GASTROINTESTINAL PARASITES IN CATTLE IN ONTARIO

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Introduction

In 1957, MacGregor and Kingscote (14) reported that 21.2% of the cattle in Ontario had gastrointestinal parasite eggs in the feces. In Ontario this is the only field survey for such parasites although others (6, 12, 15, 18, 19) have demonstrated gastrointestinal parasitism in cattle. Slocombe (19) found that 58% of the bovine fecal samples examined at the Ontario Veterinary College during 1965–70 were positive and suggested several reasons for the apparent increase from 1957.

Since management practices had changed considerably from 1957, a field survey was conducted in 1970 and the results are now reported. The survey was confined to Southwestern Ontario where the majority of cattle are located. The study was restricted to dairy cattle which represents in Ontario a more indigenous and less transient population than beef cattle.

Materials and Methods

Seven areas were selected in the vicinity of the following towns: Shelburne, Listowel, Guelph, Stratford, Paris, Ingersoll-Embro and Fisherville. Factors which influenced the selection of these sites were topography, climate, soil and accessibility for the collection of all fecal samples for any one area in one day.

From a list of dairy farms prepared by local veterinarians, four farms were selected randomly from each area. The farmers' cooperation was solicited, and they were questioned on the number of animals, management practices, and parasitism on their farms. Fecal samples were collected on at least three occasions: once in early May, once in late June to early July, and once in August. In some instances a fourth visit was made in September. At each visit, fecal samples were taken randomly from two groups of animals. The first group (Off-Pasture) consisted of calves which were not to be pastured that summer. The second group (On-Pasture) consisted of calves and yearlings which were to be pastured that summer. At least 25% of the animals in each group were sampled at each visit. In addition, no fewer than four and eight animals for the Off-Pasture and On-Pasture groups respectively were sampled, if that number of animals were available.

Fecal samples were examined for helminth eggs and coccidial oocysts by a modification of the Cornell-McMaster technique (9). 20 g of feces were used instead of 10 g to ensure an adequate sample. One fecal culture was made for each farm. This culture was a pool of 2 g samples collected from each animal on that farm. Infective larvae from these cultures were identified as described by Whitlock (23). No more than 100 larvae from each culture was examined.

Results

Results on a questionnaire directed to the farmers are shown in Table I. The Off-Pasture group was located either within the barn or in the yard adjoining the barn. At the time of the May collection the On-Pasture group was found as described for the Off-Pasture group. The On-Pasture group was placed on pasture from late May to mid-June depending on the area and weather conditions.

The number of fecal samples examined and the percentage of positive samples for each area is shown in Table II. The incidence of

TABLE I

Management Practice and Parasitism on 28 Dairy Farms in Southwestern Ontario

Item	Number of Farms
1. History of Parasitism on Farm	
None	22
Gastrointestinal parasitism	2
Coccidiosis	3
Lungworm	1
2. Use of Anthelmintics	
None	26
Routine	2
3. Submission of Fecal Samples for Laboratory Examination	
None	27
Routine	1
4. Initial Age of Calves Placed on Pasture	
6 months	13
9 months	9
12 months	6

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TABLE II

INCIDENCE OF FECAL SAMPLES WHICH WERE POSITIVE FOR GASTROINTESTINAL PARASITE EGGS AND OOCYSTS FOR EACH AREA

Area	Group	Number of Examinations	% Positive
Shelburne	Off-Pasture	63	14.3
	On-Pasture	127	40.9
Listowel	Off-Pasture	62	19.4
	On-Pasture	119	28.6
Guelph	Off-Pasture	75	18.7
	On-Pasture	178	30.9
Stratford	Off-Pasture	56	8.9
	On-Pasture	142	31.0
Paris	Off-Pasture	65	7.7
	On-Pasture	125	31.2
Ingersoll-Embro	Off-Pasture	69	14.4
	On-Pasture	123	29.2
Fisherville	Off-Pasture	66	12.1
	On-Pasture	150	46.7
All Areas	Off-Pasture	456	13.8
	On-Pasture	958	34.4
	Both Groups	1414	27.8

