	9.33	0.492
Theft (security)	9.67	0.492

N= 12, W = 0.959, P=0.000

Table 2: Ranking of five important sheep diseases by pastoralists as having affected their sheep

Diseases local name	Scientific Name	Mean Rank	Std. Deviation
Geraworie/ Andegule	PPR	1.92	1.030
Buhi/Boho/Sole/Tuffo	Pasteurellosis	2.00	0.793
Ambrarisso/Korbor /Abbula	Sheep pox	3.13	1.240
Agara/Arga	External parasite	3.46	1.567
Kirbi	Ovine fascioliasis	4.50	0.669

N=12, W=0 .696 P=0.000,

Table 3: Matrix scoring of five diseases of sheep according to the degree to which they manifest selected clinical signs ($N = 12$)

	Diseases				
Clinical Signs	PPR	Pasteurellosis	Sheep pox	External parasitism	Fascioliasis
High mortality rate(W=0.922)	15(10-17)	10(8-13)	0(0-0)	0(0-0)	0(0-0)
Coughing (W=0.944)	5(0-7)	20(18-25)	0(0-0)	0(0-0)	0(0-0)
Salivation (W=0.880)	0(0-8)	10(7-13)	10(8-14)	0(0-0)	0(0-0)
Nose discharges (W=0.944)	10(10-15)	0(0-0)	10(10-15)	0(0-0)	0(0-0)
Sudden death (W=0.981)	15(10-17)	10(8-11)	0(0-0)	0(0-0)	0(0-0)
Skin lesion (W =0.905)	0(0-0)	0(0-0)	22(15-25)	0(0-10)	0(0-0)
Abortions (W =0.969)	20(15-25)	0(0-0)	5(0-10)	0(0-0)	0(0-0)
Decrease market value(W =0.725)	5(5-5)	5(5-6)	6(5-7)	3(2-5)	5(5-6)
Jaundice (W =1.00)	0(0-0)	0(0-0)	0(0-0)	0(0-0)	25(25-25)
Bottle jaw (W =1.00)	0(0-0)	0(0-0)	0(0-0)	0(0-0)	25(25-25)
Loss of hair (W =0.970)	0(0-0)	0(0-0)	0(0-5)	20(20-25)	0(0-0)
Diarrhea (W =0.906)	15(12-15)	7(6-10)	0(0-2)	0(0-0)	0(0-5)

Number of informants groups =12; W= Kendal coefficient of concordance; P- value is <0.001 for all W. Median scores (With minimum and maximum scores) were shown in each cell of the table.

Major Diseases at Producers Level: The result of pair-wise ranking of diseases revealed that Afar pastoralist ranked PPR as the first highest ranking diseases for sheep in terms of impact on livelihoods and trade. Informants groups ranked pasteurellosis, sheep pox, external parasite and ovine fascioliasis as second, third, fourth and fifth highest ranking diseases of sheep. The Kendall's coefficient of concordance (W) for all informant groups for the above diseases indicated strong agreement among 12 informant groups (W=0.696, P=0.00) to rank sheep diseases. Table 2 shows the five most commonly mentioned diseases for sheep by Afar pastoralists.

Perceived Association Between Diseases and Clinical Signs and Risk Factors: The Afar pastoralists proved adept at recognizing symptoms of five important diseases of sheep (Table 3). Afar pastoralist consistently listed symptoms such nose discharges, diarrhea, abortions, sudden death and high mortality rate nose as being indicative of PPR. They listed that symptom such as coughing, salivation and sudden death as indicative of pasteurellosis. Decrease market value was listed as indicative all diseases listed. Strong agreement (W= 0.725 to 1.00; P=0.000 and W= 0.712 to 1.00; P=0.000) were observed among the 12 informant groups with for all listed

Table 4: Matrix scoring of five diseases of sheep with respect to their perceived strength of association with selected risk factors (N=12)

	Diseases				
Risk factors	PPR	Pasteurellosis	sheep pox	External parasite	Fascioliasis
Abnormally heavy rains (W=0.892)	0(0-3)	25(22-25)	0(0-0)	0(0-0)	0(0-0)
Occur during drought (W=0.923)	0(0-5)	15(10-15)	0(0-0)	0(0-0)	10(10-14)
Occur during mobility (W =0.944)	0(0-0)	13(12-15)	0(0-0)	0(0-0)	12(10-13)

Number of informants groups =12; W= Kendal coefficient of concordance; P- value is <0.001 for all W. Median scores (With minimum and maximum scores) were shown in each cell of the table.

