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Trypanosoma evansi ABORTION IN A DROMEDARY CAMEL HERD IN THE UAE - PART I

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ABSTRACT

A dromedary camel breeding herd consisting of 16 female and 2 male camels experienced an abortion storm over a period of 2 years. Fifteen (94%) of the 16 female camels aborted during the last stage of pregnancy. *Trypanosoma evansi* was directly identified by the buffy coat technique in 7 (39%) of the camels and in 15 (83%) with the indirect in-house antibody ELISA developed at the Central Veterinary Research Laboratory (CVRL). One bull and two newly introduced female camels were negative in both tests.

The whole herd was treated with 20ml of Cymelarsan. Blood samples were retested 6 weeks after treatment. All 18 dromedary camels did not clear the parasite from the blood and four dromedaries were still positive in the buffy coat technique and the level of antibodies had further increased. In Part II of our investigations we will report if another *Trypanosoma*l drug had cured the herd.

Key words: Antibody ELISA, buffy coat technique, camel abortion, *Trypanosoma evansi*

All trypanosomes infecting camels belong to the Salivaria group and are transmitted by bites of blood sucking flies. Surra caused by *Trypanosoma* (*T.*) *evansi* is the most important parasitic disease in dromedaries. The literature of surra in Bactrian camels is scarce. A good overview of trypanosomiasis in camels has been compiled by Wernery *et al* (2014) and OIE (2018). In the OIE chapter 3.1.21 multiple diagnostic techniques are explained in detail including agent identification, animal inoculation, polymerase chain reaction (PCR) and serological tests. At CVRL in the UAE, surra is diagnosed serologically with an indirect in-house antibody ELISA (i-ELISA) and with the buffy coat technique (BCT) (OIE, 2018). In camels, the *T. evansi* prevalence rate in the UAE reached 25% in 2019 (CVRL Annual Report, 2019). The increase of trypanosomiasis cases in camels is most probably due to advanced landscaping and imported dromedary camels. Surra has been diagnosed in dromedaries in many Middle Eastern countries (Wernery *et al,* 2014), but literature of abortions is rare. We report here an abortion storm in a camel herd in the UAE caused by *T. evansi*.

Materials and Methods

Dromedary camels

A breeding herd of 18 dromedary camels was affected which consisted of 16 females and 2 males. The herd roamed 40 km north-east of Dubai in a desert area near a village with ponds, agriculture greeneries and farms. Fifteen of the 16 female dromedary camels aborted during the breeding season 2018-19 of which 4 became again pregnant during the breeding season 2019-20.

Test methods

Jugular venipuncture was performed to obtain blood samples from all 18 dromedaries. The EDTA blood was tested for the presence of the parasite with the BCT and the sera were examined for *T. evansi* antibodies with a CVRL indirect ELISA (i-ELISA). Both methods are described by the OIE (2018). The results are shown in Table 1. The blood was also tested for haematological parameters and iron levels with analysers from Sysmex XN for haematology and Cobas C311 for iron. The values were then compared between the 15 infected dromedary camels and 3 non-infected camels as a mean and the significant difference calculated before and after treatment. The results are shown in Table 2.

Treatment

All camels including the 3 negative ones were treated with 20 ml of Cymelarsan (Melarsomine) intramuscularly (im) divided into 2 injections 10 ml each. This is the recommended dosage for a 400 kg camel.

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Table 1. Results of *T. evansi* infection diagnosed with BCT and CVRL i-ELISA.

S.No.	Camel ID	Gender	Before treatment		6 weeks after treatment with Cymelarsan	
			BCT	i-ELISAxx	BCT	i-ELISAxx
1	Shaheen Ajeeb	F	-	2.0	-	2.4
2	Shaheen Abbady	F Pregnant	++*	1.1	-	2.2
3	Shaheen Al Muhairi	F	-	2.3	-	2.5
4	Bint Mukhles	F	+	2.2	-	2.4
5	Al Khawara	F	-	-	-	-
6	Shaheen Al Arti	F	-	2.1	-	2.5
7	Shaheen Hamroor	F Pregnant	-	2.0	++++	1.2
8	Bint Dhabyan	F Pregnant	-	1.7	-	2.3
9	Sudaniyah	F Pregnant	++	2.3	-	2.6
10	Bint Al Qaher	F	+	2.2	++++	2.4
11	Al Naseem	F	-	2.0	++++	2.3
12	Ghourob	F	+	1.5	-	2.2
13	Bin Mashaal	F	-	2.2	-	2.5
14	Faraha	F	+	1.6	-	1.7
15	Shaheen Weld Al Nuaimiyeh	F	-	0.4	-	-
16	Al Hathrah	F	-	-	-	-
17	Nassi	M	++++	0.78	++	1.1
18	Moshawesh	M	-	-	-	-

* = number of parasites seen in BCT + = 1 or 2 in a slide ++ = very few in a slide +++ = 1 in view field
++++ = more than 1 in view field xx = Optical Density (OD) - = negative

