

## Sero-Prevalence of Contagious Bovine Pleuropneumonia in Abattoirs at Bishoftu and Export Oriented Feedlots Around Adama

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**Abstract:** Contagious bovine pleuropneumonia (CBPP) is a highly infectious cattle disease, which is widespread in pastoral areas of Africa and it is a major problem for Ethiopian livestock. A cross-sectional study was conducted from October 2014 to April 2015 to determine sero-prevalence of CBPP among apparently healthy bulls to be slaughtered at selected abattoirs in Bishoftu (384 bulls) and from export oriented feedlots around Adama (1086 bulls). The serum sample was tested for *Mycoplasma mycoides subspecies mycoides Small Colony* (MmmSC) antibody using c-ELISA. Slightly higher sero-prevalence (7.8%) of the disease in abattoirs than quarantines (5.9%) was found. Among the potential predisposing factors assessed, origin and age of the animals were not found significantly ( $P>0.05$ ) associated with the occurrence of the disease, whereas body condition was found significantly associated with the disease. The present study obtained from serum sample collected from animals which were apparently healthy and this might not demonstrate the true prevalence of CBPP in animals' original production area, but it highlights a need to scheme and implement control measures directing at preventing further spread and lowering the prevalence of the disease in the original areas of the animals through the use of better and coordinated vaccination program with great emphasis to animal movement routes.

**Key words:** Sero-prevalence • CBPP • Abattoirs • Feedlots

### INTRODUCTION

Contagious Bovine Pleuropneumonia (CBPP) is an acute, sub-acute or chronic respiratory disease of cattle caused by a *Mycoplasma* called *Mycoplasma mycoides subspecies mycoides Small Colony* (MmmSC) [1]. CBPP is the only bacterial disease classified as a list 'A' disease by the Office International des Epizooties (OIE) in 2004. It is characterized by difficulty in breathing, loss of condition, extensive sero-fibrinous pleurisy and edema of the interlobular septae [2]. The diagnosis of CBPP is based on a history of contact with infected animals, clinical findings, immuno-diagnosis tests, necropsy findings and cultural examination. The attenuated and chronic forms of CBPP are difficult to detect. They are the main source of spread and can often only be detected by

systematic serological testing. The complement fixation test (CFT) and competitive enzyme linked immunosorbent assay (c-ELISA) have been prescribed by the World Organization for Animal Health as herd-level serological diagnostic tests [3].

Currently CBPP is one of the major constraints of animal trade in Africa, especially Ethiopia is facing big problem in live animal export due to diseases like CBPP [4]. Although the previous studies revealed that the disease is more prevalent in low lands [5, 6], it can be distributed to other parts of the country due to unrestricted animal movement in the country. And there is a trend that those animals failed to be exported due to diseases are sold in local markets for local consumption. As a result there is lack of research works done on assessment of sero prevalence of animals from different

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origin that are slaughtered at abattoirs. This kind of study has advantage to be aware on the silent distribution of the diseases due to unrestricted animal movement. Therefore, the objective of the present study are to assess the sero-prevalence of CBPP on animals of different origin slaughtered at selected abattoirs at Bishoftu and to appreciate the difference in disease occurrence between locally slaughtered animals and those to be exported.

## MATERIALS AND METHODS

**Study Area and Study Animals:** The study was conducted on cattle bulls to be slaughtered at selected abattoirs in Bishoftu city which are of different origin and on bulls at finishing phase for export from feedlot quarantines around Adama brought from Borena pastoral area. Bishoftu municipal abattoir and Elfora export abattoir were the abattoirs where the study was conducted. Since animals in abattoirs are bought from markets, the name described as origin in the study was the place where the animals were bought. The origins of the animals to the presented markets were: Adama, originated from Arsi, Bale and Borena areas; Bishoftu, were from in and around Bishoftu town (Kebeles of Adaa woreda, East Shoa zone) and Harar were locally so-called “Harar senga” are brought from Harar city by vehicle transport. Animals from export feedlots are originated from Borena, where all are in 3-5 years age group and all were males. These animals were included in the study only to appreciate occurrence of the disease not to assess the associated risk factors. The Study population for this study was apparently healthy animals.

