

## PARASITES OF DOMESTIC AND WILD ANIMALS IN SOUTH AFRICA. XXIV. ARTHROPOD PARASITES OF BUSHBUCK AND COMMON DUIKER IN THE WEZA STATE FOREST, NATAL

I. G. HORAK<sup>(1)</sup>, M. E. KEEP<sup>(2)</sup>, A. M. SPICKETT<sup>(3)</sup> and J. BOOMKER<sup>(4)</sup>

### ABSTRACT

HORAK, I. G., KEEP, M. E., SPICKETT, A. M. & BOOMKER, J., 1989. Parasites of domestic and wild animals in South Africa. XXIV. Arthropod parasites of bushbuck and common duiker in the Weza State Forest, Natal. *Onderstepoort Journal of Veterinary Research*, 56, 63-66 (1989)

One bushbuck, *Tragelaphus scriptus*, and 1 common duiker, *Sylvicapra grimmia*, were shot each month from May 1983 to May 1984 in the Weza State Forest, Natal, i.e. a total of 13 animals of each species. The bushbuck were infested with 8 ixodid tick species, 2 louse species and a louse-fly species. The common duiker harboured 7 tick species and 2 louse species.

Ticks of the genus *Ixodes* were the most numerous and prevalent on both antelope species, but no pattern of seasonal abundance was evident. Although only small numbers were recovered, adult *Haemaphysalis aciculifer* were present from September to February, nymphs of *Rhipicephalus appendiculatus* from May to September, and adult *Rhipicephalus lunulatus* from December to March. The louse-fly, *Lipoptena paradoxa*, was recovered from some of the bushbuck from October to May.

### INTRODUCTION

The distribution, habitats, habits and food preferences of bushbuck, *Tragelaphus scriptus*, and of common duiker, *Sylvicapra grimmia*, have been summarized and commented upon by Boomker, Keep & Horak (1987) and Boomker, Du Plessis & Boomker (1983) respectively.

The ixodid ticks of these animals in countries outside the Republic of South Africa have been recorded by Theiler (1962), Yeoman & Walker (1967) and Walker (1974). Those occurring in South Africa are listed by Theiler (1962) and Baker & Keep (1970), while Horak, Potgieter, Walker, De Vos & Boomker (1983) and Boomker *et al.* (1983) have determined the actual tick burdens of both species in the Transvaal.

The lice recovered from bushbuck and common duiker have been listed by Ledger (1980) and the flies by Haeselbarth, Segerman & Zumpt (1966). The louse and louse-fly burdens of common duiker have been determined by Boomker *et al.* (1983).

Allen-Rowlandson (1986) required freshly-killed bushbuck and common duiker for his study of these species within the Weza forestry areas of Natal. During the later part of his project, material for parasitological investigation was collected and the present paper records the arthropod parasite burdens of 13 animals of each species. The helminth burdens of these animals have been reported in a separate paper (Boomker *et al.*, 1987).

### MATERIALS AND METHODS

#### Study site

The physiography of the Weza State Forest (30° 35' S; 24° 45' E), Alfred District of Natal, in which the animals were collected, has been described by Boomker *et al.* (1987).

#### Survey animals

One bushbuck and 1 common duiker were shot at night each month for 13 consecutive months from

May 1983 to May 1984. Eleven adults and 2 sub-adults of each species were shot. These comprised 7 male and 6 female bushbuck and 8 male and 5 female duiker.

#### Parasite recovery

Immediately after slaughter the skins of the animals were processed for arthropod parasite recovery as described by Horak, Meltzer & De Vos (1982). The ectoparasite burdens of the animals were determined as described by Horak *et al.* (1983).

### RESULTS

#### Bushbuck

The total numbers of arthropod parasites recovered from the 13 animals examined are summarized in Table 1.