Results

Table 1 shows the results of *T. evansi* infection before and after 6 weeks of treatment. Table 2 shows the haematological and iron values compared between 2 groups, the infected and non-infected dromedaries as a mean before and after treatment. The results show that one bull of the herd and two pregnant female camels which were recently introduced into the herd remained negative for *T. evansi*. However, 15 camels (94%) aborted during the last stage of pregnancy during the breeding season 2018-2019 (Fig 1). *T. evansi* was directly identified by the buffy coat technique (BCT) in 7 (39%) camels and in 15 (83%) of them serologically. One bull and two newly introduced pregnant females were negative in both tests. Six weeks after the Cymelarsan treatment, *T. evansi* was still detected in the blood of 4 camels by BCT and the i-ELISA antibody levels had further increased (Table 1). The comparison of haematological and iron values of the 2 groups, which is shown in Table 2 revealed significant differences in most of the values. Red blood cell count (RBC), haemoglobin (HB), packed cell volume (PCV), platelets (PLT) and iron values were significantly decreased in comparison to the non-infected camels, but remained within the reference values; outside the reference values were only White Blood Cell (WBC) and the lymphocyte counts.

Table 2. Comparison of mean blood parameters and iron values of 15 dromedaries with no *T. evansi* in their blood and 3 infected camels.

Parameters	SI units	Reference values*	Before treatment Mean Results 4 weeks later	
			3 Non-infected	15 infected
Haematology				
RBC	10^{12}/L	7.00 – 10.50	10.1	8.3
HB	g/dl	10.5 – 14.5	13.9	11.1
PCV	L/L	0.23 – 0.30	0.30	0.25
PLT	10^{9}/L	270 – 600	424	381
IRON	µmol/l	15 - 27	22	16
WBC	10^{9}/L	8.0 – 15.0	13.9	23.6
NEU	%	40 – 60	43.8	42.5
LYM	%	25 - 45	36.2	50.3
MONO	%	3.0 – 6.0	3.8	3.6
EOS	%	0.0 – 8.0	4.2	2.5

* Wernery *et al* (1999)

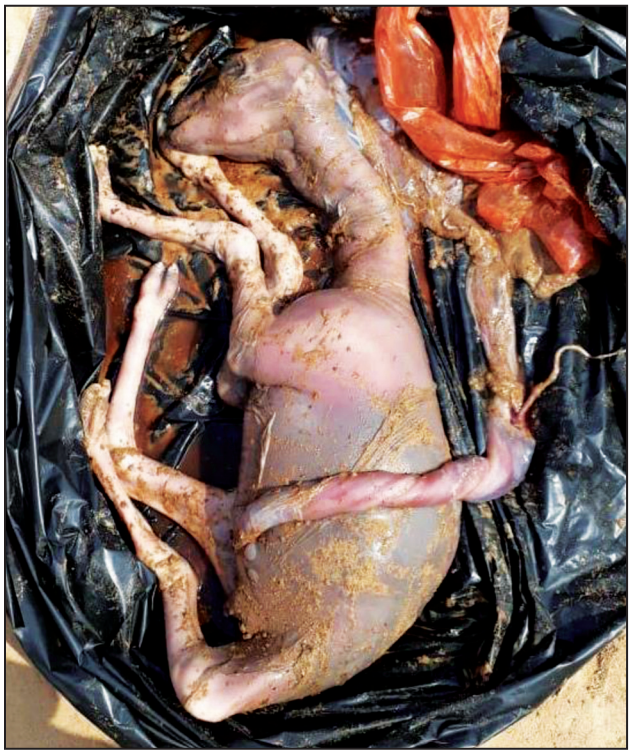

Fig 1. Aborted approximately 7 month-old foetus caused by *T. evansi*.

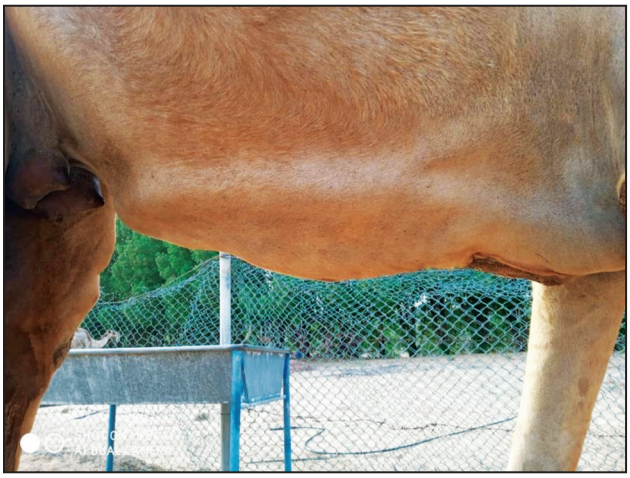

Fig 2. Oedema under the belly of a dromedary, pregnant with a 7 month-old foetus, caused by *T. evansi.*

