

A SURVEY ON GASTRO-INTESTINAL NEMATODES IN DAIRY CATTLE IN THE COMMEWIJNE DISTRICT (SURINAME).

Dr. P. X. M. Bastiaensen, dvm

Ministry of agriculture, animal husbandry and fisheries.
Veterinary services eastern regions.
P/o. box 9262 · Paramaribo · Suriname.

Summary

In this article, an attempt was made to assess the problem of gastrointestinal parasitism of nematodes in adult dairy cattle in Commewijne (Suriname). Over a period of almost a year, dung from 51 cows was sampled for nematodes, immediately following artificial insemination. Qualitative and quantitative (epg) examination of the faeces for nematode egg's were performed using the MacMaster- and coproculture-techniques. Faecal egg counts revealed overall low epg's (eggs per gram faeces) in all of the recovered worm-types (*Strongyloides*, *Trichuris* and *Strongylidae*). No age or breed-related differences in epg were found. Differentiation of species based on recognition of eggs or recognition of L3-larvae, revealed the following genera in order of decreasing prevalence : *Trichostrongylus*, *Haemonchus*, *Oesophagostomum*, *Trichuris*, *Coöperia*, *Strongyloides* and *Bunostomum*.

In the view of these results, the conclusion is drawn that worm-infestations should not solely be held responsible for the poor production results in dairy enterprises in Commewijne. Recommendations are given with respect to the type of anthelmintics to be used and the frequency of dosing.

Samenvatting

In dit artikel tracht de auteur een beeld te geven van de problematiek van maag-darm nematoden (rondwormen) bij volwassen melkvee in het district Commewijne (Suriname). Gespreid over een periode van bijna één jaar werden er meststalen genomen van in totaal 51 melkkoeien; dit onmiddellijk na het uitvoeren van kunstmatige inseminatie bij deze dieren. De meststalen werden kwantitatief en kwalitatief onderzocht op de aanwezigheid van nematode-eieren, gebruik makend van de MacMaster-techniek en coprocultuur. De kwantitatieve ei-tellingen brachten overwegend lage epg's (eieren per gram faeces) aan het licht en dit voor alle herkende wormtypes (*Strongyloides*, *Trichuris* en *Strongylidae*). Er werden geen leeftijds- of ras-gebonden verschillen in epg vastgesteld. De differentiatie van de verschillende wormgenera via differentiatie van de eieren of de L3-larven, bracht de volgende species aan het licht (in dalende volgorde van voorkomen) : *Trichostrongylus*, *Haemonchus*, *Oesophagostomum*, *Trichuris*, *Coöperia*, *Strongyloides* en *Bunostomum*.

Gelet op deze resultaten kan besloten worden dat wormbesmettingen zeker niet alleen verantwoordelijk mogen worden gesteld voor de over het algemeen slechte produktieresultaten in de melkveehouderij in Commewijne. Gebaseerd op deze besluiten worden er enkele aanbevelingen gedaan met betrekking tot de soorten en het gebruik van ontwormingsmiddelen.

Introduction

The milkproduction-sector in Suriname has been neglected for the last few decades. Due to severe, but inadequate government interference (fixed off-farm prices, government owned milk-board and processing facilities, government involvement in distribution of inputs, etc...) local milkproduction decreased dramatically in the seventies and eighties. Whereas even in the late sixties Suriname had a surplus production of locally produced raw milk, it quickly became nearly fully dependent of imported milkpowder in order to satisfy consumer demand. The rehabilitation of the milk-sector in Suriname is now one of the main priorities within agricultural policy in Suriname. A decrease in government-involvement and subsequent liberalization of the sector have led to renewed interest and increasing investments in milkproduction in Suriname.

The aim of this simple screening was to investigate the need for thorough and frequent dosing of dairy cattle, as it is propagated in Suriname by veterinarians, animal health assistants and extension workers in order to enhance milk production. The general idea concerning the use of anthelmintics in Suriname is that the very humid and hot climate which is typical of the Surinam coastal area, where most of the animal husbandry is situated, calls for frequent deworming of all livestock, especially young animals and animals with breeding influences of temperate zone (dairy) breeds, like Holstein, Friesian, Holstein-Friesian or Brown Swiss.

