

Epidemiological Study of Small Ruminant Diseases in Selected Districts of Kaffa and Bench-Maji Zone, Southern Nations Nationalities and Peoples Regional State (SNNPRs), Ethiopia

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Abstract

An epidemiological survey of small ruminant disease was conducted in Boka-Shuta, Konda-Zuriya and Debre-Work kebelles of Kaffa and Bench-Maji zone, Southern Nations, Nationalities and people's regional state (SNNPRs), Ethiopia from July 2012 to June 2013. The objective of the study was to assess diseases of small ruminants affecting production and productivity; their occurrence and distribution; and associated risk factors. For these, Semi structured questioner format was prepared and survey was conducted. The result revealed that, 90.6

Index terms— agro-ecology, diseases, epidemiology, production, small ruminant, susceptible.

Abstract—An epidemiological survey of small ruminant disease was conducted in Boka-Shuta, Konda-Zuriya and Debre-Work kebelles of Kaffa and Bench-Maji zone, Southern Nations, Nationalities and people's regional state (SNNPRs), Ethiopia from July 2012 to June 2013. The objective of the study was to assess diseases of small ruminants affecting production and productivity; their occurrence and distribution; and associated risk factors. For these, Semi structured questioner format was prepared and survey was conducted. The result revealed that, 90.6%, 76.0% and 65.6% of interviewed farmers describe the multi-factorial causes of respiratory diseases; systemic diseases; and Gastro-intestinal parasite respectively were the most prevalent diseases irrespective of agro-ecology difference. The type of disease conditions documented in each agro-ecology had differences. Bloating (accumulation of excess amount of fluid in their abdominal cavity and blood tinged internal organs observed when slaughtered) followed by head circling in Boka-Shuta (highland); gastro intestinal parasite and head circling in Debre-Work (midland); and bottle jaw and orf in Konda-Zuriya (lowland) were the most prevalent and had serious problems in small ruminant production and productivity. Regarding the diseases occurrence and distribution, the highest cases were recorded in summer followed by autumn. Ewes/doe and lambs/kids were the most susceptible age group. Each specific disease conditions occurrence and distribution in this study had its own specific risk factor. In general, however, disease management methods and practices by the farmers, susceptible age groups and seasons of occurrence were important risk factors playing an important role. Thus, the production and productivity of small ruminant was highly determined by diseases conditions. The result presented here suggests that, ewes/doe and lambs/kids need special attention to prevent them from diseases to improve production and productivity. And also, the small ruminant flock should get appropriate vaccination prior to the disease occurrence. Thus, the farmers' disease management and practices method need to be improved through training on small ruminant disease and their management. In addition, further studies should be conducted to identify the specific diseases types and their associated risk factors.

1 Introduction

Indigenous small ruminants constitute greater percentage of ruminant population in Africa (Lebbie et al., 1994). These flocks of animals are commonly found in the rural areas where they are owned and managed under extensive system (Otchere, 1986). Small ruminants play an important role in the lives of most people especially

rural farmers who livelihood entirely depend on them. They provide source of animal protein through their meat and milk (Fajemisin, 1991). Not with standing, they fetch a source of income when sold to meet some other family needs as well as play a vital social roles during ceremonies and festivals.

The importance of small ruminants (ie sheep and goats) to the socio-economic well being of people in developing countries in the tropics in terms of nutrition, income and intangible benefits (eg savings, insurance against emergencies, cultural and ceremonial purposes) cannot be overemphasized (Kosgey, 2004). Sheep and goats are important livestock species in developing countries because of their ability to convert forages, and crop and household residues into meat, fibre, skin and milk.

For an improved animal protein intake, there is need for improvement in the production of meat and other protein sources from the livestock industry. Sheep and goats offer a great potential in this respect due to their relative ease of breeding, management, ability to subsist on forages, hardiness, adaptation to a wide range of ecological zones and distribution among others. In recent times, sheep and goats production is becoming popular even among urban dwellers as result of the aforementioned merits (Umunna et al., 2014).

