

Notes on Serological Tests carried out on Equine Species Infected with Dourine.

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THE complement fixation test has been used for the diagnosis of dourine in equines in South Africa for the last twenty years. At first it was used on quite a small scale, mainly to get some idea of the distribution of the disease and it was found that infection was widespread in the North Western Cape Province and the adjoining portions of the Transvaal and Orange Free State. During the early years of the decade from 1930 to 1940 an attempt was made to eradicate the disease from some of these areas, but on quite a limited scale, involving however, some thousands of tests. The campaign had to be given up owing to indifference on the part of farmers and in some cases active opposition. It has not been renewed up to date as there is very little interest in horse-breeding in the areas where the disease is most prevalent, but some farmers have continued to try and keep their farms free from the disease.

In 1937 dourine was diagnosed in the Western Province where there are many progressive horse-breeders. With the co-operation of the farmers it was decided to undertake the eradication of the disease district by district. Tests on the whole equine population of two districts, Bredasdorp and Swellendam, were carried out, involving in each case about 20,000 tests, including the retests. This testing was very successful and would have been extended to other districts but for the outbreak of war which prevented any further extension on account of lack of staff.

At present we do not know the exact distribution of the disease as samples are never obtained from some areas of the country. Recently it was found that a very heavy infection existed amongst the horses of the natives in the Alice district of the Eastern Province. During the organization of the Veterinary Corps for the second world war, it was found necessary to purchase about 3,000 horses from different areas in the Union. Most of these were purchased from horsebreeding districts, particularly the North Western Cape areas. All these horses were tested for dourine as a precautionary measure and an opportunity was thus afforded of observing to what extent the animals were infected. Out of a total of 3,160 horses tested, 31 reacted, a percentage of roughly 0.98. The reactions were all controlled by testing samples in duplicate, the duplicate being tested if a sample reacted. In practically every case the reaction was strongly positive in a dilution of .05 c.c. of serum which would take it out of the class of border line or low antibody reactions. As the animals which reacted were geldings in all cases one must presume that they must have become infected before castration or that they belonged to the class of animal that becomes infected as a foal and remains infected.

GENERAL OBSERVATIONS.

During the period 1934 to 1944, large numbers of equines affected with dourine have been under observation at Onderstepoort. The great majority have been mares but a few stallions and some mules and donkeys have been included. One animal has been under observation during the whole period and has foaled several times. Her reaction to the test remained strong throughout and the mare herself was always in good condition. Altogether 95 equines have been under observation of which 55 have been adult mares. The number under observation at any one time has not exceeded 40, additions and deaths having balanced themselves out fairly well. On account of the necessity of economy during the war period, the number was reduced to about 10 and subsequently to 5. Only those animals of special interest were kept. In the two appendices at the end of this article, data are given of the history of a large number of these animals and of the tests carried out on them over a period of some years.

CONCLUSIONS.

A record is given of a large number of equine animals under observation for dourine at the Onderstepoort Laboratory, with their reactions to serological tests over a period of five years.

Mention is made of the results of field testing for dourine on a limited scale in different parts of South Africa but involving a large number of tests.

REFERENCE.

DE KOCK, G., PARKIN, B. S. and ROBINSON, E. M. (1939). Some observations on dourine. *Jl. S.A.V.M.A.*, Vol. 10, No. 2, pp. 45-55.

APPENDIX I.

Of the 95 equines mentioned as having been under observation a record is given of 84 of them. Of these the mares 20972, 20973 and 20978 were probably uninfected. Of the donkeys it is possible that some were uninfected as it has been found that donkey sera frequently give non-specific reactions. 57 of the equines were adults and 27 were foals born to some of the mares.

Of the adult equines there were only four in which a diagnosis of dourine was made at post mortem and the diagnosis was made mainly from the history during life. Many retained their condition very well, and in some cases were in very good condition. A number of the animals in good condition were killed for media production or for students anatomical work, eighteen in all.

Eight animals died of horsesickness, three from internal haemorrhage, one from gangrenous metritis, one from pleuritis, one from impaction, one from dystokia. Eight died of poverty which may have been due to dourine but some were heavily infected with worms.

