Seroprevalence of Contagious Bovine Pleuropneumoni and Assessments of Community Knowledge, Attitudes & Practices in Western Oromia, Ethiopia

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Abstract

Contagious Bovine Pleuropneumonia (CBPP) is a threat to Cattle health and Production in Ethiopia. Therefore, objective of this study is to estimate prevalence of CBPP in Horo Guduru Wollega, Western Oromiya Region. This cross-sectional study was supported by questionnaire surveys which evaluate community awareness level toward CBPP disease from September 2019 to June 2020. Out of 768 sera tested for detection of Antibody against *Mycoplasma mycoides* small colonies using a competitive enzyme linked Immunosorbent test 14.3% of them became positive. The districts level Prevalence was 16.4%, 13.6 % and 10.8 % in Abe, Dongoro, Hababo, Guduru, and Guduru district, respectively. There was not a significant association with district and PA's ($p > 0.05$). However, Statistically Significant associations ($P < 0.05$) were seen in different group of Age, Sex and Body condition. Moreover, questionnaire survey was collected from 200 households of the respondents of three districts. The majority of the respondents were male (77%) and the rest were female (23%). This survey showed that there was limited awareness among the farmers toward CBPP disease, with only 4.5% and 7% of respondents aware of as disease able to cause reduced growth and fertility rate of cattle, respectively. Therefore, the finding shows that high CBPP prevalence Horo Guduru Wollega Zone. This shows that this area needs high attention from government and other stakeholder interventions to stop further spread of the disease.

Introduction

Contagious Bovine Pleuropneumonia (CBPP) was found globally, and it was eliminated once from most continents in the mid-20th century (OIE, 2002). It is essential infectious disease in Africa affecting Cattle (OIE, 2002). Its occurrence also starts to decrease in Africa in the 1970s. Yet, for the reason that of the economic and financial problems that affected the capacity of regimes to sufficiently fund Veterinary Facilities, the disease reoccurrence in the late 1980s and early 1990s. Major CBPP epidemics have been knowledgeable in Eastern, Southern, and West Africa over the last few years. It currently affects 27 countries in Africa at an estimated annual cost of US \$2 billion. A total of 2,719 outbreaks were stated in Africa between 1995 and 2002. Countries in East Africa reported 66% of the entire outbreaks in which Ethiopia and Tanzania part was 58% out of 66% while 8% outbreaks happened in other part East Africa nations (Alemayehu et al., 2014 ; Rovid, 2008; Tambi et al., 2006; Otte et al., 2004.).

Ethiopia located in East Africa were enormous fiscal damages are happening because of sickness and death of cattle by CBPP disease (OIE, 2008). Livestock offers income for 65% of the total population and 80% of the countryside population of the country and contributes 15–17% of Gross Domestic Product (GDP) and 35–49 % of agricultural GDP and 37–87% of the household income (Leta and Mesele, 2014). Ethiopia was ranked highest among Sub-Saharan countries in livestock disease burden (Grace et al., 2012), such as in the 2014/2015 fiscal year deaths estimated for Ethiopia due to various diseases were 3.23, 4.37 & 4.90 million in cattle, sheep & Goat respectively (CSA, 2015).

CBPP is a contagious respiratory disease caused by an infectious agent *Mycoplasma Mycoides subsp. Mycoides*. It shows anorexia, fever, dyspnea, polypnoea, Cough, and nasal discharge in cattle (FAO, 2004; OIE, 2014). The main way of transmission is inhalation of contaminated aerosol by agent from diseased animals. Outbreaks tend to be more widespread in confined and in those in transportation by train and on foot (Radiostits et al., 2007). Issues such as age, tension, and coexisting disease may predispose to tissue invasion (Thomson, 2005).

In Africa this disease control is only based on vaccination (T1/44 or T1SR) and antibiotic treatment (OIE, 2008; Radiostits et al., 2007). However, current research work has shown that antibiotic treatment of cattle may greatly reduce the transmission to healthy contacts, but this requires treatment of all affected cattle (CFSPH, 2015). Despite Ethiopia considered Vaccination as a strategy of CBPP disease control, the disease still continues in multiple regions and Prevailing from time to time (Huschle and Nicholas, R. J.,2004). Different factors contributed for this outcome mainly, the lack of livestock movement control, the lack of an effective vaccine, irregular and short coverage, absence of reliable data, and systematic disease surveillance (Gizaw, 2004).