Since anthelmintics are very expensive (while imported from the USA, Europe or Brasil) in comparison to the off-farm prices of meat and especially raw milk, dosing is the most important veterinary cost involved in animal husbandry in this country. It is therefore imperative to understand the epidemiology of the common gastro-intestinal nematodes in the prevailing climatic conditions and within the management systems used, as well as to assess the pathological and economic desirability of frequent treatment. A field experiment is currently being carried out to investigate this problem in sheep husbandry (Bastiaensen P., non published data).

The aim of this survey was to investigate the incidence of gastro-intestinal nematodes in dairy cattle in order to get a rough idea of the average infestation-levels and causative nematode-species in rural dairy farming practice.

Materials and methods

The survey was carried out within the framework of the artificial insemination service in the district of Commewijne (eastern Suriname). Therefore, dairy farms using natural servicing only were not included in the survey, neither were exclusive beef-production farms or farms outside the Commewijne district.

51 non-pregnant cows (lactating or dry) were sampled for dung, this immediately following artificial insemination of the cow on heat. These 51 cows represent 51% of the cows that were inseminated during this period of time (n=100) and 15% of the estimated AI-herd in Commewijne since 1991 (n=321). The samples were collected between July 1994 and April 1995, thus covering all seasonal variations in temperature and rainfall.

Dung was collected in rectal gloves and labelled with a reference number. Each sample record contained the following data : sex (all female), age, predominant breed-influence and interval since last dosing/deworming. The samples thus included dung of cows having been dosed very recently.

Following collection of samples, the dung was being examined for eggs of gastro-intestinal nematodes. Microscopic egg-counts (eggs per gram or epg) were carried out using the Mac Master method (Thienpont et al., 1986), followed by quantitative flotation in case of negative Mac Master counts. A negative Mac Master count and positive flotation would account for less than 50 epg or -for practical reasons- 25 epg.

The nematode genera involved were partly diagnosed while performing the Mac Master or flotation technique. The following wormtypes can be readily distinguished by their eggs : order of the *Rhabditidae* (*Strongyloides*), order of the *Strongylidae* (several genera) and the order of the *Enoplida* (*Trichuris*). Soulsby, 1986.

Further distinction between genera of the Strongylida-order was made by larval culture of a dung-woodshavings mixture, followed by microscopic examination of L3-larvae (Hansen & Perry, 1990). The following L3-larvae of the *Strongylidae* can be readily distinguished (anonymous, 1986): *Haemonchus*, *Trichostrongylus*, *Cooperia*, *Bunostomum*, *Oesophagostomum* and *Nematodirus*. This larval culture was performed only with faeces of cows showing egg-counts exceeding 200 epg. Lower epg's usually lead to insufficient numbers of larvae (at least 100 larvae per sample need to be examined).

Results

The results are summarised in the table below. The epg's for each of the *Strongylidae* (between brackets) were extrapolated from the overall epg (107 epg) and the percentages of each genera found following larval differentiation.

Order	Genera	Average faecal egg counts	%
Rhabditida	Strongyloïdes	1,00 epg	
Enoplida	Trichuris	4,08 epg	
Strongylida	- overall -	107,00 epg	[100,00%]
	Haemonchus	[48,00 epg]	44,86%
	Trichostrongylus	[48,02 epg]	44,88%
	Coöperia	[2,96 epg]	2,77%
	Bunostomum	[0,66 epg]	0,62%
	Oesophagostomum	[7,34 epg]	6,86%

The highest values encountered were 800 epg (strongyles) in two cows only. 13 cows had negative egg counts, while 21 cows had egg counts not exceeding 50 epg (25 or 50 epg).

