



Detection of bovine viral diarrhoea virus antibodies in camels (*Camelus dromedarius*) in Maiduguri, Nigeria

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Abstract

This study was carried out to determine the seroprevalence of bovine viral diarrhoea virus (BVDV) antibodies in camels presented for slaughter at the Maiduguri abattoir using a BVDV specific indirect enzyme-linked-immunosorbent assay (ELISA). Ninety (90) serum samples collected from adult male and female camels were tested for BVDV antibodies. From the samples tested, 28 (31.1%) were positive for BVDV. The sex distribution of the positive samples showed 7 (33.3%) males and 21 (30.4%) females were positive for BVDV antibodies. The results showed no statistically significant ($p < 0.05$) difference in the sex prevalence of camels observed in the study. This finding demonstrates the presence of BVDV antibodies in camels in Maiduguri. Further studies will be required to elucidate the epidemiology of BVDV infection in camels and other livestock species in the study area.

Keywords: Antibodies, Bovine viral diarrhoea virus, Camels, Nigeria, Seroprevalence

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Introduction

The growing human population in the world has brought into focus the issue of food security amongst others; thus the need to explore alternatives to meat, milk and other products (Ahmad *et al.*, 2010). Camels have been domesticated for meat, milk and transport over 4, 000 years ago (Muhammad & Akpan, 2008; Bamaiyi & Kalu, 2011; Gadahi *et al.*, 2013). The Nigerian camel population was reported to be slightly over 87, 000 heads which are found mostly in the northern parts of the country (Bamaiyi & Kalu, 2011). Although considered a less conventional source of meat compared to cattle, sheep and goats (Kurtu, 2004), it can be a better option for animal protein compared to cattle as it has a large body mass and good dressing percentage (Mukasa-Mugerwa, 1981). Camels are adversely affected by lack of water, poor feed, heat stress and diseases (Bamaiyi & Kalu, 2011; Mshelia *et al.*, 2013) leading to decrease in productivity. Studies have shown that camels are susceptible to common diseases affecting other animal species such as brucellosis and bluetongue

(Yousif *et al.*, 2003; Amstel & Kennedy, 2010; Wernery, 2012; Gadahi *et al.*, 2013).

Bovine viral diarrhoea virus (BVDV), a member of the genus Pestivirus is characterized by a wide spectrum of clinical manifestations from mild infections to severe clinical signs resulting in respiratory, reproductive or immunosuppressive diseases (Duong *et al.*, 2008; Kampa *et al.*, 2009). The virus is maintained in animal population by persistently infected animals that become infected *in-utero* prior to development of immunocompetence and thus shed BVDV for life (Passler *et al.*, 2009). Bovine viral diarrhoea virus infection is not exclusively a disease of cattle, but affects sheep (Paton *et al.*, 1995), rabbits (Frolich & Streich, 1998), camels (Belknap *et al.*, 2000) and goats (Passler *et al.*, 2014). It has been reported that BVDV can produce cases of diarrhoea, ill thrift, reproductive losses as well as respiratory disease in camelids (Kapil *et al.*, 2009). The virus has recently been described as an emerging disease in camelids (Wernery, 2012) but the distribution globally is yet to be determined. A

recent report (Mshelia *et al.*, 2014) from this study area has shown that camels are commonly found grazing together with cattle and other ruminant species in Nigeria, which could lead to cross infections with BVDV amongst these species. In view of the above, this study was designed to determine the seroprevalence of BVDV antibodies in camels slaughtered at the Maiduguri abattoir in Nigeria.

Materials and methods

Study area

The study was carried out in Maiduguri, Nigeria which lies between longitude 10⁰48`N and latitude 11⁰20`E. The city is cosmopolitan and is situated at 354 m above sea level. The months of March and April are usually the hottest months, while November to January are the cold dry periods. The city receives annual rainfall from June to September (Mayomi & Mohammed, 2014)

Animals and sample collection

Slaughter animals brought into Maiduguri from locations within northern Borno state and even trade animals from neighbouring Niger and Chad Republics were used for this study. Adult animals (<4 years) were selected for sampling. Their ages were estimated according to the methods described by Bello *et al.* (2012).

