

Participatory Assessment of Trade Limiting Diseases of Small Ruminants in Afar's Small Ruminants' Export Market Chain

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Abstract

Participatory epidemiological study was carried out from June 2013 to June 2014 to identify most economically important trade sensitive diseases which constraints trade and to quantify and rank the major diseases along the small ruminant market chain of export of small ruminants originated from Afar pastoral community. A retrospective case control study design was used to collect data on trade sensitive disease problems in the market chains using epidemiological techniques of semi-structured interview, disease ranking and matrix scoring. Information was collect from producers, key informants and participants in the shoat export market chains. Purposive sampling was used to select 291 producers, 12 focus groups of traders and key informants that held in four districts selected districts with their respective markets and four quarantine stations to generate information about health problems along the market chain. Collected data was coded, managed and validated in excel spread sheet. 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, 2007). About 72.2% of pastoralist offers shoat for sale to meet their urgent needs at any time during the year. Majority (51.9%) of the producers have no specific target to sale their shoat. Animal characteristics in terms of health, quality and other criteria required by importers were known only by 7.6% of the producers. Afars' sheep are the most demanded by importers next to Somali black head but from total shoat presented for sale, sheep accounts only 20%. Majority of producers (40.9%) indicated that they present young male for sale and 28.2% of producers presented culled female shoat for sale. Pastoralist motioned PPR, Pasteurellosis, sheep pox, External parasite, Ovine Faciolosis and CCPP as most important diseases in terms of impact on livelihoods. Quarantine centers listed PPR, pasteurellosis, CCPP, sheep pox and external parasite most important disease of shoat in terms of impact on businesses. Most of the diseases motioned by quarantine centers as major diseases are also the major diseases prevailing at the producer level.

Keywords: Trade sensitive, PPR, CCPP, Shoat Pox, Producer, Quarantine, key informant

1. INTRODUCTION

Ethiopia is a resourceful country bestowed with largest livestock resource in Africa continent with about 54 million cattle, 25.5 million sheep and 24.06 million goats. From the total small ruminant population 99.8% of the sheep and nearly all goat population of the country are local breeds (CSA, 2013). This resource is both in terms of number and diversity. The subsector contributes about 16.5% of the national Gross Domestic Product (GDP) and 35.6% of the agricultural GDP (Metaferia *et al.*, 2011). It also contributes 15% of export earnings and 30% of agricultural employment (Behnke, 2010). The GDP of livestock related activities valued at birr 59 billion (Metaferia *et al.*, 2011). These livestock population is distributed over highland and lowland areas. Of the total animal population of the country, pastoralists own about 27 % cattle, 26 % sheep and nearly two-third of the goats' population.

With notable fluctuation from years to year, livestock export sector has shown promising increment during 2000/01-2011. The export value was mounted from USD 0.2 million to USD 91 million (SPS-LMM, 2010 a; b). Of the total number of live animals exported 19% was sheep. Of the total value of exported live animals the share of sheep was 2%. In shoat marketing system, 95% of the exported animals were sheep (Hailemariam *et al.*, 2009). In the twenty-one year period from 1984 to 2004, livestock provided on average 6% of official livestock sector exports. Despite this large number of livestock population and its diversity, the benefits obtained is low compared to other African countries and the world standard.

Demand for meat in the Middle East especially in the Saudi market has increased rapidly as a result of rising income levels, population growth, urbanization and growth in the food service sector from increased investment in tourism. However, Ethiopian market share and absolute exports to Saudi market have declined in recent years while the share of the competitors increasing. Ethiopia's current share in global market is very limited. In 2004, the share of Ethiopia was only 0.23% of global figure (FAO, 2005). Major competitors of Ethiopia for the Middle Eastern market are very far from importing countries; their volume of export is increasing. This increase is mainly due to countries meeting export sanitary requirements, better economies of scale of livestock production, and well-informed, capable value chain actors able to take advantage of the current market more so than traditional exporting countries such as Ethiopia.