Small ruminant management is seriously hindered by diseases in the tropics. Diseases are very important to farmers and affect the production of small ruminants in several ways. It increases cost of production, lowers production level, reduces the quality and quantity of animal products and generally causes great loss to the farmer (Abdullahi et al., 2013).

In Ethiopia, There are more than 38 millions of cattle and 30 million small ruminants (CSA, 2007). However, the country is not making use of this huge potential attributed to different constraints among which disease stands in the front line (Samson and Frehwot, 2010; Firew, 1999). Diseases of various origins (bacterial, viral, parasitic, etc.) directly or indirectly are among the numerous factors responsible for poor production and productivity (Firew, 1999; Feyesa et al., 2010) which results the major barriers for the improvement of livestock production, reproduction and marketing. The annual total economic losses due to diseases, mortality and reduced productive and reproductive performance were estimated by 150 million USD (Berhanu, 2002).

In Ethiopia, Sheep and goats contribute 25% of the meat domestically consumed with a production surplus mainly being exported as live animals (Alemayehu and Fletcher, 1991; Tibbo, 2006). Both species also contribute 50% of the domestic needs in wool, about 40% of skins and 92% of the value of hides and skin exported (ILCA, 1993). The total income share of small ruminants tends to be inversely related to size of land-holding, suggesting that small ruminants are of particular importance for landless people. In some settings where, agriculture (crop production) provides only seasonal employment, rearing small ruminants would provide employment and income as a subsidiary occupation (Coppock et al., 2006). However in Ethiopia, Small ruminant contribution to food consumption, rural income and export economy is below the expected potential, because of their husbandry is constrained by compound effect of disease, poor feeding, and poor management (Chalachew, 2001). Among many factors which limit the economic return from small ruminant production diseases stands in the front line (Firew, 1999). As a result of small ruminant diseases, 5-7 million sheep and goats die each year (Sileshi and Lidetu, 2007) and 35% of sheep and 56% of goat skins rejected due to skin parasites (Bayou, 1998) which leads serious economic loss to small holder farmers, the tanning industry, and the country as whole (ESGPIP, 2009) in which Many of the diseases in Ethiopia are still uncontrolled and are causing devastating effects both to the producers and to the national economy (EARO, 1996).

Even if small ruminants play a very important socio-economic role, little is known about health problems of these animals in the study area. In order to design relevant disease control strategies, assessment of the existing small ruminant diseases in the area is vital to devise appropriate technological interventions as well as for further study. Therefore, the aim of this study was, to assess diseases of small ruminant affecting production and productivity; their occurrence and distribution; and associated risk factors in selected districts of Kaffa and Bench Maji zone.

2 II.

3 Materials and Methods

4 a) Study Area and Study Design

A cross-sectional study to assess diseases of small ruminant affecting production and productivity; their occurrence and distribution; and associated risk factors was conducted from July 2012 to June 2013 in Boka-Shuta and Konda-Zuriya of Kaffa zone; and Debre-work of Bench-maji zone. The study areas were selected purposively based on altitude variations, accessibility and availability of small ruminant. Thus, Boka-Shuta (highland), Konda-Zuriya (lowland) and Debre-work (Midland). The interviewed households with in each study areas were selected using systematical random sampling technique.

5 b) Sample Size Determination and Data Collection

Before conducting the formal survey, group discussion was made with experts of each respective zonal and district agriculture and rural development office on small ruminant production problems and diseases in particular. Semi structured questioner format was prepared. Then, it was pre-tested and modified as necessary and finally the formal survey was conducted and data was collected using single-visit-multiple-subject formal survey technique

(ILCA, 1990). Accordingly, a total of 96 households were interviewed and data's were collected on major small ruminant disease and health problems; their occurrence and distribution; and associated risk factors.

6 c) Data Management and Analysis

The data was analyzed using STATA version 11. Descriptive statistics was employed to determine the prevalence and Chi-square (X^2) test was used to measure the effect of predisposing factors on the distribution of different diseases. A significance level ($p < 0.05$) and confidence level (95%) was set to determine the presence or absence of statistically significant difference between the given parameters. And also, multivariate logistic regression was tested to confirm the stated factors.

