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RESEARCH COMMUNICATION

COLOSTRUM-DERIVED ANTIBODIES TO *COWDRIA RUMINANTIUM* IN THE SERUM OF CALVES AND LAMBS

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ABSTRACT

DU PLESSIS, J. L., 1984. Colostrum-derived antibodies to *Cowdria ruminantium* in the serum of calves and lambs. *Onderstepoort Journal of Veterinary Research*, 51, 275–276 (1984).

Antibodies to *Cowdria ruminantium* were detected in the serum of calves born from artificially immunized heifers, by means of the indirect fluorescent antibody test, only for as long as 4 weeks after birth. Lambs born from artificially immunized ewes, however, were still serologically positive at 8–12 weeks of age. Much higher antibody titres were recorded in the sera of ewes and their lambs than in that of heifers and their calves.

INTRODUCTION

To interpret correctly the serological findings obtained during studies on the epidemiology of heartwater, it is important to know to what extent colostral antibodies persist in the serum of newborn calves. An earlier study (Du Plessis & Bezuidenhout, 1984) indicated that colostral antibodies can be detected by means of the indirect fluorescent antibody (IFA) test in the sera of calves born to cows exposed to the tick vector, *Amblyomma hebraeum*, but not in the sera of calves born to cows not so exposed. To obtain more precise information, experiments were done to determine for how long passively acquired antibodies persist in the serum of both calves and lambs.

MATERIALS AND METHODS

Experimental animals: Twelve 18-month-old Afrikander-Simmentaler heifers and 10 year-old Merino ewes were inoculated intravenously with 10 mℓ of *Cowdria ruminantium*-infected sheep's blood, routinely issued as a vaccine by the Veterinary Research Institute, Onderstepoort. Early morning rectal temperatures of the animals were recorded and their febrile reactions placed in 4 categories as previously described (Du Plessis & Bezuidenhout, 1979). All the ewes were treated with a long-acting preparation of oxytetracycline* 3–4 days after the initial rise of the temperature, while the heifers were only treated if a temperature in excess of 40,5 °C was recorded for 3 consecutive days.

Three months later the heifers were put to the bull and 8 of them were selected for further study as soon as they were found to be pregnant. A challenge inoculation with infective sheep's blood was given 4–6 weeks before the calculated parturition date. A month later a second challenge inoculation was given to 3 of the heifers that had not yet calved. The ewes were also mated and 4 of them that were found to be pregnant were likewise challenged 50–60 days before parturition. Before and subsequent to parturition the heifers and ewes were kept free of ticks.

Serology: Serum samples were collected from the heifers and ewes on the day following parturition and from the calves and lambs at 1, 4, 8–12 and 16 weeks of age. Twofold serial dilutions of the sera were subjected to the IFA test (Du Plessis & Bezuidenhout, 1984).

RESULTS

The reactions of the heifers and ewes to the heartwater agent, both when they were initially infected and when they were challenged, are shown in Table 1. All the ewes and 5 out of 8 heifers had shown strong febrile reactions to the initial infection, but failed to react when they were challenged. It can also be seen from the Table that low levels of antibody were detected in the sera of the heifers on the day following parturition, even in the case of the 3 animals that were challenged twice before parturition. Considerably higher titres were recorded, however, in the sera of the ewes. Correspondingly higher levels of antibody were likewise detected in the serum of the lambs a week after birth than were recorded in the sera of the calves.

It is evident that there was also a correlation between the antibody levels recorded in the heifers and ewes and their offspring at the time of parturition and the persistence of detectable levels of antibody in the sera of their progeny. No antibodies could be detected in the sera of

TABLE 1 Antibodies in the serum of calves and lambs born from mothers immune to heartwater

Cow No.	Category febrile reaction at:		Interval in days between challenge and parturition	Calf No.	Reciprocals of IFA titres				
	Initial infection	Challenge			Cow/ewe at parturition	Calves/lambs weeks after birth			
						1	4	8–12	16
1	II	IV	28	1	10	10	10	—	—
2[1]	I	IV	48	2	20	10	—	—	—
3	IV	III	17	3	10	80	10	—	—
4	II	III	21	4	10	10	—	—	—
5[1]	I	IV	54	5	40	80	20	—	—
6	IV	IV	14	6	80	10	—	—	—
7[1]	IV	IV	65	7	40	20	10	—	—
8	I	IV	12	8	40	80	20	—	—
Ewe No.				Lamb No.					
1	I	IV	60	1	640	640	160	80	—
2	I	IV	50	2	1 280	320	320	80	—
3	I	IV	50	3	640	320	320	80	—
4[2]	I	IV	56	4	640	640	640	80	80
—	—	—	—	5	640	640	640	40	—

[1] Challenged a second time before parturition.
[2] Ewe No. 4 had twin lambs.

* Liquamycin/LA, Pfizer.

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the calves 8 weeks after birth, whereas lambs at that age and, in the case of one lamb, even at 16 weeks of age, were still serologically positive.

DISCUSSION

The role played by colostrum-derived serum antibodies of calves in the development of their immunity to heartwater in response to artificial immunization or infections through the tick is not known. It can be concluded with reasonable certainty, though, that these antibodies alone are not responsible for the marked resistance to artificial infection of calves under 1 month of age (Neitz & Alexander, 1941), since calves born from cows fully susceptible to heartwater are as resistant as those born from immune cows (Du Plessis, unpublished observation 1984). Furthermore, a high degree of resistance to infection has been recorded in calves up to the age of 6 months or more, although the colostrum-derived antibodies only persist for a few weeks after birth. These findings are nevertheless compatible with the concept that the immunity in heartwater is in all probability cell mediated, serum antibodies playing a minor role, if any role at all (Du Plessis, 1982).

If can be concluded from the results obtained in this experiment that in serological surveys designed to study the epidemiology of heartwater in cattle, the seropositivity of calves older than 3 months of age can be attributed to natural tick infection rather than to passively transferred colostral antibodies.

REFERENCES

DU PLESSIS, J. L. & BEZUIDENHOUT, J. D., 1979. Investigations on the natural and acquired resistance of cattle to artificial infection with *cowdria ruminantium*. *Journal of the South African Veterinary Association*, 50, 334–338.

DU PLESSIS, J. L., 1982. Mice infected with a *Cowdria ruminantium* like agent as a model in the study of heartwater. D.V.Sc. thesis, University of Pretoria.

DU PLESSIS, J. L. & BEZUIDENHOUT, J. D., 1984. The immunization of calves against heartwater: Subsequent immunity in the absence and presence of natural tick challenge. *Onderstepoort Journal of Veterinary Research*, 51, 193–196.

NEITZ, W. O. & ALEXANDER, R. A., 1941. The immunization of calves against heartwater. *Journal of the South African Veterinary Medical association*, 12, 103–111.

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