Table 5: Major problems which affect live sheep export businesses as perceived by quarantine centers owners/ managers

Problems	Mean rank	Std. Deviation
Diseases	1.00	0.00
Poor quality	2.25	0.50
Market for export	2.75	0.50
High local price	4.25	0.50
High input cost	5.00	0.816
Poor infrastructure	6.00	0.816
Delaying payment	6.75	0.50

W=0.938, p=0.00, N=4

sheep diseases. Pastoralists also indicated that pasteurellosis was associatedwith abnormally heavy rains, drought and mobility (Table4).

Major Problems and Diseases at Quarantines Level: Sheep which were collected from producers were admitted to privately owned quarantine facilities which were found in Awash 7, Methara and Mile for 21 days. All quarantine centers have concrete fences with secure gate. Feed and water are supplied in concrete or metallic feeding troughs. There are at least one loading and unloading ramps in each quarantine facilities. However, none of the ramps were fitted with crushes (Stanchions) that permit the inspection and handling of individual animals. Of the total 75% of the facilities are designed for large animals.

Almost all staff working in quarantine centers has direct contact with quarantined animals. The staff were coming in contact directly with sheep for several reasons at all stages of the production cycle including tagging, prophylaxis treatments, vaccinations, medication of sick animals, blood sample collections and disposal of dead bulls. Indirect contacts also occur during feeding and watering. In all quarantine facilities, all staffs did not use any protective cloths while handling dead sheep and also did not use sanitary and disinfection facilities to avoid contamination. Formal training for quarantine centers workers on biosecurity was offered in none of the quarantine center. Daily record such as mortality, cull, prophylaxis and treatments were not kept in all quarantine centers.

The facility receives only male animals intended for export as live animals; they originate mainly from Afar and oromia region. All animals were bought as batch and arrived by truck. Previous health statuses of the admitted animals were not known. Those animals were not subjected to any tests before they were moved into facilities. There was no primary inspection at the point of entry before the animals are accepted for quarantine. Therefore, the sheep were admitted into quarantine facilities with all their problems. After collection of the animals was completed, animals are examined individually and identified with ear tags before vaccination. Reasons for culling included sub-optimum body condition and signs of clinical disease.

Vaccinations for sheep and goat pox, CCPP, PPR, anthrax and pasteurellosis diseases were given for all sheep in all assessed facilities as part of SPS requirements and rules and regulations of animal quarantine. All assessed quarantine centers have their own veterinarian for the treatment of sick animals.

Quarantine centers owners/ managers were asked to mention major problems that affect profitability of the business in descending in order of importance. The most important problems from owners'/ managers' point of view are summarized in Table 5. They ranked animals' diseases as number one prevailing problems which challenge their business. Poor quality from the source, market for export, high local price, high input cost, poor infrastructure and delaying payment are most important problems mentioned by exporters next to animals' diseases. There was strong agreement (W=0.938, P=0.00) between quarantine centers owners/ managers to rank major problems which affect their export business.

Quarantine centers veterinarians were asked to list and rank 10 most important sheep diseases in their quarantine centers. The result of pair-wise ranking of disease at quarantine centers ranked PPR as the first most important disease of sheep in terms of impact on businesses. Quarantine centers ranked pasteurellosis, CCPP, sheep pox and external parasitisim as second, third, fourth and fifth highest ranking diseases of sheep.

Table 6: Ranking of important sheep diseases by quarantine centers veterinarians as having affected their sheep export business

Diseases	Mean Rank	Std. Deviation
PPR	1.25	0.50
Pasteurellosis	1.75	0.50
CCPP	3.25	0.50
Sheep and goat pox	3.75	0.50
External parasite	5.25	0.50
Bloat	5.75	0.50
Respiratory complex	8.25	0.957
GIT disorder	8.00	0.816
orf	8.50	1.732
Foot rot	9.25	0.957

W=0. 936, P=0.000, N=4

The most important diseases ranked by quarantine centers veterinarians are summarized in Table 6. There was strong agreement (W=0.936, P=0.00) between quarantine centers veterinarian to rank sheep diseases which affect their export business.

Inspection and Certification System for Quality Assurance along Export Market Chain: Market survey indicated that at various points in market chain from primary market up to quarantine center, there was no government veterinarian performing pre-purchase inspection and selection for quality assurance and certification for live sheep. The traded animals were not subjected to any tests before they were moved into quarantine. Per-purchase selections along the market chain have been conducted by traders or purchaser groups without necessary animal health knowledge.

