

Sero-Prevalence of Contagious Caprine Pleuropneumonia in Goat at Selected Woredas of Afar Region

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Abstract

A cross-sectional survey was conducted from 17 Oct. to 11 Dec. 2008 with the aim of determining the sero-prevalence and the major risk factors of contagious caprine pleuropneumonia (CCPP) in the selected eight districts of Afar region namely: Afambo, Assaita, Dubti, Mille, Gewane, Amibara, Dewe and Telalak. During the study a total of 329 goat sera, was examined for the presence of specific antibodies against *Mycoplasma capricolum sub. spp. capripneumoniae* using CFT. The result revealed that 22.49% (74) prevalence rate. With respect to goats origin, the serological prevalence rates was 31.85%, 36.36%, 18.75%, 12.50%, 12.16%, 10%, 22.22%, and 19.56% from Afambo, Assaita, Dubti, Mille, Gewane, Amibara, Dewe and Telalak districts respectively. The result indicated that there is significant difference ($P < 0.05$) in sero positive rate among the different districts. The considered risk factors, age ($P < 0.05$, $\chi^2 = 7.8792$) and sex ($P < 0.05$, $\chi^2 = 5.9661$) were found to be significantly associated with the prevalence of CCPP in the study population.

In conclusion the present study indicated that the over all prevalence of CCPP in Afar region is high. The study underlines the importance of further epidemiological study of the disease and its associated risk factors, and implementation of appropriate preventive and control measures.

Keywords: Afar region, CCPP, Goat, Sero-Prevalence, Risk factors, CFT

Introduction

In Ethiopia, one of the most important constraints to the livestock development is the direct and indirect effect of diseases. Diseases of various origins (bacterial, viral, parasitic, etc) are among the numerous factors responsible for poor production and productivity (Firew Tegene, 1999). Goats being an important

component of livestock play a significant role in the food production system in developing countries (Gall, 1981).

In Ethiopia, about 17 million of goats population is estimated, which makes the country second in Africa and fifth in the world (FAO, 2002).

Contagious caprine pleuropneumonia (CCPP) is very important disease of goats characterized by acute sign of pneumonia, fibrinous pleuropneumonia, and high mortality and morbidity rates. It is a disease of higher economic significance in Africa and Asia where the total goat population is more than 500 million (Laikemariam Yigezu *et al.*, 2004; OIE, 2004). The disease is common in Ethiopia and it results in severe economic losses, because CCPP occur in most extensive goat rearing areas of Ethiopia namely; Afar, Borana, Omo valley, West Gojjam and in the low land of Tigray (Thiaucourt *et al.*, 1992; Likemariam Yigezu *et al.*, 2004).

Different workers have indicated that the epidemiological picture of the disease has not yet been well established (Gezahegn Mamo, 1993; Thiaucourt *et al.*, 1992; Solomon Mekuria, 2005). Although there is no sufficient epidemiological investigation systematically conducted to show the distribution and impact of CCPP in the country, it is considered that, together with peste des petits ruminantis, it is the major disease of small ruminant in Ethiopia especially in pastoral and agro pastoral area.

In Afar region disease outbreak reports for the last five year has shown CCPP to be tentatively endemic in all Zones, however the disease has not been confirmed. Therefore, the objectives of the present study are:

1. To determine the sero-prevalence of CCPP in the selected districts of Afar region.
2. To assess the association between the major risk factors and CCPP.

Materials and methods

Study area

The study was conducted in the Afar Region, in Afar pastoral area of Ethiopia, particularly in eight districts (Afambo, Gewane, Amibara, Dubti, Millie, Telalak, Dewe and Assayta). Afar is located in the North-Eastern part of Ethiopia at 8° 40' to 14° 47' North and 39° 51' to 41° 23' East. Administratively the region which covered a total of 85,410Km² is divided in to five Zones, which are fur-

ther sub-divided in to 29 districts. The total human population of the Region is estimated to be 1.3 million; of which over 90% are primarily livestock dependant pastoralist while the remaining 10% are agro-pastoralist. The altitude ranges from 120 to 1800m.a.s. Mean daily temperature vary widely ranging from 22-45°C. The Region is characterized by an arid and semi- arid climate.

Study Design, Sample size and sampling technique

A cross-sectional survey was conducted from October 17 to December 11, 2008, in order to assess the prevalence of contagious caprine pleuro pneumonia in the study area. The study animals were local goats, and the study population was all goats in the eight districts of the Afar region. A total of 329 sample size was determined based on the formula given by (Thrusfield, 2005) for simple random sampling method at 95% CI and 5 % absolute precision with expected prevalence of 31%.

Diagnostic Method

Serum samples were collected from the study area from goat that were above one year of age and stored in the sample bank of the National Animal Health Diagnostic and Investigation Center until the time of testing. Complement fixation test was used for testing the antibody of CCPP. The test was undertaken according to the standard operating procedures by OIE, (2004).

Data Analysis

Data collected from the field and laboratory assay was stored on Microsoft (Ms) excel spread sheet program and analysis was done by using SPSS version 12 of SPSS Software program. Chi- square was also used for data analysis particularly to determine whether risk factors have association with disease prevalence or not.

