

Prevalence of hemorrhagic septicemia in dromedary camel (*Camelus dromedarius*) of some selected farms at Benadir region, Somalia

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ABSTRACT

Pasteurellosis (Hemorrhagic septicemia) is common respiratory disease of camel that is an acute fatal disease caused by *Pasteurella multocida* type A or several serotypes of *Mannheimia hemolytica*, which also affect other animals. The disease had shown to spread between animals, across herds and to humans. Meaning that the disease is zoonosis. The study aimed at establishment of sero-prevalence of pasteurellosis in some selected Districts of camels rearing in Benadir Region. It was a cross-sectional study, where the study population was purposively chosen to consist animals taken within three sub-Districts of Benadir Region, namely Sub-District (Daynile Township), Sub-District (Yaaqshid) Sub-District (kaxda). This was because the normally handle many camels in a day, thus making it easy for the investigator to access the required number conveniently; it was also assumed that data collected from these for-slaughter camels was representative of the situation in the sub-District/county. A total of one hundred and sixty camels were tested using four serological tests: Rose Bengal Plate Test (RBPT),) and Complex Fixation Test (CFT). The serological tests were purposively chosen to increase the chances of picking positive cases and also to compare their sensitivities, with respect to camel serum, since they were originally meant for use on bovine serum. Blood samples (15 ml) were collected for serum harvesting from jugular veins of the animals as they were waiting to be examined. Rose Bengal plate test and CFT were run at a laboratory within the department of Veterinary Medicine, University of Horsed, 21 October campus; serum samples having been transported in a cool box. On average, out of an overall total of 300 serum samples tested, 180 samples were selected as sample procedure and were gives eleven (11) positive results, amounting to a prevalence of 6.67%. For the three districts, respective prevalence (averaged from the two (2) serological tests run) were: 7% (3/50) for Yaqshiid; 8% (3/60) for Deyniile and 10% (3/70) for Kaxda. When sensitivities of the two (2) serological tests were compared, there was no significant difference between them, with respect to picking of positive cases ($p=0.05$). The study has demonstrated presence of Pasterolosis in camels at Benadir Region and the authors are, recommending usage of RBPT and CFT as a screening test, since they are cheap, quick, and easy to carry-out. Any of the other three more involving tests can then be used if one wants to establish respective titers. Therefore, further detailed investigation needs to be conducted so as to understand specific etiological agents causing pasteurollosis in camel and can be instituted to optimize the benefit obtained from the camel sector.

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Introduction

Pasteurellosis are highly affecting livestock industry in the country. Pasteurellosis is a multifactorial disease caused by numerous etiologic agents (Hasso, 2016). *Mannheimia haemolytica*, *Bibersteinia trehalosi* and *Pasteurella multocida* cause pasteurellosis in animals and humans. *Pasteurella* are commensal organisms of healthy animals which can be trigger with stress factors to cause fatal disease in farm animals. Pasteurellosis / Hemorrhagic septicemia is an acute

fatal disease of camels caused by *Pasteurella multocida* type A or several serotypes of *Mannheimia haemolytica* is characterized by fever, edema of the throat region, dyspnea, and sudden death. *P. multocida* type A is considered to be a common inhabitant of the upper respiratory tract and it may cause disorders, in association with other microorganisms such as parainfluenza type 3 virus, in animals weakened by exposure to cold, malnutrition

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or gastro-intestinal parasitism (Jones et.al. 2013).

Infective agents acquired by inhalation of infected droplets or close contacts among susceptible animals. Pasteurellosis is responsible for huge mortality in feedlot animals worldwide. Haemorrhagic septicemia is an acute and characterized by sudden onset of fever, profuse salivation, severe dyspnea and death in about 24 hours whereas shipping fever causes severe broncho-pneumonia and pleurisy. The diagnosis of the disease is based on the clinical signs, gross pathological lesions, isolation of the pathogens and molecular characterization (Alemneh & Tewodros, 2016).

