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THE PREVALENCE OF HELMINTH AND ARTHROPOD PARASITES OF WARTHOG, *PHACOCHOERUS AETHIOPICUS*, IN SOUTH WEST AFRICA/NAMIBIA

I. G. HORAK[1], H. C. BIGGS[2], TAMMY S. HANSSEN[3] and ROSE E. HANSSEN[3]

ABSTRACT

HORAK, I. G., BIGGS, H. C., HANSSEN, TAMMY S. & HANSSEN, ROSE E., 1983. The prevalence of helminth and arthropod parasites of warthog, *Phacochoerus aethiopicus*, in South West Africa/Namibia. *Onderstepoort Journal of Veterinary Research*, 50, 145–148 (1983).

A total of 38 warthog, *Phacochoerus aethiopicus*, shot on a farm in northern South West Africa/Namibia, were examined for internal and external parasites at monthly intervals over a period of 13 months. They harboured cestodes, 9 nematode species, 6 ixodid tick species and 1 species each of an argasid tick, a flea, a louse and larvae of a dipteran fly.

Clear patterns of seasonal abundance could be determined only for the spirurid stomach worm, *Physocephalus sexalatus*, and the sucking louse, *Haematopinus phachoeri*.

INTRODUCTION

The range of the warthog, *Phacochoerus aethiopicus*, covers practically the entire Northern and Southern Savanna zones, from Port Elizabeth in the south to Cape Verde in the west. Its northern limits in Angola are uncertain, but it apparently does not extend as far northwest as the Congo River mouth (Ansell, 1971).

Numerous collections of parasites of warthog have been made and these have been incorporated into several check-lists. The helminths recovered were listed by Round (1968), the fly larvae by Zumpt (1965), the fleas by Haeselbarth, Segerman & Zumpt (1966), the lice by Ledger (1980) and the ticks by Theiler (1962), while D'Huart (1974) has compiled a list of the helminth, arthropod and protozoan parasites recovered from warthog.

It would appear, however, that no study has been made of the actual numbers of parasites harboured by warthogs or of the seasonal fluctuations of these parasites. An opportunity to make this study presented itself during a culling programme on a farm in the northern bushveld region of South West Africa/Namibia on which a number of warthog were shot nearly every month over a period of 13 months. The present paper describes the total helminth and arthropod burdens of these warthog.

MATERIALS AND METHODS

Survey farm

The farm "Okonjima" (20 ° 51′S; 16 ° 40′E; Alt. 1 550–1 885 m) is 5 420 ha in extent and is situated in the northern bushveld region of South West Africa/Namibia. The most numerous animals present on the farm are 540 cattle, 40 horses, approximately 400 kudu, 150 gemsbok, 250 warthog and hundreds of baboons.

Survey animals

An attempt was made to shoot at least 2 warthog each month from September 1978 to September 1979. This was not always possible and no warthog were shot during December 1978 and only 1 during September 1979, but 38 warthogs in all were shot and examined. The sex of the animals was noted and, whenever possible, their age was estimated from the fact that the majority of warthog in the survey region are born during November/December.

Parasite recovery

The carcasses were transported to the farmhouse on "Okonjima" where they were immersed in hot water before skinning, and the heads, bodies and legs were thoroughly scrubbed with a steel brush. The carcasses were then skinned, and the skins of the heads, bodies and legs were further scrubbed and washed until visibly clean. In some cases the carcasses were skinned before the skins were immersed in hot water and scrubbed for the recovery of ectoparasites, as described above. All parasites which were not removed by this process were picked off individually and added to the washings. The scrubbings and washings were sieved through sieves with 38 µm apertures.

The livers were thinly sliced and the slices washed, using a stream of water over a sieve with 38 µm apertures. The contents of the stomachs and of the small intestines were sieved over sieves with 38 µm apertures and those of the large intestines over sieves with 150 µm apertures. No digests were made of the mucosae of the gastro-intestinal tracts, but the stomach walls were placed in formalin and later thoroughly scrubbed with a nail brush, the scrubbings being sieved on a sieve with 38 µm apertures.

