

RESEARCH COMMUNICATION

SEROLOGICAL REACTIONS TO *LEPTOSPIRA* SPECIES IN GAME ANIMALS OF NORTHERN NATAL

PAMELA HUNTER, J. R. B. FLAMAND⁽¹⁾, J. MYBURGH and SANETTE M. VAN DER MERWE, Veterinary Research Institute, Onderstepoort 0110

ABSTRACT

HUNTER, PAMELA., FLAMAND, J. R. B., MYBURGH, J. & VAN DER MERWE; SANETTE M., 1988. Serological reactions to *Leptospira* species in game animals of northern Natal. *Onderstepoort Journal of Veterinary Research*, 55, 191-192 (1988).

Fifty sera collected from 12 different species of free-living game animals in game parks in the Northern Natal were tested against 8 *Leptospira interrogans* antigens using the microscopic agglutination test (MAT). Six out of 50 animals had titres, all less than 100. Three of these animals had titres to serovar *mini*, 1 animal to *tarrasovi*, and 3 animals had multi-serovar reactions, 1 to *mini* and *hardjo*, and 1 to *tarrasovi*, *copenhageni* and *pomona*.

INTRODUCTION

Leptospira infections in South Africa are seen mainly in pigs, in which *L. pomona* is the most important serovar (Hunter, Van der Vyfer, Selmer-Olsen, Henton, Herr & De Lange, 1987) and cattle in which *L. hardjo* (Te Brugge & Dryer, 1985) and *L. pomona* (Herr, Riley, Naser, Roux & De Lange, 1982) are the most important serovars.

Sporadic human cases involving *L. copenhageni* (*icterohaemorrhagiae*) (Gear & Wolstenholme, 1958; Maze & Kirch, 1981) are seen where the source has been rats, or *L. canicola* (Gear & Wolstenholme, 1958) and *L. pomona* (Hunter & Oetlé, unpublished 1985), where the source has been dogs and pigs respectively.

Investigation of abortion problems on cattle farms reveals that the major problems are *L. hardjo* (Te Brugge & Dreyer, 1985) and *L. pomona* (Herr *et al.*, 1982). Serological titres to *L. mini* and *L. tarrasovi* are frequently seen in herds in certain areas of the country, namely Natal, eastern Transvaal and northern Natal (Herr, personal communication 1983). *L. mini* was isolated from a bovine abortion case at Soutpan Nature Reserve near Pretoria (Herr, unpublished 1984). Serological evidence of *L. tarrasovi* has been found in up to 5.3% of cattle in the USA (Lauerman, Kiser & Long, 1983) in the absence of clinical disease or positive isolation from urine samples.

The epidemiology of leptospirosis with regard to the role played by wild animals has not been fully investigated in South Africa, and speculation therefore arose to the transmission of *L. tarrasovi* and *mini* by wildlife

species. Shepherd & Leman (1985) were unable to isolate leptospires from wild rodents collected in various regions of the RSA, although these were collected mainly in drier parts of the country where leptospirosis is less prevalent.

It was decided to investigate serological reactions in free-living game species which had had no contact with domestic animals, in order to determine whether any specific species served as a reservoir of leptospirosis for domestic animals.

MATERIALS AND METHODS

Serum was collected from game animals during culling operations and stored until they could be tested at -20°C .

The sera were tested using the microscopic agglutination micro-volume technique of Sulzer & Jones (1978) using the following antigens: *tarrasovi* (hyos), *mini* (szwajizak), *pomona*, *copenhageni* (icterohaemorrhagiae), *canicola grippotyphosa*, *hardjo* and *pyrogenes*.

Antigens were grown on liquid EMJH medium and used between 4-14 days when the growth of the leptospires exceeded 2×10^7 organisms per ml (Sulzer & Jones, 1978). Titres are expressed throughout as a reciprocal of the endpoint dilutions.

RESULTS

Fifty sera representing 11 different game species were tested and of these six animals had serological reactions. Table 1 sets out the species tested and the serological reactions recorded.

TABLE 1 Serological reactions to *Leptospira* sp. in various game species

Species	No. tested	Positive	Serovar	Antibody titre
Impala (<i>Aepyceros melampus</i>)	9	0		—
Nyala (<i>Tragelaphus angasii</i>)	17	1	<i>tarrasovi</i>	40
Black rhino (<i>Diceros bicornis</i>)	5	2	<i>mini/hardjo</i> <i>tarrasovi</i>	80/40/80
Red duiker (<i>Cephalophus natalensis</i>)	5	0		
Lion (<i>Panthera leo</i>)	4	0		
Reedbuck (<i>Redunca</i> sp.)	2	1	<i>mini</i>	80
Bushpig (<i>Potamochoerus porcus</i>)	2	1	<i>mini</i>	80
Buffalo (<i>Syncerus caffer</i>)	2	0		
Hyaena (<i>Crocuta crocuta</i>)	1	0		
Waterbuck (<i>Kobus ellipsiprymnus</i>)	1	0		
Black wildebeest (<i>Connochaetes gnou</i>)	1	1	<i>mini</i>	80
Warthog (<i>Phacochoerus aethiopicus</i>)	1	0		

⁽¹⁾ Natal Parks Game and Fish Preservation Board

DISCUSSION

The occurrence of titres to *L. tarrasovi* and *L. mini* in free-living species, although in a small sample of the population, may indicate that these species are being exposed to leptospira species under natural conditions.