Pasteurellosis is complex multifactorial disease difficult to control however, good management, chemotherapy, chemoprophylaxis and early immunization are control and preventive measures. In Somalia, pasteurellosis is an endemic disease posing a serious threat to the animal productions. However, data on epidemiology, diagnosis, prevention and control is scarce (Gluecks, et.al. 2017).

Materials and Methods

Study area: The study carried out Benadir region Somalia. Benadir region consists of 17 districts. The region is one of the four regions in the south Somalia Benadir and it is the capital of Somalia. It covers the same area as the city of Mogadishu, which serves as the capital. It borders with middle Shebelle River in the north and the east, lower Shebelle River in the west and Indian Ocean in the south. The study was collected out in three (3) sub divisions for Benadir region district name: Daynile district, Yaaqshid district Kaxda district. However, the study was especially collected in dairy camel rearing farms which contributes the Daly life of capital Markets. Although by far the smallest administrative region in Somalia, it has the largest population, estimated at 3,650,227 (including 369,288 internally displaced persons) in 2014. Mogadishu, locally known as Benadir /Xamar or Hamar, is the capital and most populous city of Somalia. It is estimated to be about 2.3 million and covers an area approximately 637 km² and their Elevation is 9 m (Wikitravel, 2019). Therefore, the four districts study were selected purposively samples due to their Animal population. The Samples were collected randomly from the semi intensive and intensive dairy farms. Study design was a cross-sectional by collecting blood from sampled animals. The study was a cross-sectional on camel in some selected farm camels in three (3) districts of Benadir region in Somalia. The farms visited at one (1) months to collect suspect camels and samples were

collected carefully. The camel brought to the farms (4 weeks) were collected for bacteriological examination. In addition the selected animals was examined clinical and bacteriological examination. The calculated information was include the size of the Animal in the herd, the Age of the animal, the hygiene of the farm production system and water sources of the farms.

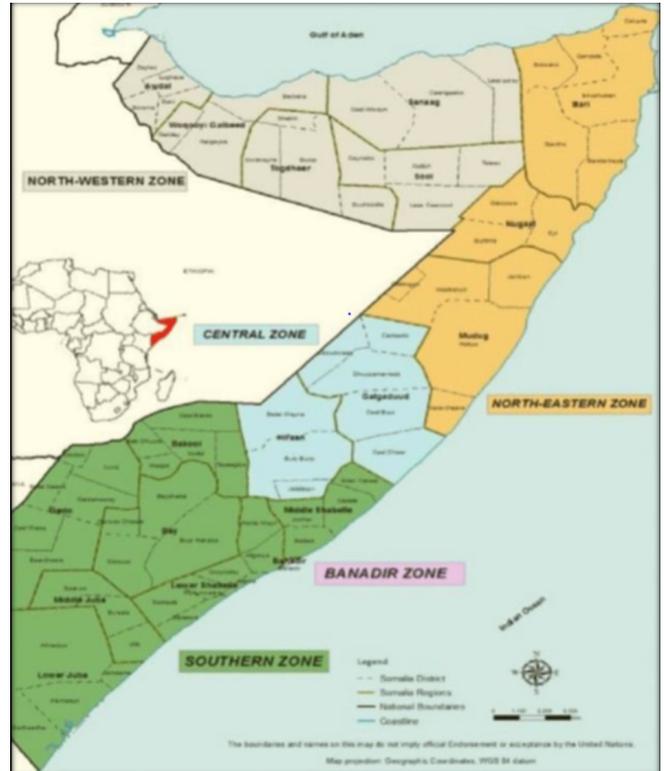


Figure 1. Map of Somalia showing the study sites of Benadir Region (National Bureau of Statistics, 2018).