**Study Design:** A cross-sectional study was conducted from October 2014 to April 2015 to determine and appreciate the difference in sero-prevalence of CBPP at selected abattoirs in Bishoftu and export oriented feedlots centers around Adama city.

**Sampling Method and Sample Size Determination:** Systematic random sampling was used in abattoirs, but in case of export quarantine all 1086 animals in the batch was screened for export. Hence, all animals were included in the study. The sample size for abattoirs was determined according to Thrusfield [7] for an infinite population with 95% confidence interval, 5% desired absolute precision by considering the expected prevalence to be 50%. Accordingly the sample size was 384.

**Sample Collection and Processing:** About 5-7 ml of blood sample was collected using vacutainer tubes. The samples were kept protected from direct sun light in slant position until the blood clotted and sera were separated. The sera sample were transferred to serum tubes and kept at -20°C until laboratory analysis done. Corresponding to each sample, bull origin, breed, age and body condition were collected and registered. After sample collection was completed, each sample was tested for MmmSC antibody using c-ELISA based on the manufacturer instruction (CIRAD-EMVT) at NVI serology laboratory. The IDEXX CBPP Ab Test is a competitive ELISA (c-ELISA) based on a monoclonal anti-MmmSC antibody (named 117/5). It was developed by the CIRAD-EMVT (FAO world reference center for CBPP), as an alternative to the CFT for the OIE and can be used for official CBPP control. This test is under evaluation by the Joint Division FAO/AIEA within the framework of a Coordinated Research Project (CRP).

**Data Management and Analysis:** All the data were entered to MS excel spread sheet and analyzed by SPSS version 20. Descriptive statistics was used to determine the prevalence of the diseases. In all the analyses, confidence level was held at 95% and  $P < 0.05$  was set for significance.

## RESULTS

A total of 384 animals from abattoirs and 1086 animals from feedlots were examined for the presence of Anti-body against CBPP using C-ELISA. During the study period, about 30 (7.8%) and 65 (5.9%), of the animals were positive for CBPP in two study places respectively.

Table 1: Sero-prevalence of CBPP in abattoirs and feedlots

Study place	No. of animals examined	Positive result	Prevalence
Abattoirs	384	30	7.8%
Feedlot	1086	65	5.9%

Table 2: The relative prevalence of CBPP at abattoirs based on associated risk factors

Factors	No examined	No positive	Prevalence	p-value
<b>Origin</b>				
Adama	181	21	11.6%	0.08
Bishoftu	118	6	5.08%	
Harar	55	3	5.4%	
<b>Age</b>				
<4 years	36	2	5.7%	0.64
4-9 years	305	24	7.8%	
>9 years	43	4	9%	
<b>Body condition</b>				
Poor	11	2	18%	0.037
Medium	64	8	12.5%	
Good	309	20	6.4%	

## DISCUSSION

The relatively higher sero-prevalence of the disease was recorded in abattoirs (7.8%) than feedlots (5.9 %). This is an indication of the fact that the disease still prevails in the country, since animals are originated from different areas. The variation of these findings might be due to the variation in distribution of the disease, animal management difference in different animal production systems and areas. But due to the insidious nature of the disease, this finding does not necessarily convey the extent of the distribution of CBPP in Ethiopia.

The sero-prevalence of 7.8 % on abattoirs is not equivalent to the study conducted in southern zones of Tigray region 11.9% [5]. The finding of this study is lower than 21.5% among cattle in selected zones of Dabola, Upper Guinea [8]. The result of this study is relatively higher than that of Bonnet *et al* [9] on Ethiopian highlands that reported sero prevalence of 4.6%. The prevalence of CBPP varies according to the epidemiology of the disease as well as the production system [10]. Higher prevalence occurred during epidemics whereas much lower in endemic situations. The sensitivity of the serological tests used may also contribute to the variation in result, this study was done by using c-ELISA test and while some others were used CFT.