The bushbuck were infested with 8 ixodid tick species, 2 louse species and a louse-fly species. Small numbers of adult *Haemaphysalis aciculifer* were recovered from each animal examined from September 1983 to February 1984. Ticks of the genus *Ixodes* were the most numerous and all animals were infested, but no pattern of seasonal abundance was evident. Three of the 5 antelope examined between December 1983 and April 1984 each harboured 2 adult *Rhipicephalus follis*, while the 3 animals examined between December and February were each infested with adult *Rhipicephalus lunulatus*. Six of the 8 antelope examined between October 1983 and May 1984 harboured the louse-fly *Lipoptena paradoxa*.

#### Common Duiker

Table 2 summarizes the total numbers of arthropod parasites recovered from the 13 antelope examined.

The duiker harboured 7 ixodid tick species and 2 species of lice. The 3 animals examined between November 1983 and January 1984 were each infested with adult *H. aciculifer*. Although ticks of the genus *Ixodes* were the most numerous no pattern of seasonal abundance was evident. Each of the animals examined from May to September 1983 was infested with 2-4 nymphs of *Rhipicephalus appendiculatus*. Only the animal shot during March 1984 was infested with adult *R. lunulatus*.

### DISCUSSION

#### Ixodid ticks

The bushbuck harboured more ticks of each species than did the duikers. In total they carried approximately 8 times more larvae, twice as many nymphs and 10 times

<sup>(1)</sup> Tick Research Unit, Rhodes University, Grahamstown 6140. Present address: Department of Parasitology, Faculty of Veterinary Science, University of Pretoria, Onderstepoort 0110

<sup>(2)</sup> Natal Parks Board, P.O. Box 662, Pietermaritzburg 3200

<sup>(3)</sup> Veterinary Research Institute, Onderstepoort 0110

<sup>(4)</sup> Faculty of Veterinary Science, Medical University of Southern Africa, Medunsa 0204

Received 5 December 1988—Editor

TABLE 1 Arthropod parasites recovered from 13 bushbuck from the Weza State Forest, Natal

Arthropod species	Total numbers of arthropods recovered					Number of animals infested
	Larvae	Nymphs	♂♂	♀♀	Total	
Ixodid ticks						
<i>Boophilus decoloratus</i>	70	0	2	0	72	4
<i>Haemaphysalis aciculifer</i>	0	0	58	16	74	6
<i>Ixodes</i> spp.	42 502	4 568	—	—	47 070	13
<i>Ixodes pilosus</i>	—	—	212	978	1 190	13
<i>Ixodes</i> sp. (near <i>I. pilosus</i> )	—	—	64	930	994	12
<i>Rhipicephalus appendiculatus</i>	26	4	0	0	30	2
<i>Rhipicephalus evertsi evertsi</i>	788	120	0	0	908	9
<i>Rhipicephalus follis</i>	0	0	4	2	6	3
<i>Rhipicephalus lunulatus</i>	0	0	18	14	32	3
Total	43 386	4 692	358	1 940	50 376	
Lice	Nymphs		Adults		Total	
<i>Damalania natalensis</i>	150		112		262	6
<i>Linognathus panamensis</i>	216		142		358	10
Total	382		258		640	
Flies	Adults				Total	
<i>Lipoptena paradoxa</i>	156				156	6

TABLE 2 Arthropod parasites recovered from 13 common duiker from the Weza State Forest, Natal

Arthropod species	Total numbers of arthropods recovered					Number of animals infested
	Larvae	Nymphs	♂♂	♀♀	Total	
Ixodid ticks						
<i>Boophilus</i> sp.	12	2	0	0	14	4
<i>Haemaphysalis aciculifer</i>	0	2	6	4	12	4
<i>Ixodes</i> spp.	5 370	2 140	—	—	7 510	13
<i>Ixodes pilosus</i>	—	—	21	124	145	12
<i>Ixodes</i> sp. (near <i>I. pilosus</i> )	—	—	15	58	73	10
<i>Rhipicephalus appendiculatus</i>	6	14	0	0	20	6
<i>Rhipicephalus evertsi evertsi</i>	92	20	0	0	112	9
<i>Rhipicephalus lunulatus</i>	0	0	2	0	2	1
Total	5 480	2 178	44	186	7 888	
Lice	Nymphs		Adults		Total	
<i>Damalania</i> sp.	22		26		48	2
<i>Linognathus breviceps</i> -complex	30		50		80	8
Total	52		76		128	

more adults. MacLeod, Colbo, Madbouly & Mwanaumo (1977) have stated that the larger the host the more adult ticks it seems likely to carry. This is confirmed by the observations of Horak & Knight (1986) and Horak, Sheppey, Knight & Beuthin (1986). They determined the total tick burdens of various sympatric host species and found that, with some exceptions, the larger the animal species the better host it is, particularly for the adults.

