RESEARCH COMMUNICATION

The helminths of ranch calves in the North-eastern Mountain Grassland of South Africa

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ABSTRACT

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The cumulative total helminth parasite burdens of ranch calves during their first seven months of life on the North-eastern Mountain Grassland of South Africa were determined during two consecutive years.

Trichostrongylus axei was the most abundant nematode parasite followed by *Cooperia* spp. and *Ostertagia ostertagi*. *Haemonchus* spp. occurred in relatively low numbers and its development was significantly inhibited. The total helminth parasite burdens of the calves ranged from 681 to 7 269 with a mean of 4 405.

Keywords: Helminth parasites, North-eastern Mountain Grassland, ranch calves

The incidence and prevalence of helminth parasites of cattle in South Africa have been reported from the northern bushveld area (Horak 1978), karroid areas (Fourie & Horak 1990) and the north-eastern Highveld (Horak & Louw 1978). However, the study by Horak & Louw (1978) was conducted on irrigated pastures while the helminth populations of cattle kept under extensive ranching conditions may be different.

The present study was conducted on a cattle and sheep ranch in the North-eastern Mountain Grassland (Bredenkamp, Granger & Van Rooyen 1996). This ranch, Elandskloof (25°31'S; 30°07'E), is situated 10 km from Dullstroom and 25 km from both Belfast and Machadodorp in the Mpumalanga Province. Calves, weaned at the end of the summer grazing seasons and never treated with anthelmintics, were necropsied during the winters of 1997 and 1998 and their helminth parasite burdens determined. During the seven-months study periods meteorological data was obtained from Rietvallei, the weather station nearest to the ranch (Fig. 1). During the study periods of 1997 and 1998 respectively, 378 and 343,6 mm of rain were recorded. Long-term mean annual temperature for the region is 15 °C and range from –8 °C to 39 °C.

Drakensberger bull calves of approximately seven months old were selected on faecal worm egg counts and transferred to the Onderstepoort Veterinary Academic Research Unit of the Faculty of Veterinary Science, University of Pretoria at Onderstepoort. At this facility they were housed in pipe-frame cattle pens. One half of each pen had a roof and a concrete floor, while the other half was open and had a compacted gravel floor. The calves were fed two kilograms of a beef finishing ration daily and lucerne and eragrostis hay *ad libitum*. Dung was removed daily to eliminate the possibility of nematode parasite infections in the pens.

For the 1997 study, eight calves were selected on faecal worm egg counts immediately after weaning on 6 June 1997 and transferred to the experimental facilities. They were slaughtered during 29–31 July 1997 and their gastro-intestinal parasites recovered for the study.

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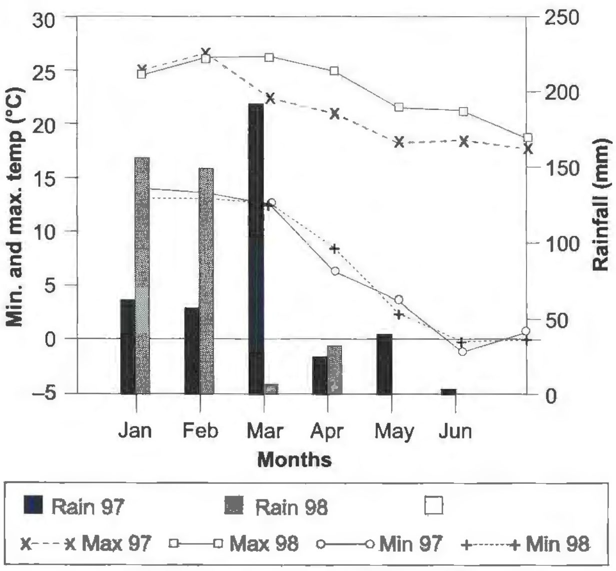

FIG. 1 Meteorological data recorded at Rietvallei during 1997 and 1998

For the 1998 study, calves were weaned on 15 June 1998, kept in a kraal on the farm and fed eragrostis hay and a beef-finishing ration until six were selected and transferred to the experimental facilities on 14 July 1998. These calves were slaughtered on 12 and 13 August 1998 and their gastro-intestinal parasites recovered for the study.

