

## Parasitic helminths of veterinary importance in cattle, sheep and goats on communal farms in the northeastern Free State, South Africa

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### ABSTRACT

The purpose of the study was to record and determine intensities, seasonal incidence and distribution of helminth parasites of veterinary importance that occur in cattle, sheep and goats in the northeastern Free State. The study was conducted at Harrismith and Kestell and in Qwa-Qwa from March 2000 to May 2001. Cattle of various breeds (including Bonsmara, Simmentaler and Friesian), Merino sheep and Angora goats were sampled. Faecal samples were analysed using the McMaster and Visser sieve techniques for egg counts and faecal cultures for 3rd-stage nematode larvae identification. *Haemonchus* and *Oesophagostomum* were the dominant nematode genera found to be infecting the animals. The socioeconomic status of the farmers in the study area was determined through a questionnaire survey aimed at recording their management strategies. It indicated that 81 % of farmers take care of their livestock by feeding them with supplements. The low to moderate faecal egg counts from cattle showed that helminth infections in this region are still under control even though helminthosis seems to be a problem in small-stock, since EPG counts of more than >1000 were found. Cattle farmers in this region are encouraged to continue with good animal husbandry practices that have ensured that helminth infections rates are kept low. Small-stock farmers are, however, encouraged to control helminth infections in their sheep and goats by anthelmintic treatment.

**Key words:** faecal egg counts, helminths, livestock.

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### INTRODUCTION

Cattle on communal grazing play an important role in the culture and economics of small-scale farmers living in villages or townships in South Africa. These cattle are seldom, if ever, treated for internal parasites. Information on helminth infections and production losses in cattle belonging to small-scale farmers is not readily available and often only deaths and the presence of worms are recorded<sup>1</sup>. Helminth infection can result in losses in productivity through a reduction of feed intake and feed conversion efficiency, loss of blood and even death<sup>2</sup>. The northeastern Free State is predominantly a rural area with more small-scale farmers than commercial farmers. They are not aware of the seriousness of helminth infection, and further lack the relevant skills on how to treat and control internal parasites.

There is very little information on the helminths that occur in livestock in the northeastern Free State and it was therefore important that a survey of helminths of economic importance occurring in this area be conducted. Data derived from this study form the basis for the formation of appropriate control strategies against helminths of veterinary importance in this region.

### MATERIALS AND METHODS

The study was carried out in the northeastern Free State province at 3 study sites, namely at Harrismith and Kestell and in Qwa-Qwa. Faecal samples were collected from at least fifteen cattle, 10 sheep and 10 goats over a period of 14 months (April 2000 – May 2001). Sampling was done randomly, with different animals each month. The experimental animals' physical conditions were assessed using a condition-scoring method<sup>14</sup>. Faecal samples were collected directly from the recta of the animals and used for worm egg counts and 3rd-stage larvae identification. The faecal egg counts were done according to the modified McMaster

(nematodes) and Visser Sieve techniques (trematodes)<sup>9</sup>. Faecal samples from each farm were pooled and cultured<sup>9</sup>. A questionnaire regarding animal husbandry practices was administered to each farmer who gave permission to study his/her flock. Data were statistically analysed using chi-square tests.

### RESULTS

#### Questionnaire survey

Of the 72 farmers given the questionnaires, 67 % were employed while 33 % were pensioners. Livestock composition at the 3 study sites was as follows: 53 % cattle, 36 % sheep, 11 % goats and 0 % equines. About 62 % of the livestock were kept on pasture during the day and in an enclosure at night, while 7 % were kept in a yard both during the day and night and 21 % were permanently kept on pasture. Eighty-seven per cent of the farmers fed their livestock with supplements while 13 % did not. Of those who fed supplements, 63 % fed their livestock during winter, 11 % between winter and spring and 16 % throughout the year.

