

## **On-Station Retrospective Epidemiologic Study of Small Ruminant Disease in Sirinka Agricultural Research Center, Sheep and Goat Breeding, Evaluation and Distribution Site**

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**Abstract:** A retrospective epidemiological study of sheep and goats diseases were undertaken at Sirinka agricultural research center, small ruminant breeding, evaluation and distribution site, from 2010 to 2013 to determine temporal distribution and associated risk factor of clinical cases. Of the total 393 clinical cases, external parasites, internal parasites, dermatitis, pneumonia, nervous disturbance and clinical mastitis were common cases with frequency of 21.4%, 17.3%, 16.5%, 11.5% and 8.7%, respectively. There is highly significance association of clinical cases with breed, age, sex, year and season ( $P = 0.00$ ). Prevalence of Clinical cases indicated that caprine (54.4%) were more affected than ovine (45.6%). Female animals (65.6%) were more susceptible than males and age group between 90-180 days old (42.5%) as compared to other age groups. Highest and lowest number of cases were registered in short rainy season (38.9%) and dry season (32.3%) and during the years 2013 (36.6%) and 2012 (12.4 %), respectively. Highest frequencies of clinical cases were observed during the months of May, august and September. Generally, clinical cases of external parasites, internal parasites, dermatitis and pneumonia were the most important health problems in the breeding site and priority should be given for thus disease conditions.

**Key words:** Dermatitis • Parasite • Pneumonia • Temporal

### **INTRODUCTION**

In Ethiopia, spread of disease is a major constraint for livestock production. The annual total economic losses due to diseases, mortality and reduced productive and reproductive performance were estimated to 150 million USD [1]. Currently, restricted attention is given to flock health and comprehensive preventive medicine which give proper consideration to both infectious and non-infectious diseases and designed to increase production by preventing disease, rather than just dispensing traditional treatment to clinically sick animals [2].

Even though there have been notable successes in the control of livestock diseases, some still pose problems both in developed and developing countries. In Ethiopia, timely recognition of the diseases followed by acquisition of the pharmaceuticals are lacking due to shortage of infrastructure facilities to support health services delivery.

Consequently, in the country majority of disease intervention consists of mass inoculations following outbreaks [3].

Screening disease occurrence on a study area is the accumulation of valuable information and allowing animal attendants and veterinarians to confidently determine priorities to design preventive measures which consequently leads the prevention of economic losses associated with diseases [4]. Diagnosing a disease and provision of treatment and control measures for disease management involves physical examination and generation of a list of differential diagnoses; the critical part of which is clinical examination of individual animal or group of animals [5].

Prevalence and intensity of pathogenic infections are often seasonal and occur in many species and may be linked to changes in the host or to seasonal changes in the prevalence of the pathogen or vector [4]. In this regard, knowledge of temporal pattern of distribution of a

disease in a population is important in suggesting the type of disease that is occurring and its possible causes [3]. Understanding on the incidence, prevalence, distribution and determinants or risk factors of diseases in an area is necessary for undertaking efficient control program. The objective of this was to observe the occurrence and associated risk factors of clinical diseases of sheep and goats and to point out the epidemiology of diseases in breeding, evaluation and distribution site.

## MATERIALS AND METHODS

**Description of Study Area:** Sirinka Agricultural Research Center sheep and goat breeding, evaluation and distribution site is found in Eastern Amhara Regional state of Ethiopia. The site located 372 km from Bahir dar, capital city of Amhara Region and 508 km away from Addis Abeba. The site is located at an altitude of 1850 m.a.s.l and at 11° 45' 00"N and 39° 36' 36"E. The rainfall pattern is bimodal, with two-rainfall season, *belg* (February/March - April) and *meher* (July - October/November) and the mean annual rainfall amount is on average about 950 mm. This area has three seasons of sub-humid agro-climatic zone with mean daily temperature ranges from 16 - 21°C. Months of June to August are main rainy seasons; months of September to February are dry seasons, while months of March to May are short rainy season.

**Study Animals and Their Management:** Clinically sick, sheep and goats were the study subjects. In Sirinka sheep and goat breeds evaluation and distribution site, animals were kept in intensive and semi-intensive management system. Lambs and kids weaned at 3 months of age. Concentrate supplementation was provided based on their age group and physiological condition in erratic manner. Lambs and kids had access to concentrate feed in addition to their dam's milk before weaning. After weaning, however, they supplemented with 100 g/day of concentrate until they are able to graze actively. Sometimes pregnant ewes and does at last stage of gestation were supplemented with concentrate mixture while weaned female lambs and kids, non-pregnant ewes and does were kept on grazing land. In main rainy season indoor housing has been implemented.