Between June and August, 2013, blood samples from ninety (90) dromedary camels were collected at the point of slaughter and transferred into plain vacutainer tubes. The samples were then placed on ice pack and transported to the Animal Virus Research Laboratory, Department of Veterinary Microbiology and Parasitology, University of Maiduguri, Nigeria where serum was separated by centrifuging at 3 000 x g (4000 rpm) for 15 minutes and stored in identifiable vials at -20⁰C until tested.

Serological test

Sera were tested for antibodies specific for BVDV using an indirect Enzyme Linked Immunosorbent Assay (ELISA) Kit (Bio-X Diagnostics, Belgium). The test was performed according to the instruction of

the manufacturer. Both positive and negative control sera were included in the assay. The results were read by a microplate reader (Emax precision Micro plate reader, California, USA), where the optical density (OD) of the positive and negative sera and those of all the samples were measured at 450 nm wavelength. The cut-off point for positive and negative tests were OD values < 2.216 and >3.391 respectively.

Data analysis

Data generated from the study were expressed as simple percentages and presented in a table. The Fischer's Exact test was used to compare prevalences between male and female animals. P-value was considered significant at 0.05.

Results and Discussion

The result shows that BVDV antibodies were detected in 28 (31.1%) of the 90 camel serum samples tested. The sex distribution of the positive samples showed 7 (25%) males and 21 (75%) females (Table 1), but there was no statistically significant (P>0.05) difference in detection rates between male and female camels tested. The rate of detection of BVDV antibodies in camels in the present study is higher than the 1.3% previously reported by Baba *et al.* (1996) who used agar gel immunodiffusion technique in the same study area. This sharp rise may be due to increased spread of infection amongst this species or due to differences in the assay techniques used. The antibodies detected in this study may likely be due to natural exposure of camel to BVDV as vaccination of animals against bovine viral diarrhea virus is not practiced in Nigeria. Besides Baba *et al.* (1996), there seems to be no other reports available on the sero-prevalence of BVDV in camels in Nigeria to the best of our knowledge. The sero-prevalence pattern observed in the present study can be compared to the findings obtained elsewhere. For example, seroprevalence rates ranging from 1.6 to 23% have been reported in Oman (Hedger *et al.*, 1980), USA (Doyle &

Table 1: Prevalence of BVDV antibodies in camels in Maiduguri, Nigeria

Sex	Number of Samples tested	Detection Rates	
		Positive n (%)	Negative n (%)
Male	21	7 (33.3)	14 (66.7)
Female	69	21 (30.4)	48 (60.6)
Total	90	28 (31.1)	62 (68.9)

Heuschele, 1983), Sudan (Bornstein & Musa, 1987), Saudi Arabia (Al-Afaleq *et al.*, 2006) and the UAE (Wernery *et al.*, 2008); higher sero-prevalence rates (>52%) have also been reported among camels in Egypt (Zaghana, 1998) and Sudan (Intisar *et al.*, 2010). The prevalence of BVDV in camels observed in the present study could arise as a result of cross infection from other animal species as they are found grazing together freely in rangelands in the northern frontiers of Nigeria (Mshelia *et al.*, 2014). To validate this claim, a study should be focused on the detection and molecular characterization of BVDV from camelids and other animals to compare their genotypes and to determine their phylogeny. In conclusion, this study has revealed a prevalence of BVDV (31.1%) antibodies among camels presented for slaughter at the Maiduguri abattoir. Since there is no vaccination against the virus in this region, the present finding indicates that camels might be

exposed to natural BVDV infection, thus the epidemiology of this virus in camel population needs to be elucidated. A larger sample size will be required to determine the true seroprevalence in this animal species. Furthermore, studies should also be carried out to isolate and genetically characterize the field strains of BVDV in other animals and to determine the disease burden caused by this virus in Nigeria.

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