Immediately after slaughter at the abattoir, the calves were eviscerated and the gastro-intestinal tract from the abomasum to the rectum collected in a numbered tray. Double ligatures of string were tied between the different gastro-intestinal sections before they were transported to the parasite recovery room. The livers were examined for trematodes and cestodes at the abattoir.

The abomasa and small and large intestines were opened in separate buckets and thoroughly rinsed under running water. The contents were then washed on sieves, collected in labeled jars marked with the animal's number and the relevant section of the gastro-intestinal tract. For the abomasa and small intestines a sieve with 63 μm apertures was used, while a sieve with 150 μm apertures was used for the large intestines. To preserve the processed material, formalin to a final dilution of approximately 4 % was added to all jars. The abomasal wall was digested with 3 % hydrochloric acid in jars placed in a water bath operating at approximately 40 °C. After approximately four hours the digested material was washed on a sieve with 63 μm apertures and preserved in labeled jars marked with the animal's number and the identity of the material.

Two 5-% aliquots of every section of the gastro-intestinal tract were collected in honey jars. These aliquots were examined under a stereoscopic microscope and the worms counted and identified according to the genus. Where possible, approximately 20 males of each genus and approximately 20 immature worms were removed from each aliquot, mounted in lacto-phenol and the species and stages of development determined according to descriptions by Soulsby (1968). These differential counts were subsequently used to divide the total counts into species and stages of development.

After removal of the aliquots, the remainder of the ingesta was examined macroscopically in a black tray for large worm species such as *Bunostomum, Oesophagostomum* and *Trichuris*. These worms were counted and recorded as total counts. Worm counts and faecal worm egg counts of the calves in the two studies are presented in Tables 1 and 2.

Southcott, Major & Barger (1976) found that *Haemonchus* larvae are unable to survive climatological stress during spring and early summer. Horak (1978) recovered very few *Haemonchus, Trichostrongylus* and *Cooperia* from calves under extensive grazing conditions during the period from August to November. Although the calves in the present study were only born in December, they spanned almost the entire parasitic season of each year of the study. The worm burdens are consequently an indication of the total number of worms that calves on cattle ranches in the region can accumulate in one year. The worm burdens ranged from 681 to 7 269 (mean 4 405). Worm burdens of this magnitude probably justify the deworming of calves at weaning. Deworming cattle is, however, not common practice in the region under study. In a survey carried out over a period of three years, Louw (1995) determined that the volume of cattle anthelmintic purchased in this region was hardly sufficient for a single treatment of 25 % of the cattle population.

One of the two calves infected with cestodes, harboured *Moniezia* spp. and the other, *Avitellina centripunctata*. Except for one calf which was not infected with *Trichuris,* all calves harboured *Oesophagostomum* spp. and *Trichuris* spp. Only one calf was infected with *Bunostomum.*

Trichostrongylus axei was the most abundant nematode parasite found in the calves. This was in contrast to the other surveys carried out on cattle in South Africa. In their study Horak & Louw (1978) found that *Haemonchus* and *Cooperia* were the most abundant parasites of calves. The relatively low number of *Haemonchus* and *Ostertagia* in the animals under the present study was probably due to the suppressing effect of *T. axei.* Turner, Kates & Wilson (1962) documented such an effect in sheep.

A cross-section of approximately 0,5 mm thick was cut out of ten adult *Haemonchus* in the region of the junction of the oesophagus and the intestine. Each

TABLE 1 Nematode parasites recovered and faecal worm egg counts of 8 calves slaughtered in 1997

