Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.5, No.11, 2015

Participatory Epidemiological Studies of Major Trade Constraint Diseases of Goats in Selected Districts of Afar Region

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Abstract
In Afar pastoral area, livelihoods depend, at least in part, on livestock. Small ruminants made by far the greatest contribution to livestock-based livelihoods in all study districts. This study was conducted to assess and analyze trade sensitive disease problems of goats of Afar pastoral community. Information was gathered from pastoralists from June 2013- June 2014. At producers' level, 12 focus group discussion and interview with 291 pastoralists were held at the selected four districts of Afar pastoral areas. Majority of markets in Afar region performed below their capacity. About 72.2% of pastoralist offers goats 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 goats. Animal characteristics in terms of health, quality and other criteria required by exporters were known only by 7.6% of the producers. Afars' sheep are the most demanded by exporters 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, goat pox, External parasites 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 and certification for live shoat at various points in market chain. Quarantine centers listed PPR, pasteurellosis, CCPP, goat pox and external parasites 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, Goat Pox, Producer, Quarantine, key informant

1. INTRODUCTION

Agriculture constituting means of improving living standards of exponentially increasing poor farmers in many regions of developing world. Livestock production and productivity is one segments of agriculture and it is principal means of improving living standards in many regions of developing world (Sere and Steinfeld, 1995; FAO, 2009). In sub-Saharan countries; livestock plays a crucial role both in national incomes and livelihood of rural communities. It is the main economic stay of pastoralists and agropastralists. It provides draught power, high value feed, closing transport and provides cash incomes, manure for soil fertility and energy (ILCA, 1980).
Small ruminants form an integral and important component of pattern of animal production. Small ruminant population found in Ethiopia and Afar regional state were estimated at 63.3(CSA, 2011) and 5.6 million (Behnke, 2010) respectively, with the potential to export substantial numbers of live animals and their products. There are several advantages of keeping sheep and goats rather than large ruminants. Among these are: low cost, little feed requirement, manageable quantities of products, law risk of total loss, high reproductive rate and so on (Devendra and Burns, 1983).

In tropical areas livestock health problems is high due to environmental factors like high temperature, humidity, topographical structure of sloppy areas exposed to flood, stress factors and drought. This is common in these areas as a result of limited feed availability and low vegetation coverage with weak animal health services (Asseged, 2000). Development of small ruminant production in Ethiopia is constrained by widely distributed disease, amongst other important factors and due to this, expected outcome is less. Major diseases contributing to the poor performance of small ruminants in the sub-sector include the prevalence of highly contagious transboundary animal diseases (TADs) such as Peste des petites ruminants (PPR), Sheep and Goat pox, Brucellosis and Contagious Caprine Pleuropneumonia (CCPP).

These diseases continue to hinder international trade in live goat and their products seriously in an era of globalization. Public concern is growing regarding rapid transboundary spread of animal diseases. Small ruminant diseases could be spread through production and marketing chains (Rossiter and Hammadi, 2009). Epidemics of PPR, goat Pox and CCPP threaten national livestock industries by high levels of morbidity and mortality. These major diseases were remained as central issues related to food security, link between animal health and meat quality and safety (Sebsibe, 2011). 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 and measurable effects on human welfare particularly in pastoral societies; livestock contribute directly or indirectly to food security. Failure of pastoral community to sell their goats therefore can bring severe hardship to a pastoral family with no other income sources of support.

For goat production to contribute its full potential to national economic growth and to support livelihood of pastoral community, exported goats from Ethiopia needs to compute on international markets. Therefore, to improve competitiveness, active strategy to improve health, safety and quality requirements of importing countries are crucial. This is achieved mainly by reducing disease risk in value chains to acceptable level. These involve changes in health status and behavior of people involved in production of small ruminants. If such a strategy is to be effective, different people involved will have to be convinced of its necessity and validity of trade sensitive diseases prevention and control along the chain.