Sheep and goats were vaccinated against sheep and goat pox, Anthrax, pestides petites ruminitis and ovine pasterollosis diseases. They were treated regularly for internal and external parasites. All animals were dipped and sprayed for ticks, mites and other ectoparasites with

Diazinon 60% and Amitrazine (12.5%) and regularly drenched for internal parasites with Albendazole for treatment and for prophylaxis measure. Generally, there were a regular follow up of sick animals and the causes of illness and type of disease were registered in case recording book.

**Study Design:** Retrospective epidemiologic study of diseases was done using of 4 years recorded data (September, 2010 to August, 2013) in Sirinka Agricultural Research Center, sheep and goat breeding, evaluation and distribution site. Diagnosis was based on faecal, postmortem and clinical examination. Accordingly management system, weaning time and chance of exposure to infectious agent, diseased animals were grouped as <90 days, 90 - 180 days, 181-365 days and >365 days. Breed were categorized into local sheep, cross sheep (pure Dorper X local sheep), local goat and cross goat (pure Boer X local goat). There were 393 clinical cases, which has been registered in case recording book. Clinical cases of bloat, hypocalcaemia, clinical mastitis, conjunctivitis and septicemia were taken as separate problems. Other cases were grouped into the following eight major categories. Contagious ecthyma, dermatophilosis, foot rot and dermatophytosis categorized as cases of dermatitis. Cases which discharge pus without intervention or following paracentesis or minor surgery like localized purulent lesions and actinobacillosis were considered localized abscess. Cases of tetanus and cowdriosis were categorized into nervous disturbance. Strongyles, lung worms, trichuris, fasciolosis, moneziasis and coccidiosis considered as internal parasites. Ticks and mange mites were grouped into problems of external parasites. Pasteurella pneumonia, verminous pneumonia, contagious caprine pleuro-pneumonia (CCPP) was categorized into problems of pneumonia. Cases due to abortion, retained fetal membrane, dystocia, phimosis, paraphimosis and orchitis were categorized into reproductive tract problem. Cases of mechanical injury and wounds produced due to any trauma were categorized into cases of wound.

**Data Management and Analysis:** The data were checked manually for obvious inconsistencies, recording errors or missing data. Data were statistically analyzed by Statistical Package for Social Science (SPSS) software 16.0 version. Descriptive statistics was used to determine the prevalence of diseases; seasonal pattern and distribution of diseases. Proportion of different animal's health problems was expressed as percentage by dividing total

number of animals positive to a specific health problem to the total number of animals which showed clinical disease. Chi-square ( $\chi^2$ ) test with P-value was applied to test the existence of association and to see level of significance between observed health problems and associated risk factors, respectively.

## RESULTS AND DISCUSSION

**Prevalence of Different Clinical Cases and Their Distribution in Sex:** In this study the overall prevalence of clinical cases of external parasites, internal parasites, dermatitis, pneumonia, nervous disturbance, clinical mastitis and reproductive tract problems were 21.4%, 17.3%, 16.5%, 11.5%, 8.7%, 6% and 4.3%, respectively. The result displayed that prevalence of external parasites was higher as compared to endo- parasite which can be associated with lack of effectiveness of acaricide drugs. Frequent occurrence of parasites was related to narrow grazing land at which rotational grazing was unable to practice. Result of external and internal parasitic cases (38.7%) was deviated from works of Abebe and Esayas [6]. reported a prevalence of 95.6% ovine and caprine gastro-intestinal helminthosis and ectoparasites. This variation is due to the practice of regular deworming and dipping against endo and ectoparasites and although the drugs may not be not fully effective.

Based on the study higher clinical cases were registered in female goat and male sheep with prevalence of 37.4% and 16.3%, respectively. External and internal parasites Cases were the highest in both sexes as compared to other diseases (Table 1). The occurrence of diseases was found to be more in females than males. It could associate with higher number of female animals as

compared to male in the study site. In addition, it might also partly associate with the low level of immunity of female animals. Susceptibility to infection in female animals is maximized during time of periparturient and parturition where relaxation of resistance and suppression of immunity happens [2].