One of the major factors contributing to poor performance of livestock sub-sector is prevalence of highly contagious transboundary animal diseases (TADs). These diseases continue to hinder international trade

in live shoat and their products seriously in an era of globalization. Public concern is growing regarding the rapid transboundary spread of animal diseases through animals and animal products which forced importing countries to apply strict measures so that animals and their products exported should meet international sanitary phytosanitary (SPS) requirements. Epidemic diseases such as Peste des petits ruminants (PPR), brucellosis and contagious caprine pleuropneumonia (CCPP) threaten national shoat industries by high levels of morbidity, mortality and control costs and restrictions to trade in livestock and livestock products. Occurrence of such diseases impacts both poor and richer livestock producers by marginalizing them from higher price livestock markets and restricting their capacity for value-added trade. In addition to measurable economic impact on a national economy, TADs have significant effects on human welfare particularly in pastoral societies for food security as failure of pastoral community to sell their sheep or goats that bring severe hardship to a pastoral family with no other income.

In Afar region, there is limited information on the major trade sensitive disease and hence, there is a need for assessment of trade limiting diseases in the market chain of the region for export to identify and rank diseases of small ruminant originated from Afar pastoral community. Therefore, the specific objectives of the study were:

- To describe overall production and market chains of small ruminants
- To identify and rank the trade sensitive diseases along the small ruminant market chain
- To evaluate the awareness and concern of small ruminant market chain actors towards these diseases and to identify quality constraints of market chains

2. MATERIAL AND METHODS

2.1. Study Area

The study was conducted in Afar region, located in North-eastern part of Ethiopia. It is located at 8°40' to 14°47' North latitude and 39° 51' to 42° 23' East longitude with altitude ranges from 150 meter below sea level in the Danakil depression to 1000 meter above sea level. The region is divided into 5 administrative zones which are sub-divided in to 32 woredas. Mean annual rainfall ranges 225.3 mm to 561 mm and disruptions of rainfall affects availability of pasture and water. Mean minimum and maximum annual temperature ranges between 18⁰C and 35⁰C (Piguet, 2001; CSA, 2008). Peoples' livelihood in the region mainly relies on pastoral (90%) and agro pastoral (10%) production system. Seasonal movements of the herds are routinely practiced in the region in search of pasture and water (Philpott *et al.*, 2005). The study was conducted in Aysaita, Dubti and Chifra of zone 1, Awash Fentale of zone 3 and one district from Oromiya region (Metehra).

2.2. Study Population and Farming System

Target population comprised of small ruminants of Afar region and study population was those small ruminants in selected study sites of Afar regional State which were kept under traditional practices characterized by extensive pastoral productions system, seasonal mobility; utilize communal grazing and watering points. Study animals at producers' level was selected from approximately 353,421 and 407,203 Afar sheep and goat population, respectively in four districts of Afar pastoral area namely: Aysaita, Dubti, chifra and Awash Fentale. At market and quarantine level, small ruminant population in Afar pastoral area was considered as study population. Shoat populations recorded for each district were found more or less in similar agro climatic conditions.

2.3. Assessment Design

Retrospective study was conducted from June 2013 to May 2014 using semi-structured questionnaire and lists of checklists to assess perception of pastoralists on major disease of small ruminants and to identify and rank these diseases. The study approach was based on the symptomatic identification of clinically observed diseases by Pastoralists, traders and quarantine workers that were asked to describe the clinical symptoms of the disease encountered in their flock. Both closed and open ended questions were asked generate information from participants of the study. The main participants of this study were men and women of Afar pastoralists or producers, quarantine workers, key informants and district animal health assistants.

2.4. Sampling Procedure

Purposive sampling was used to select study districts, kebeles and key informants based on shoat population, disease reports, market activity and transport accessibility. Participants of the study were selected purposively based on their social status, previous exposure to various diseases in their flock. Individual interviews were randomly selected and single group of key informant consists of 8-12 people. Assessment was conducted in four districts of Afar pastoral areas. Aysaita, Dubti, , Chifra and Awash Fentale and were selected from the existing 32 districts of Afar regional state based on their relative importance of export quality shoat, shoat population, relative importance of domestic versus export market outlets; and their geographical location, availability of

watering wells and socioeconomic characteristics.

At producers' level, three focus group discussions were conducted in each district with group size varied from 8-12 pastoralists. A total of 291 producers were interviewed with semi structured interview. Informal interview was conducted with traders at market levels. Furthermore, key informants which include veterinarians, para-veterinarian, livestock marketing expert and pastoralist were interviewed about health, quality and marketing problems and about veterinary of shoat exported from Afar region. Four quarantine stations were used for to generate information about health and quality problems and selection and certification system along the market chain.