Sample size determination: The sample size calculation was done using the equation of Dohoo et.al, (2016).

$$n = \frac{Z\alpha^2 pq}{L^2}$$

Where; N is required sample size

Zα= 1.96 the normal deviate at 5% level of significant

P = A priori estimation of prevalence for the disease

q = 1-p and L is allowable error of estimation

Slaughtered camel: using the highest prevalence estimation of 20% for hemorrhagic septicemia in camel (Arimi et.al, (2005) and L is at 5%. The required sample size was calculated as follows:

$$n = \frac{1.96^2(0.15)(0.69)}{(0.05)^2} \quad n = \frac{3.8416(0.15)(0.69)}{(0.05)^2} \quad n = \frac{3.8416(0.15)(0.69)}{0.0025} = 180$$

Therefore, sample size per sub-districts were calculated based on the number of camels per herd,

which was found to be in the ratio of 4:4:3 for the three sub selected districts in Benadir region respectively. The respective animals were recruited into the study on several visits to the camel farms until the required number was achieved. To be 95% confident that our estimate of Pasteurellosis seroprevalence is within 20% of the true population value (i.e., a relative error of 0.20) 300 camel should be sampled.

Sample collection procedure: The collected samples were from selected dairy farm camels. for (15ml) of blood samples were collected from jugular vein by using gauge 15 needle and 20 ml syringe. The blood samples were then placed in large test tubes, without anti-coagulant, taken to Veterinary Investigation Laboratory, at Horsed international University. The samples were then centrifuged at 4,500 xg, serum decanted into cryovials, which were labelled and stored in freezer (-20°C) at the laboratory of the university. The blood was centrifuged and harvested using the standard procedure of OIE and similarly done by (Belak et.al, (2016). Samples had cultured on casein/sucrose/yeast agar containing 5% blood. Conventional blood agar may also be used. Details, including biochemical methods for identification of the organisms. Serotyping methods include the rapid slide agglutination test, indirect haemagglutination test, somatic antigen agglutination tests, agargel immunodiffusion and counter immunoelectrophoresis. Details were found in the OIE Terrestrial Manual.

For each serum sample, part were used to carry out RBPT at the Horsed laboratory, while part of it was transported in a cool box to Department of Veterinary medicine for carrying-out of c-ELISA and CFT.

Data collection and analysis: The data was collected through quantitative methods. The Information (data) was gathered through Descriptive examination from the investigation zone, revised, composed and organized. The data collected from the sub study area district, edited, collated and tabulated. Both MS Excel Windows® 2013 data base and Stata 17 statistical analysis Software by using descriptive statistics. The outcome between the variable (status of Hemorrhagic septicemia in the herds), blood serum and identification of the samples from selected district farms in Benadir region were the first screen in a university of hosed laboratory.

Results

Rose Bengal Plate Test (RBPT) results overall and with respect to the three study area of Benadir region Somalia are presented Table 1.

Table 1. Rose Bengal Plate Test (RBPT) results overall and with respect to the three study area of Benadir region Somalia.

Study sub-district	Number of examined camels	Number of positive	Number of negative	Positive %
Dayniile district	55	11	44	.020
Yaaqshiid district	45	12	33	0.26
Kaxda district	80	10	70	0.125
	Total: 180	Total: 33	Total: 147	0.585

The overall prevalence of hemorrhagic septicemia in camel different species were 58.6% positive which were indicated that examined camels having a higher number of positive results when compared to number of negative however there is no statistically significant connotation ($p < 0.05$).

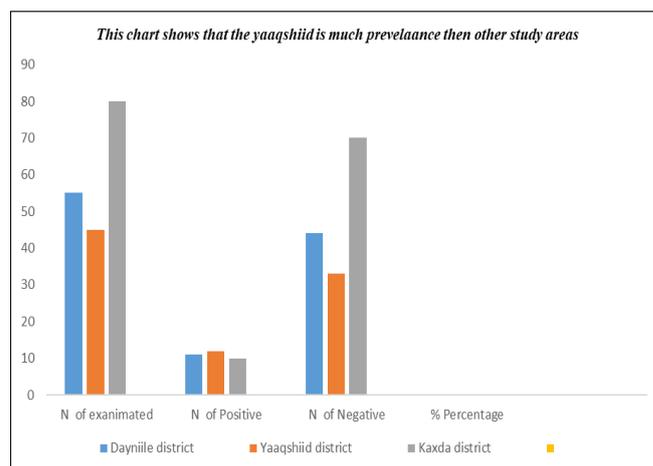


Figure 2. This figure were indicted that the three sub district had much near results at the prevalence level and Yaaqsiid sub district is much more positively charged camels due to farm animals.