Recently, the disease has emerged from areas where it has been persisting in an endemic form to reinvade areas where previously been eradicated. In addition to these lately plague-ridden areas, the endemic areas are experiencing an upsurge in the incidence of CBPP (FAO, 2002). The measurement of knowledge, attitudes, perceptions, and practices in the control of a disease is important for generating information that can be used in policy advice (Thomson, 2005; McLeod and Rushton, 2007; Heffernan, 2008). Nevertheless, there is no information about the seroprevalence of this disease in Abe Dongoro, Guduru and Hababo Guduru districts of Horo Guduru, Wollega; therefore, outbreaks of the disease remain undiagnosed in this area. Moreover, Knowledge, attitudes, and practices (KAP) regarding early recognition, detection and notification of transmission, symptoms, and controlling methods of the disease in this community have not been properly documented. Therefore, based on these key statements, the study was conducted with the objectives of:

- To assess the Seroprevalence of CBBP in Horo Guduru Wollega.
- To determine the potential risk factors of CBPP in study area.
- To evaluate awareness and perception of community toward the disease.

Materials And Methodology

The Study Area Descriptions

Horro Guduru Wollega zone located Oromiya regional state, in high altitude 2,430 Meters above sea level. This zone had nine districts and one zonal town; from these districts the research was conducted in Abe, Dongoro, Hababo, Guduru, and Guduru.

Abe dongoro district found on an altitudes ranging from 1600-2300meter above sea level and its annual average temperatures ranging from 12C⁰-32C⁰. The Population of livestock in the area is Cattle 91,151, Sheep 8,082, Goat 14,126,Horse 111, Mule, 1,308, Donkey 8,374,and poultry 67,580 (ADWLSFDO 2019).

Guduru district is located on an altitude ranging 1500-2400meter above sea level. The temperatures vary from 16C⁰ -32C⁰ this district has 69,886 of Cattle, 16,087 Sheep, 15,782 Goat, 3,480 Horses, 662 Mules, 14,273 Donkeys and 67,130 Poultries (GWLFD0, 2019).

Hababo Guduru district is located in an altitude range from1500 to 2400 meter above sea level. The minimum temperature of the area is 16⁰C and the maximum is 32⁰C. The populations of livestock in the district were 81,739 cattle, 19,626 sheep, 15,259 Goats, 1,838 horses, 828 Mules, 7,786 donkeys, and poultry 39,561 as reported by (HGLSFDO, 2019)(Figure 1).

Study Animals (Population)

The study animal (population) include indigenous(local) breed Cattle(zebu), both sex and age greater than six months with no history of CBPP vaccine for one year of in the three districts.

Exclusion Criteria: Cattle having vaccination history were not included. were excluded The age of the study animals was grouped into two(6 months to 3 years(young) and greater than 3 years(adult) based on owner information and dentition rules as in De Lahunta and Habel, 1989 (Appendices 3). Body condition score (BCS) of the animals characterized based on Nicholson and Butterwoth (1986) principles, then categorized in to three poor 0-3, medium 4-6, and good 7-9(Appendices 2).

Study Design

A Cross- sectional study conducted from September 2019 - June 2020. The sample sizes were considered for the selected three districts based on geographical location and zonal towns. The concept study fully explained to the selected owners before collecting the sample to have agreement and interviews with semi structured questionnaires.

Sample size Determinations

The Number of animals (cattle) required was calculated according to Thrust field (1995) depending on the expected seroprevalence of CBPP. Due to, there is no previous study in this zone. 50% expected Prevalence and 5% absolute level of precision are used for sample size determination calculation. The sample size calculation formula is:

$$N = \frac{((1.96)^2 (P_{exp})(1-p_{exp}))}{d^2} = \frac{((1.96)^2 (0.5)(1-0.5))}{(0.05)^2} = 384$$

Where; n=total number of sample size, P_{exp}= expected prevalence, d=absolute precision (0.05) to increase the precision, it inflated to two times and it gives a total sample of 768(raw data for Seroprevalence assessment)

Whereas the estimated sample size for households that participated in the questionnaire survey was calculated by the recommended formula of Arsham (2002). Arsham formula was used by assuming the standard error 5%, precision level 0.05, and confidence interval 95%.

$$N = 0.25 / SE^2 = \frac{0.25}{(0.05)^2} = 100$$

Where N= sample size. SE= standard error

To increase number of sample, it was doubled and the total sample size of the respondents inflated to 200(raw data for KAP assessment).

Sampling Techniques

First, the districts were selected based on access of road, livestock, population size, and geographical location of the districts. From the zonal districts, three districts (i.e., Abe Dongoro, Guduru, and Hababo Guduru) were selected.