Approximately 87 % of the farmers observed what appeared to be worms in the faeces of their livestock. These were probably proglottids of tapeworms. About 84 % of them observed them often during spring and summer. Only 29 % of the farmers used anthelmintics to control helminths and of these, 76 % dewormed their livestock twice a year, 20 % once a year and 4 % more than twice a year, when they observed worms in the faeces of their animals. About 58 % of the farmers bought the anthelmintics from the farmers' cooperatives, while 42 % obtained them from the district state agricultural offices. Eighty-one per cent considered these drugs effective, while 19 % considered them ineffective. Eighty-nine per cent of the farmers interviewed did not consider helminthosis to be a problem in their livestock. Those who regarded helminthosis as a problem were mainly small-stock farmers.

#### Physical condition of sampled animals

A total of 682 cattle, 300 goats and 501 sheep of ages ranging from as young as

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3 months to adults of both sexes were sampled and rated fair according to the physical condition-scoring method<sup>14</sup>.

### Helminth diversity, distribution and abundance in cattle

Identification of helminth species was done by only examining eggs and 3rd-stage larvae. Therefore the classification of helminth parasites was only done to generic level. The results of the larval identifications agreed with those of the egg counts and identification. Six nematode genera were isolated from cattle, the dominant genera being *Haemonchus* (0–42 eggs per gram of faeces [EPG]) and *Oesophagostomum* (0–22 EPG) (Fig. 1). *Calicophoron* and *Fasciola* were also isolated with EPGs ranging between 0–3.4 and 0–15, respectively. A chi-square ( $\chi^2$ ) test showed that there was a significant difference ( $P = 0.0001$ ) in the prevalence of various nematode genera. No significant difference was shown in the distribution of nematode genera from cattle ( $P = 0.0957$ ) at the 3 study sites.

### Seasonal dynamics of nematode genera isolated from cattle

A  $\chi^2$ -test showed that there was a significant difference ( $P = 0.0850$ ) in the average monthly EPG counts at the 3 sites. The average monthly EPGs at Harrismith and in Qwa-Qwa showed the same seasonal pattern, both with higher peaks of EPGs of 250 and 150 the warmer months (January–March) and January (February) and January, respectively. However, Kestell did not follow any seasonal pattern (Fig. 2).

### Helminth diversity, distribution and abundance in goats

Five nematode genera were isolated from goats, dominant species belonging to the genera *Haemonchus* (Fig. 3). A  $\chi^2$ -test showed that there was a significant difference ( $P = 0.0001$ ) in the prevalence of various helminth genera and that there was no significant difference in the distribution of helminth genera recovered from goats ( $P = 0.5444$ ) at Kestell and in Qwa-Qwa (Fig. 3). Owing to the scarcity of goats in the eastern Free State it was only possible to sample goats at Kestell and in Qwa-Qwa.

### Seasonal dynamics of nematode genera isolated from goats

A significant difference ( $P = 0.0365$ ) was found in the average monthly EPG counts at Kestell and in Qwa-Qwa. The average monthly EPGs at the 2 sites followed the same seasonal pattern, with peaks of 5000 and 1500 EPGs during the warmer months (January and February) and low EPGs (0–500) during the colder

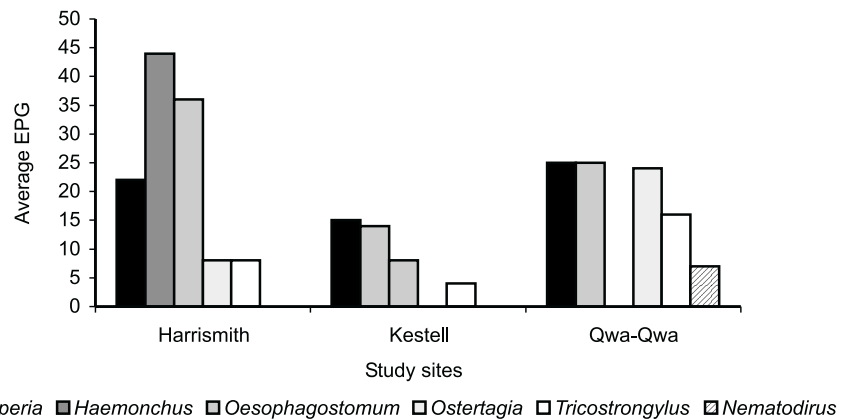


Fig. 1: Comparison of EPG counts of helminth genera from cattle at Harrismith and Kestell and in Qwa-Qwa between April 2000 and May 2001.