Table 2. Overall sero-prevalence of hemorrhagic septicemia used by complex fixation test (CFT).

District	No of examined camels	No of Positive	No of Negative	Positive %
Dayniile District	55	11	14	0.20
Kaxda District	50	15	13	0.30
Yaaqshiid District	75	13	12	0.17
	Total: 180	Total: 39	Total: 39	Total: %0.67

In this table of seroprevalence of pastuerollosis for the three sub district Kaxda is indicating higher prevalence according to the other sub district due to camel farms were visited and they were much more examined camel farms.

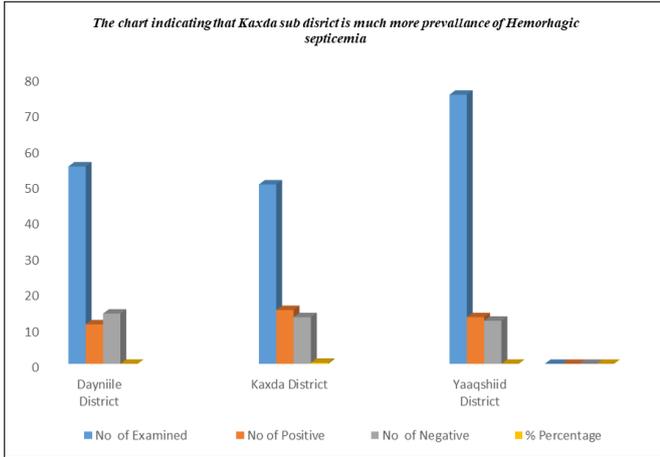


Figure 3. The above chart were used by state software for analysis of the data, the prevalence of the two study area were indicated that Kaxda sub count made overall prevalence result 0.3%.

Table 3. Prevalence of hemorrhagic septicemia in Kaxda and Yaqshiid

Districts	Number of examined camels	RBPT Positive	CFT Positive	Percentage %
Kaxda	162	7	6	0.08
Yaqshiid	138	5	4	0.06
Total	300	12	10	0.07

In this Table the researchers were selected the most common camel farms in Benadir region and their sub study area and we conformed that there was different prevalence values in the two higher study area both are very near as you see the result.

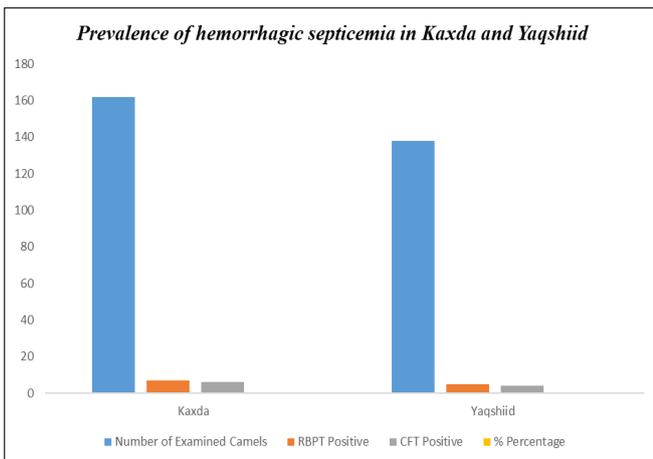


Figure 4. Prevalence of hemorrhagic septicemia in Kaxda and Yaqshiid.

In this chart indicates that both sex of camels examines for the two serological test with the selected sub study area (Kaxda & Yaqshid) which were totally different. However, there was no significant statistically analysis ratio (>P.005).

Table 4. Prevalence of hemorrhagic septicemia in male and female examines camels

Districts	Number of examined camels	RBPT Positive	CFT Positive	Percentage %
Male	152	8	7	0.09
Female	148	6	8	0.09
Total	300	14	15	0.09

This Table of the study concerns that the female and male camels examined used by RBPT and CFT. Therefore, both are near prevalence and percentages so female animals are most susceptible in Benadir region.