Consequently, intervention along the chain should be based on transparent and evidence-based planning and decision-making which requires methods to analyze impact of these diseases in chains that link production systems, markets and consumers. Information on status of trade sensitive diseases in small ruminant market chain for export from Ethiopia in general and Afar's small ruminant market chain for export in particular is highly scanty. Hence, there is a need for assessment of these diseases in Afar small ruminant market chain for export with aim of assessing and conduct analysis of trade sensitive diseases in the market chain for export of small ruminant originated from Afar pastoral community. Therefore, the specific objectives of the study were:

- To describe pastoralists perceptions on major diseases of small ruminants that could affect small ruminants production and productivities
- To identify most economically important goats diseases which constraints trade
- To quantify and rank the major diseases along the small ruminant market chain
- To produce documented baseline information about the major trade sensitive diseases of goats for further investigation

2. MATERIAL AND METHODS

2.1. Study Area Description

The study was conducted in Afar region, one of the nine regional states situated in the North-eastern part of Ethiopia. The altitude of the region ranges from 1500 m.a.s.l. in the western highlands to 120 meters below sea level in the Danakil/Dallol depression. Administratively, the region is divided into 5 administrative zones which are sub-divided in to 32 woredas. Capital city of the region is Samara, located in zone 1 (Dubti Woreda) some 588 Kms North-east of Addis Ababa on the main Addis–Djibouti road. The study was conducted in two zones of Afar region namely in zone 1 and 3 and one district of Oromia Regional State (Fentale). Three woredas (Aysaita, Dubti, Logia and Chifra) and one woreda (Awash Fentale) was selected from zone 1 and zone 3 respectively. These areas are characterized by an arid and semi-arid climate with low and erratic rainfall. Temperature varies from 20^{o}c in higher elevations to 48^{o}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.

2.2. Study Population and Husbandry System

The target population of this study comprised of goats of Afar region and study population was goats in selected districts of Afar regional State. This goats population is under traditional management conditions characterized by extensive pastoral productions system, seasonal mobility; utilize communal grazing and watering points. Study animals at producers' level were selected from approximately 407,203 goat population in four districts of Afar pastoral area namely: Aysaita, Dubti, Chifra and Awash Fentale. Goats populations recorded for each district were found more or less in similar agro climatic conditions. Generally, these animals were with different vaccination history, physiological and production state. Animals from pastoral areas in particular are subjected for seasonal mobility for search of pasture and water.

2.3. Participatory Epidemiological Design

2.3.1. Assessment Design

A retrospective case control study was conducted from June 2013-June 2014 to assess the perception of pastoralists on constraints of small ruminants, occurrence of major goats diseases, and ranking of diseases. Pastoralists were asked to memorize major goats diseases encountered in their flock. The main participants of this study were men and women of Afar pastoralists or producers, key informants and district animal health assistants. These local people were involved in disease problem analysis and generation of ideas on disease prioritization and ranking.

2.3.2. Sampling Procedure

Purposive sampling technique was used to select the 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 recognition, previous exposure to various diseases and close link to animals. Informants for individual interviews were randomly selected and single group of key informant consists of 8-12 people. Participatory rapid appraisal methods were applied to generate information from key informants and

participants on major goat diseases that affect trade along goat producers. Assessment was conducted in four districts of Afar pastoral areas. Aysaita, Dubti, , Chifra and Awash Fentale 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.

2.4. Techniques 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).

This method was applied to generate qualitative information on major livestock diseases in the survey area. Information gathered from participants was triangulated for their validity by the researcher. Clinical symptoms described by goat owners cross checked for their similarity with one described by Radostits et al. (2006). Three persons were engaged in the research with responsibility of interviewing, rapporteuring and facilitating. 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).

2.4.1.Rapid Market Appraisal

Rapid Market Appraisal (RMA) approach was used to generate information about main characteristics of marketing system, mapping of supply chains, understanding constraints and opportunities, and generating information as a basis for designing follow-up research such as focused survey of value chain components and actors.

2.4.2. Semi-structured interviews

The interviews were used to collect general information about the livestock owners, types of livestock kept, use of livestock and livestock diseases encountered. The interviews also collected descriptions of the clinical presentation of five prioritized diseases of shoat livestock.

2.4.3.Key informant interviews

The interviews were conducted with various officials who had been involved in goat market chain to collect information on health, quality and marketing problems and veterinary service and delivery system. The key informants include: veterinarians, para-veterinarian, livestock marketing expert and pastoralist.