The low titres recorded (all less than 100) point to carrier states or low grade exposure to the leptospira species involved, which are all potential pathogens. It is interesting to note that the species showing titres were all water frequenting (Smithers, 1983). The role of wet environments in aiding the survival of leptospira species has been demonstrated and reviewed by various authors (Henry & Johnson, 1978; Kirschner & Maguire, 1957; Gordon-Smith & Turner, 1961). *L. tarrasovi* has been recorded from an amphibian *Bufo marinus*, a toad on the Caribbean island of Grenada (Everard, Sulzer, Blagwandin, Fraser-Champong & James, 1980), and a turtle *Pseudemys* sp. (Sulzer, 1975) in Alabama, U.S.A. In the latter case it was thought that the *Pseudemys* turtles which occur along the rivers and waterways of Alabama may be the source of infection for the cattle in this area (Lauerman *et al.*, 1983) which became serologically positive but from which no organisms could be isolated.

L. mini isolates have been made from a variety of wild species on various continents; mice and field voles in Europe, hedgehog (Israel), racoon and skunk from N. America and opossum from S. America (Van der Hoeden, 1964).

The serological reactions in game to *L. mini* and *L. tarrasovi* seen in the Transvaal and Natal, may therefore be the result of exposure to these leptospira species via free-living animals. However, more epidemiological data are necessary and isolations should be attempted from various free-living species from these areas.

REFERENCES

EVERARD, C. O. R., SULZER, C. R., BLAGWANDIN, L. J., FRASER-CHAMPONG, G. M. & JAMES A. C., 1980. Pathogenic leptospira isolates from the Caribbean islands of Trinidad, Grenada and St. Vincent. *International Journal of Zoonoses*, 7, 90-100.

GEAR, J. & WOLSTENHOLME, B., 1958. Leptospirosis in South Africa. *South African Medical Journal*, 94-100.

GORDON-SMITH, C. E. & TURNER, L. H., 1961. The effect of pH on the survival of leptospira in water. *Bulletin of World Health Organisation*, 24, 35-43.

HENRY, R. A. & JOHNSON, R. C., 1978. Distribution of the genus *Leptospira* in soil and water. *Applied and Environmental Microbiology*, 35, 492-499.

HERR, S., RILEY, A. E., NESER, J. A., ROUX, D. & DE LANGE, J. F., 1982. *Leptospira interrogans* serovar *pomona* associated with abortion in cattle: isolation methods and laboratory animal histopathology. *Onderstepoort Journal of Veterinary Research*, 49, 57-62.

HUNTER, P., VAN DER VYVER, F. H., SELMER-OLSEN, ANNE, HENTON, MARYKE M., HERR, S. & DE LANGE, J. F., 1987. Leptospirosis as a cause of "white-spot" kidneys in South African pig abattoirs. *Onderstepoort Journal of Veterinary Research*, 54, 59-62.

KIRSCHNER, L. & MAGUIRE, T., 1957. Survival of *Leptospira* outside their hosts. *New Zealand Medical Journal*, 56, 385-391.

LAUERMAN, L. H., KISER, D. D. & LONG, I. R., 1983. *Leptospira tarrasovi* in Alabama cattle: serologic evidence. *Proceedings of 87th Annual Meeting of U.S. Animal Health Association*, 193-196.

MAZE, S. S. & KIRSCH, R. E., 1981. Leptospirosis experience at Grootte Schuur 1967-1979. *South African Medical Journal*, 59, 33-36.

SHEPHERD, A. J. & LEMAN, P. A., 1985. Bacterial surveillance of South African rodents. *South African Journal of Science*, 81, 302-308.

SMITHERS, R. H. N., 1983. The mammals of the Southern African sub-region. Published by University of Pretoria, Pretoria, Transvaal, South Africa.

SULZER, C. R., 1975. Leptospiral serotype distribution lists according to host and geographic area. United States, Department of Health Education and Welfare, Center for Disease Control, Atlanta, Georgia. 1966-1973.

SULZER, C. R. & JONES, W. L., 1978. Leptospirosis: methods in laboratory diagnosis. Revised edition. United States Department of Health, Education and Welfare, Center for Disease Control. Atlanta, Georgia.

TE BRUGGE, LESLEY A. & DREYER, T., 1985. *Leptospira interrogans* serovar *hardjo* associated with bovine abortion in South Africa. *Onderstepoort Journal of Veterinary Research*, 52, 51-52.

VAN DER HOEDEN, J. (ed.), 1964. Zoonoses. Amsterdam Elsevier.