***Boophilus decoloratus***

Horak *et al.* (1983) found that in habitats in which *B. decoloratus* abounds, such as the Kruger National Park, bushbuck are good hosts of this tick. The small number of ticks recovered from these animals in the present survey therefore probably indicates an unfavourable habitat. *B. decoloratus* prefers open grassland or savanna with an annual rainfall above 380 mm (Howell, Walker & Nevill, 1978), whereas the study area comprises mountain grassland (27%), indigenous forest (19%) and plantations of exotic trees (54%) (Boomker *et al.*, 1987). The bushbuck and duiker examined in this study were shot in forested regions with variable grass cover depending upon the size of the trees. However, as only small numbers of *B. decoloratus* have been recovered from common duiker examined in a habitat suitable for the blue tick (Boomker *et al.*, 1983), duiker are in any event probably not good hosts for this species.

***Haemaphysalis aciculifer***

Hoogstraal & El Kammah (1972) have recorded bushbuck as a host of this tick in Uganda, Kenya and Tanzania and common duiker in Kenya. Walker (1974) also lists bushbuck and common duiker as hosts in Kenya. Its recovery from these animals in the Weza State Forest confirms the observation of Horak *et al.* (1986) that it has a wider distribution in South Africa than is given by Theiler (1962). Norval (1985) notes that the 7 collections made in Zimbabwe were all from animals in woodland or wooded grassland habitats on the high rainfall, highveld plateau. These collections, which consisted only of adults, were all made from November to January. In the south-western Cape Province Horak *et al.* (1986) recovered small numbers of adult ticks from grey rhebuck (*Pelea capreolus*) and bontebok (*Damaliscus dorcas dorcas*) from August to February. In the present survey adults were recovered from September to February.

***Ixodes pilosus***

We have assumed that the immature stages of this tick and those of the other *Ixodes* species recovered are indistinguishable, hence they are lumped under *Ixodes* spp. in the tables. *I. pilosus* is found in sourveld areas along the coast from Port Shepstone in Natal to Cape Town in the western Cape Province (Howell *et al.*, 1978). A total of 29 males and 102 females (a ratio of

1:3,5) were recovered by Norval (1974) from bushbuck and duiker in the eastern Cape Province. Horak, Jacot Guillarmod, Moolman & De Vos (1987) recovered 38 males and 130 females (a ratio of 1:3,4) from dogs and only 1 male and 39 females from caracals (*Felis caracal*) in the same region, while Horak *et al.* (1986) recovered 63 males and 205 females (a ratio of 1:3,3) from bontebok, grey rhebuck and scrub hares (*Lepus saxatilis*) in the south-western Cape Province. The animals from the Weza forest harboured a total of 233 males and 1 102 females (a ratio of 1:4,7). Norval (1974) suggests that these ratios indicate that mating may occur either on the host or on the ground.

Although no pattern of seasonal abundance was obvious in the present survey, Horak *et al.* (1986, 1987) found that in the south-western and eastern Cape Province the larvae peak in June and the nymphs in August, while the adults may peak from October to December or January to May. They suggested that only one life cycle was completed annually.

#### *Ixodes* sp.

These ticks resemble *I. pilosus*, but show definite palpal, coxal and setal differences and they probably represent a new species. One of us (A.M.S.) examined the *Ixodes* sp. collected from 2 blue duikers (*Cephalophus monticola*) during the National Tick Survey in Zimbabwe (Norval, Spickett & Clifford, 1987) and considers them to be identical to those collected in the present survey. No pattern of seasonal abundance is evident and the ratio of males to females is 1:12,5.