All the formalinized, sieved material was transported by road from South West Africa/Namibia to the laboratory at Onderstepoort, where it was examined under a stereoscopic microscope either *in toto* or after representative samples had been taken.

Climatic data

Rainfall was recorded on a farm adjoining "Okonjima", while mean monthly minimum and maximum atmospheric temperatures were obtained from a weather station approximately 50 km NNW of "Okonjima" in a region considered to be slightly warmer than that in which the farm is situated.

RESULTS

The helminth parasites recovered, the total number of worms of each species counted and the percentage of warthogs infested with each are summarized in Table 1.

TABLE 1 The total numbers and prevalence of helminths recovered from 38 warthog in South West Africa/Namibia

Helminth species	Total No of helminths recovered and stage of development			Percentage of warthogs infested
	3rd	4th	Adult	
Ascaris sp.	0	1	0	2,6
Cooperia sp.	0	0	25	2,6
Impalaia nudicollis	0	200	30	13,2
Oesophagostomum spp.	0	950	0	28,9
Oesophagostomum mpwapwae	0	0	140 601	94,7
Oesophagostomum mwanzae	0	0	62 310	94,7
Oesophagostomum roubaudi	0	0	26 743	84,2
Physocephalus sexalatus	6 128	1 094	6 894	92,1
Probstmayria vivipara		Millions		100,0
Trichostrongylus colubriformis	0	0	25	2,6
Moniezia/Paramoniezia sp.	0	0	35 (Scolices)	44,7

[1] Department of Parasitology, Faculty of Veterinary Science, University of Pretoria, Onderstepoort 0110. Present address to which requests for reprints should be sent: Tick Research Unit, Rhodes University, Grahamstown 6140

[2] Central Veterinary Laboratory, Private Bag X13187, Windhoek 9000

[3] P.O. Box 793, Otjiwarongo 9000

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A total of 9 nematode species, and 1 or possibly 2 cestode species were recovered. (No attempt was made to determine whether the cestodes recovered were *Moniezia* sp. or *Paramoniezia* sp., or possibly both). *Probstmayria vivipara* were the most numerous of the helminths recovered, and all the warthogs were infested by them, but no endeavour was made to establish the actual numbers present in each of the warthogs because of the truly enormous burdens sometimes found.

Oesophagostomum mpwapwae, Oesophagostomum mwanzae and *Oesophagostomum roubaudi,* in that order, also occurred in substantial numbers, and nearly all the warthogs were infested by the above species and with *Physocephalus sexalatus*.

The seasonal prevalence of the adults of the 3 *Oesophagostomum* spp. and of immature and adult *Physocephalus sexalatus* are graphically illustrated in Fig. 1 & 2.

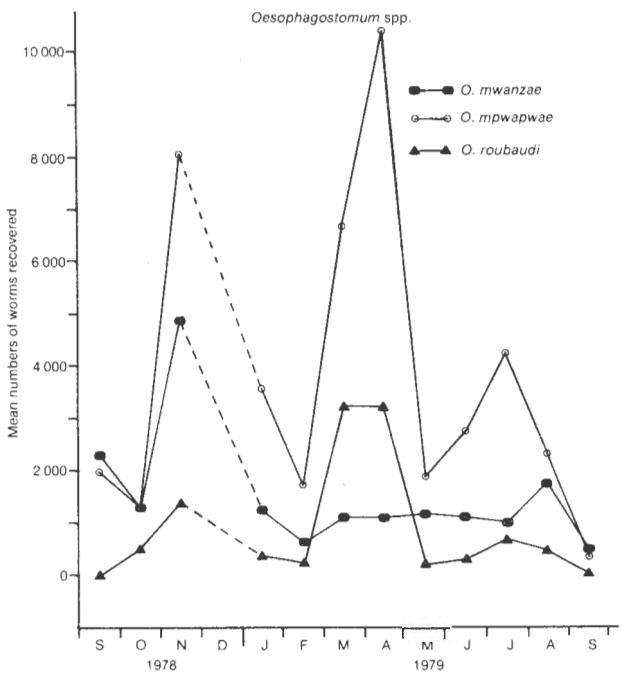

FIG. 1 Seasonal fluctuations in the numbers of 3 *Oesophagostomum* spp. in warthogs in South West Africa/Namibia