7 III.

8 Results and Discussions a) Importance of Livestock Species

The overall importance of livestock species irrespective of agro-ecology difference indicated that, cattle had the highest proportion (90.6%) followed by poultry (68.8%) (Figure 1). The different animal species are distributed throughout the three agro-ecologies of the study areas; and these could suggest that, the areas have a potential to favorably support live stock production and productivity. However, the proportion of livestock species had differences amongst the different agro-ecologies. Thus, small ruminants had the highest level of proportion than other livestock species; goat (54.5%) in Konda-Zuriya (lowland) followed by sheep (49.2%) in Boka-Shuta (highland). These could indicate that, the production potential for selected species of animals in different agro-ecologies (figure 2). The present finding was supported by Enwelu et al (2015) from Nigeria; the farmer's preferred goat than sheep due to a number of reasons. These were; prolificacy (54.2%); profitability (36.1%); longevity (long life span) (5.6%); and type of meat/animal dung (2.8%). Farmers listed different types of small ruminant diseases conditions that could cause mortality and morbidity in the study areas during the questioner survey. Among these, respiratory disease, systemic diseases, diarrhea, swollen head, Gastro-intestinal parasite and head circling had most frequently recorded. 90.6% of the respondents mentioned, diseases of the respiratory system (with signs of coughing and nasal discharge) which could be multifactorial caused followed by 76.0% for systemic diseases (with signs of erected hair, depression and inappetent) were the most common. The multi symptomatic gastro-intestinal parasitism (in the present case could be manifested in diarrhea, emaciation or bloating) had significant occurrence (Figure ??).

Different research reports in Ethiopia indicated that, diseases are the main constraints limiting small The study report by Abebe et al (2013) in north western Ethiopia confirmed that, Sheep diseases were one of the main constraints for sheep production and Foot rot, skin disease, pasteurellosis, orf and internal parasites were the main. The authors extended their findings and; sheep diseases were the major constraints (ranked first) amongst several constraints limiting small ruminant production. Other authors from South Sudan revealed that; internal parasite followed by pneumonia and external parasite were the most prevalent small ruminant diseases (Lado et al., 2015).

The occurrence of small ruminant diseases conditions with respect to agro-ecologies indicated that; bloating (accumulation of excess amount of fluid in their abdominal cavity and blood tinged internal organs observed when slaughtered) followed by head circling were the most prevalent in Boka-Shuta. Whereas, gastro intestinal parasite and head circling in Debre-Work; and bottle jaw and orf in Konda-Zuriya were the most prevalent and had serious problems in the small ruminant production and productivity (Figure ??).

And also, statistical significant differences of diseases occurrence among the study areas were observed. Thus, systemic diseases followed by gastrointestinal parasite and head circling had highest in Midland; whereas, Orf followed by tick infestation in Lowland. Lowest proportion of diseases occurrence was observed in Highland (Boka-Shuta) and these could be due to several intervention activities in the area by Bonga Agricultural research center for controlling and preventing diseases occurrence in small ruminant (like regular vaccination against ovine pasteurellosis disease, anthrax, PPR, sheep and goat pox disease; routine treatment of cases; and regular deworming with broad spectrum antihelmentics), since it was one of Bonga sheep breed improvement community/cooperative (Table 1).

9 c) Small Ruminant Diseases Management and Practices by the Farmers

In general, small ruminant disease management by modern treatment in veterinary clinics was significantly different among the study areas. For example, 77.1% the interviewed household in Konda-Zuriya had better trend and awareness for treating their sick animals in veterinary clinics (Table 2). But, in areas where veterinary clinics are remote from farmers' residences (like in case of Boka-Shuta out of the reach of intervention areas by the research center); the farmers manage their sick animals either by treating with home remedy and herbs or slaughtered for skin. Few households were also mentioned that, they used drugs by buying from the market and shop to treat their animals by themselves. The present finding was strongly supported by the study from South Sudan that; inadequate knowledge of small ruminant management was the most common challenge facing small ruminant production (Lado et al., 2015).