We found no statistical evidence of age-related or breed-related differences in egg shedding. The relationship between the interval since last dosing and egg shedding could not be evaluated due to a disproportionate distribution of the groups.

Haemonchus-spp and *Trichostrongylus*-spp. are the predominant species. *Strongyloïdes*, *Trichuris*, *Coöperia*, *Bunostomum* and *Oesophagostomum* were occasionally seen.

Two samples revealed nearly pure *Haemonchus*-populations (81,25% and 100%), while four samples showed almost pure *Trichostrongylus*-populations (85% - 100%). The cows concerned were of different age and breeding influence and were sampled on different farms.

Discussion

Results indicate relatively low faecal egg-counts in nearly all sampled cows. Whatever the dominant breed-influence, age or season, egg counts seldom exceed 200 epg. In some of the cases low egg count is accounted for by recent deworming, most of the cows however had not been dosed for less than 6 (six) months.

The only earlier investigation concerning nematodes in cattle in Suriname dates from the early sixties. H.Kuil (1965) reported on his observations of 4 (four) naturally infected calves. Egg shedding and causative species were monitored as from birth up to the age of approximately one year. Kuil found that calves were first infected with *Strongyloïdes papillosus* at the age of three to four weeks. After two months eggs of the *Strongylidae* were recovered from dung, while epg's remained low. The species involved were recognized as being *Cooperia*-spp. After six months, when calves were brought on pasture, epg's rose to a higher level. Within three to four weeks of natural grazing, epg's varied from 620 epg to 2200 epg. *Cooperia* -spp., but also *Oesophagostomum radiatum* and *Haemonchus placei* were involved. The importance of *Haemonchus* increased while *Cooperia* -eggs gradually disappeared from dung. Around the age of approximately one year *Cooperia* -eggs were virtually absent, while *Haemonchus* became the dominant species involved. Egg shedding increased to between 1000 epg and 4440 epg. Post mortem analyses at the age of 400 days, confirmed *Haemonchus placei* -infection in the abomasum and *Oesophagostomum radiatum* in the colon (Kuil H., 1965).

These figures are not quite in accordance with the results we found in adult dairy cattle. H. Kuil (1965) reported a very low prevalence of *Trichostrongylus*. In our trial, most of the cows for which larval differentiation was undertaken indeed showed a dominant *Haemonchus* infection (n=6), but quite some animals showed *Trichostrongylus* dominance too (n=5). The faecal egg counts found by Kuil are quite high in comparison to those we found, but this phenomenon is most probably due to the difference in age and thus the immunological status of the animals in the trial.

Indeed, egg-counts in mature and (presumably) immune animals do not link directly to infection-levels in rumen, stomach or intestines. Immunity leads to a decrease in the fertility of female nematodes, as well as a decreased conception and egg-production (Jansen J., 1990). The absence or scarce appearance of eggs in faeces does not necessarily indicate an absence of larval or adult nematodes in the host. Immunity itself involves a number of mechanisms by which the host is capable of controlling its worm-burden up to a level whereby the pathological effects of nematode-infestation are limited to a minimum. Unless the host is weakened by disease, pregnancy, malnutrition or other causes of decreased immunity, adult animals ought to be able to withstand worm-infestations without affecting the health status. Thus, it would seem that gastro-intestinal parasitism in dairy cattle in this country is a somewhat over-estimated problem and that endo-parasitism should certainly not solely be held responsible for overall poor production results. Numerous trials have established that the effects of frequent deworming of adult dairy cattle seldom exceed a 12% increase in milkproduction (de Rond J.C.G., de Jong R., Boon J.H. en Brouwer B., 1990).

On the other hand, one has to observe the necessary caution when extrapolating these results to cattle in general. AI-farms in Suriname are usually the better equipped and better managed farms and are therefore not fully representative of cattle husbandry in Commewijne or the rest of Suriname.