2.5. Tools of Participatory Epidemiology

Participatory methods were used to collect epidemiological data and disease information. This approach was employed based on open communication and transfer of knowledge, using a toolkit of methods guided by some key concepts and attitudes so as to understand existing knowledge, veterinary disease situation and zonal surveillance. This information is basic to enable training program to be adapted from local context and to ensure local needs. Concerns that are being met were used to provide a clear and accurate picture of disease status of their locality & priorities of communities regarding livestock disease (Catley, 2005). Information gathered from participants was triangulated for their validity by the researchers. Clinical symptoms described by shoat owners cross checked for their similarity with one described by Radostits *et al*(2006).

Two persons were engaged in the research with responsibility of interviewing and rapporteur. Some of the common materials used during this study were black sheet paper, flip chart, flip chart stand, marker, handouts, exercise book, pens, pencils and binders. Participatory appraisal methods used in this study was semi-structure interview (SSI), rapid market appraisal, pair-wise ranking and matrix scoring techniques (Catley, 2005). The main tools used during this data collection were semi-structured interviews of producers, key informant interviews, pair-wise comparison and ranking and matrix scoring.

2.6. Data Management and Analysis

Data was classified, filtered, coded using Microsoft Excel and was transferred to Statistical Package for Social Sciences software version 16 (SPSS software V.16). Thereafter analyzed according to different variables. The level of agreement between informant groups was assessed using the Kendall's coefficient of concordance (W). Evidence of agreement between informant groups was categorized as 'weak', 'moderate' and 'strong' according to published guidelines on the interpretation of W (Siegel and castellan, 1994) 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 $W > 0.38$, $P < 0.01$. Agreement among scores of informant groups was assessed using Kendall coefficient of concordance (W) (Siegel and castellan, 1994) and in all analyses, confidence level (CI) was at 95% and $P \leq 0.05$ was set for significance.

3. RESULT AND DISCUSSIONS

3.1. Market Supply Chains

Kotler and Keller (2006) indicated that market is social and managerial function associated selling and distributing a products and livestock. Shoat market in Afar region is structured so that marketable livestock from Afar pastoral area reaches to final consumer passing through complex channels along supply chains. A supply chain is series of interlinking steps that determine nature, character and value of shoat at time of receipt by consumer. The supply chain in Afar's sheep and goat subsector comprises three functional stages: input supply, livestock production and livestock marketing. The generalized supply chains and marketing channels for live shoat export is depicted in Figure-1.

The export livestock marketing chain actors for shoat are those who transact a particular product as it moves along the chain from primary producers to end users: producers, middlemen, traders, live animal exporters. The enabling factors for live animal market business environment are critical factors and trends that are shaping the market chain environment and operating conditions which are generated by structures and institutions (policies and regulations) that are beyond direct control of the market participants. Inputs and other services from other enterprises or service provider organizations are provided for all participants in the chain which will allow actors to grow and maintain their competitiveness in the supply chain (Legese, *et al.*, 2008). The main market structure may be determined by the number of animals and market participants (Legese *et al.*, 2008).

3.2. Characteristics of Trade Participants

Focus group discussion with pastoralist indicated that small ruminant made by far the greatest contribution to livestock-based livelihoods in all study districts. Study by Jost *et al* (2010) in North Eastern Province of Kenya indicted that small ruminant especially goats made the greatest contribution to livelihoods of Kenyan pastoralist.

According to Schwartz (1985) the main functions of sheep and goats in pastoral households are to provide subsistence products (milk, blood and meat), to meet social obligations (bride price, stock alliances and stock patronages) and to ensure against disaster (Abdullahi, 1990; Sieff, 1999). Majority (97.3%) of respondents practiced free range (extensive) production system and only 2.7% of them practiced tethering (subsistence) system, while none of them practiced intensive livestock production system. In 82.5 % of households' shoat were sold by males whereas only 17.5% of women were involved in shoat selling.