**Prevalence of Clinical Cases in Species:** From total observed disease conditions, higher clinical cases were registered in caprine as compared to ovine species. The difference in the number of clinical cases between species might be associated with the number of population of animals in the study area or difference in natural immunity. External Parasites were highest in caprine and internal parasite and dermatitis were higher in ovine. Besides this, clinical cases of bloat and conjunctivitis were not observed in ovine species (Figure 1).

**Disease Distribution in Age:** Of the total 393 clinical cases, 42.5%, 39.5%, 8.9% and 8.6% were observed in the age group of 90- 180 days, >365 days, 181-365 days and <90 days, respectively. Animals with age group of 90 - 180 days old were most significantly susceptible to diseases. This might associate with chance of exposure to infectious agents during weaning shock caused by sudden feed change [7]. All Clinical cases were recorded in animals at the age of >365 days while hypocalcaemia were not observed in the rest age groups (Table 2). Cases of external and internal Parasites were highest animals in the age group 90- 180 days old. Effect of age on occurrence of pneumonia recorded in this study supports the report of Donkin *et al.* [8] who recorded kids were susceptible to pneumonia.

Table 1: Association between clinical cases and sex of animals

Type of cases	Sex				Total case	$\chi^2$
	Female sheep (%)	Male sheep (%)	Female goat (%)	Male goat (%)		
Septicemia	5(71.4)	2(28.6)	-	-	7 (1.8)	30.9***
Pneumonia	12(26.7)	12(26.7)	12(26.7)	9(20)	45(11.5)	
Internal Parasite	15(22)	16(23.5)	32(47)	5(7.3)	68(17.3)	
Dermatitis	29(44.6)	10(15.4)	18(27.7)	8(12.3)	65(16.5)	
Nervous disturbance	11(32.3)	6(17.6)	10(29.4)	7(20.6)	34(8.7)	
Bloating	-	-	12(80)	3(20)	15(3.8)	
Wound	5(41.7)	2(16.7)	1(8.3)	4(33.3)	12(3.1)	
Local abscess	1(14.4)	-	3(42.8)	3(42.8)	7(1.8)	
Clinical mastitis	3(12.5)	-	21(87.5)	-	24(6)	
Conjunctivitis	-	-	4(36.4)	7(63.6)	11(2.8)	
Reproductive problem	2(11.7)	2(11.7)	6(35.3)	7(41.2)	17(4.3)	
Hypocalcaemia	4(100)	-	-	-	4(1)	
External parasite	24(28.6)	14(16.6)	28(33.3)	18(21.4)	84(21.4)	
Total	111(28.2)	64(16.3)	147(37.4)	71(18.1)	393	