The most commonly used anthelmintic drug in Suriname is levamisole, being available as injectable, pour-on or oral formulations. The species encountered in cattle in this survey, lead us to believe that the action of levamisole in these animals should not be a problem. Several studies (Guerrero J. et al., 1984) have found levamisole to have an excellent action against adult and larval stages of all species encountered in this trial. This is being confirmed by a recent (small) trial involving naturally infected (dairy) calves in Suriname (Ronoredjo E. et al., submitted).

In conclusion, it is recommended to encourage the practice of simultaneous and strategic once-a-year treatment of adult dairy cattle, while an additional treatment two to three weeks prior to calving would be advantageous to the new born calf. Levamisole is a suitable drug, while febantel (Courtney C.H. et al., 1988 ; Stuedemann J.A. et al., 1990) and albendazole (De Backere M., 1987) can be used as well.

Further research should be undertaken to establish a suitable strategy for such block-treatments with regard to the seasonal infestation pattern of the pasture. Preliminary results in sheep lead us to believe that the onset of the dry season might be a suitable time for such a treatment (P. Bastiaensen, unpublished data)

Acknowledgments

The author wishes to thank the veterinary assistants, mr. Patrick Pinas (animal health assistant) and mr. Swamipersad Mohan (inseminator) for their help in collecting samples and data. The thorough advices of Prof. Dr. J. Vercruyse and Dr. P. Dorny (both Faculty of Veterinary Medicine, University of Ghent, Belgium) were of invaluable help. This trial was carried out within the framework of the Belgo-Surinamese technical assistance program of the Flemish Organisation for Development Cooperation and Technical Assistance (VVOB) in Brussels.

References

- Anonymous (1986) *"Manual of veterinary parasitological laboratory techniques"*, Ministry of Agriculture, Fisheries and Food, London, United Kingdom, Reference book 418, p.36-39.
- Bastiaensen P. (1995) *"The epidemiology of gastro-intestinal nematodes in sheep in Suriname"*, personal communication, non published data.
- Courtney C.H., Shearer J.K., Zeng Y. & Arther R.G. (1988) *"Efficacy of febantel paste against naturally acquired gastrointestinal nematodes of cattle"*, J. Am. Vet. Med. Assoc., vol. 193, 6, p. 665-667.
- Debackere M. (1982) *"Algemene farmacologie en farmacotherapie"*, University of Ghent, Belgium, p.AP2-AP52.
- Guerrero J., Campbell Barbara, Newcomb Kathleen, Michael B., Garcia-Naranjo F. & Rogiers M. (1984) *"Controlled and clinical evaluations of the anthelmintic activity of a levamisole pour-on formulation against gastrointestinal nematodes in cattle"*, Am. J. Vet. Res., vol. 45, 6, p.1086-1089.
- Hansen J. and Perry B. (1990) *"The epidemiology, diagnosis and control of gastro-intestinal parasites of ruminants in Africa"*, ILRAD, Nairobi, Kenya, p.51-64.
- Jansen J. (1990) *"Epidemiology and immunology of trichostrongylosis in cattle and sheep, a synthesis"*, Tijdschrift Diergeneeskunde, vol. 115, 22, p. 1042-1050.
- Kuil H. (1965) *"Wormen bij het rund in Suriname (I)"*, De Surinaamse Landbouw, p.225-236.
- Ronoredjo E.P. and Bastiaensen P. (1995) *"The use of indigenous papaya (Carica papaya) as an anthelmintic for the treatment of gastro-intestinal nematodes in naturally infected calves in Suriname"*, De Surinaamse Landbouw (submitted).
- Soulsby E.J.L. (1986) *"Helminths, arthropods and protozoa of domesticated animals."*, 7th ed., Baillière Tindall, London.
- Stuedemann J.A., Ciordia H. & Arther R.G. (1990) *"Anthelmintic efficacy of febantel paste in naturally infected calves"*, Veterinary Parasitology, 35, p. 341-347.
- Thienpont D. , Rochette F. and Vanparijs O.F.J. (1986) *"Diagnose van verminosen door coprologisch onderzoek"*, Janssen Research Foundation, Beerse, Belgium, p. 19-43.