Majority of markets in Afar region performed below their capacity. This might be due to livestock production systems in pastoral areas have evolved largely as a result of influence of natural production environments and socio-economic circumstances of pastoralists. The main market actors participated in Afar's small ruminant export market is producers, collectors, medium and big traders, brokers and exporters. Collectors buy shoats from producers of local markets and supply to small and larger scale traders. medium traders are large in number relative to big traders, the volume of their purchases is smaller than that of big traders. Since they buy smaller number of animals at a time, they have very limited number of collectors from the primary markets. Big traders purchase large number of animals from remote production areas and bring them to the terminal markets for live sheep and goat export. They are few in number compared to small traders. Big livestock traders have several smaller agents collecting livestock from the primary markets and producers' villages. Exporters export live shoat to different countries through the formal channel. Live shoats are exported to Saudi Arabia, Dubai, Oman and Beirut. Exporters are few in number compared to traders in the market.

3.3. Health and Quality indicators at Producers' Levels

According to the interview result, 72.2% of pastoralist offers shoat for sale to meet their urgent needs at any time during the year. About 19.2% of the producers' sale during drought due to feed shortage, while only 8.6% of the producers indicated that they supply shoat according to seasonal variation in demand and select the appropriate type of shoat according to function (Hajj, Ramadan or other holiday). Furthermore, the survey result indicated that 12.4% producers targeted primarily restaurants, 23.3% and 4.5% targeted primarily household consumers and butchers, respectively. While, majority (51.9%) of the producers have no specific target to sale their shoat. Only 7.9% of producers targeted traders who supply shoat for export market. The prices received by pastoralist were lower when they sold for traders compared to other costumers. Animal characteristics in terms of health, quality and other criteria required by importers were known only by 7.6% of the producers, while majority of them (92.4%) were did not know about health, quality and other criteria required by importer. Furthermore, only 18.2% of pastoralists informed about Afars' shoat are demanded by Middle East consumers.

3.4. Major Animal Health Problems and Disease Ranking

3.4.1. Semi-structured interviews (SSI)

Informal semi-structured interviews were used at household level to rank major problems and diseases of shoat which has an impact on livestock-derived livelihoods. Table-6. Summarizes major problems perceived by pastoralist. Informants groups ranked animals' diseases thirdly in terms of impact on livestock-driven livelihood. The informant group ranked drought and feed shortage as first and second constraints that impact small ruminants-driven livelihood. Access to get feed is becoming a serious concern in the areas. In the area, livestock are dying due to lack of feed.

3.4.2 Ranking of Major Diseases

The result of pair-wise ranking of disease revealed that Afar pastoralist ranked PPR as the first highest ranking diseases for sheep and goats in terms of impact on livelihoods. Informants groups ranked Pasteurellosis, sheep pox, external parasite and Ovine Faciolosis as second, third, fourth and fifth highest ranking diseases of sheep and they ranked pasteurellosis, CCPP, external parasite and goat pox as second, third, fourth and fifth highest ranking diseases of goat in terms of impact on livelihoods. 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 and $W=0.782$, $P=0.00$ for goat disease. Table-1 and Table-2 presented most economically important sheep and goat diseases by pastoralists, respectively. This information can be used to design better animal health projects and delivery systems, more successful, timely and sensitive surveillance and control strategies or as new perspectives for innovative research hypothesis in ecological epidemiology (Schwabe, 1984).

3.4.3 Matrix Scoring

The results of pair-wise comparisons were the basis for further characterization and selection of diseases for matrix scoring. The results of matrix scoring for major diseases of sheep and goat are presented in Table-3 and Table-4 respectively. Strong agreement, $W= 0.725$ to 1.00 ; $P=0.000$ and $W= 0.712$ to 1.00 ; $P=0.000$ were observed among 12 informant groups with for all sheep and goat diseases indicators, respectively. The informant groups indicated that high mortality rate, nose discharges, sudden death, abortions and diarrhea were common indicators of PPR. They also indicated that abnormally heavy rains, occurrence during drought; occurrence

during mobility and respiratory distress were most important indicators of pasteurellosis.

