Sudan Journal of Science and Technology
Journal homepage:
http://jst.sustech.edu/

Seroprevelance and Risk Factors of Contagious Bovine Pleuropneumonia in Khartoum State 2016-2017

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Received:1/2/2021 Accepted: 25 /3/ 2021

Abstract:
Across-sectional study was conducted from 2016 to 2017 in various pastoral areas in Khartoum state, Sudan; to determine Seroprevelence and risk factors of contagious bovine pleuropnumonia (CBPP). A total of 386 sera were examined for the incidence of specific antibodies against *Mycoplasma mycoides* subsp *mycoides* small colony (*Mmm*SC), using a competitive enzyme-linked immunosorbent assay(c.ELISA). well designed questionnaire from the animal owners and the pastoralists was used to evaluate the risk factors in this study which were include the geographical location, age, sex, breed , herd structure, herd size , introducing of cattle and the health of introduced cattle ,exposuring , passage of nomads, Sharing other herd in grazing land, community knowledge ,antibiotics treatment, number of sick animals ,number of dead animals, neighbouring health Status, selling or transferring. The overall seroprevalences in this study was 45.3% and with regard to the risk factors some of them have significance association: the community knowledge,Age, Sex, the breed , herd structure, herd size and the number of dead animals the P- value was less than 0.05 for all of them. Punctual diagnosis, isolation and stamping out of the outbreaks, serious surveillance, followed by authoritarian cattle movement control should be implemented by Khartoum state Veterinary Services to eliminate thedisease.

Introduction:
The Sudan has a very enormous wealth of animal resources that has been estimated to be around 107,555 million MOAR (2016).
Contagious bovine pleuropneumonia (CBPP) is an infectious and contagious respiratory disease of *Bovine* caused by *Mycoplasma mycoides* subsp. *mycoides* “small colony” (*Mmm*SC) with a major impact on livestock production and a potential for rapid spread.

CBPP-infected countries are excluded from international trade of live animals. It causes major economic losses, particularly in sub-Saharan Africa Thomson, *et.al*. (2005) During 1990s CBPP has spread alarmingly, in several countries previously known to be free from the disease as had been reported by the Office International des Epizooties Egwu *et. al* (2012) as causing greater losses in cattle than any other Epizootic diseases threatened cattle since their domestication disease and even not similar to Rinderpest.

Objectives:

This study aimed to assess the prevalence of CBPP in Khartoum study at the period of the study with respect to the probable risk factors.

Materials and Methods:

Atotal of 386 serum samples were collected randomly from dairy farms and cattle herds in Khartoum State (between November 2016 – May
2017) from different areas(west soba project, Omdurman abuzaid market, Saig project, Mahlab 2 eastern Nile province, Omdurman Alrudwan project , Omdurman Almwelih market , Nifasha, Alhalfaia and Eid babeker.

For collection of serum, 10 ml of blood samples were collected in sterile plain vacationers. Samples were left for 1h at room temperature then kept overnight in refrigerator at 4ºC. Samples were then centrifuged at 3000 rpm for 10 min. The separated serum was aspirated with sterile pipette, transferred into sterile containers and stored at -20ºC till used.

We used c.ELISA to determine the presence of anti-CBPP antibody in serum, it is based on the competition between the anti-CBPP monoclonal antibody and the antibodies in the serum sample binding to the CBPP antigen. The presence of antibodies CBPP in the serum sample will block reactivity of the monoclonal antibody resulting in reduction in expected colour following the addition of conjugate and substrate chromogen solution, wash steps are required between each step to ensure removal of unbounded reagents.

Competitive ELISA kit was that of IDEXX, Institute Pourquier, Montpellier, France, CBPP serum competition ELISA. The technique described sheet fact accompanied the kit was followed. .

Finally the plate was read at 450 nm.

The reader was connected to a computer loaded with ELISA Data Interchange (EDI) software, which was used to automate the reading and calculation of percentage of inhibition (PI) values. The optical density (OD) values were converted to percentage inhibition by using the following formula: P1 = 100x [(optical density of monochnal control – optical density of the test) / (optical density of monoclonal control – optical density of the conjugate control)].

P1 = 100 x [(ODcm – OD test) / (ODcm- ODCc)] Sera showing P1 equal to or lower than 40% were considered negative and those showing P1 equal or greater than 50% were considered positive.

Data Analysis:

Data were classified, filtered, coded using MS Excel, and was transferred to Statistical Package for Social Sciences Software (spss) version 22. Descriptive statistics was performed to summarize seroprevalence of CBPP for all sites together and at individual level. The χ 2 test was used to assess risk factors at feedlots. In all analysis confidence level was held at 95% and $P< 0.05$ was set for significance.