Of the foals some were born dead on account of dystokia and several died in the first few days of life from conditions such as gastro-enteritis, and pneumonia. Several died of poverty and in a few cases the cause was undetermined.

In analyzing the data relating to these equines and these foals it seems likely that dourine played some part as a cause of mortality but there is no doubt that if affected animals are kept under good conditions a large proportion will remain in good condition and very few will actually show any clinical symptoms of dourine. (See Tables 1 and 2).

TABLE I.

Species.	Number.	Cause of Death.	Species.	Number.	Cause of Death.
Horse.....	20934	Septicaemia	Horse.....	21106	Dourine.
„	20935	Dourine.	„	21107	Gangrenous metritis.
„	20936	Killed. Abscessation.	„	21108	Pleuritis.
Donkey.....	20959	Killed (media).	„	21109	Killed (poverty).
„	20960	Shock.	„	21110	„
„	20961	Killed. Injury.	„	21111	Horsickness.
„	20962	Killed (media).	„	21112	Impaction.
„	21925	„	„	21113	Dystokia.
„	20963	„	„	21114	Killed (media).
„	21933	„	„	21115	„ (fracture).
Horse.....	20971	„	„	21116	„ (media).
„	20972	Horsickness.	„	21117	Internal haemorrhage
„	20973	Killed (Anatomy).	„	21118	Dourine.
„	20974	„	„	21119	Horsickness.
„	20975	Poverty.	„	21120	Killed (media).
„	20976	„	„	21121	„ (poverty).
„	20977	Horsickness.	„	21122	Poverty.
„	20978	Killed (media).	„	21593	„
„	21095	Internal haemorrhage	„	21594	Internal haemorrhage
„	21096	Horsickness.	„	21595	Horsickness.
„	21097	Still alive.	„	21596	Poverty.
„	21098	Horsickness.	„	21597	Dourine.
„	21099	Killed (media).	Donkey.....	21598	Killed (media).
„	21100	Killed (media).	„	21599	Haemorrhage.
„	21101	„	Horse.....	21927	Killed (anatomy).
„	21102	„	„	21928	„ (media).
„	21103	Killed in Extremis.	„	21929	„
„	21104	„ (media).	Horse.....	21930	Killed (fracture).
„	21105	Horsickness.			

APPENDIX II.

In table 3 in this appendix, the tests on 34 horses brought to Onderstepoort for observation on account of dourine infection are given over a period of five years. The tests were carried out at fairly regular intervals and some of the horses survived the whole period. One, 21097, is still alive today (1947) and still gives a positive reaction ten years after the first test. Two border line reactors 21100 and 21101 were killed in 1944 and were still reacting. Another mare 20934 died in 1944 and was still a strong reactor up to the date of death.

Three mares, 20972, 20973 and 20978 never gave a positive reaction and must be considered as having been uninfected. As mentioned in an article by de Kock, Parkin and Robinson (1939) one meets with certain cases where the reaction is just positive and which were called low antibody reactors.

SEROLOGICAL TESTS ON EQUINES INFECTED WITH DOURINE.

TABLE 2.

Species.	Number.	Mare.	Cause of Death.
Foal.....	22169	21099	Killed for media.
Foal.....	21903	21100	Killed. Anatomy.
Foal.....	22486	21100	Killed in extremis.
Foal.....	21247	21101	Poverty.
Foal.....	21617	21101	Poverty.
Foal.....	22198	21101	Bronchopneumonia.
Foal.....	21555	21102	Killed for media.
Foal.....	22172	21102	Killed for media.
Foal.....	21620	21104	Gastro-enteritis.
Foal.....	21606	21107	Horsesickness.
Foal.....	21218	21116	Death in dystokia.
Foal.....	21578	21116	Horsesickness.
Foal.....	21610	21117	Undetermined.
Foal.....	21616	21120	Undetermined.
Foal.....	21988	21120	Ascaris infection.
Foal.....	21561	20934	Gastro-enteritis.
Foal.....	22188	20934	Pneumonia.
Foal.....	21925	20962	Killed (media).
Foal.....	21933	20963	Killed (media).
Foal.....	22208	20963	Unknown.
Foal.....	21626	21095	Poverty.
Foal.....	21942	21095	Poverty.
Foal.....	21603	21096	Dystokia.
Foal.....	21556	21097	Killed (injury).
Foal.....	21902	21097	Killed for media.
Foal.....	63	21097	Killed for media.
Foal.....	21632	21899	Killed (fracture).