From these districts, nine PAs were randomly selected from the three districts (i.e., Biftun, nubatekidame, Gudanededu, Lalistuloya, Idokusa, Gorte, Tulumoti, Gamanegudane, Ulaguto and Gudanekebo). Cattle owners and cattle were selected by lottery Method in Simple random sampling technique.

In second phase the sampling frame comprised list of district PA's, animal owners, and number of cattle were developed. About households that have ≤ 7 (i.e., the average number of cattle per household of the area) cattle, all animals were sampled (Gebremedhin et al., 2013). From households with those having greater than seven cattle, only seven animals were sampled using the random sampling method. A household (owner) of the study area recognizes each cattle owned by name, thus, animals were randomly sampled using the name of the animal as ID number (Figure 2).

Study Method and Data Collection

Questionnaire survey

A questionnaire survey (structured) was made to evaluate farmers' knowledge, attitude, and practices (KAP) towards a general overview of cattle respiratory health problems with special emphasis on CBPP. Therefore, a detailed structured questionnaire (Appendices 4) was prepared in English before being translated into Afaan Oromo. Information that contained in the body of the developed questionnaires were: general household characteristics (gender, age, educational background, marital status, and household family size); cattle herd size and structure (sex, and age); to ascertain farmers knowledge, attitude and practice a general overview of cattle's respiratory disorders such as presence or absence of respiratory disorders within the herds, farmers assumption related to the factors that causes the disorders, any infectious diseases known by farmers.

Sample Collection and Transportation

From each animal owner interviewed for KAP, blood samples were collected from his/her animals. All owners were involved in their Animal handling to Smooth restraining protocol for sample Collection. About 7-10 ml of blood sample were collected from jugular vein then properly labeled and stored for 24 hours at room temperature to allow the clot. Serum part of samples were gently transferred to clean, sterile vials and stored at -20°C for those type "B" Veterinary Clinic until submitted to Bedele Regional Laboratory (BRL). Finally, the stored sera were transported to Bedele Regional Laboratory in an ice box and submitted for laboratory analysis.

During blood sample collection, the variables that considered as risk factors were (Appendices 1): location (districts and PAs); two age group of cattle (6 months to 3 years(young) and greater than 3 years(adult) as Bitew et al. (2011) based on owner information and dentition based on De Lahunta and Habel (1989) principle (Appendices 3); sex (male and female); herd size (grouped in to three, since the interviewed minimum and maximum number of herd sizes ranges 2-25 categorized as 2-7 called small herds, 8-14 called medium herds and 15-25 large herds); history of respiratory disorder (yes/present or no/absent); body condition score (BCS) (characterized based on Nicholson and Butter woth (1986) principles, then categorized in to three poor 0-3, medium 4-6 and good 7-9) (Appendices 2).

Laboratory Investigation Technique

The collected serums were submitted to Bedele Regional Laboratory where the sera were tested to check the presence of specific antibodies against CBPP Causing agents (Appendices 5). cELISA was used as recommended

by CIRAD-UMR15(France). It relied on Mab117/5 Monoclonal anti-MmmSc Immunoglobulin(OIE, 2014). Micro plates were coated with MmmSC purified lysate. The sera to be tested were premixed with Mab117/5 specific monoclonal antibodies in a preplate and the content of preplate was transported in to the coated micro plate.

Immune complex reaction between any mmmsc antibody found in serum and mmmsc antigen coated on microplate competing with mab 117/5 for a specific epitopes. An anti-mouse antibody enzyme conjugate added after washing out the unbounded material was done. In the presence of an immune complex between MmmSC antigen and antibodies on the sample, Mab117/5 cannot bind to its specific epitopes and the conjugate is blocked from binding to Mab117/5.

On the contrary, in the absence of MmmSC antibodies in the serum, MAb117/5 can bind to its specific epitopes and the conjugate is able to bind to MAb117/5. Unbound conjugate was washed away and the enzyme substrate Tetra methyl Benzedrine (TMB) was added. In the existence of enzyme, the substrate is oxidized and changed to blue color, becoming yellow later adding stop solution. Subsequent color advance was inversely proportional to the amount of anti-MmmSC antibodies in the test sample.

The underneath of the plate was wiped and the optical density (OD) of individual reactions was measured at 450 nm using a plate reader. The percentage inhibition (PI) value for each sample was calculated by the following formula.

$$PI = \frac{(OD \text{ Mab} - OD \text{ test serum}) \times 100\%}{(OD \text{ Mab} - OD \text{ Conjugated})}$$

$$PI = \frac{(OD \text{ Mab} - OD \text{ serum}) \times 100\%}{OD \text{ Mab} - OD \text{ conjugate}}$$

Where OD Mab is the optical density for the monoclonal antibody; OD serum is the optical density for the serum; OD conjugate is the optical density for the conjugate (OIE, 2014).