Animal no.	*Haemonchus* spp.		*Ostertagia ostertagi*		*Trichostrongylus* spp.			*Cooperia*	*Cooperia pectinata*	*Oesophago- punctata*	Trichuris *stomum radiatum*	Total spp.	Epg on worm burden	22/7/97
	L4	Ad	L4	Ad	*a**	*f**	*r**	*c**	Ad	Ad	Ad	Ad		
1	100	20	0	275	330	30	0	0	140	440	8	3	1 346	33
2	190	125	40	505	4 320	60	0	0	405	405	65	2	6 117	33
3	5	30	55	215	4 750	235	660	0	40	770	26	6	6 792	133
4	5	15	0	95	435	20	0	0	55	55	1	0	681	100
7	35	65	55	275	1 330	165	0	0	200	780	50	2	2 957	200
18	85	65	15	1 385	2 825	0	0	30	665	1 995	91	1	7 157	495
21	255	65	315	465	5 595	0	0	0	140	210	40	1	7 086	266
23	0	20	20	145	920	0	0	0	20	20	3	1	1 149	100
Mean	84	51	62	420	2 563	64	83	4	208	584	36	2	4 161	170

*a** = *axei*
*f** = *falculatus*
*r** = *rugatus*
*c** = *colubriformis*

TABLE 2 Nematode parasites recovered and faecal worm egg counts (Epg) of 6 calves slaughtered in 1998

Animal no.	*Haemonchus* spp.		*Ostertagia ostertagi*		*Tricho-strongylus axei*	*Cooperia punctata*	*Oesophago-stomum radiatum*	*Trichuris* spp.	*Buno-stomum*	Cestodes spp.	Total worm burden	Epg on 15/7/98
	L4	Ad	L4	Ad	Adult	Adult	Adult	Adult	Adult			
R2	1 020	70	0	530	4 650	930	5	64	0	0	7 269	300
R11	180	340	0	480	3 740	2 160	55	32	0	0	6 987	200
R12	260	50	0	350	640	570	8	34	0	2[a]	1 914	133
R17	160	440	0	170	440	440	5	84	0	1[b]	1 740	300
R19	640	1 610	0	840	1 340	1 360	8	136	1	0	5 935	1 033
R22	430	160	0	730	1 620	940	83	80	0	0	4 043	167
Mean	448	445	0	517	2 072	1 067	27	72	< 1	< 1	4 648	356

[a] *Moniezia* spp.
[b] *Avitellina centripunctata*

section was mounted upright in chilled lactophenol and the number of longitudinal cuticular ridges (synlophe) determined. In only two of the worms examined did the number of synlophe fall within the *Haemonchus placei* range. The remaining worms were all in the *Haemonchus contortus* range (Lichtenfels, Pilitt & Hoberg 1994). *H. contortus* is predominantly a sheep parasite, but the present study confirmed that it could establish itself in cattle. Such infections are, however, self-terminating because they are sterile in the foreign host (Southcott & Barger 1975). This phenomenon was successfully employed by Reinecke & Louw (1991) to reduce the infectivity of sheep pastures by "vacuum cleaning" with cattle. Anthelmintic resistance in sheep is rife in South Africa (Van Wyk, Malan & Randles 1997), but is not very common in cattle. When cattle become infected with a sheep strain of *Haemonchus* which also happens to be resistant to anthelmintics, it is likely to be mistaken for an authentic case of anthelmintic resistance in the cattle.

The development of *Cooperia* spp. was not inhibited in the present studies. This is in agreement with what was found by Horak & Louw (1978) who postulated that inhibited development of *Cooperia* spp. was probably dictated by the severity of cold conditions in autumn and winter. The climate in South Africa does not appear to be cold enough to inhibit the development of this parasite. *Cooperia oncophora* is almost completely retarded in Canada (Smith 1974). However, in the arid northern bushveld region of South Africa Horak (1978) recorded extensive inhibition of *Cooperia* spp. in cattle almost throughout the year. Drought, rather than cold, therefore seems to be the more important environmental trigger in South Africa for *Cooperia* spp. to slow down its development in the host in order to escape unfavorable conditions in the environment. The development of *Haemonchus* was significantly inhibited in the present study.

Although worm egg counts in animals with mixed infections are probably species dependant, it is clear from Tables 1 and 2 that there was no correlation between faecal worm egg counts and actual worm burdens.

This publication appears to be the first record of the helminth parasite populations of calves reared under ranching conditions on the North-eastern Mountain Grassland of South Africa. The information should be invaluable to stock farmers in this important cattle ranching region.

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