One can more easily pick these out if the antigen is not very potent and one may get considerable variation, from positive to doubtful and even to negative reactions. In the first two years of the testing the antigen was stored at 12° C. and not used after three weeks storage as was later the case, so that in the later tests the low antibody cases do not show up so well.

Where animals have been strongly positive during the first few tests they have usually remained so during the whole testing period, as exemplified by mares 20934, 20936, 21095, 21096, 21097, 21102, 21104 and 21117. Slight fluctuations occasionally occur in strongly positive animals' reactions and one may get a border-line positive or a doubtful reaction as seen in mares 21099, 21109 and 21116.

Examples of border-line or low-antibody reactors are mares 21098, 21100, 21101, 21107, 21110, 21114, 21114, 21116 and 21120. It will be noticed that from 1936 onward, those surviving rarely showed a reaction which could not be considered as definitely positive.

TABLE 3

Number.	1935.											
	4 April.	16 April.	10 May.	21 May.	23 June.	10 July.	14 Aug.	12 Sept.	9 Oct.	12 Nov.	15 Dec.	29 Dec.
20934.....	+		+++		++	+++	+++	+++	++	+++	++	+++
20935.....	+		+++		++	+++	+++	+++	++	+++	++	+++
20936.....	+		+++		++	+++	+++	+++	++	+++	++	+++
20972.....	-		-	-	-	-	-	-	-	×	-	-
20973.....	-		-	×	+	+	+	+	+	+	+	+
20978.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21095.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21096.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21097.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21098.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21099.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21100.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21101.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21102.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21103.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21104.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21105.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21106.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21107.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21108.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21109.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21110.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21111.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21112.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21113.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21114.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21115.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21116.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21117.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21118.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21119.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21120.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21121.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++
21122.....	+	+	+++		+++	+++	+++	+++	++	+++	++	+++

++ = Strong



TABLE 3. (cont.)

1936.						1937.								
12 Jan.	13 Feb.	7 May.	7 June.	24 July.	19 Oct.	3 Dec.	17 Feb.	31 Mar.	3 May.	22 June.	22 July.	8 Sept.	16 Oct.	10 Dec.
+++ +++ —	+++ +++ —	+++ +++ ×	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ ×	+ +	+ +	+ +	+ +	+ +	+ +	+ +	+ +
+++ +++ +	+++ +++ +	+++ +++ ×	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +
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+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +	+++ +++ +

++ = Strongly positive in 0.1 c.c. of Serum.

+ = Positive in 0.2 c.c. of Serum.

± = Doubtful.

- = Negative.

TABLE 3 (cont.)

1938.								1939.					1945.			
11 Feb.	22 Mar.	8 June.	29 Aug.	13 Oct.	26 Nov.	6 Jan.	24 Feb.	20 Mar.	13 May.	20 June.	29 Nov.	4 June.				
++	++		++	++	++	++	++	++	++	++	++					
++	++	+	++	++	++	×	++	++	++	+	+					
+++	+++	+++	+++	+++	+++	+++	+++	×	+	+	+					
+++	+++	+++	+++	+++	+++	+++	+++	+	+++	+++	+++	+	+			
+++	+++	+++	+++	+++	+++	+++	+++	+	+++	+++	+++	+	+			
×	+	+	+	±	+	+	+	+	+	×	×					
+	+	+	+	±	+	+	±	+	+	+	+					
+	+	+	+	±	+	+	±	+	+	+	+					
+	+	+	+	±	+	+	±	+	+	+	+					

— = Negative.

×

= = Died.