Interpretation of Results

Samples with a percentage of inhibition less than or equal to 40% are considered as negative for the presence of MmmSC antibodies. Samples with the percentage of inhibition greater than 40% and less than 50% are considered doubtful, whereas samples with a percentage of inhibition greater than or equal to 50% are considered positive for the presence of MmmSC antibodies (OIE, 2014).

Data Management and Analysis

The collected Data stored in Microsoft office Excel version. The questionnaire analyzed using SPSS version 24 statistical software and finally analyzed using descriptive statistical tests (frequency and proportions).In all statistical analysis, 95% confidence interval level and P-Value 0.05 were used.

Results

4.1. Sero-Prevalence and Associated Risk Factors of CBPP

An overall sero-prevalence of the present finding is 14.3% ($p < 0.05$) was determined by c-ELISA test. Out of 768 sampled animals, 110 of the cattle are sero positive for CBPP disease (Table 1). A higher sero-prevalence of 16.4% was observed in Abe Dongoro, Hababo Guduru (13.6%) when compared to Guduru (10.8 %) but there was no

statistical significant variation between the study districts (Figure 3) and CBPP sero-positivity. This indicated that all districts are found in the same ecological location (Table1).

Table 1: Seroprevalence of CBPP from three districts by using c-ELISA

Risk factor		No of animal tested	No of positive	% of positive	χ^2	P-value
District	Hababo Guduru	199	27	13.6%	3.310	0.191
	Abe Dongoro	384	63	16.4%		
	Guduru	185	20	10.8%		
	Total	768	110	14.3%		

Among the nine sampled PAs (villages), higher number of animal tested from Ido Kusa, Gorte and Tulu Moti were 144,121& 119, respectively. In other side From Six Pas lower numbers of animals were sampled 54, 56, 60, 69, 72 & 73 From Gudane dadu, Gamane Gudane, Gudane Kobo, Ula Guto ,Lelistu loya and Biftu Nubate Kidame Respectively.

PAs level seroprevalence recorded in Idokusa, Lalistuloya, Tulumoti, Gudanededu, Gamane Gudane, Gorte, Gudane Kobo, Biftunnubatekidame and Ula Guto, were 19.4%,16.7%,15.1%,14.8%,14.3%,14%,10.0%,9.6% and 8.7% respectively. Like the districts, there was no statically significant variation among PA's and CBPP serostatus. ($p > 0.05$) (Table 2).

Table 2: Seroprevalence of CBPP at PAs (village) level selected from three districts.

PA's(Kebeles)	No. of animal tested	No. of animal positive	% of positive	χ^2 (P-value)
Biftunnubate Kidame	73	7	9.6%	7.508(0.473)
Gudanededu	54	8	14.8%	
Lelistu loya	72	12	16.7%	
Ido Kusa	144	28	19.4%	
Gorte	121	17	14.0%	
Tullu Moti	119	18	15.1%	
Gamane Gudane	56	8	14.3%	
Ula Guto	69	6	8.7%	
Gudane Kobo	60	6	10.0%	
Total	768	110	14.3%	

In the present study also various prevalence results showed that among the host-associated possible threat elements that considered age, sex, and status of body condition were assessed with CBPP, Sera status of the animal shown ever, all of these factors significantly clarify ($p < 0.05$) the existence of CBPP (Figure 4). As a result of the study described, seropositivity was higher: in adults (17.3 %) than in young (10.8 %) with ($p: 0.011$) Significant. Whereas, the highest prevalence was in poor body condition (20.2%) than in medium (14.2 %) and good body condition (7.5%). Body conditions were statically significant ($P: 0.000$) (Table 3).

Table 3: Seroprevalence of CBPP disease in age, sex, and body condition score by cross tabulation.

Variables	No. of animal tested	positive	% of positive	OR(95% Confidence interval)	X ² (P-value)
Sex	768	110	14.3%	1.860(1.239-2.794)	9.136(0.003*)
Female	450	50	11.1%		
Male	318	60	18.9%		
Age	768	110	14.3%	0.582(0.382-0.887)	6.441(0.011*)
Young	351	38	10.8%		
Adult	417	72	17.3%		
BCS	768	110	14.3%		18.311 (0.000*)
Poor	302	61	20.2%	0.318(0.184-0.549)	
Medium	211	30	14.2%	0.486(0.265-0.891)	
Good	255	19	7.5%		

BSC= Body condition score; CI: Confidence interval; X²= Chi square and *=statistically significant.

