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Short communication

SEROLOGICAL EVIDENCE OF EPIZOOTIC HAEMORRHAGIC DISEASE AND SCHMALLENBERG VIRUS IN DROMEDARIES

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Epizootic Haemorrhagic Disease (EHD) and Schmallenberg virus (SBV) are viral diseases of cattle, small domestic and wild ruminants. They also may infect camelids. EHD and SBV are caused by arboviruses causing non – contagious diseases transmitted by haematophagous insects. Details of both viral diseases are found in Table 1.

The aim of this study was to investigate if dromedaries produce antibodies against EHD and SBV.

Materials and Methods

In total 200 dromedary sera were tested against both diseases. Fifty and ninety dromedary sera originated from Pakistani and Sudani milking camels. Twenty five were racing dromedaries from the UAE as well as 35 UAE breeding dromedaries.

For EHD and SBV commercial antibody ELISAs were used from France (LSI Vet, Ruminant EHDV, ID Vet) with monoclonal anti – EHDV HRP and multispecies HRP, respectively as conjugates.

Results

In total 200 dromedary sera from Pakistan, Sudan and UAE were tested with the commercial antibody ELISAs. The detailed results are shown in Table 2.

Discussion

Epizootic haemorrhagic disease (EHD) is capable of infecting wild and domestic ruminants and has been particularly associated with disease in white – tailed deer of North America. EHD is an infectious non – contagious viral disease transmitted by *Culicoides*. The virus belongs to the family *Reoviridae*, genus *Orbivirus* and currently 8 or more serotypes are recognised and Ibaraki virus which is a member of EHD virus serogroup (serotype 2) (Fernandez and White, 2010). The disease occurs in North America, Africa, Asia, Australia and around the Mediterranean Sea. Significant clinical signs were observed in white – tailed deer, cattle and other wild and domestic ungulates, but have never been reported to occur in camelids. Cattle show sharp decline in milk production, swelling of eyelids, respiratory distress, nasal and occular discharge, redness and scaling of muzzle and lips, lameness and erythema of udder (Savini *et al*, 2011). Cattle, however, which were experimentally infected with the Moroccan or Turkish isolates of EHDV – 6 remained clinically

Table 1. Epidemiological details about EHD and SBV.

Name of Disease	Abbreviation	Virus family	Genus	Mode of transmission	Clinical signs	Affected species	Serology
Epizootic haemorrhagic disease	EHD	RNA *Reoviridae Arbovirus*	Orbivirus 8 serotypes	Non – contagious Culicoides	Fever, anorexia dysphagia, ulcer and necrosis of oral mucosa	Wild ruminants, White tailed –deer cattle, camelids	ELISA VNT
Schmallenberg virus	SBV	RNA *Bunyaviridae Arbovirus*	*Orthobunyavirus*	Non – contagious Culicoides	Abortion with malformations ''Arthrogryposis hydraencephalopathy''	Lamb, bovine calf NWCs(?)	ELISA VNT IFT

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Table 2. Antibody ELISA results of 2 viral diseases of 200 dromedary sera from different countries.

Disease	Total sera - 200							
	50 – Pakistan		90 – Sudan		25 – UAE racing		35 – UAE breeding	
	+ (%)	-	+ (%)	-	+ (%)	-	+ (%)	-
EHD	25 (50%)	25	15 (17%)	75	O	25	10 (29%)	25
SBV	43 (86%)	7	17 (19%)	73	O	25	13 (37%)	22

+ = ELISA positive - = ELISA negative

healthy throughout the experiment but had high levels of viral DNA and virus in their blood (Batten *et al,* 2011). Dromedaries have tested negative with the virus neutralisation test (VNT) using EHDV – 6 reference strain in Morocco (Touil *et al,* 2012).

Our results show that 29% camels from the UAE have antibodies to EHD which indicates that the virus seems to be present in this country. No reactors were detected in racing dromedaries which are younger than breeding stock. Fifty per cent reactors were detected in Pakistani and 17% in Sudani camels. All tested dromedaries were healthy animals. It is known EHDV demonstrates immunological cross reactivity with the Blue Tongue virus group (Fernandez and White, 2010).

Schmallenberg virus (SBV) is an *Orthobunyavirus* of the family *Bunyaviridae* and a member of the Simbu serogroup. It is closely related to the *Akabane* virus. This serogroup contains more than 24 viruses, most of which have been detected in ruminants. SBV is most probably transmitted by biting midges (*Culicoides* spp) and does not infect humans. SBV was first detected in sheep flocks in Germany and consequently spread to many other European countries. Before 2011 *Orthobunyavirus* have never been detected in Europe before and therefore it seems likely that SBV was introduced from elsewhere (Conraths *et al,* 2013). Ruminants and NWCs (alpacas) are susceptible to infection and especially young animals develop disease (Schulz *et al,* 2012). Important is the transplacental infection which can lead to abortion with severe congenital malformations of the skull, brain, vertebral column and spinal cord which is named ''athrogryposis – hydraencephalopathy''. Adult animals may develop mild disease, if any.

OWCs are susceptible to *Orthobunya* viruses because antibodies to the Akabanevirus have been detected in 50 to 70% of dromedaries on the Arabian Peninsula (Al – Busaidy *et al,* 1988), Australia (Cybinski *et al,* 1978) and Kenya (Davies and Jessett, 1985). Antibodies to SBV were recently detected in NWCs (Jack *et al,* 2012; Anonymous, 2013) with no evidence of any clinical problems. High sero prevalence was found in our study in Pakistani (86%), Sudani (19%) and UAE breeding camels (37%). Their significance is not known but veterinarians and camel owners should be aware of this emerging disease which may affect the development of the unborn.

SBV genome can be readily detected by PCR and specific antibodies can be demonstrated in serum samples by VNT, IFAT or ELISA (De Regge *et al,* 2013). In our study we used an ELISA from ID Vet with good results.

From our investigation it is obvious that dromedaries produce antibodies against a variety of viral agents but so far it is unknown if these viruses which may produce disease in cattle, sheep, goats and wild ruminants are pathogenic for camelids. Recently antibodies were found in healthy Omani dromedaries to the Middle East Respiratory Syndrome Coronavirus (MERS CoV) (Reusken *et al,* 2013).

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