10 d) Temporal Distribution of Small Ruminant diseases

The occurrence of small ruminant diseases conditions in different seasons of the year had significantly varied. Thus, the highest occurrence was documented in summer (50.0%) followed by autumn (21.9%). On the other hand, seasons with high risk of disease occurrence were identified; and thus, autumn and summer with 32.3%. For these, different factors were identified. Grazing on immature fresh grass (22.9%) was the main predisposing factor followed by unknown reason (20.8%) (Table 3). The present finding was justified by Abebe et al (2013); Sheep death occurs mainly at the end of the rainy season. This may be due to feed shortage and the suitability of the environment for the disease causing organisms. These also further aggravated by the introduction of animals into the area from different places and markets which might introduce different diseases. e) Occurrence of Disease Outbreak in Small Ruminant flock Significant variations for the occurrence of small ruminant disease outbreak in different seasons were recorded. Thus, 33.3% were during winter followed by 25% in autumn. Diseases manifesting respiratory signs had 50% of probability for causing outbreak (Table 4). The present finding was justified by Abebe et al (2013) report; disease mainly occurs during feed shortage periods (dry periods).

11 f) Distribution of Small Ruminant Diseases Conditions in Different Age Groups

The occurrence and distribution of small ruminant diseases conditions in different age groups were significantly vary even if, 22.9% were documented in all age groups. Thus, the highest was in ewes/doe and lambs/kids (26%) as compared to other age groups (Table 5).

12 g) Factors Associated with the Occurrence and Distribution of Small Ruminant Diseases

Based on multivariate logistic regression analysis, different determinant factors were found significantly associated for the occurrence and distribution of small ruminant disease conditions (Table 6). According to the model, holding the effect of other variables constant, the risk of acquiring infection with disease conditions manifested by swelling of head was 6.9% higher for those not treated in veterinary clinic (didn't get Modern treatment) than treated. The risk of getting head circling was 13.6% higher for Ewes/doe and lambs/kids than Lambs/kids alone; and season of occurrence was 39.6% higher in summer than winter. For GIT parasite infestation, the risk was 0.9% lower in Boka-Shuta than Konda-Zuriya which is justified by the regular deworming intervention by the research center in the study area. Traditional treatment practice by the farmers in the study areas for GIT parasite infestation indicated that, the risk was 21.2% higher for those not treated by herbal remedy than treated. For the occurrence and distribution of disease conditions like emaciations and eye diseases, market was significantly associated as a source of infection where diseased animals could disseminate the disease causing organism to the areas.

13 IV. Conclusions and Recommendations

The distribution and production of small ruminant was highly determined by diseases conditions. Of which, multi-factorial cause of respiratory diseases and Gastro-intestinal parasite are most prevalently occurred. The occurrence and distribution of those disease conditions had differences in seasons where the highest was in summer followed by autumn; and ewes/doe and lambs/kids were most frequently affected. Each specific disease conditions occurrence and distribution in this study had its own specific risk factor. In general, however, disease management methods and practices by the farmers, susceptible age groups and seasons of occurrence were important risk factors playing an important role. Thus, the production and productivity of small ruminant was highly determined by diseases conditions. The result presented here suggests that, ewes/doe and lambs/kids need special attention to prevent them from diseases to improve production and productivity. And also, the small ruminant flock should get appropriate vaccination prior to the disease occurrence. In addition, the farmers' disease management and practices method need to be improved through training to create awareness on small ruminant disease and their management. In addition, further studies should be conducted to identify the specific diseases types and their associated risk factors.