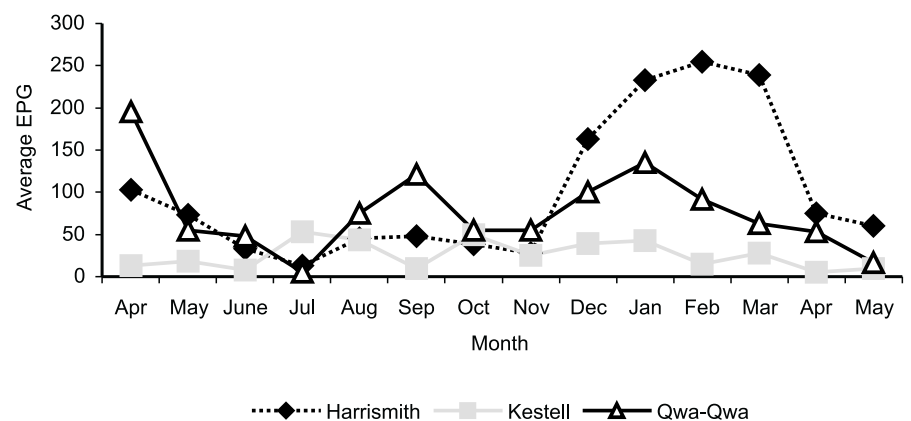


Fig. 2: Average monthly EPG counts of helminths from cattle at Harrismith and Kestell and in Qwa-Qwa between April 2000 and May 2001.

months (April–June) (Fig. 4). *Fasciola* and *Calicophoron* were isolated with 15 and 10 average EPGs, respectively.

genera from sheep at the 3 study sites was evident ( $P = 0.7701$ ).

### Helminth diversity, distribution and abundance in sheep

Six nematode genera were isolated from sheep, the dominant genus being *Haemonchus* (Fig. 5). A significant difference ( $P = 0.0001$ ) in the prevalence of helminth genera and a non-significant difference in the distribution of helminth

### Seasonal dynamics of helminth species isolated from sheep

A significant difference ( $P = 0.0004$ ) was evident in the average monthly EPG counts at the 3 sites. The average monthly EPGs at Harrismith and Kestell followed the same seasonal pattern, with high EPGs [(6000 and 7000 during the warmer month (March)]. The average monthly

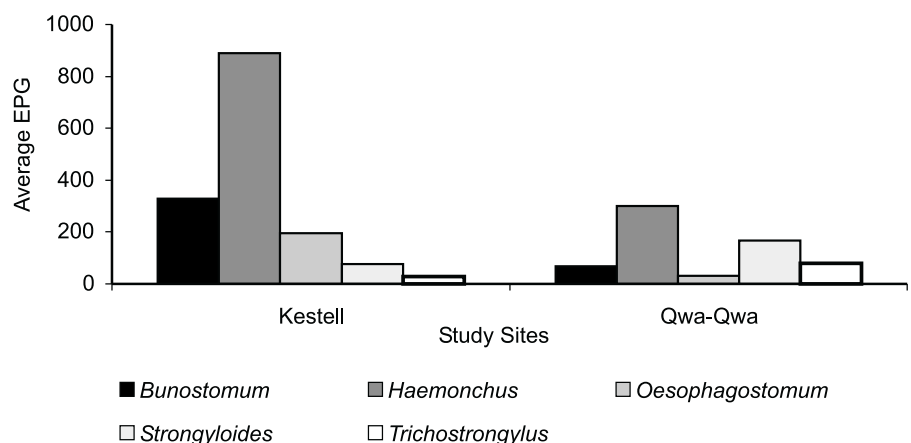


Fig. 3: Comparison of EPG counts of helminth genera from goats at Kestell and in Qwa-Qwa between April 2000 and May 2001.