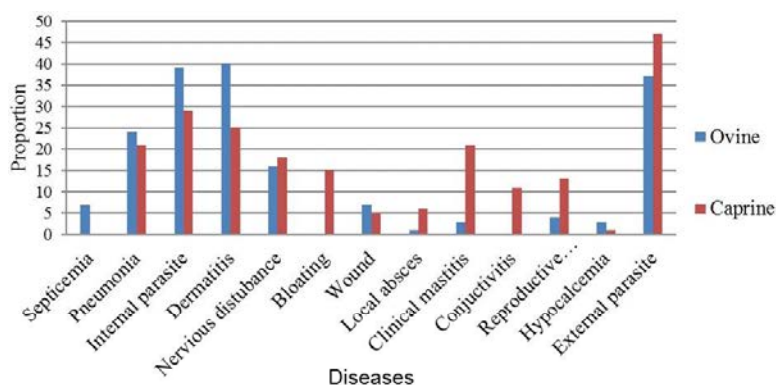


Fig. 1: Types of clinical cases between species of animals

Table 2: Types of clinical cases between age group of animals

Type of cases	Age groups				Total cases (%)	$\chi^2$
	<90 Days (%)	90-180 Days (%)	181-365 D Days (%)	>365Days(%)		
Septicemia	-	2(28.6)	1(14.3)	4(57.1)	7 (1.8)	126.2***
Pneumonia	4(8.8)	16(35.5)	8(17.7)	17(37.7)	45(11.5)	
Internal Parasite	5(7.4)	42(61.7)	7(10.3)	23(20.6)	68(17.3)	
Dermatitis	5(7.7)	23(35.4)	2(3)	34(8.6)	65(16.5)	
Nervous disturbance	-	13(38.2)	2(5.8)	19(55.8)	34(8.7)	
Bloating	1(6.6)	10(66.6)	-	4(26.6)	15(3.8)	
Wound	1(8.3)	3(25)	1(8.3)	7(58.3)	12(3.1)	
Local abscess	-	3(30)	1(11)	5(55.5)	7(1.8)	
Clinical mastitis	-	2(8.3)	-	22(91.6)	24(6)	
Conjunctivitis	2(18.1)	4(36.3)	1(9.1)	4(36.3)	11(2.8)	
Reproductive problem	-	1(5.8)	1(5.8)	15(88.2)	17(4.3)	
Hypocalcaemia	-	-	-	4(100)	4(1)	
External parasite	16(19)	49(58.3)	11(13)	8(9.5)	84(21.4)	
Total	34(8.6)	167(42.5)	35(8.9)	157(39.5)	393	

Table 3: Number of clinical cases in local sheep and goats and cross goats and sheep

Type of cases	Type of breed				Total Cases (%)	$\chi^2$
	Cross Sheep (%)	Local Sheep(%)	Cross Goat(%)	LocalGoat (%)		
Septicemia	4 (57.1)	3 (42.9)	-	-	7(1.8)	137.0***
Pneumonia	17 (37.8)	6 (13.3)	16 (35.5)	6 (13.3)	45(11.5)	
Internal Parasite	28 (41.2)	3(4.4)	13(19.1)	24 (35.3)	68(17.3)	
Dermatitis	33 (50.8)	6 (9.2)	23 (35.4)	3 (4.6)	65(16.5)	
Nervous disturbance	11 (32.4)	5 (14.7)	14 (41.2)	4(11.8)	34(8.7)	
Bloating	-	-	6 (40)	9 (60)	15(3.8)	
Wound	5 (30)	2 (20)	4 (40)	1 (10)	12(3.1)	
Local abscess	1 (14.3)	-	5 (71.4)	1 (14.3)	7(1.8)	
Clinical mastitis	-	3 (12.5)	10 (41.7)	11 (45.8)	24(6)	
Conjunctivitis	-	-	11 (100)	-	11(2.8)	
Reproductive problem	4 (23.5)	-	10 (58.8)	3(16.7)	17(4.3)	
Hypocalcaemia	1 (25)	3 (75)	-	-	4(1)	
External parasite	20 (23.8)	18 (21.4)	33 (39.3)	13(15.5)	84(21.4)	
Total	124(31.5)	49 (12.5)	145 (36.9)	75 (19.1)	393	

**Comparison of Clinical Cases within Breed:** The results obtained from the study showed that clinical cases were more prominent in cross goats (36.9%) than that of local sheep (12.5%), local goat (19.1%) and cross sheep (31.5%). Cases of parasites, pneumonia and dermatitis were more common in cross breeds than

local once. This might associated with local breeds were more resistance than cross breeds and the presence of higher number of cross breed animals in the study area. It was also observed that hypocalcaemia were not recorded in local and cross goats (Table 3).

Table 4: Seasonal occurrence of clinical cases of animals in three seasons

Type of cases	Number of cases in season				$\chi^2$
	Dry (%)	Short rainy (%)	Main rainy (%)	Total cases (%)	
Septicemia	5 (71.4)	2 (28.6)	-	7 (1.8)	222.5***
Pneumonia	3 (8.9)	13(26.7)	29 (64.4)	45(11.5)	
Internal Parasite	48(70.6)	13(19.1)	7(10.3)	68(17.3)	
Dermatitis	16 (25)	34 (53.1)	15 (21.9)	65(16.5)	
Nervous disturbance	10 (29.4)	19 (55.9)	5 (14.7)	34(8.7)	
Bloating	13 (86.7)	2 (13.3)	-	15(3.8)	
Wound	7 (60)	5(40)	-	12(3.1)	
Local abscess	5 (71.4)	2(28.6)	-	7(1.8)	
Clinical mastitis	-	24 (100)	-	24(6)	
Conjunctivitis	-	3 (27.3)	8 (72.7)	11(2.8)	
Reproductive problem	5(29.4)	8 (47.1)	4 (23.5)	17(4.3)	
Hypocalcaemia	3 (75)	1(25)	-	4(1)	
External parasite	6 (7.1)	25 (29.8)	53(63.1)	84(21.4)	
Total	127 (32.3)	153(38.9)	128 (32.6)	393	