Among the potential predisposing factors assessed, origin and age, of the animals were not associated significantly ( $P>0.05$ ) with the occurrence of the disease. This finding is in agreement with that of Teshale [5] who found no significant difference between age groups. This may be due to similar exposure of animals to the disease since the disease is contagious that all animal in the herd can be affected and chronic that a single diseased animal can serve as continuous source of infection to the herd. This finding is a bit contradictory to the finding in the Merck veterinary manual which has stated that there does seem to be some age variation in resistance to the disease; animals less than 3 years of age are less resistant to experimental challenge. In two separate experiments, it was shown that cattle over 3 years of age were more resistant to CBPP than younger animals. No attempt was made to explain this increase in resistance with increasing age, but it was suggested that a better knowledge of factors that influence resistance and susceptibility would be of value in understanding the pathogenesis of CBPP. Among different origins the prevalence of the disease was higher in those from Adama, than others but there was no statistically significant difference of prevalence between origins.

The absence of statistically significant association of the disease with origin is not parallel with the study by Tadese [4] in which there was significant difference in the prevalence of the disease between the origins. This might suggest that the disease is occurring in different agro-climatic zones. The body condition was found significantly ( $P<0.05$ ) associated with the occurrence of the disease in which a high sero-prevalence was recorded in animals with poor body condition (18%) than medium (12.5%) and good body condition (6.4%). There was no any suggestion on previous studies that is parallel with this finding.

The finding on export feedlots signifies that CBPP is still important in export oriented feedlots as it is reported by [11] as 4% sero-prevalence of CBPP at export feedlot centers in and around Adama, Ethiopia. A study by [12] reported the low sero-prevalence of the disease (0.4%) in quarantines in which the bulls originated from Borena pastoral area of Southern Ethiopia. The increased prevalence in the current finding might indicate that the disease still important even though its prevalence vary among different batches of the animals and it may also suggest that the disease is occurring in the areas where the animals are brought to the quarantine. A study by Tadese [4] on Adama-Modjo livestock export industry has shown the prevalence of 8% which is relatively similar finding to the present result on export quarantines in the area.

The finding of this study may suggest that the disease posing great impact on live animal export by causing ban of sero positive animals to be exported. Due to this reason the animals that were ready for export but found sero positive for CBPP are returned to the local market, this might be the reason for slightly higher sero prevalence among the animals slaughtered at abattoirs than those ready for export.

## CONCLUSION

This study was not conducted in specific study area but it was designed to discover the fact that CBPP is an insidious contagious disease which is highly distributing in the country as being one of the big constraints for livestock industry despite the efforts of controlling it. It was also aimed to appreciate the difference of the disease occurrence in locally slaughtered animals and those which are going to be exported. The occurrence of the disease may cause restriction on the trade of animals and animal products internationally, affecting the export earnings of the country, thereby threatening the

livelihood of the farmers and national agricultural economy. The findings suggested that the disease was found more in locally slaughtered animals. Serological survey alone is not enough to discover the occurrence of CBPP, but the finding of this study may give feed back to the animal disease control strategies in the country. Even though there had been many research works on animal disease of great economic importance like CBPP, there is limited information about the epidemiological status of the CBPP in country level and there is limitation of publication of the studies in this concern but there are frequent reports of the disease only in export quarantines. Hence, Clinical diagnosis, serological surveillance and post-mortem examination of lesions at abattoirs are essential at primary production level to know the true prevalence of CBPP. Control measures directing at preventing further spread and lowering the prevalence of the disease should be implemented in the areas from where the animals were originated. Real figure of nationwide CBPP prevalence at regional and zonal level should be made available to the scientific community to conduct further investigations on the scenario.

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