#### *Rhipicephalus appendiculatus*

Horak *et al.* (1983) and Boomker *et al.* (1983) recovered fair numbers of larvae and nymphs, but few adults, from bushbuck and common duiker examined in the Transvaal. None of those bushbuck were examined during late summer, the season of peak adult abundance, while some of the duiker were. The infestation at Weza was possibly maintained by cattle and goats which occasionally stray into the forest from surrounding farms (Boomker *et al.*, 1987). The period during which the nymphs were present (May–September) was slightly shorter than that of the peak nymphal abundance (April–October) observed by Knight & Rechav (1978) and Rechav (1982) on kudu (*Tragelaphus strepsiceros*), goats and cattle in the eastern Cape Province.

#### *Rhipicephalus evertsi evertsi*

Although no adult ticks were recovered this species was probably maintained by the mules and horses used as transport animals in the forest (Boomker *et al.*, 1987). Equids are the preferred hosts of this tick (Hoogstraal, 1956; Norval, 1981).

#### *Rhipicephalus follis*

The description of the male of *R. follis* by Theiler (1947) and the original illustrations by Dönitz (1910) were used to identify this species. The descriptions given under this name by Theiler & Robinson (1953) and the accompanying illustrations by D. Pringle are now thought to refer to another species. Theiler (1947) suggests that domestic stock are hosts of this tick. Although only very small numbers of adult ticks were recovered from the bushbuck these were present from December to April.

#### *Rhipicephalus lunulatus*

There has been considerable confusion in the past between this species and *Rhipicephalus tricuspis* (Walker, Keirans, Pegram & Clifford, 1988), but these authors have recently published redescriptions of both species,

listed their host associations and illustrated their geographic distributions.

Norval & Tebele (1983) state that *R. lunulatus* is widely distributed in Zimbabwe in woodland or woodland/savanna habitats which receive 550–1 200 mm of rain per annum. Amongst the collections of adult ticks in that country, the majority of which were made from November to January, there is one from a common duiker. Colborne (1985) recovered adults from cattle in Zimbabwe from November to May. The preferred sites of attachment were the legs and tail. In the present study adult ticks were present from December to March and all but 2 were recovered from the lower legs of the bushbuck or duiker.

#### Lice

Both *Damalinia natalensis* and *Linognathus panamensis* are specific parasites of bushbuck (Ledger, 1980). The *Damalinia* sp. on the duiker could not be specifically identified, while the *Linognathus* sp. on this host belonged to the *Linognathus breviceps*-complex as discussed by Ferris (1932). Boomker *et al.* (1983) have recovered small numbers of *Damalinia lerouxi*, *L. breviceps* and *Linognathus zumpti zumpti* from common duikers in the central Transvaal. The lice burdens were never large on either of the antelope species and no patterns of seasonal abundance could be ascertained.

#### Flies

The louse-fly, *L. paradoxa*, has a wide host range among the antelope and many species that browse are infested (Haeselbarth *et al.*, 1966). Although some of the bushbuck in the present survey were infested none of the duikers were. This contrasts with the findings of Boomker *et al.* (1983), who recovered *L. paradoxa* from 12 of the 16 duikers they examined. In the present survey the flies were only recovered from October to May and then not from all the bushbuck examined during this period.

#### ACKNOWLEDGEMENTS

We wish to thank the Directorate of Forestry, Department of Environmental Affairs, for placing the animals at our disposal. We are also grateful to Dr T. S. Allen-Rowlandson, during whose project the animals were collected and who also assisted with the collection of parasites. The technical assistance of Mrs Valerie A. Horak is gratefully acknowledged. We are also indebted to Dr Jane B. Walker for confirming the identities of *R. follis* and *R. lunulatus* and for supplying the appropriate references and to Dr E. M. Nevill for confirming that of *L. paradoxa* and assisting with the identification of the lice.

This research was funded by the Council for Scientific and Industrial Research, the Meat Board and Rhodes University.