14 V. Acknowledgments

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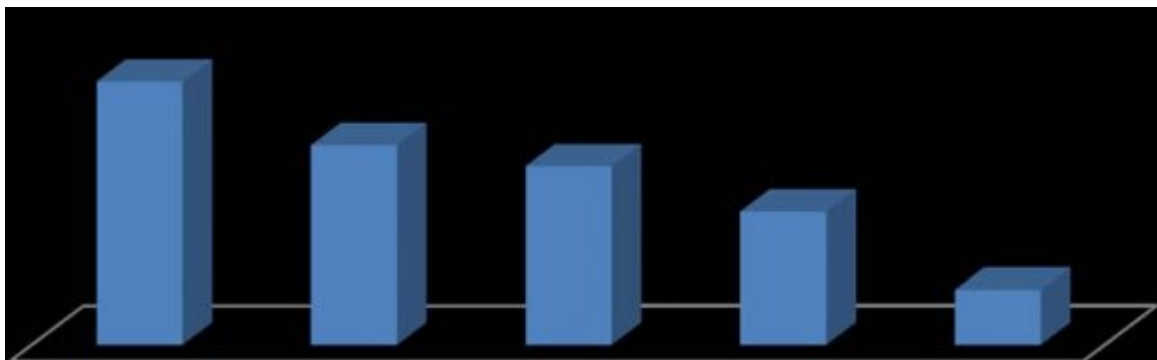


Figure 1:

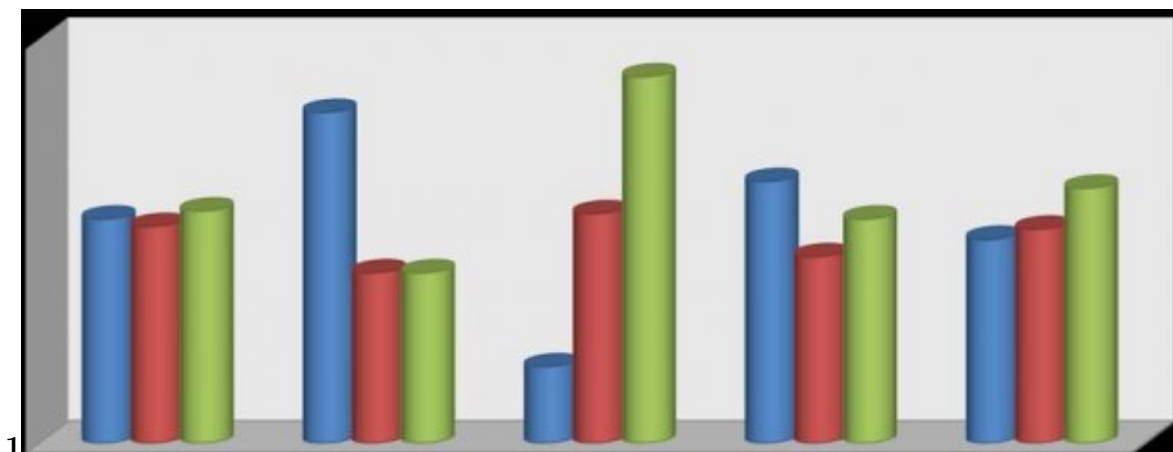


Figure 2: Figure 1 :

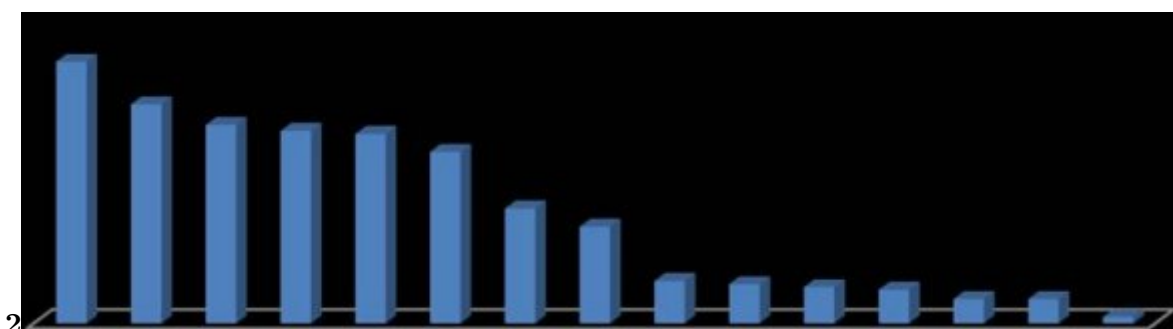


Figure 3: Figure 2 :