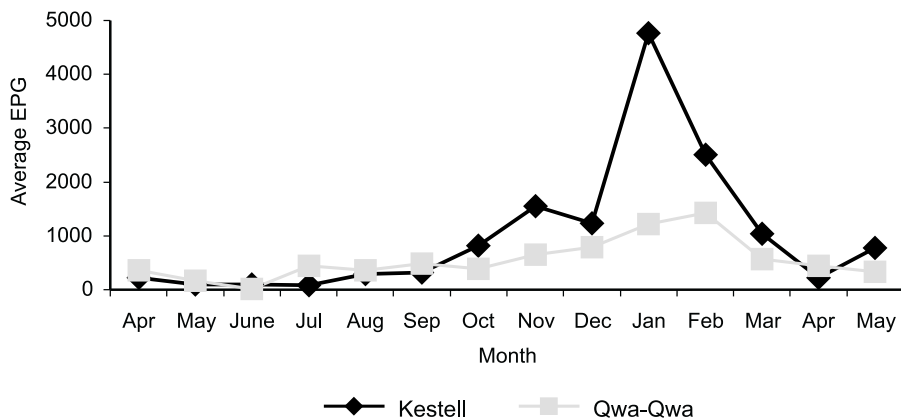


Fig. 4: Average monthly EPG counts of helminths from goats at Kestell and in Qwa-Qwa between April 2000 and May 2001.

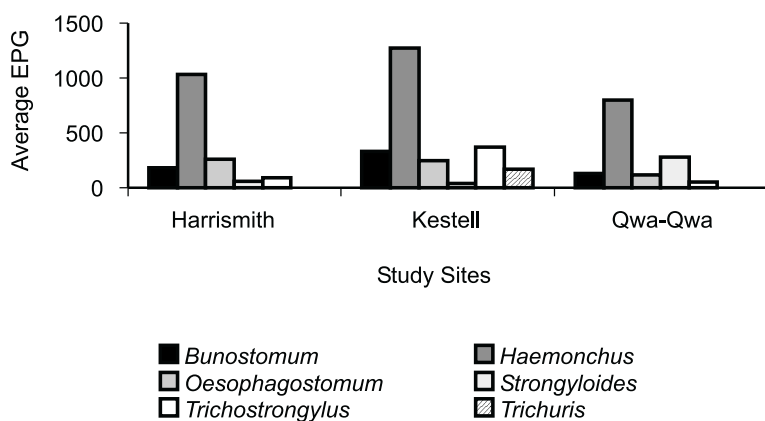


Fig. 5: Comparison of EPG counts of nematode genera from sheep at Harrismith and Kestell and in Qwa-Qwa between April 2000 and May 2001.

EPGs in Qwa-Qwa showed high peaks in August (EPG 2000), December (EPG 2000) and March (EPG 1800) (Fig. 6).

### DISCUSSION

Results from this study constitute the 1st documented information on helminths of veterinary importance in the northeastern Free State and are important in the formulation of appropriate control strategies against these parasites in livestock.

There were no significant differences in the distributions of helminth genera in

cattle, goats and sheep at Harrismith and Kestell and in Qwa-Qwa. This is probably because Harrismith, Kestell and Qwa-Qwa lie in the same geographical region and experience the same climatic conditions.