3.5. Animal Health and Quality Problems at Quarantine Level

Sheep and goat 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 shoat 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 shoat 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 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 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 animals are accepted for quarantine. Therefore, sheep and goat were admitted into quarantine facilities with all their problems. After collection of 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 shoat 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 treatment of sick animals. Quarantine centers owners (exporters) were asked to mention major problems that affect profitability of the business in descending 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 owners/ managers (exporters) were also asked to list and rank 10 most important shoat 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 shoat in terms of impact on businesses. Quarantine centers ranked pasteurellosis, CCPP, sheep pox and external parasite as second, third, fourth and fifth highest ranking diseases of shoat. The most important diseases ranked by quarantine centers owners'/ managers' are summarized in Table-6. There was strong agreement ($W=0.936$, $P=0.00$) between quarantine centers owners/ managers to rank shoat diseases which affect their export business.

4. CONCLUSIONS AND RECOMMENDATION

In Afar pastoral area, livelihoods depend, at least in part, on livestock and small ruminant made by far the greatest contribution to livestock-based livelihoods in all study districts. Majority pastoralist offers shoat for sale to meet their urgent needs at any time during the year. Majority of markets in Afar region performed below their capacity. Majority of the producers have no specific target to sale their shoat. Animal characteristics in terms of health, quality and other criteria required by importers were not known by majority producers. Pastoralist motioned PPR, Pasteurellosis, sheep pox, External parasite, Ovine Faciolosis and CCPP as most important diseases in terms of impact on livelihoods. There was no veterinarian performing pre-purchase inspection and selection for quality assurance for live shoat at various points in market chain. Quarantine centers listed PPR pasteurellosis, CCPP, sheep pox and external parasite most important disease of shoat in terms of impact on businesses. Most of the diseases motioned by quarantine centers as major diseases are also the major diseases prevailing at the producer level.

On the basis of the above findings, the following recommendations are made for actions to improve the functioning and efficiency of market chain and for approaches to future studies and research.

- Strategies are needed to improve veterinary service delivery by field staff and laboratories. Improved veterinary health services will reduce disease incidence, mortality and morbidity and improve the quality of marketed animals. In the medium to long term, health facilities and laboratories need to be

- better equipped and the number of veterinary staff in the public and private sectors should be increased.
- Regular and periodic complementary serological studies and examination of clinical records for validation are required to build a reliable system for disease diagnosis, reporting and control.
 - An effective biosecurity plan such as proper disposal of carcasses, isolation of sick animals in such a way to prevent cross contamination and cleaning of all equipment used on sick animals and between animals should be designed and implemented in the quarantine centered.
 - Awareness should be given to exporters, livestock traders, dealers and marketers on key epidemiological factor in the spread transboundary diseases. Emphasis should be placed 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.
 - Vaccination programmes employing for transboundary diseases should base surveillance activities which provide serotypes or subtypes circulating within the country to ensure that the most appropriate vaccine strains can be selected for use in the country. Vaccination should also be timed appropriately, taking into consideration seasonal animal husbandry and livestock movement patterns.

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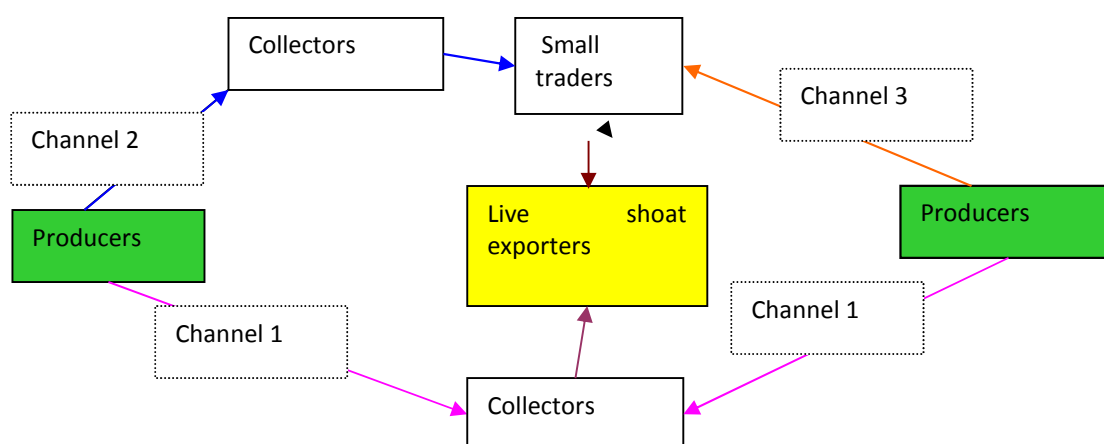