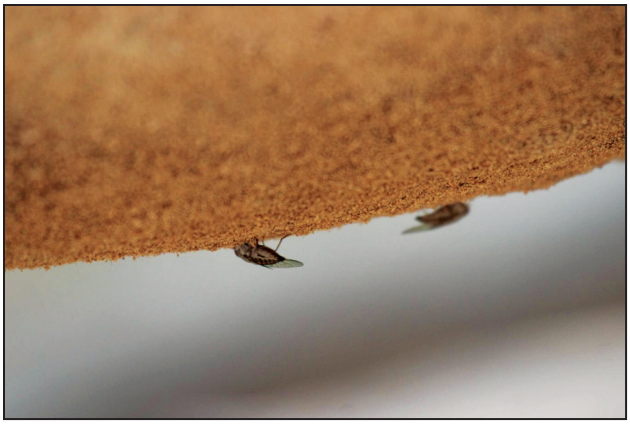

Fig 3. Two horse Tabanid flies under the belly of a dromedary camel.

Discussion

Surra is an arthropod borne parasitic disease of camels and horses, but also all domestic animals are susceptible. Several species of haematophagus flies like Tabanids and Stomoxys transfer the parasite from host to host, acting as mechanical vectors. The disease can be fatal, particularly in camels, horses and dogs, but in other animal species it appears to be non-pathogenic and these species serve as reservoirs for the parasite. Also a few wild animals are susceptible to infection and may also serve as reservoirs. Surra occurs in North Africa, the Middle East, Asia, the Far East and Central and South America (Wernery *et al*, 2014). The distribution of *T. evansi* in Africa extends into the Tsetse belt areas, where differentiation from *T. brucei* is difficult. Surra is transmitted by biting flies, probably resulting from interrupted feeding. The parasite does not undergo a development in the flies. A large number of horse fly species act as mechanical vectors for *T. evansi* (Wernery *et al*, 2014). Ticks, mosquitos and Culicoides do not play a role in the transmission of the parasite. The clinical signs of surra in dromedaries are multifaceted and may vary widely depending on the infection phase. Therefore, it is important to differentiate between acute and chronic cases. The acute form occurs mostly in horses and camels (Van den Bossche *et al*, 2009). In a classical surra case, the disease, if not treated, develops into a chronic course with weight loss, weakness, loss of condition, rough coat and oedema at different locations but mainly under the belly (Fig 2). Two of the infected camels developed oedema at the ventral part of the abdomen and hind limbs. This clinical sign develops also during the acute stage. The animal develops anaemia, mucous membranes are pale and changes in the haematological parameters are often significant with low red blood cell count (RBC), low haemoglobin (HB), low packed cell volume (PCV) and decreased platelets. Anaemia is often a reliable indicator of a chronic trypanosome infection, but it is not pathognomonic as mild subclinical and acute infections often show no evidence of anaemia.

Although there was a significant difference in haematological and iron levels of the 15 infected dromedaries in comparison to the 3 non-infected camels, most of the values were still in the normal reference range as shown in Table 2. This shows

that it is nearly impossible to diagnose a *T. evansi* infection on haematological grounds. However, the WBC and the lymphocyte counts were significantly increased and lay outside the reference values. It is worthwhile to mention that an elevation of eosinophil count is common in a parasitic infection. However, the eosinophil count was not elevated in the *T. evansi* infected dromedaries.

One of the most important features of surra is abortion and it occurs in all stages of pregnancy (Gutierrez *et al*, 2005). So far it is not known why abortions occur and this would be an interesting research field in future to examine the aborted foetus and afterbirth material thoroughly for any alteration.

In 2018/2019 an abortion storm caused by *T. evansi* infection occurred in a dromedary camel herd consisting of 16 female and 2 male dromedaries. The parasite was directly identified by the buffy coat technique (BCT) in 7 (39%) of the camels and by the indirect ELISA in (83%) of them. It is a well-known fact that *T. evansi* is intermittently excreted into the circulating system of a camel and therefore an infection can be easily missed when only parasite detection techniques are applied for the diagnosis of surra. Recurring episodes of parasitaemia occur regularly during the course of the disease. Identification of the agent and a serological test was therefore used in this camel herd. The indirect antibody ELISA identified more than 50% of the infected dromedaries compared to BCT: 7 with BCT, 15 with i-ELISA. According to the OIE (2018) several tools should be used to diagnose a *T. evansi* infection which include serological tests as well as tests for the identification of the parasite. At CVRL, the BCT and i-ELISA are regularly used in parallel as they give the most reliable results for the diagnosis of surra.

Using the recommended doses by the producing company, Cymelarsan had no effect on the eradication of the *T. evansi* infection of this dromedary herd. Blood test after the treatment showed that the antibody levels had further increased as shown by the OD values and that in 4 camels the parasite was still detectable. In a Part II we will report about the outcome of the infection when another *Trypanosomal* drug is used.

Conclusion

Typanosoma evansi abortion in the dromedary camel is common and the diagnosis of surra cannot be made on haematological grounds. Recurring episodes of parasitaemia occur and therefore only direct and indirect tests can identify all infected camels. At CVRL, the buffy coat technique (BCT) and an indirect antibody ELISA are routinely used to diagnose surra in dromedary camels.

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