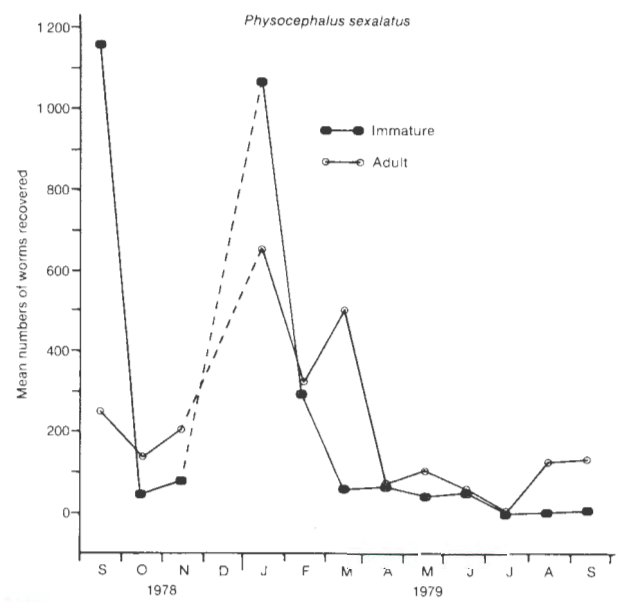

FIG. 2 Seasonal fluctuations in the numbers of *Physocephalus sexalatus* in warthogs in South West Africa/Namibia

The numbers of *O. mpwapwae* and *O. roubaudi* reached major peaks during November 1978 and April 1979, and a minor peak during July 1979. *O. mwanzae* had a major peak during November 1978 and minor peaks during March and August 1979.

Peak burdens of immature *Physocephalus sexalatus* were recovered during September 1978 and January 1979, while adults attained peak numbers from January to March 1979.

The ectoparasites recovered, their total numbers and the percentage of warthogs infested with each are summarized in Table 2.

TABLE 2 The total numbers of ectoparasites and their prevalence on 37 warthogs in South West Africa/Namibia

Ectoparasite species	Total No of ectoparasites recovered and stage of development			Percentage of warthogs infested
	Larvae	Nymphae	Adults	
Hyalomma marginatum rufipes	0	0	3	5,4
Hyalomma truncatum	0	0	41	37,8
Rhipicephalus evertsi mimeticus	0	2	7	16,2
Rhipicephalus longiceps	0	0	3	8,1
Rhipicephalus oculatus	0	0	8	18,9
Rhipicephalus simus	0	0	1	2,7
Ornithodoros moubata	0	8	0	10,8
Cordylobia-like species	38	—	—	18,9
Echidnophaga larina	—	—	532	89,2
Haematopinus phacochoeri	—	3 340	1 147	91,9

Six species of ixodid ticks, 1 argasid tick, a flea, a louse and the larvae of a fly were recovered from the 37 warthogs examined. (The ectoparasite collection of 1 animal was mislaid.)

The flea, *Echidnophaga larina,* and the louse, *Haematopinus phacochoeri,* were present on the majority of warthogs and also accounted for the major portion of the total ectoparasite burden.

The seasonal prevalence of *E. larina* and *H. phacochoeri* is graphically illustrated in Fig. 3 & 4.

The flea burdens increased and decreased erratically, but were very low for 2 consecutive months, namely, February and March 1979. Peak burdens of lice were present during September 1978, while few lice were recovered from November 1978 to February 1979, and

