A serological survey of African horse sickness in Botswana

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ABSTRACT

A retrospective serological survey of African horse sickness (AHS) in Botswana covering a 10-year period (1995–2004) is reported. The survey involved horses showing clinical symptoms of the disease; the horses had not been vaccinated against AHS. Over the period surveyed, serological evidence suggestive of infection with AHS virus (AHSV) was found in 99 clinical cases out of which 41.4 % (41/99) cases were found during the 1st half (1995–1999) and 58.6 % (58/99) cases were found in the 2nd half of the survey period (2000–2004). These serological findings are discussed in relation to AHSV serotypes isolated from diseased horses in Botswana before and during the period of this serological survey.

Key words: African horse sickness (AHS), AHS virus serotypes, Botswana, *Culicoides* midges, serological survey.

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INTRODUCTION

African horse sickness (AHS) is a non-contagious, insect-borne disease primarily of equine animals caused by a virus classified in the genus *Orbivirus* in the family *Reoviridae*. Biting midges, particularly *Culicoides imicola,* are the main vectors responsible for transmission of AHS virus (AHSV) in Africa[4]. There are 9 serotypes of the virus, designated as AHSV-1, 2, 3, 4, 5, 6, 7, 8 and 9. Serotypes 1–8 are all highly pathogenic, but serotype 9 is slightly less pathogenic[4,5]. Antisera that neutralise homologous serotypes can cross-neutralise heterologous serotypes. There are, for example, cross-neutralisation reactions between serotype 1 and 2, 3 and 7, 5 and 8 and 6 and 9[4].

Among equids, horses (*Equus caballus*) are most susceptible to the disease (mortality rate between 70–95 %), while mules are less so (mortality rate between 50–70 %). Donkeys (*Equus asinus*) and plains zebras (*Equus burchelli*) are very resistant; most infections being subclinical[1]. Generally, horses of all breeds are equally susceptible to AHSV, but variation in susceptibility to the virus has been reported[5]. In addition to equids, dogs are the only other species that contract a highly fatal form of AHS after natural infection with the virus[7]. All reported clinical cases of AHS in dogs have resulted from the ingestion of infected horse meat[3,6], but they can also be infected on inoculation of virus by various routes[4]. As *Culicoides* midges do not feed readily on dogs, the role of these animals in the spread or maintenance of AHSV is doubtful.

African horse sickness is a notifiable disease in Botswana, where it occurs sporadically. In this retrospective serological survey, the AHS cases confirmed serologically over a period of 10 years (1995–2004) are presented.

MATERIALS AND METHODS

A serological survey of AHS was conducted retrospectively using 10-year diagnostic data of positive cases captured by the Botswana National Veterinary Laboratory[2]. Serum samples from the clinical cases (1–2 samples per case) were screened for antibodies to AHSV by the complement fixation test (CFT). The survey was split into 2 periods; period 1 from 1995–1999 and period 2 from 2000–2004. Total numbers of positive cases for each period were established by adding all the cases reported for the period. For each period the data were also analysed by district in order to estimate the geographical distribution of the disease. The relative frequency (RF) values for the periods and districts were calculated according to Thrusfied[8] and were expressed as a percentage.

RESULTS

A total of 99 positive cases of AHS was recorded over the 10 years (1995–2004). Out of these cases about 41 % were for the period 1995–1999 and 59 % for 2000–2004.

Tables 1 and 2 present the distribution per district of the positive AHS cases in Botswana for 1995–1999 and 2000–2004, respectively. Evidence of occurrence of the disease in horses was confirmed in 13 veterinary districts. Positive AHS cases occurred during both periods in 8 districts (Table 1). The remaining 5 districts were seemingly free of AHS or infection with AHSV during 1995–1999, but positive cases occurred ruing 2000–2004 (Table 2).

DISCUSSION

The cases examined in this survey involved horses that exhibited clinical signs consistent with AHS. The clinical stage at which the sera were taken was not specified and no paired sampling was carried out in either phase of the survey. The horses were from rural communities of Botswana and had not been vaccinated against AHSV. The antibodies detected by the CFT were probably due to exposure of the horses to field AHSV.

Table 1: **Distribution of clinical horse cases exhibiting antibodies to African horse sickness virus in Botswana for the period 1995–1999.**

District	No. of cases per year					Total cases	Relative frequency (%)
	95	96	97	98	99		
Letlhakane					1	1	2.4
Mahalapye		1			2	3	7.3
Maun	3		1		4	8	19.5
Mochudi		1	1		2	4	9.8
Molepolole				1	19	20	48.8
Selibe Phikwe				1	1	2	4.9
Serowe					1	1	2.4
Tsabong				1	1	2	4.9
Total	3	2	2	3	31	41	100

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Table 2: **Distribution of clinical horse cases exhibiting antibodies to African horse sickness virus in Botswana for the period 2000–2004.**

District	No. of cases per year					Total cases	Relative frequency (%)
	00	01	02	03	04		
Francistown	1	1				2	3.5
Ghantsi		8				8	13.8
Jwaneng					1	1	1.7
Letlhakane	2					2	3.5
Lobatse		1				1	1.7
Mahalapye	2					2	3.5
Maun		6		1		7	12.1
Mochudi					1	1	1.7
Molepolole	3	1			1	5	8.6
Selibe Phikwe					1	1	1.7
Serowe	2	1				3	5.2
Shakawe		10				10	17.2
Tsabong		15				15	25.9
Total	10	43	0	1	4	58	100

Table 3: **African horse sickness virus** (AHSV) **serotypes isolated in Botswana*.**

Year	Month	District	Virus serotype
1985	March	Gaborone	AHSV-1
2001	May	Maun	AHSV-4
2002	February	Gaborone	AHSV-2
2004	May	Jwaneng	AHSV-4

*Isolated and typed by the OIE Reference Laboratory for AHS: Onderstepoort Veterinary Institute, Pretoria, South Africa.

Virological findings recorded elsewhere[2] highlight that several AHS virus serotypes might be distributed widely in Botswana. Outbreaks of the disease in this country have so far been caused by serotypes 1, 2 and 4 (Table 3). Serotype 1, which was isolated in 1985, seems to be the 1st recorded serotype of AHSV isolated in Botswana. The outbreaks of AHS in Botswana occurred during the autumn and early winter months[2]; the climatic conditions during these months consist of fairly warm temperatures and scattered rains, which are favourable breeding conditions for the *Culicoides* midges[4].

Onderstepoort Biological Products, South Africa, produces 2 polyvalent vaccines containing attenuated AHSV strains: one contains serotypes 1, 3 and 4 and the other serotypes 2, 6, 7 and 8. A course of immunisation consists of the administration of these vaccines 3 weeks apart. Serotypes 5 and 9 are not included in the vaccines because they are very rare in southern Africa; serotype 6 confers adequate cross-protection to these 2 serotypes. It is recommended that such vaccines be used to immunise horses in Botswana in those districts where evidence of occurrence of the disease as indicated by clinical, serological and/or virological diagnosis has been obtained. Vaccination should preferably be done in mid-summer in order to protect the horses against the virus, which they are most likely to acquire in autumn or early winter as a result of increased density of *Culicoides* midges[4].

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