Result

Over all Prevalence

Out of a total of 329 collected sera which were subjected for CFT for the presence of Ab to Mccp antigen, 74 sera were found to be positive with the prevalence rate of 22.49% (95% CI= 17.95709 – 27.02771). The prevalence of CCPP varies significantly ($\chi^2= 16.0261$, $P = 0.029$) between the eight districts as indicated in Table 1.

Table 1. Sero-prevalence of CCPP at individual animal by district

District	No tested	No Positive	Prevalence rate (%)
Afambo	135	43	31.85
Assaita	11	4	36.36
Dubti	16	3	18.75
Mille	8	1	12.50
Gewane	74	9	12.16
Amibara	30	3	10.00
Dewe	9	2	22.22
Telalak	46	9	19.56
Total	329	74	22.49

Sex and age as Potential Risk Factors

In the present study the CCPP sero-prevalence is found to be associated with sex and age. Significant difference was observed in prevalence rates of CCPP between female and male goats as indicated in Table 2.

Table 2. Sero-prevalence of CCPP in relation to sex groups

Sex	No tested	No positive	Prevalence (%)	CI 95%
Male	299	72	24.08	19.21– 28.95
Female	30	2	6.66	2.81– 16.14
Total	329	74	22.49	17.96– 27.03

$X^2=5.9661$; $P=0.029$

The two age groups were compared for sero-positivity which is indicated in Table 3. Significant difference was also observed in the age groups, the prevalence being higher in the adults (age ≥ 4 years) than the young ones.

Table 3. Sero-prevalence of CCPP in relation to age groups

Age Groups	No tested	No positive	Prevalence (%)	CI 95%
< 4	186	32	16.93	11.54– 22.33
> 4	140	42	30	22.31– 37.69
Total	329	74	22.49	17.96– 27.03

$X^2=7.8792$; $P=0.005$

Discussion

Previous studies on sero-prevalence of CCPP for the different regions of the country including, East shoa (51.5%) using CFT (Gezahegn Mamo, 1993), Ge-

wane (Afar) 33%, Konso 37% using CFT B- ELISA, Sire (Arsi) 11% (Roger and Bereket Zekarias, 1996), Arbaminch zuria 36% (Mekonen Lema, 1996) using B – ELISA, Yeballo 52%, Arsi 44.85% (Teshome Fetene, 1997) using B- ELISA , Dire Dawa 6% using CFT (Beyene Nigatu, 2003), Wollo 29%, Metehara 62% and Borena 77% using CFT (Sharew *et al.*, 2005) have shown varying prevalences.

The result obtained in this study is relatively low as compared to East shoa, Gewane (Afar), Konso, Arbaminch zuria, Yeballo, Arsi, wollo, Metehara. This variation could arise from differences in the situation of the disease during the time of sampling, the type of tests used to evaluate the seroprevalence of CCPP, variation in the agro-ecological system, management, production systems and samples of sick goats and recovered goats after two months (may give low sero prevalence).

In addition, the samples collected during this study were mostly from goats that were acutely infected during outbreak. In these animals, the antibodies are eclipsed by circulating antigens from the infecting *Mycoplasma* and give negative result. Similarly, serum samples collected from animals long after the outbreak could give negative results (Jones, 1989; Wamwayi *et al.*, 1989). All of the studies reporting higher prevalence of antibodies to *Mccp* used ELISA tests, while we used CFT. B- ELISA is found to be more sensitive than CFT in detecting the presence of antibodies to *Mccp* (Sharew *et al.*, 2005). However, the prevalence encountered during this investigation was greater than that of Sire (Arsi) (Roger and Bereket Zekarias, 1996) and Dire Dawa (Beyene Nigatu, 2003).

The sero-prevalence of CCPP at district level is with significant difference. Higher prevalence was found in Assaita and low prevalence was found in Amibara. This might be strongly attributed to the presence of different animal management system, production system, population density and presence of carrier animal in the region (Solomon Mekuria, 2005).

The analysis of sero-prevalence among age groups and sexes revealed a statistically significant difference. Higher prevalence was found in adults than younger ones. The presence of significant difference between the two age groups contradicts the established facts. There was also a report that suggested absence of age factor in CCPP epidemiology (Lefevere *et al.*, 1987; Gezahegn Mamo, 1993; Dawit Ketema, 1996 and Lesanworke Eshetu, 2005). Significant

difference was also observed in prevalence rates of CCPP between female and male goat. Higher prevalence was recorded in female than male.

Conclusion and recommendation

From the present study it can be concluded, that the over all prevalence of CCPP in Afar region is very high, and that sex, age, and location can be considered as risk factors associated for the occurrence of CCPP reactor goats. Therefore, positive animals can be a potential hazard to the animals which are free of the disease in the area. From the above results and conclusion; further systematic epidemiological study on the association of the anticipated risk factors, and on the distribution of the disease in different ecological zones of the country, could be recommended. In line with this, the control and preventive strategies should be designed and be effective to mitigate the disease impact.

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