2.4.4. Pair-wise comparison and ranking

Participatory appraisal was conducted mainly through informal semi-structured interviews (SSI) of key participants in live shoat market chains. SSI was used to gain an understanding of the local perception of shoat diseases. The groups of informants were identified by key informant to list, prioritize and rank the most important shoat diseases which affect market. Diseases were introduced into discussion with their local names and represented with easily memorable objects with of course frequent check of memory and understanding. Pair-wise ranking of five important shoat diseases was conducted to identify locally perceived indicators (signs). These processes were used to generate indicators for matrix scoring.

- Identify and illustrate the diseases to be compared and the indicators
- Where possible, include in the list of livestock and disease
- Pair-wise comparison can be used to identify the indicators as follows:
- Select diseases and ask people which disease was more important and why
- They were state a preference and give reasons why one disease is more important than another and these reasons are indicators, showing differences between items
- Repeat the comparison using different pairs of items, until the informants are no longer offering new indicators, but referring back to the indicators they have already identified
- We now have a full list of indicators to use

- Record the ranking questions, the result and note of any discussion during ranking

2.4.5. Matrix scoring

Matrix scoring was used to score the five top ranking diseases against a list of clinical, epidemiological, production and market indicators. It was adapted from the methods described by Catley (2005). Identified diseases were presented using by either written names on cards or on paper, or use local objects or pictures based on literacy of participants and placed along the tope X-axis of the matrix. Each of the five diseases in the matrix was scored against a list of clinical signs or cause of the diseases to create a matrix. The indicators were illustrated along the Y-axis of the matrix. For each indicator, informants were asked to score each disease by dividing piles of 25 stones against the five diseases. The matrix scoring was standardized and the procedure was repeated with other informants. The following procedure was used in the matrix scoring system.

- Have a list of five to six items such as common diseases or disease syndromes that the participants have mentioned. Use the same names as used by the participants
- For each item, obtain a list of indicators, or characteristics, of the item. In the case of diseases, this may be the main clinical signs or epidemiological characteristics of the disease
- Use pictures, objects or cards to represent the items and place these across the top of the matrix
- Write the first indicators on a card or use a picture/object to represent it. Place this to one side of the first row of the matrix
- Place a pile of counters next to the indicator and ask the participants to use the counters to show how strongly the indicator correlates with each item. Summarize and crosscheck for agreement on how they have scored
- Repeat for each indicator, gradually building up the matrix. Leave the matrix in place so that everyone can view the results and discuss as a group
- During the exercise and after the matrix is complete, it is essential that the investigator carefully probe the informants as to why they are scoring the way they are. After the matrix is complete, summarize the results and give the informants the opportunity to make changes if they wish
- Record the results in a matrix in your notebook

2.5. Data Management and Analysis

Data was classified, filtered, coded using Microsoft Excel 5, and was transferred to Statistical Package for Social Sciences software version 16 (SPSS software V.16).Thereafter analyzed according to the different variables. 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). 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 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 $P \leq 0.05$ was set for significance.

3. RESULT AND DISCUSSION

3.1. Description of Major Problems

Participatory rural appraisal was conducted mainly through informal semi-structured interviews (SSI) at village and household/flock level to rank major problems and diseases of shoat which has an impact on livestock-derived livelihoods. Table-1 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 and perception of pastoralists is indicated in table-1.

3.2. Ranking of Major Goat Diseases

The result of pair-wise ranking of disease revealed that Afar pastoralist ranked PPR as the first highest ranking diseases for goats in terms of impact on livelihoods. Informants groups 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 $W=0.782$, $P=0.00$ for goat disease. Table-2 presented most economically important 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 hypothesies in ecological epidemiology (Schwabe,

1984) as shown in table-2.

3.3. 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 goats are presented in Table-3 respectively. Strong agreements W= 0.712 to 1.00; P=0.000 were observed among the 12 informant groups with for all 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. Table-3.Summarized matrix scoring of goat diseases as characterized by pastoralists.