Discussion with traders indicated that purchased decision was reached based on traders' physical evaluation of the animals while moving freely in the market by palpation of the sheep at points for fatness; tail, chest, back. Purchasers knew the age of the sheep using teeth eruption. The traders tried to select sheep with good general health and not emaciated, clean smooth glistening hair not rough coat, good appearance condition (Active) and tried fulfill export quality criteria. The traders tried to avoid diseased animals (Such as these having emaciation, diarrhoea, pneumonia and severe cases of mange).

Animals are not weighed in Afars' primary and secondary markets but the animals are weighed at export terminal markets. In all livestock market there is no objective standard for selling and buying animals. Trader may buy a particular type of shoat, e.g. adult male, young male etc or a combination of types in a mob or batch as a unit or as single animals. Sales may occur in the same manner. Average price per animal from these combinations (Or mix) differs greatly. The traders mix sheep different type and making a batch consisting of animals within a range of weight, e.g. underweight, medium or heavy weight to make a balanced batch to maximize average price. In addition to diseases, other physical conditions and criteria are used to screen animals in markets to assure quality.

Different actors are involved at various points of export chain for inspection and selection for quality assurance. At each level, there is inspection and selection criteria, indicated in terms of phonotypical characteristics of shoat, diseases related requirements and regulatory requirements. There are two major bodies through which inspection and selection for quality assurance and certification of export sheep is performed. The first is the exporter (A private sector enterprise or a company). The second is the Federal Ministry of Agriculture (Animal health directorate) playing its role through Adama animals inspection and quarantine centers

In quarantine centers, inspection and selection for quality assurance of export sheep is performed both by centers veterinarian and Federal Ministry of Agriculture. Before the animals were admitted to quarantine facilities, the veterinary authority from federal quarantine service through Adama quarantine station inspects the premises whether the facilities and measures are met the required quarantine standards. To ensure completion of quarantine period, veterinary inspectors with technicians perform inspection and checking at entrance, vaccination and departure of quarantine premises.

During departure, the veterinary inspectors screen unfit animals using visual inspection. Adama animal quarantine station veterinary inspector indicated that sheep pox was the leading cause of rejection. Other conditions leading to rejection during departure inspection include orf (Contagious pustular dermatitis), mange, diarrhea, pneumonia and foot rot. Finally, after they reject unfit animals for export they issued certification for exported animals.

Veterinary inspectors from Adama animal quarantine station also inspect and reject animals which were not suitable for the religious requirements in Saudi Arabia. During the Hajj period, animals have to met conditions according to strict Islamic or Sharia law such as to be healthy and fat (Not diseased, not emaciated, not having any abnormalities or deformities), no tail docking, ear cut no more than one-third of the ear and not less than six months of age.

DISCUSSIONS

In this study animal diseases were ranked as third most important constraint next drought and feed shortage in terms of impact on small ruminant driven livelihood at producers' level. The result of the current study agreed with previous study conducted by Philpott *et al.*[10] in which drought was number one problem in the region. During the past decade drought is occurring almost every year and the areas and population affected is increasing from year to year. Feed availability is subject to seasonal variations. A general reduction in availability throughout the region has resulted from drought, increased population density (Humans and livestock) and encroachment of grazing land from agriculture, wild life parks and administrative boundaries.

The result of pair-wise ranking of diseases revealed that Afar pastoralist ranked PPR as the first highest ranking diseases for sheep in terms of impact on livelihoods and trade. Report from Ethiopian Ministry of Agriculture (MoA) also indicated that high prevalence of (86%) PPR was recorded in Afar region in 2009/2010 in sheep and goat [11]. Megersa *et al*. [12] also reported seroprevalence of PPR in five selected districts of Afar and Gambella to be 31.3% in goats and 29.5% in sheep, with an overall seroprevalence of 30.9%. Similarly, Delil *et al*. [13] indicted that 36.6% of small ruminants sampled from flocks showing clinical signs resembling PPR were seropositive. Afar pastoralist ranked pasteurellosis, sheep pox, external parasite and ovine faciolosis as second, third, fourth and fifth highest ranking diseases of sheep. The finding of this study is supported by previous study conducted by Philpott *et al.*[10] in which pasteurellos, sheep pox, externa parasites and liver fluke were major sheep diseases in the area. The Kendall's coefficient of concordance (W) for all informant groups for the above diseases indicated strong agreement among 12 informant groups (W=0.696, P=0.00) for sheep diseases. This might be due to the fact that afar pastoral community develop traditional knowledge concerning livestock diseases for the reason that they spend most of their lives in close proximity to livestock and poor access to animal health services and conventional veterinary drugs, which may have increase their need to closely monitor disease problems in their herds. Moreover, afar pastoral communities have custom of exchanging information while greeting one another and at any gathering occasions called *Dagu*. Through *Dagu* they exchange information related to disease outbreaks condition of pasture, the availability of water and local security issues.