Results:

Of the total 386 samples of sera tested for the presences of antibodies using c-ELISA, (45.3%) of them were found seropositive, The seroprevalence of *Mycoplasma mycoides* small colony antibodies was higher in projects (45.7%) than other sectors and lowest at the traditional farms (20.6%) it showed no significant association, the P- value was (0.162). No statistically significant associations were found between the geographical location, introducing of cattle and the health of introduced cattle ,exposuring , passage of nomads, Sharing other herd in grazing land, antibiotics treatment, number of sick animals, Neighbouring health Status, selling or transferring ($p > 0.05$) (Table 1) The other evaluated risk factors have significance association, the community knowledge (the P- value was (0.001),Age (the P value was 0.000), Sex the P value was (0.000), the breed (P value was (0.018) herd structure (the P- value was (0.029), herd size the P value was (0.003).number of dead animals the P- value was (0.000).

Table (1) Crosstabs of ELISA test result and risk factors:

Variable		No of tested	No of positive	% of positive	Chi	P value
Areas	Project	157	80	45%	5.137	0.162
	CVRL	26	11	6.3%		
	Traditional farm	76	36	20.6%		
	Markets	127	48	27.4%		
herd structure	Mix	287	140	80%	7.058	0.29
	Non	98	34	19.4%		
Breed	Hybrid	178	94	53.7%	8.0570	.018*
	Local	207	81	46.3%		
herd size	>300	161	57	32.6%	11.632	.003*
	<100	101	50	28.6%		
	300-400	124	68	38.9%		
Age	>18 month	259	141	80.6%	26.76	0.0000*
	< 6 month	125	33	18.9%		
Sex	Female	225	120	68.6%	13.919	0.0000*
	Male	161	55	31.4%		

introduce or buy of cattle	Yes	359	163	93.1%	.009	.923
	No	27	12	6.9%		
Exposuring	Yes	351	153	44.4%	1.244	0
	No	35	19	45.6%		.265
Sharing other herd in grazing land:	Yes	348	153	87.4%	2.682	0
	No	38	22	12.6%		.101
Community knowledge:	Aware	204	115	65.7%	21.262	0
	Not aware	182	60	34.3%		.0000*
antibiotics treatment:	Yes	360	164	93.7%	0.103	0
	No	26	11	6.3%		.748
number of dead animal:	>50	180	99	56.6%	12.708	0
	<50	206	76	43.4%		.000*
	Poor	123	59	33.7%		

***significant association**

Discussion:

Of the total 386 sample of sera tested for the presence of antibodies using c-ELISA, (45.3%) of them were found seropositive , this lower than the result of a study done on 2009 by Amira Shareef found the Seroprevelence was (57%) and a study done on 2005 by Isam Eldin Suliman found the Seroprevelence was (51.1%), and it was higher than those reported in previous study of CBPP in Khartoum state the prevalence was 20.9% (Ibrahim Osman, 2016) and 17.19 % (Ibtisam Elsadig, 2012). It showed high percentage in projects sectors (45.7%) that may be due to owner's opinions and difficulty to exclude with permanent coexist of infected cattle.

This study revealed positive association between herd structure and the present prevalence of the disease, the P- value was (0.029) ,we notice in this study the positive association between disease and the breed the P value was (0.018).this means the local breed had .....tolerance this is not agree with study done at Ethiopia 2016 which found that there was no statistically significant associations were found between the host demographics (breed, age, sex and body condition) and the serological status of the animals ($p > 0.05$) (Daniel 2016)

,this study also assured that high herd size has positive association with the P value was (0.003); this oppose with last study which indicate that the prevalence of the disease is reduced when the herd size increased,(Ibtisam Elsadig, 2012),the study recognized that

age of the animals was associated with the CBPP, the disease had low occurrence in animals less than six month and the disease prevalence increase with age the P value was (0.000).this result agree with last study which supposed that there association between the disease and the immunity of the animal which acquired it from his dam. Also may indicate that the duration of expose to the causative agent is too longer in older animals ,the result showed statistically significant with sex the P value was (0.000); this result agree with last study which found result females were more affected more than males with percentage of 21.14% and 13.6% respectively (Ibrahim Osman , 2016),there was low statically significant association with introducing of cattle, health of introduced cattle, exposuring and passing of nomads the p-value was (0.923),(0.170),(0.265),(0.345) in each one ,there was also low statically significant association with sharing other animals in grazing land (p-value 0.101) this disagree with last study (Ibtisam Elsadig,2012),the result showed statically significant association with community knowledge (p-value 0.000) and number of dead animals (p-value 0.000) ,there were no statically association with antibiotic treatment (p-value 0.748) this may agree with suppose which say that veterinarian have supported the use of antibiotic for the control of (CBPP) for animal owners use but accompanied with other control methods Amanfu W. **(2007)** and **Mariner, *et, al.* (2006).**

Recommendation:

To control the disease serious regular surveillance, followed by authoritarian cattle movement control should be implemented by Khartoum state Veterinary Services to eliminate the disease.

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