In this study, participatory appraisal methods used indicated that goat diseases that have transboundary importance were major problems in Afar's goat market chain for export. The participatory methods help to obtained insights on pastoralist perspectives of the diseases. Strong agreement among informant groups implied that the prioritized diseases were commonly perceived diseases in the studied segment of the chain. This indicated that both pastoralist and exporters acquire knowledge of diseases on their own context. Then pastoralist take an action by their own to mitigate risk diseases outbreak through a continuous adaptive process, whereby decisions are made based on perceptions of the external environment such as market access, resources and operators' own attitudes and preferences. Indigenous practices and technologies can often be quite effective at decreasing risk (Grace et al., 2008). It is not necessarily only the factors affecting disease prevalence, but also pastoralist perceptions to the diseases, that are crucial in decision-making.

Market chain actors understanding of risk and support for decision making process are critical, especially in situations where potential adverse outcome has serious health or economic consequences on a regional or national level. But sometimes it is neglected in preventing or managing diseases at community level which engender a bottom up approach planning and implementation of disease control programmes, to complement more traditional top-down approach adopted by governments. On the other hand, the participatory approach give opportunities to identify people involved (stakeholders) in the sector and examining how they operate and what determines their risk profiles. It is also means of determining their resource bases, the profitability of their business and their alternative opportunities, as well as their constraints in terms of regulations, investment in human capital and infrastructure.

3.4. Goat Health Problems at Market Levels

Market survey indicated that at various points in market chain from primary market up to quarantine center, there was no veterinarian performing pre-purchase inspection and selection for quality assurance and certification for live shoat. 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 goats while moving freely in the market by palpation of the goats at points for fatness; tail, chest, back. Purchasers knew the age of the goats using teeth eruption. The traders tried to select goats 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 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 goat, 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 goats of 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.

3.5. Goat Health Problems at Quarantine Level

Goats 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 the animals are accepted for quarantine. Therefore, goats were admitted into quarantine facilities with all their problems. After collection of animals was completed, animals were examined individually and identified with ear tags before vaccination. Reasons for culling included sub-optimum body condition and signs of clinical disease.

Vaccinations for goat pox, CCPP, PPR, anthrax, and pasteurellosis diseases were given for all goats in all assessed facilities as part of Sanitary and Phyto Sanitary requirements and rules and regulations of animal quarantine. All assessed quarantine centers have their own veterinarian for treatment of sick animals. Quarantine centers owners/ managers (exporters) were asked to mention major problems that affect profitability of business in descending order of importance. The most important problems from owners'/ managers' point of view are summarized in Table-4. 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 as shown in table-4.

Quarantine centers owners/ managers (exporters) were also asked to list and rank ten most important goat 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 goats in terms of impact on businesses. Quarantine centers ranked pasteurellosis, CCPP, and external parasite as second, third, fourth and fifth highest ranking diseases of goats. The most important diseases ranked by quarantine centers owners'/ managers' are summarized in Table-5. There was strong agreement (W=0.936, P=0.00) between quarantine centers owners/ managers to rank shoat diseases which affect their export business as indicated in table-5.

4. CONCLUSION AND RECOMMENDATIONS

The finding our study indicated that about 72.2% of pastoralist offers goats 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 goats. Goat characteristics in terms of health, quality and other criteria required by exporters were known only by 7.6% of the producers. Majority of producers (40.9%) indicated that they present young male for sale and 28.2% of producers presented culled female goats for sale. Pastoralist motioned PPR, Pasteurellosis, goat pox, External parasites 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 and certification for live shoat at various points in market chain. Quarantine centers listed PPR, pasteurellosis, CCPP, goat pox and external parasites most important disease of goats 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. Based on the above findings, the following points are recommended.

- Better clinical capacity and records at every step in the chain are required to develop long-term predictive disease statistics.
- 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 transboundery 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.

Conflicts of Interest Statements

None of the authors has any financial or personal relationships that could inappropriately influence the contents of this paper.

Acknowledgements

The authors acknowledge to Samara University for financial support and for the provision of necessary facilities and administrative works which had remarkable role for the success of research work. We would like to present our gratitude to districts veterinarians and participants of the study who contribute their views and ideas for the life of this research.

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Table-1. Respondents' perception of the constraints that impact small ruminants-driven livelihood

Constraints	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 economically important goat diseases by pastoralists

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

W=0.782, P=0.000, N=12

Table-3. 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-4. Major problems affect goats export businesses perceived by quarantine centers

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-5. Ranking of goats diseases in quarantine centers

Diseases	Mean Rank
PPR	1.25
Pasteurellosis	1.75
CCPP	3.25
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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