Matrix scoring result showed that Afar pastoralist provided more detailed and accurate clinical descriptions of diseases affecting their sheep and had greater appreciation of the risk factors associated with the diseases and showed a stronger recall of the outbreak history. Strong agreement (W= 0.725 to 1.00; P=0.000 and W= 0.712 to 1.00; P=0.000) were observed among the 12 informant groups to characterize all listed sheep diseases. This strong agreement among informant groups implied that Afar pastoralist commonly perceived diseases and well adapted with their symptoms and risk factors.

Sheep which were collected from producers were admitted to quarantine facilities which were found in Awash 7, Methara and Mile for 21 days. The existing quarantine stations in Ethiopia are small in size and without adequate facilities and owned and run by private entrepreneurs but certification is only made by a "Competent authority" [14]. This quarantine is not recognized by the Gulf Cooperation Council (GCC) countries and animals must be re-quarantined at the port of export. For animals that go through the Djibouti quarantine the Ethiopian certification is neither required nor seen by the final recipient, as all animals are re-certified as Djibouti origin [15]. This practice is potentially leading to duplication of tests, doubling of quarantine waiting requirements, feed costs and the like. However, in order to bring the existing practice to an end and secure the country's proprietary rights, the government of Ethiopia on the way to finalized the construction of large quarantine facilities at Mile area.

Along the market chain pre-purchase inspection and selection for quality assurance and certification for live sheep were none existant. Purchased decision was reached based on traders' physical evaluation of the animals while moving freely in the market by palpation of the sheep at points for fatness; tail, chest, back. Since there is no disease free zone in Ethiopia including afar pastoral area [13,16-18] some diseases, especially trade related (Transboundary) diseases might pass undetected along the market chain. This could limit market supply of export quality animals by compromising most important quality criteria related to health and diseases.

This study indicated biosecurity practice of the quarantine centers are none existent. This poor biosecurity measures in quarantine centers increase risk of the introduction and spread of disease agents within and between facilities. Introduction and spread of diseases in quarantine centers reduce the efficiency of production and thus it makes economic sense. Most stringent biosecurity requirements are concentrated on

the people in the high-risk category, such as those who have direct contact with animals or manure on the farm, as well as other farms [19,20]. Therefore, improving biosecurity practices is the most cost-effective in protection of animal diseases in quarantine facilities [21, 22].

The most important problems from owners'/ managers' point of view are animals' diseases, quality from the source, market for export, high local price, high input cost, poor infrastructure and delaying payment. Majority of constraints which observed at quarantine level are the reflection of those problems at producers' level. Most important diseases of sheep in terms of impact on businesses are PPR, pasteurellosis, CCPP, sheep pox and external parasitisim. Thus major diseases prevailing at quarantine level are also the major diseases prevailing at the producer level. Hence this study indicated that strategies and rigorous works will be expected at the grassroots level to improve quality and health status of sheep along the markets chain.

Introducing traded animal into quarantine facilities without health certificate and any test along market chain resulting in high rates of rejection within quarantine facilities and between the export and import ports. Such high rejection rates cause severe financial hardship for the business owners by increasing the costs and reduce the competitiveness of the country. Importing countries are strict in screening unfit animals regarding health and quality. Such action provides a good signal and an incentive to undertake inspection and screening in a serious manner.

CONCLUSION

From the finding of study it can be concluded that most of the diseases reported at quarantines' level were also the major diseases prevailing at the producers' level. This is because there were no inspection and certification system for quality assurance along export market chain.The sheep were admitted into quarantine facilities with all their problems which result high rejection rate within quarantine facilities and between the export and import ports. This reduces the competitiveness sheep exported from Afar pastoral production area. Strategies are needed to improve veterinary service delivery by field staff and laboratories to reduce incidence of diseases at production level. Awareness should be given to exporters, livestock traders, dealers and marketers on the importance of doing the "right thing" about sourcing animals from disease-free areas where possible; not buying any sick stock; following rules about quarantine, vaccination, testing or identification of animals; and keeping records. The potential consequences of the occurrence of a disease on national and international trade should be emphasized.

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