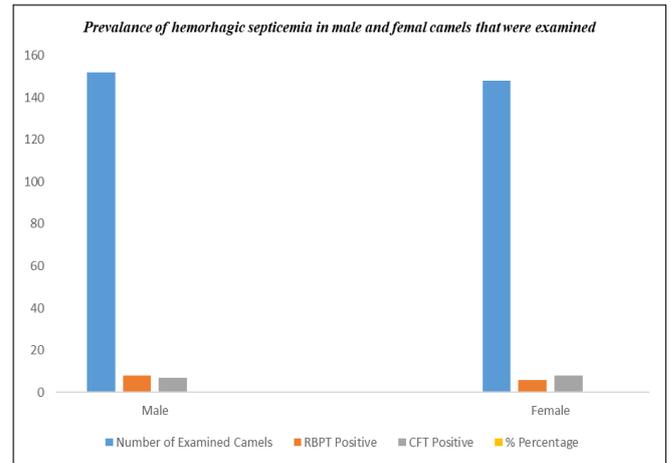


Figure 5. Prevalence of hemorrhagic septicemia in male and female examines camels.

In Figure 5 indicates that the female and male animals are so near, however females camels are more susceptible indicating that the sub study area of Benadir Somalia.

Table 5. Prevalence of hemorrhagic septicemia in herd level for examined camels at the three-study site.

Districts	Number of Tested	RBPT Positive	CFT Positive	% Percentage
Kaxda	104	9	7	0.15
Yaqshiid	107	8	6	0.13
Deynile	89	7	5	0.13
Total	300	24	18	0.14

In the above Table denotes that the herd level according to the study site therefore the most common positive (+) are Kaxda sub-district and it was estimated to 16 (0.15) and Yaqshiid was the second site for the herd prevalence and there was not statistically significant.

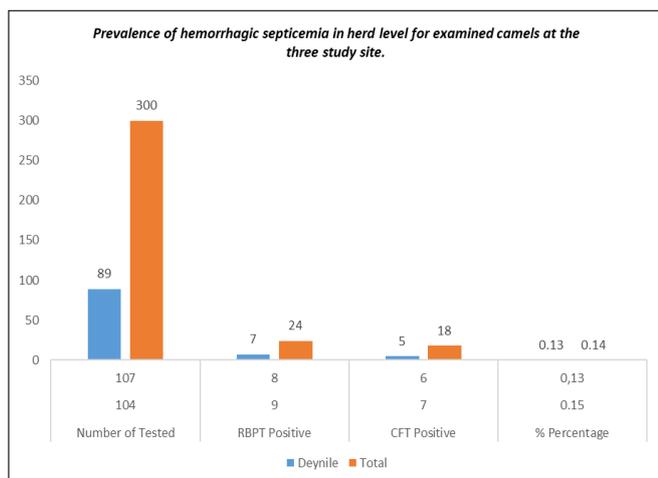


Figure 6. Prevalence of hemorrhagic septicemia in herd level for examined camels at the three-study site.

Table 6. Prevalence of hemorrhagic septicemia based on the site of the farms in three sub -district of the study area in Benadir Region Somalia.

Districts and Farm Names	Number of Tested	RBPT Positive	CFT Positive	Percentage %
Kaxda: Sheikh Adanley Farm	124	10	8	0.14
Yaqshiid: Jamhuriya Farm	84	8	9	0.20
Deynile: caliyaale Farm	92	11	7	0.19
Total:	300	29	24	0.17

In Table six (6) defined that the study has different sites and different Sero-prevalence and including the most susceptible site are Kaxda and Yaqshiid due to their farm animals (Camels) are more than other sites of the study area and further more identification will recommend.