Multivariate logistic regression was used to screen all potential risk factors for statistical significance at (p <0.05). The risk factors (sex, age, and body condition score) that statistically significant in multivariate logistic regression analysis were included in the model and analyzed together. Therefore, the final multivariable logistic regression model analysis result showed that sex, age, and Body condition scores were statistically significant association with CBPP seroprevalence (P < 0.05) (Table 4).

Table 4: Seroprevalence degree of association analysis across potential risk factors using multivariate logistic regression

Risk factors		No of animal tested	No positive	OR(95%CI)	p-value
Sex	Female	450	50	1.868(1.235-2.826)	0.003*
	Male	318	60		
Age	Young	351	38	.623(.405-.958)	0.030*
	Adult	417	72		
BSC	Poor	302	61	2.946(1.698-5.112)	0.000*
	Medium	211	30	1.933(1.049-3.561)	
	Good	255	19		

Key: CI=confidence interval at 95%; OR=Odd ratio; BSC= body condition score; PA= peasant association; and *=statistically significant.

Knowledge, attitudes and Practice (KAP) of respondents related to CBPP disease

Demographic characteristic and herd size of respondents

A total of 200 households that had at least one cattle were involved in this questionnaire survey. This questionnaire survey was collected from Horo Guduru Wollega Zone of three districts, Guduru (24%), Hababo Guduru (26%), and Abe Dongoro (50%) respectively. The majority of the respondents were male (77%) and the rest female (23%). The respondents were of different age groups, with the age group of 55 years being 17%, 41-55 years were 20.5%, 31-40 years 35%, and the group with the last not least participants was 18-30 years with 27.5% participants. The ages of the respondents were range 18 to 78 years.

Regarding the education status of the participants(27%) had completed primary education,(24%) were completed secondary school,(9%) college or university,(12%) vocational school, and the rest (28%) of them had no formal education. From the two hundreds respondents involved in the questionnaire survey (16%), of them single, married (83%), and (1%) widowed. Out of the total 1806 animals, those 200 households had more than one cattle, and half of their cattle were female (57%) per respondent and (43%) were male animals. Similarly, 27.5% cattle population was young, 59 % adults, and 13.5 % calves (Table 5).

Table 5: Demographic characteristic and herd size of respondents

Category		Frequency	%
Gender of respondent	Male	154	77%
	Female	46	23%
Total of respondent		200	100%
Marital status	Married	166	83%
	Single	32	16%
	Widowed	2	1%
Educational Back ground of respondents	Colleague/university	18	9%
	vocational School	24	12%
	Secondary school	48	24%
	Primary school	54	27%
	No formal education	56	28%
Age of respondent	>55 years	34	17%
	(41-55) years	41	20.5%
	(31-40) years	70	35%
	(18-30) years	55	27.5%
Herd size of respondent	Male	776	43%
	Female	1030	57%
Age of animals	Calf(<0.6 months)	242	13.5%
	Young (1-3 years)	497	27.5%
	Adult>3 years	1067	59 %
Total herd size		1806	100%

Respondents' knowledge, attitudes and practices (KAP) depend on their education level

The interviewed participants who could correctly identify CBPP in cattle were assessed depending on their educational level as the following. Generally in this study, 18, 24, 48, 54, and 56 of the respondents are college/university, vocational school, secondary school, primary school, and no formal education, respectively. Depending on their educational level, the percentages of their responses were calculated. Majority of the respondents familiar with CBPP disease were those who have no formal education when we camper with e and rest of the respondents those who have formal education. This occurrence may be do you to those not have no formal education but were daily contact with their animals during keeping,feeding, and watering. (Table 6).

Table 6: Knowledge, attitudes and practice of respondents based on education level