**Pattern of Diseases across a Month and Season:** Peak parasitic cases were observed during the months of September and August while the lowest number of cases of parasite was observed in December, November and February. The highest points of external parasites were observed during the months of May and August while the prevalence of internal parasite was highest in dry season (70.6%) in months of September which disagrees with works of Alemu *et al.* [9] who reported highest prevalence of small ruminant lungworms was in November and February. Across the season clinical cases were highest in short and main rainy seasons which covers 38.9% and 32.6%, respectively. The difference might be associated with variation in seasonal factors as the epidemiology of gastrointestinal parasitic infections is influenced by climatic factors (particularly rainfall and temperature), management systems used for the animals and parasite factors including intermediate hosts all determine the epidemiology of the parasite as well [10].

Skin lesions (dermatitis) were highest in short rainy season as compared to other seasons. This condition might be associated with the shortage of feed, animals graze close to the ground and short rain might favor multiplication and transmission of infectious agents and other environmental stress factors.

Highest cases of pneumonia were recorded in main rain season (July). Marked changes in weather and other factors that impair innate or adaptive resistance increase susceptibility to pneumonia [3]. In such cases, most of the bacteria which are normally resident in the upper

respiratory tract have the ability to establish themselves in the lower respiratory tract (lung) and cause disease when the defense mechanism of the host is affected [11]. Therefore, the highest number of pneumonia is associated with change in the factors that determine animals' resistance to infection or due to lack of an effective vaccine against pasteurellosis.

**Distribution of Clinical Cases in Years:** When the distribution of clinical cases was observed during the years 2010 to 2013, the prevalence was highest during 2013 (36.6%), followed by 32.3 % during 2011 and 22.4 % during 2010 and was lowest in 2012 (12.4 %) as stated in Table 5. occurrence of Highest number of cases in the year 2013 might be associated with changes in environmental factors like rain fall, temperature and humidity which might affect animal disease occurrence among the study years. Clinical cases were also highest in the year 2011 relative to 2010 and 2012. This condition related with severe drought occurrence in the year 2011. As a result of scarce grazing, animals graze close to the ground and have higher chance to acquire infectious agents and parasitic larvae. Those animals which are under fed and debilitated had low resistance to infection. Number of cases with parasites was highest in each of the study years followed by dermatitis cases and pneumonia. The relative variation in the distribution of the number of clinical cases within year, season and month might be associated with changes in environmental factors directly or indirectly affecting animals' immunity.

Table 5: Number of clinical cases diagnosed in four years

Type of cases	Number of cases in four years					Total cases (%)	$\chi^2$
	2010 (%)	2011 (%)	2012 (%)	2013 (%)			
Septicemia	-	1 (14.3)	1 (14.3)	5 (71.4)	7 (1.8)	226.3***	
Pneumonia	9 (17.8)	28 (64.4)	2 (4.4)	6 (13.3)	45(11.5)		
Internal Parasite	49 (72.5)	5 (7.4)	7 (10.3)	7 (10.3)	68(17.3)		
Dermatitis	6 (9.2)	26 (40)	14 (21.5)	19 (29.2)	65(16.5)		
Nervous disturbance	-	18 (47.1)	9 (29.4)	7 (23.5)	34(8.7)		
Bloating	12 (80)	1 (6.7)	-	2 (13.3)	15(3.8)		
Wound	4 (33.3)	1 (8.3)	1(8.3)	6 (50)	12(3.1)		
Local abscess	5 (71.4)	2 (28.6)	-	-	7(1.8)		
Clinical mastitis	2 (8.3)	3 (12.5)	2(8.3)	17 (70.8)	24(6)		
Conjunctivitis	8 (72.7)	1 (9.1)	-	2 (18.2)	11(2.8)		
Reproductive problem	2 (11.8)	3 (17.6)	1 (5.9)	11 (64.7)	17(4.3)		
Hypocalcaemia	-	2 (50)	-	2 (50)	4(1)		
External parasite	11(13)	25(29.8)	8 (9.5)	40 (47.7)	84(21.4)		
Total	88 (22.4)	127 (32.3)	49 (12.4)	144 (36.6)	393		

### CONCLUSION

The result of this study indicated that clinical cases of external parasites, internal parasites dermatitis and pneumonia were most health problems in the breeding site. The occurrence of diseases was found to be more in females than male's as well in cross breeds than local breeds. The prevalence of diseases was more in caprine species and animals around post weaning age. It also observed that distribution of diseases were affected by temporal factors.

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