#### REFERENCES

- ALLEN-ROWLANDSON, T. S., 1986. An autecological study of the bushbuck *Tragelaphus scriptus* and grey duiker *Sylvicapra grimmia* in relation to forest management in the Weza State Forest, Natal. Ph.D. thesis, University of Natal, Pietermaritzburg.
- BAKER, MAUREEN K. & KEEP, M. E., 1970. Checklist of the ticks found on the larger game animals in the Natal game reserves. *Lammergeyer*, 12, 41–47.
- BOOMKER, J., DU PLESSIS, W. H. & BOOMKER, ELIZABETH A., 1983. Some helminth and arthropod parasites of the grey duiker, *Sylvicapra grimmia*. *Onderstepoort Journal of Veterinary Research*, 50, 233–241.
- BOOMKER, J., KEEP, M. E. & HORAK, I. G., 1987. Parasites of South African wildlife. I. Helminths of bushbuck, *Tragelaphus scriptus*, and grey duiker, *Sylvicapra grimmia*, from the Weza State Forest, Natal. *Onderstepoort Journal of Veterinary Research*, 54, 131–134.

- COLBORNE, J., 1985. The life cycle of *Rhipicephalus lunulatus* Neumann, 1907 (Acarina: Ixodidae) under laboratory conditions, with notes on its ecology in Zimbabwe. *Experimental and Applied Acarology*, 1, 317–325.
- DÖNTZ, W., 1910. Die Zecken Südafrikas. In: SCHULTZE, L. Zoologische und anthropologische Ergebnisse einer Forschungsreise im westlichen und zentralen Südafrika ausgeführt in den Jahren 1903–1905, 4, 3 Lieferung. *Denkschriften der Medizinisch-Naturwissenschaftlichen Gesellschaft zu Jena*, 16, 398–494 + 4 plates.
- FERRIS, G. F., 1932. Contributions toward a monograph of the sucking lice. Part V. California: Stanford University Press.
- HAESSELBARTH, E., SEGERMAN, J. & ZUMPT, F., 1966. The arthropod parasites of vertebrates in Africa south of the Sahara. Vol. III. (Insecta excl. Phthiraptera). Publication No. 52 of the South African Institute for Medical Research, Johannesburg.
- HOOGSTRAAL, H., 1956. African Ixodoidea. I. Ticks of the Sudan (with special reference to Equatoria Province and with preliminary reviews of the genera *Boophilus*, *Margaropus* and *Hyalomma*). Department of the Navy, Bureau of Medicine and Surgery, Washington D.C. 1101 pp.
- HOOGSTRAAL, H. & EL KAMMAH, K. M., 1972. Notes on African *Haemaphysalis* ticks. X. *H. (Kaiseriana) aciculifer* Warburton and *H. (K.) rugosa* Santos Dias, the African representatives of the *spinigera* subgroup (Ixodoidea: Ixodidae). *Journal of Parasitology*, 58, 960–978.
- HORAK, I. G., MELTZER, D. G. A. & DE VOS, V., 1982. Helminth and arthropod parasites of springbok, *Antidorcas marsupialis*, in the Transvaal and western Cape Province. *Onderstepoort Journal of Veterinary Research*, 49, 7–10.
- HORAK, I. G., POTGIETER, F. T., WALKER, JANE B., DE VOS, V. & BOOMKER, J., 1983. The ixodid tick burdens of various large ruminant species in South African nature reserves. *Onderstepoort Journal of Veterinary Research*, 50, 221–228.
- HORAK, I. G., SHEPPEY, K., KNIGHT, M. M. & BEUTHIN, C. L., 1986. Parasites of domestic and wild animals in South Africa. XXI. Arthropod parasites of vaal ribbok, bontebok and scrub hares in the western Cape Province. *Onderstepoort Journal of Veterinary Research*, 53, 187–197.
- HORAK, I. G. & KNIGHT, M. M., 1986. A comparison of the tick burdens of wild animals in a nature reserve and on an adjacent farm where tick control is practised. *Journal of the South African Veterinary Association*, 57, 199–203.