	Yes/ No	Educational level of the respondents				
		Number formal education	Primary school	secondary school	vocational School	college or university
Do you know CBPP disease?	yes	35(62.5%)	14(26%)	18(37.5%)	10(42%)	11(61%)
	No	21(37.5%)	40(74%)	30(62.5%)	14(58%)	7(39%)
Have you heard about CBPP disease?	yes	19(34%)	24(44.5%)	19(39.5%)	11(46%)	7(39%)
	No	37(66%)	30(55.5%)	29(60.5%)	13(54%)	11(61%)
Has your neighbor had any problems with cattle RD?	yes	26(46%)	34(63%)	27(56%)	14(58%)	9(50%)
	No	30(54%)	20(37%)	21(44%)	10(42%)	9(50%)
Do you think infectious disease can cause the RD?	yes	33(59%)	30(55.5%)	24(50%)	9(37.5%)	6(33%)
	No	23(41%)	24(44.5%)	24(50%)	15(62.5%)	12(67%)
Do you know factor that cause respiratory disorder?	yes	16(28.5%)	4(7%)	8(17%)	5(21%)	5(28%)
	No	40(71.5%)	50(93%)	40(83%)	19(79%)	13(72%)
Do you know the method of CBPP disease prevention and control?	yes	10(18%)	4(7%)	8(17%)	6(25%)	7(39%)
	No	46(82%)	50(93%)	40(83%)	18(75%)	11(61%)

Major signs of CBPP disease known by respondents

The interviewed participants who could correctly identify one or more symptoms of CBPP in cattle were grunting during coughing or exhaling (72%), head extended, coughing (70%), dilation of the nostril and mucoid discharge (75%), swelling of the throat and dewlap (58%), standing with back arched (45%), labored & painful breathing (51%), standing with the elbows abducted (41%), chest pain (15%), frothy saliva at the mouth (51%), and poly arthritis on young (22%). Generally, in this study, the majority of the respondents were encountered or familiar with signs of CBPP disease (Table 7).

Table 7: Respondents' knowledge assessment related to major symptoms of CBPP disease

Question related to the major CBPP symptoms	Yes (%)	No (%)	I Don't know (%)
Dilation of nostril & mucoid discharge	150(75%)	34(17%)	16(8%)
Stand with the elbows abducted	82(41%)	66(33%)	52(26%)
Standing with back arched	90(45%)	52(26%)	58(29%)
Head extended coughing	140(70%)	28(14%)	32(16%)
Labored & painful breathing	102(51%)	58(29%)	40(20%)
Grunting when exhaling (coughing)	144(72%)	32(16%)	24(12%)
Chest pain	30(15%)	108(54%)	62(31%)
Frothy saliva at the mouth	102(51%)	76(38%)	22(11%)
Poly arthritis particularly on young	44(22%)	134(67%)	22(11%)
Swelled throat and dewlap	116(58%)	58(29%)	26(13%)

Respondents' knowledge regarding to the possible transmission of CBPP disease.

The overall knowledge on the cause and transmission of CBPP disease among Guduru, Hababo Guduru, and Abe Dongoro was found to be relatively similar. Regarding knowledge of disease transmission, the majority of the respondents had't-aware of the possible transmission methods of contagious diseases like CBPP. However, 66% and 63 % of the respondents recognized as diseases transmitted through close contact with diseased animals and through coughing of infected animals, respectively.

Regarding to the contaminated diseased cattle fetal membrane and uterine discharge, only (8%) of the participants were knowledgeable as it was associated with the disease transmission method. The table below is clearly summarized the knowledge of respondents regarding the possible transmission methods of CBPP disease (Table 8).

Table 8: Farmers' knowledge regarding to the possible transmission methods of CBPP disease

Question raised regarding to disease transmissions methods of CBPP disease.		Yes (%)	No (%)	I don't know (%)
What is transmission method of CBPP disease?	Close contact with diseased animal	132(66%)	28(14%)	40(20%)
	Inhalation of infected droplets(cauphing)	112(56%)	24(12%)	64(32%)
	Through fetal membrane and uterine discharge	16(8%)	34(17%)	150(75%)
	Through contaminated fomites/objects	38(19%)	76(38%)	86(43%)
	Through coughing of infected animal	126(63%)	20(10%)	54(27%)
	Through using common grazing land	60(30%)	50(25%)	90(45%)

Knowledge of respondents towards economic importance CBPP disease.

The current study depending on the knowledge, attitudes, and practices (KAP) of the respondents related to CBPP disease showed that the respondents were aware of the economic impacts of CBPP disease. This disease caused different impact on farmers income like death of animals(fatality) ,loss of production, loss of body weight, reduce draft power , reduce growth rate , and reduce fertility rate were the known problem of this disease(Figure 5).

Respondents' Knowledge towards prevention, control of CBPP disease and their worries

Majority of the respondents regarding CBPP prevention and controlling methods, had basic practice on treatment of symptomazed or diseased animal and decontamination of infected premises (46.5%) and vaccination (37.5%). it is used for disease prevention and controlling techniques. However, no one of the participants was recognized for the test and slaughter/stamping out policy (0 %) and isolation of new purchased animal from the herd (12%). In addition, CBPP disease can cause a difficult impact on cattle production. Due to this problem, the farmer's worries for the cost of treatment of diseased animal (41%), death of animal(fatality) due to the disease (28%), and loss of production (25%) are the four worries that respondents had felt related to respiratory disease of CBPP (Figure 6).