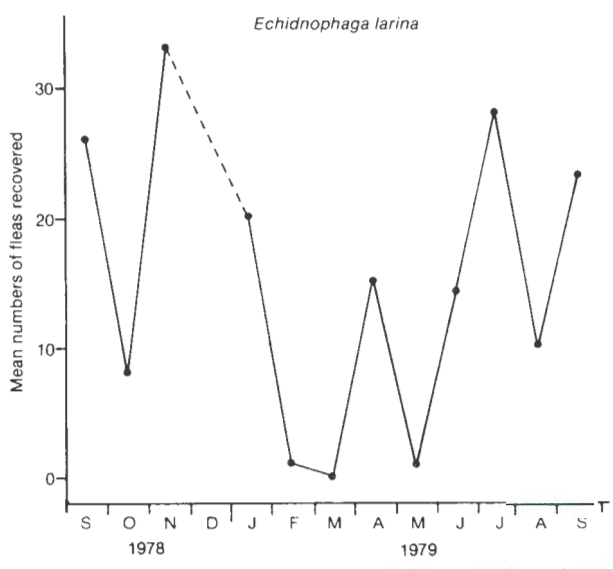

FIG. 3 Seasonal fluctuations in the numbers of *Echidnophaga larina* on warthogs in South West Africa/Namibia

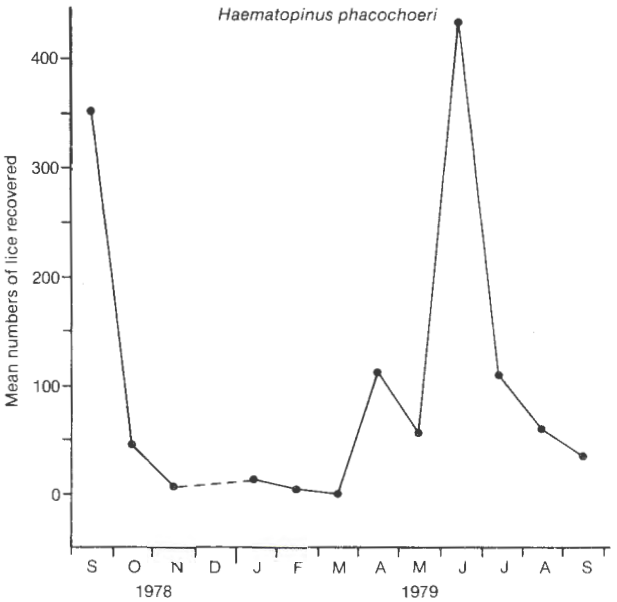

FIG. 4 Seasonal fluctuations in the numbers of *Haematopinus phacochoeri* on warthogs in South West Africa/Namibia

none during March 1979. Burdens increased during April and reached a peak during June, but decreased thereafter until September 1979, when the survey was terminated.

The monthly rainfall on a neighbouring farm and the monthly mean maximum temperatures at a weather station 50 km away are recorded in Table 3.

TABLE 3 Rainfall and atmospheric temperatures in the region of the survey farm

Month	Rainfall (mm) (neighbouring farm)	Mean maximum and mimimum temperatures °C (weather station 50 km away)	
Sept 1978	0	31,0	10,0
Oct	0	32,7	9,4
Nov	24,5	33,1	15,8
Dec	23,0	33,8	14,7
Jan 1979	139,9	31,6	16,7
Feb	294,4	29,6	16,9
March	10,3	30,4	13,4
April	8,1	30,8	12,2
May	7,0	27,0	8,3
June	0	24,9	6,5
July	0,2	24,8	5,0
Aug	0,2	27,7	7,5
Sept	14,5	32,0	11,4

Most rain fell in the period November 1978–February 1979, while September and October 1978 and June 1979 were completely dry. Maximum temperatures were recorded from October to December 1978 and minimum from June to August 1979.

DISCUSSION

Of the 9 nematode species recovered, only *O. mpwapwae, O. mwanzae, O. roubaudi, Physocephalus sexalatus* and *Probstmayria vivipara* can be regarded as definite parasites of warthogs. They have all previously been recorded from this host (Round, 1968) and in the present survey they occurred in large numbers in a high percentage of the animals examined. Apart from *Physocephalus sexalatus,* none of these helminths are found in domestic pigs. It is interesting to note that another spirurid stomach worm of pigs, *Ascarops strongylina,* which has a life cycle and intermediate hosts similar to *Physocephalus sexalatus,* has not been recorded from warthogs.

Only one 4th stage ascarid larva was recovered, but no specific identification was possible. The *Cooperia* sp., *Impalaia nudicollis* and *Trichostrongylus colubriformis* recovered were probably accidental parasites acquired from the domestic or wild ruminants also present on the farm.