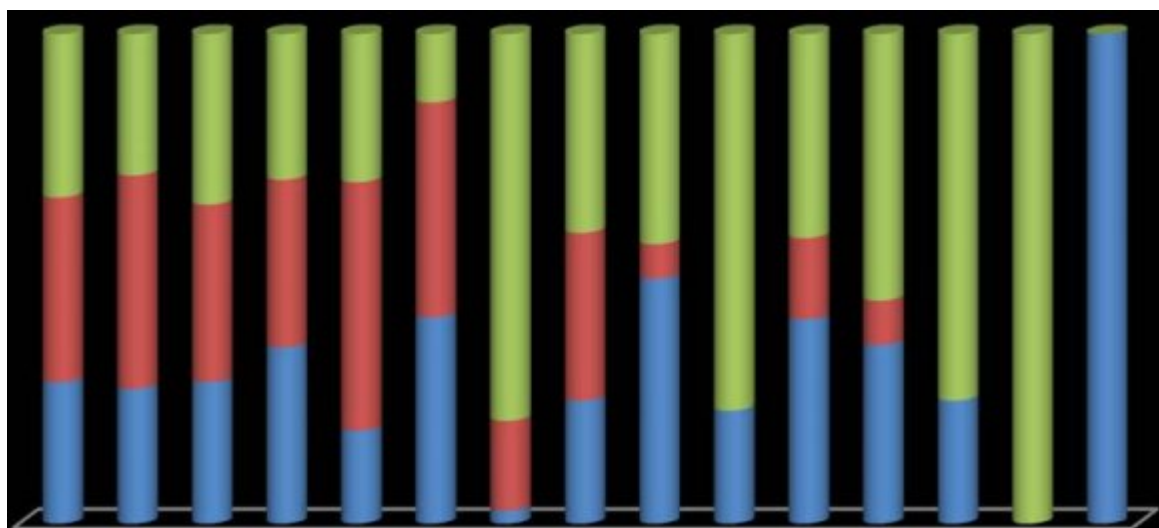


Figure 4:

3

Year 2016

90.6%

76.0%

68.8%

65.6%

66.7%

39.6%

59.4%

33.3%

14.6%

13.5%

12.5%11

.5%8.3%

8.3%

2.1%

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[Note: 30 Volume XVI Issue III Version I © 2 016 Global Journals Inc. (US) G Figure 4: Prevalence of small ruminant disease conditions with respect to agro-ecologies, southern Ethiopia]

Figure 5: Figure 3 :

1

Health related problems	N	Study areas			Percentage (%)	Sig.
		Boka-shuta (Highland)	Debre-Work (Midland)	Konda-Zuriya (Lowland)		
Respiratory disease	87	25(28.7)	33(37.9)	29(33.3)	90.6	0.074
Systemic disease	73	20(27.4)	32(43.8)	21(28.8)	76.0	0.002
Diarrhea	66	19(28.8)	24(36.4)	23(34.8)	68.8	0.817
Head swelling	64	23(35.9)	22(34.4)	19(29.7)	66.7	0.145
Internal parasite	63	12(19.0)	32(50.8)	19(30.2)	65.6	0.000
Head circling	57	24(42.1)	25(43.9)	8(14.0)	59.4	0.000
Bottle jaw	38	1(2.6)	7(18.4)	30(78.9)	39.6	0.000
Emaciation	32	8(25.0)	11(34.4)	13(40.6)	33.3	0.671
Bloating	14	7(50.0)	1(7.1)	6(42.9)	14.6	0.052
Orf	13	3(23.1)	0(0.0)	10(76.9)	13.5	0.002

[Note: 31 Volume XVI Issue III Version I Epidemiological Study of Small Ruminant Diseases in Selected Districts of Kaffa and Bench-Maji Zone, Southern Nations Nationalities and Peoples Regional State (SNNPRs), Ethiopia]