Respondents' source of information about the disease

Farmers preference ways of receiving knowledge related to animal diseases, the majority of the respondents (103) preferred to receive knowledge through veterinarian/animal health workers, others prefer agricultural developmental agents (DA)(40), whereas very few of the respondents(18) preferred to get through local cultural healers (Figure 7).

4.2.8. Part of CBPP knowledge respondents want to know more.

Among the participants, ninety-eight of the respondents preferred to know the prevention and controlling methods followed by fifty-eight chosen to know diagnostic techniques, eight of them want to know the causative agent, and while twenty-six of them want to know the transmission methods (Figure 8).

Discussion

Based on the serological results of this study, CBPP was the major problem of cattle in western Oromiya Region. In this research, a total of 768 cattle serum samples were examined from three districts of the Horo Guduru zone and the total sero-prevalence of CBPP in the area were 14.3%. The finding was nearly similar with the resulting work of various researchers who reported a prevalence of 12% in the southern zone of Tigray region of Ethiopia (Teklue et al., 2015), and 14.6% in a selected district of East Wollega and West Showa zones, western Ethiopia. Mersha (2017). On the other hand, the finding of this study was higher than the results of Gizaw (2004) in Somali regional state (10.3%) and Geresu et al. (2017) in Dello Mena and Sawena districts of Bale zone (6.51%). In the opposite of this, it is by far much lower than the previous reports of Ebisa et al. (2015) with 31.8% in Amaro district of SNNP region and Mersha (2016) with 28.5% in selected districts of western Oromiya. This difference might be due to geographical location and animal husbandry practice differences.

Different seroprevalences of CBPP were recorded across the districts and peasant associations such as animal level seroprevalence was (16.4%) in Abe Dongoro district, 13.6% in Hababo Guduru and (10.8%) in Guduru respectively ($P > 0.05$). Similarly, higher prevalence was observed in Ido Kusa (19.4%) PAs than Ula Guto (8.7%) when compared with the rest of seven Villages. The present result of variation seroprevalence in the districts and PAs was agreed with the finding of Geresu et al. (2017) in Dello Mena (8.26%) and Sawena (3.89%) districts of Bale zone, but there was no significant association between the study districts. This might indicate the presence of CBPP infection depends on certain associated risk factors like the epidemiology of the disease, agro ecology, livestock population and movement, and different management systems may be applied across the study sites such as the presence or absence of communal grazing and watering areas within locations and the probability of introduction of new purchased animal from disease endemic area (Radiostits et al., 2007). This study also indicated that there is a large size of livestock population within the district and farmers were used as communal grazing and watering areas.

There was a significant difference of CBPP seroprevalence among the sexes, which was (18.9%) in males and 11.1% in females with statically significant ($p: 0.003$). This finding is corroborated with the work done by Geresu et al. (2017) among male (11.24%) compared to female animals (2.79%) was significantly associated with the seropositivity of CBPP in Dello Mena and Sawena Districts of Bale Zone, South Eastern Ethiopia. However, this finding is disagreed with the work done by Mersha, (2016) CBPP seroprevalence among sexes (16.4%) in male and (13.2%) in female animals which is not statically significant in the selected districts of East Wollega and West Showa Zones, Western Ethiopia. In this study, statically the difference occurred might be due to people in the study are used male for draft power with few times grazing and low supplement of feeding. Additionally, there is a high rate of changing males from one place to the other. However, they give good husbandry for females since they used for milk and breeding.

The outcome of this research was also exposed that there was significant variation of CBPP disease among the age groups. Higher seroprevalence was recorded in adult animals (17.3%) than in young animals (10.8%) with ($p < 0.05$). This result is agreed with the reports of Geresu et al. (2017) in young (1.9%) and adult (8.19%) age categories with significant association. In contrast, there are different studies that reported insignificant

associations such as in young (25.5%) and adult (30.3%) age categories by Mersha (2016) in selected districts of western Oromiya and Yosef et al. (2018) reported an insignificant association between age groups in Gimbo district of south west Ethiopia. Calves were reported to be relatively more resistant to infection by Mmm SC than adult cattle (Lesnoff et al., 2004; McKeever et al., 2009), which may be explained by the fact that increasing age is a surrogate measure of repeated exposure (Boelaert et al., 2005). Age is supposed to have some association with the occurrence of CBPP disease because young calves become more resistant to experimental infection than adult cows (Provost et al., 1987; Titus, 2003). Moreover, the study also agreed with Thomson (2005) who reported that factors like extreme range of age may predispose to tissue invasion in CBPP disease. This study also indicated that the young is more resistant to this disease than the adult due to the immunity that got from the mother through the colostrum.