The adult *I. nudicollis* recovered had considerably smaller measurements than those given for this species by Gibbons, Durette-Desset & Daynes (1977) and Boomker (1977) in their reviews of the genus *Impalaia.* In addition, few of the worms had reached adulthood, a phenomenon noted also by Horak (1979) after he had artificially infested sheep with larvae of *I. nudicollis* of blesbok origin. These observations substantiate the observation that warthogs are not a definite host of this nematode.

The cestodes recovered could have belonged to the genera *Moniezia* or *Paramoniezia,* but no identification was attempted. Both *Moniezia mettami* and *Paramoniezia phacochoeri* have been recovered from warthogs in southern Africa (Ortlepp, 1964).

Few 4th stage larvae of *Oesophagostomum* spp. were recovered, perhaps because no digests of the intestinal mucosa were done and hence migrating larvae might have been missed. The maximum number of adult *Oesophagostomum* spp. recovered from a single warthog in the present survey was 30 510 worms, harboured by an adult boar shot during April 1979. Pattison, Thomas & Smith (1980) recovered up to 21 000 *Oesophagostomum dentatum* from a domestic sow in northern England, while the greatest recorded number of adult *Oesophagostomum* spp. recovered from a domestic pig in the Transvaal is 2 963 worms (Horak, 1978 a).

As so few 4th stage *Oesophagostomum* spp. larvae were recovered, it was difficult to analyse the seasonal occurrence of worms of this genus. It is possible that the November rise in numbers was due to the heavier rainfall recorded in that month and that the March or April increase was as a result of the summer rains, but no definite explanation can be given.

The peak burdens of *Physocephalus sexalatus* recorded during January–March 1978 can probably be explained by the fact that there was a considerable rainfall during this period (Table 3) and, consequently, coprophagous beetles, some of which serve as the intermediate hosts of this worm, are more likely to have been active and hence eaten by the warthogs. Horak (1978 b) noted that *A. strongylina,* which also uses coprophagous beetles as intermediate hosts, was present in the largest numbers in domestic pigs in the central Transvaal from November to March, this coinciding with the period of maximum rainfall.

Two 2–3-month-old warthog examined during February 1979 harboured virtually no *Physocephalus sexalatus,* possibly because during January 1979, when maximum infestations were recorded, these animals were still relying on their mothers' milk as the main component of their diet. The worm burdens of these warthog were excluded when the graph was constructed. No explanation can be given for the very large number of 4th stage larvae of *Physocephalus sexalatus* recovered from 1 warthog during September 1978.

In 2 of the warthogs, in which estimations of the number of *Probstmayria vivipara* were attempted, it was calculated that more than 2 million worms were present. Other animals, however, harboured considerably fewer worms of this species than these 2 animals.

The ticks recovered have all previously been recorded from South West Africa/Namibia (Theiler, 1962), but

Rhipicephalus evertsi mimeticus, Rhipicephalus longiceps and *Rhipicephalus oculatus* have apparently not previously been recovered from warthog.

Although *Ornithodoros moubata* is usually encountered in warthog burrows (Hoogstraal, 1956), it has also been recovered in fairly large numbers from warthog themselves (Chorley, 1943, cited by Hoogstraal, 1956). This would explain how this argasid spreads from burrow to burrow and may also cast some light on its role in the epizootiology of African swine fever of which it is a vector.

The fly larvae recovered from the warthog resembled *Cordylobia* sp. larvae and several of these were found partially embedded in the superficial layers of the skin. They differed from the larvae of *Cordylobia anthropophaga* in that they had considerably more spines in the 2nd larval stage and were only partially embedded in the cutaneous tissue and not completely embedded, as is the case with *C. anthropophaga*. Zumpt (1965) mentions the fly *Neocordylobia roubaudi* which is found in the entrances of warthog burrows. Nothing is known about the larvae of this fly, and it is possible that the unknown larvae encountered on the warthogs are the larval forms of *N. roubaudi*.

No clear seasonal fluctuations were evident for *E. larina* on the warthog, but the autumn–spring peak recorded for *H. phacochoeri* is similar to that recorded for *Damalinia ovis* on sheep (Scott, 1952).

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