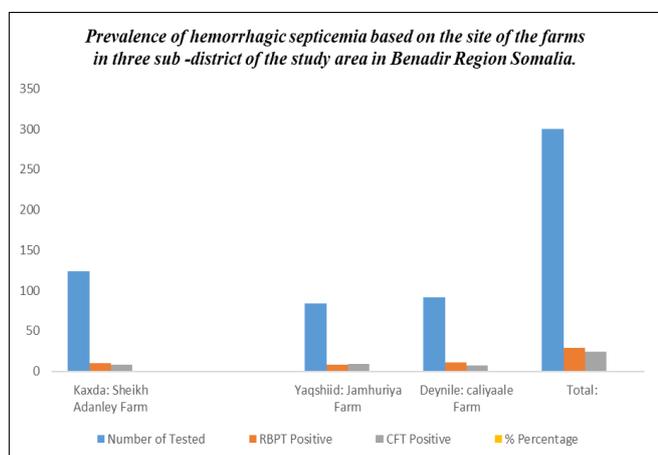


Figure 7. Prevalence of hemorrhagic septicemia based on the site of the farms in three sub -district of the study area in Benadir Region Somalia.

Discussion

In the study, the seroprevalence of Hemorrhagic Septicemia in camel, as well as the risky activities practiced by camel herders that may expose them to other disease from the camels, had been assessed. The study was conducted between February to Jun 2022, at the several villages of three (3) districts in Benadir region of Somalia so as to measure the prevalence of Pasteurellosis (Hemorrhagic septicemia), by using CFT and RBPT for the screening to evaluate the existent of the disease and other differential diagnosis of the disease. The overall prevalence of the disease hemorrhagic Septicemia in this study were estimated 7.5% therefore it indicates that there is susceptibility of the disease and other clinical manifestation were reported In camels infection associated with Pasteurella Multocida and Mannheimia haemolytica shows a that the wide range of pulmonary and septicaemic infections. P.multocida is associated with hemorrhagic septicaemia in adult camels and other enzootic camels were different in sings and had mostly shown pneumonia complex in young animals (Camels).however, Immune status and severity of infection depends on the predisposing factors like stress, climate change, Herd health status, deficient nutrition, concomitant infections, and virulence factors. According to the site of the study in Benadir region Somalia.

It also indicates that examined camels having a higher number of Negatives results compared to number of Positives tested in the three sub districts of the study area. However, there is no statistically significant association ($P < 0.05$). Therefore, our results strongly agreed with other studies conducted from Kenya and Ethiopia (Alemneh & Tewodros, (2016). Camel pasteurellosis: Isolation, identification have been confirmed the same prevalence of my study. There was other reports has been done hemorrhagic septicemia in the same prevalence but it is too old to mention in this study. Some study have been made in (Awad, et.al (1976a). Studies of prevalence with Pasteurella multocida types in camel published by Journal of Veterinary Science, 13(1), 53–56).

During the study, as a researchers we had been used tRBPT screening test due to its fast, easy, and susceptible to accept commonly (99.9%), and it allowed us processing for many of our samples per day by following the stander manual of (OIE, 2016). Therefore, The RBPT sera test positives were retested using by the Complex Fixation Test (CFT) that had having a specificity of 100% (Manish et al., 2017). in order to maximize the specificity of their tests.

Animals were considered as positive if it was positive by both RBPT and CFT. Accordingly our overall Prevalence it doesn't mean that the disease is insignificant as it is a very serious disease responsible for reproduction failure of the dairy industry in the study area and its zoonosis disease so that it is very important to know and carefully .

Conclusion

This current study for cross-sectional Camel Pasteurellosis (Hemorrhagic Septicemia) at the Benadir region of Somalia especially the three sub district study targets were showed that very low Sero-prevalence. At the same time, the low prevalence of the disease was observed in different Camel sexes and different age groups of camel. However seroprevalence is low, it can still be a potential risk for both susceptible camels and also man. And imaginably in other areas of Somalia where nomadic pastoralism is practiced. There is a need for an felon try institute to control measures of this disease and related disease through vaccination, it is needed education, control to the public awareness, and conducting sero type surveys and those animals testing positive will be controlled . Also as we researchers recommend further research to be done in this area duet luck of awareness of the farms and society.

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Competing interests: Authors have declared that no competing interests exist.

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