Most farmers in the study area were small-scale farmers who practiced communal grazing. Communal systems are often cited as a major reason for the poor veld conditions<sup>3</sup> and poor livestock production in areas where subsistence farming is practiced. According to Preston and

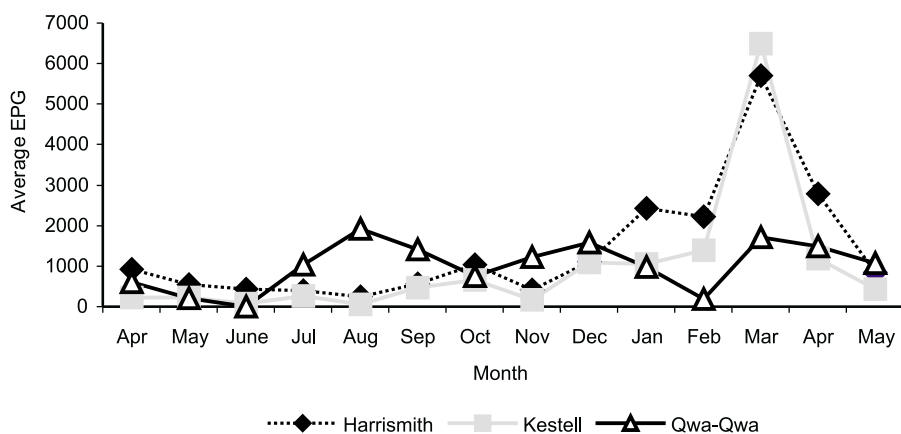


Fig. 6: Average monthly EPG counts of helminths from sheep at Harrismith and Kestell and in Qwa-Qwa between April 2000 and May 2001.

Leng<sup>11</sup> one would expect to find high worm burdens in cattle on overgrazed communal pastures, leading to severe disease and death, but this was not the case in this study. About 81 % of the farmers in the study area fed their animals with nutritional supplements and this is possibly the reason why the animals did not present clinical signs of helminth infection. Good nutritional status of a host can positively influence the pathogenesis of gastrointestinal parasitic infections<sup>5</sup>. Almost all experimental animals were rated fair in the condition scoring. Pathogenesis of a disease depends upon various factors including breed, age, nutritional status and management systems as well as environmental conditions<sup>6</sup>.

*Haemonchus* was the most abundant nematode genus throughout the study period. This is probably related to its high fecundity, which means that it is likely that the larvae are ingested in higher numbers than those of other genera<sup>10,15</sup>. Species of *Haemonchus* are able to tolerate a very wide range of climatic conditions<sup>7</sup>. The temperature and rainfall requirements of *Haemonchus* and *Oesophagostomum* species are similar<sup>12</sup> and the 3rd-stage larvae of both develop readily at temperatures ranging from 25 to 33°C<sup>8</sup>. This explains why they were both the most prevalent genera isolated in the study area.

The low prevalence of trematode genera (*Calicophoron* and *Fasciola*) in this study may be ascribed to the fact that they require intermediate hosts to complete their life cycles.

Comparing the EPG counts derived from cattle with those of small-stock, the former's EPGs were low (range 0-250), while those of sheep were high (range 0-6000), as were those of goats (range 0-5000). According to Scarfe<sup>13</sup>, the drier the faeces the more concentrated the parasite eggs are within the faeces. This might explain why the EPGs of small-stock were higher than those of cattle, since sheep and goats have drier faeces.

In general, this study showed that helminth infection in the northeastern Free State is still under control. This could be due to good farming practices and the good nutritional status of the animals sampled. However, attention should be focused on dominant genera such as *Haemonchus* and *Oesophagostomum* that have the potential to become problematic, especially in calves. It is therefore important that appropriate control and management of these helminths are practiced. To increase the productivity of cattle, sheep and goats, helminthosis control should be based on epidemiological observations and should not rely on anthel-

mintics only. Alternative means of control, such as pasture management and use of medicinal plants<sup>4</sup> merit consideration.

Management and control of helminths in small-stock is highly recommended since the results show that the EPGs were high. Emphasis should be placed on education and boosting of the self-esteem of the resource-limited farmers in the area. Major changes need to be made by the small-scale farmers themselves. A communication network amongst farmers, the government and experts is essential. A good beginning would be a well-funded, properly designed extension service that focuses on primary animal health care and livestock production. This service should be managed by well-informed, enthusiastic communicators with a solid grounding in science, agriculture and local traditions and beliefs.

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