Figure-1. Major marketing channel for live sheep exports

Table-1. Ranking of economically important sheep diseases by pastoralists

Diseases local name	Scientific name	Mean rank
<i>Geraworie/ Andegule/Undahe/Harogiti</i>	PPR	1.92
<i>Buhi/Boho/Sole/Tuffo</i>	Pasteurellosis	2.00
<i>Ambrarisso/Korbor / Abbula</i>	sheep pox	3.13
<i>Agara/Arga</i>	External parasite	3.46
<i>Kirbi</i>	Ovine Fasciolosis	4.50

W=0.696 p=0.000, N=12

Table-2. Ranking of five economically important goat diseases by pastoralists

Diseases local name	Scientific name	Mean rank
<i>Geraworie/ Andegule/Undahe/Harogiti</i>	PPR	1.29
<i>Buhi/Boho/Sole/Tuffo</i>	Pasteurellosis	1.96
<i>Surali/Karbahi/Mesengele</i>	CCPP	3.42
<i>Agara/Arga</i>	External parasite	3.50
<i>Ambrarisso/Korbor / Abbula</i>	Goat pox	4.83

W=0.782, P=0.000, N=12

Table-3. Summarized matrix scoring of sheep diseases as characterized by pastoralists

Indicators	Diseases				
	PPR	Pasteurellosis	Sheep pox	External parasite	Fasciolosis
High mortality rate(W=0.922)	15(10-17)	10(8-13)	0(0-0)	0(0-0)	0(0-5)
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)
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)
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)

Table-4. Summarized matrix scoring of goat diseases as characterized by pastoralists

Indicators	Diseases				
	PPR	Pasteurellosis	Sheep pox	External parasite	CCPP
High mortality rate(W=0.956)	10(9-12)	7(7-10)	0(0-0)	0(0-0)	5(5-8)
Coughing (W=0.0949)	5(0-5)	7(5-10)	0(0-0)	0(0-0)	12(12-20)
Salivation(W=0.712)	5(3-8)	5(5-8)	8(7-9)	0(0-0)	5(4-7)
Nose discharges (W=0.828)	8(5-15)	0(0-0)	8(5-10)	0(0-0)	10(7-10)
Sudden death (W=0.930)	10(10-15)	8(7-11)	0(0-0)	0(0-0)	5(0-8)
Abnormally heavy rains(W=0.856)	0(0-3)	16(15-25)	0(0-0)	0(0-0)	5(5-10)
occur during drought(W=0.939)	0(0-5)	15(10-18)	0(0-0)	0(0-0)	10(7-14)
occur during mobility (W=1.00)	0(0-0)	13(13-20)	0(0-0)	0(0-0)	10(5-12)
Skin lesion (W=0.905)	0(0-0)	0(0-0)	22(15-25)	0(0-10)	0(0-0)
Abortions(W=0.922)	20(15-25)	0(0-0)	5(0-10)	0(0-0) 0(0-0)	0(0-0)
Decrease market value(W=0.754)	5(5-5)	5(5-6)	6(5-7)	3(2-5)	5(5-6)
loss of hair(W=0.970)	0(0-0)	0(0-0)	5(0-5)	20(20-25)	0(0-0)
Diarrhea(W=0.961)	15(12-15)	7(6-10)	0(0-2)	0(0-0)	0(0-0)
Respiratory distress(W=)	0(0-0)	10(9-12)	0(0-0)	0(0-0)	13(13-16)

Table-5. Major problems which affect live shoat export businesses as perceived by quarantine centers owners/ managers (exporters)

Problems	Mean rank	Std. Deviation
Diseases	1.00	.000
Poor quality	2.25	.500
Market for export	2.75	.500
High local price	4.25	.500
High input cost	5.00	.816
Poor infrastructure	6.00	.816
Delaying payment	6.75	.500

W=0.938, p=0.00, N=4

Table-6. Ranking of shoat diseases in quarantine centers

Diseases	Mean Rank
PPR	1.25
Pasteurellosis	1.75
CCPP	3.25
Sheep and goat pox	3.75
External parasite	5.25
Bloat	5.75
Respiratory complex	8.25
GIT disorder	8.00
Foot rot	8.50
Orf	9.25

W=0.936, N=4

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