- HORAK, I. G., JACOT GUILLARMOD, AMY, MOOLMAN, L. C. & DE VOS, V., 1987. Parasites of domestic and wild animals in South Africa. XXII. Ixodid ticks on domestic dogs and on wild carnivores. *Onderstepoort Journal of Veterinary Research*, 54, 573–580.
- HOWELL, C. J., WALKER, JANE B. & NEVILL, E. M., 1978. Ticks, mites and insects infesting domestic animals in South Africa. Part I. Descriptions and biology. Department of Agricultural Technical Services, Republic of South Africa, Science Bulletin No. 393, v + 69 pp.
- KNIGHT, M. M. & RECHAV, Y., 1978. Ticks associated with kudu in the eastern Cape Province: Preliminary report. *Journal of the South African Veterinary Association*, 49, 343–344.
- LEDGER, J. A., 1980. The arthropod parasites of vertebrates in Africa south of the Sahara. Volume IV. Phthiraptera (Insecta). Publication No. 56 of the South African Institute for Medical Research, Johannesburg.
- MACLEOD, J., COLBO, M. H., MADBOULY, J. H. & MWANAUMO, B., 1977. Ecological studies of ixodid ticks (Acari: Ixodidae) in Zambia. III. Seasonal activity and attachment sites on cattle, with notes on other hosts. *Bulletin of Entomological Research*, 67, 161–173.
- NORVAL, R. A. I., 1974. Copulation and feeding in males of *Ixodes pilosus* Koch 1844 (Acarina: Ixodidae). *Journal of the Entomological Society of Southern Africa*, 37, 129–133.
- NORVAL, R. A. I., 1981. The ticks of Zimbabwe. III. *Rhipicephalus evertsi evertsi*. *Zimbabwe Veterinary Journal*, 12, 31–35.
- NORVAL, R. A. I. & TEBELE, NTANDO, 1983. The ticks of Zimbabwe. V. *Rhipicephalus lunulatus* and *Rhipicephalus tricuspis*. *Zimbabwe Veterinary Journal*, 13, 34–37.
- NORVAL, R. A. I., 1985. The ticks of Zimbabwe. XIV. The lesser known *Haemaphysalis* species. *Zimbabwe Veterinary Journal*, 16, 54–59.
- NORVAL, R. A. I., SPICKETT, A. M. & CLIFFORD, C. M., 1987. The ticks of Zimbabwe. XVI. The genus *Ixodes*. *Zimbabwe Veterinary Journal*, 18, 1–10.
- RECHAV, Y., 1982. Dynamics of tick populations (Acari: Ixodidae) in the eastern Cape Province of South Africa. *Journal of Medical Entomology*, 19, 679–700.
- THEILER, GERTRUD, 1947. Ticks in the South Africa Zoological Survey Collection. Part VI. Little known African Rhipicephalids. *Onderstepoort Journal of Veterinary Science and Animal Industry*, 21, 253–300.
- THEILER, GERTRUD & ROBINSON, BRITHA N., 1953. Ticks in the South African Zoological Survey Collection. Part VII. Six lesser known African Rhipicephalids. *Onderstepoort Journal of Veterinary Research*, 26, 93–136.
- THEILER, GERTRUD, 1962. The Ixodoidea parasites of vertebrates in Africa south of the Sahara (Ethiopian Region). Project S.9958. Report to the Director of Veterinary Services, Onderstepoort. Mimeographed.
- WALKER, JANE B., 1974. The ixodid ticks of Kenya. A review of present knowledge of their hosts and distribution. London: Commonwealth Institute of Entomology.
- WALKER, JANE B., KEIRANS, J. E., PEGRAM, R. G. & CLIFFORD, C. M., 1988. Clarification of the status of *Rhipicephalus tricuspis* Döntz, 1906 and *Rhipicephalus lunulatus* Neumann, 1907 (Ixodoidea, Ixodidae). *Systematic Parasitology*, 12, 159–186.
- YEOMAN, G. H. & WALKER, JANE B., 1967. The ixodid ticks of Tanzania. A study of the zoogeography of the Ixodidae of an East African country. London: Commonwealth Institute of Entomology.