Figure 6: Table 1 :

2

		Eye disease	11	4(36.4)	
		Tick infestation	8	2(25.0)	
		Orchitis	8	0(0.0)	
		Mastitis	2	2(100)	
		Total	96	29(30.2)	
Year					
2016					
32					
Medical	Small	management	Variables Self treatment using home remedy and her		
Re-	rumi-	(con-			
search	nant	trol-			
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ume		and			
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Global	Pasture management for disease transmission	Separate grazing/browsing house hold herd and flock			
Jour-					
nal					
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	Quarantine	Free movement of animal within and			
	system	across the areas			
		Restricted movement of animal within			
		and across the areas			
		Total			
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Figure 7: Table 2 :

3

			Study Areas					
Variables			Boka-shuta	Debre-Work	Konda-Zuriya	Total (%)	Sig.	
			N(%)	N(%)	N(%)			
Occurrence of diseases in	different	All season	3(75.0)	0(0.0)	14(66.7)	1(25.0)	4(4.2)	0.000
	sea-	Autumn	5(23.8)	0(0.0)	2(9.5)	1(2.6)	21(21.9)	
	diseases	Spring	2(66.7)					

Figure 8: Table 3 :

4

		Study Areas			Total	S
Occurrence of small ruminant disease outbreak		Boka-shuta	Debre-Work	Konda-Zuriya		
		N(%)	N(%)	N(%)	N(%)	
Occurrence of disease outbreak in small ruminant		14(38.9)	4(11.1)	18(50.0)	36(37.5)	
Seasonal distribution	Autumn	3(33.3)	3(33.3)	3(33.3)	9(25.0)	
	In any of the seasons	0(0.0)	0(0.0)	8(100)	8(22.2)	0
	Spring	3(75.0)	0(0.0)	1(25.0)	4(11.1)	
	Summer	2(66.7)	0(0.0)	1(33.3)	3(8.3)	
	Winter	6(50.0)	1(8.3)	5(41.7)	12(33.3)	
	Anthrax	1(50.0)	1(50.0)	0(0.0)	2(5.6)	
	Bloating	2(100)	0(0.0)	0(0.0)	2(5.6)	
	Head circling	2(100)	0(0.0)	0(0.0)	2(5.6)	
	Diarrhea Respiratory disease	0(0.0)	1(50.0)	1(50.0)	2(5.6)	0
	Respiratory disease	2(11.1)	2(11.1)	14(77.8)	18(50.0)	
Factors for diseases outbreak	disease with diarrhea	1(100)	0(0.0)	0(0.0)	1(2.8)	
	Swollen head	2(100)	0(0.0)	0(0.0)	2(5.6)	
	Swollen head with coughing	0(0.0)	0(0.0)	2(100)	2(5.6)	
	Swollen head with coughing and diarrhea	0(0.0)	0(0.0)	1(100)	1(2.8)	
	Swollen head with diarrhea	1(100)	0(0.0)	0(0.0)	1(2.8)	
	Unknown disease	3(100)	0(0.0)	0(0.0)	3(8.3)	

Figure 9: Table 4 :

5

Diseases distribution in different small ruminant age group		Study area			Total	S
		Boka-Shuta	Debre-Work	Konda-Zuriya		
		N (%)	N (%)	N (%)		
Age group	Adult	0(0.0)	1(100)	0(0.0)		
	Adults and lambs/kids	8(66.7)	2(16.7)	2(16.7)		
	All age	6(27.3)	2(9.1)	5(33.3)	14(63.6)	
	Ewes/doe	7(46.7)			3(20.3)	
	Ewes/doe and lambs/kids	7(28.0)	5(20.0)		13(52.0)	
	Lambs/kids	1(4.8)	18(85.7)	2(9.5)		
	Total	29(30.2)	33(34.4)	34(35.4)		

Figure 10: Table 5 :

6

Year 2016
35
Volume XVI Issue III Version I
Medical Research
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Figure 11: Table 6 :

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