Seroprevalence of CBPP was highest in cattle with poor body condition (20.2%), medium conditions (14.2%), and followed by good condition (7.5%) with an overall p-value ($P < 0.05$). The Present result is agreed with the Finding of Ebisa et al., (2015), poor (40%), medium (32.3%), and good (20.6%) Suleiman **et al.**, (2015) and Mtui-Malamsha (2009). This could be due to be related to the weak protective immune response in poor body conditioned cattle compared to good ones. Loss of body condition is one of the indications for the presence of the infection in the animal. Mostly CBPP chronic carrier animals became emaciated because of the clinical characteristics of the disease. Besides, animals with good body condition have relatively good immunological response to the infectious agent than animals with medium and poor body condition scores (Radostitis et al., 2007). It was supposed that CBPP seropositive animals had poor body conditions than sero negative animals; thus, the present study result confirmed the assumption.

Community awareness related to CBPP disease studies was essential during the study of disease epidemiology. In the present study, even although the existence of the disease had been confirmed through a questionnaire survey, a large number of farmers had limited awareness about CBPP disease in general. On the contrary, the majority of respondents were aware of the impact of any respiratory diseases including CBPP. Regarding disease prevention and controlling options, vaccination (37.5%), treatment of diseased animals (41.5%), isolation of new purchased animals and good management (17%), and decontamination of premises (4%) are the most recognized techniques of disease prevention and controlling options in the community. This finding was in agree with the finding of Mersha (2016) in western Oromiya; that reported many respondents responding to treatment options as a means of controlling and prevention of the disease.

Majority of farmers would not know what to do or would do nothing in the event of disease occurrence due to the disease is newly prevailing in the study. This finding agreed with the report of Kairu- Wanyoikea et al. (2014) in Narok district of Kenya. Therefore, such kind of knowledge gap among the society will create an ideal environment for contagious diseases like CBPP to easily distribute and infect the large cattle population of the study area.

Conclusion And Recommendations

This study established a relatively high seroprevalence of CBPP in cattle and limited community awareness regarding to the disease in the study area. This suggests the disease could cause considerable economic losses through morbidity and mortality. The occurrence of this disease causes restrictions on the trade of animals and animal products internationally, affecting the export earnings of the country, and threatening the livelihood of the farmers. Even although the disease is threatening the livelihood of the farmers and the country as a whole, nothing

action was not taken to tackle the distribution and transmission of the disease in the study area. Therefore, based on the above conclusion, the following recommendations were forwarded:

- The institute (Federal and Regional Veterinary office) should keep an eye on suitable anticipation and regulator measures of the disease such as quarantine infected animals and prophylaxis via strict vaccination with treatment of symptomatic animals should be started to stop further spread of the disease in the area and to save the loss of economy due to CBPP disease.
- The government has to be applying rules and regulations on the monitoring and prevention strategy of this wisely crushed disease of cattle.
- The farmers should be aware about CBPP disease particularly the economic importance, transmission methods, and controlling techniques of the disease through veterinary extension education and possible means like media.
- Thus, it is necessary to carry out careful herd management and control of animal movement within a community are good warranty.

Declarations

Ethical Clearance Approval

The study design involves both human and animals. Animal handling ethics was assessed and approved by Wollega University School of Veterinary Medicine Ethical Approval Committee through the international and national guidelines for humane Animal treatment and complies with relevant legislation. The Study involves a human questioner survey and data from respondents were collected through a formal legal agreement between the researcher and the respondent showing respondent permission.

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Conflict Of Interest Statement

A declaration by the authors that they do not have any conflicts of interest to declare.

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Figures

Figure 1

Map of study area, Horro Guduru Wollega Zone by districts (FEDBO, 2016).

Figure 2

Sampling technique flow chart

Figure 3

Seroprevalence of CBPP in those districts.

Figure 4

Seroprevalence of CBPP within the age, sex and Body condition score

Figure 5

Knowledge of respondents to Wards Economic Importance of CBPP Disease.

Figure 6

Knowledge towards prevention and controlling method CBPP disease.

Figure 7

Source of information from where respondents get.

Figure 8

Question raised to framer what part of CBPP disease they want to know.

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