TABLE III

INCIDENCE OF FECAL SAMPLES WHICH WERE POSITIVE FOR EGGS AND OOCYSTS AT EACH SAMPLING PERIOD

Group	Percent Positive			
	May	June-July	August	September
Off-Pasture	14.2	19.4	8.6	13.5
On-Pasture	40.0	37.3	27.4	20.0
All Cattle	28.9	32.6	22.5	18.3

TABLE IV

THE PERCENTAGE OF FECAL SAMPLES WITH VARIOUS TYPES OF EGGS AND OOCYSTS

Eggs-oocysts	Off-pasture	On-pasture
Gastrointestinal nematodes (GIN)	8.1	30.1
Nematodirus	2.0	2.7
Trichuris, Strongyloides	0.4	0.4
Moniezia	0	1.7
Coccidia	5.2	3.6

positive fecal samples is recorded in Table III. The frequency of fecal samples with various types of eggs and oocysts is illustrated in Table IV. The fluctuations in gastrointestinal nematode (GIN) eggs, which are thin-shelled, oval shaped, and morulated, in eggs per gram (epg) and numbers of positive samples respectively are summarized and illustrated in Table V and Figure 1. The high mean count for the Off-Pasture group for June-July was due to a count of 3275 epg in one animal. Only 2% of the fecal samples for the Off-Pasture group had egg counts greater than 50 epg. No more than 6% of all fecal samples for the On-Pasture group had counts in excess of 100 epg. Coccidial oocysts were equally prevalent in both groups, with the highest number (7%) of positive samples being found in May. *Nematodirus* eggs were equally prevalent in both groups, and maintained equal prevalence throughout the survey period. *Moniezia* was found principally in the Fisherville, Stratford, and Guelph areas during the June-July and August sampling periods. Figure 2 shows the incidence of various parasite species found in the fecal cultures.

DISCUSSION

No more than 33% of the fecal samples examined at any one sampling period during 1970 were positive for gastrointestinal parasites. The incidence in the Off-Pasture and On-Pasture groups never exceeded 20% and 40% respectively. This is a lower incidence than was found in diagnostic data previously reported (19). The incidence in mature cattle was not estimated as these have been shown generally to harbour few parasites (5, 13, 14, 17).

TABLE V

GASTROINTESTINAL NEMATODE (GIN) FECAL EGG COUNTS EXPRESSED AS EGGS PER GRAM (EPG)

Sampling Month	Group	Mean EPG	Range EPG	Number of Examinations
May	Off-Pasture	6.9	0–700	212
	On-Pasture	28.3	0–1000	265
June-July	Off-Pasture	39.3	0–3275	103
	On-Pasture	27.0	0–550	292
August	Off-Pasture	1.4	0–50	104
	On-Pasture	17.3	0–650	296
September	Off-Pasture	4.7	0–50	37
	On-Pasture	9.7	0–225	105

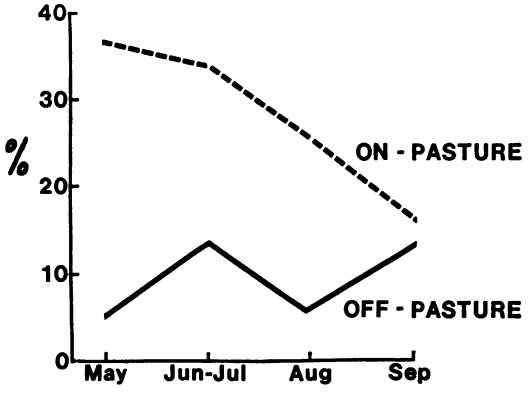

FIGURE 1. Incidence of fecal samples which were positive for gastrointestinal nematode (GIN) eggs.

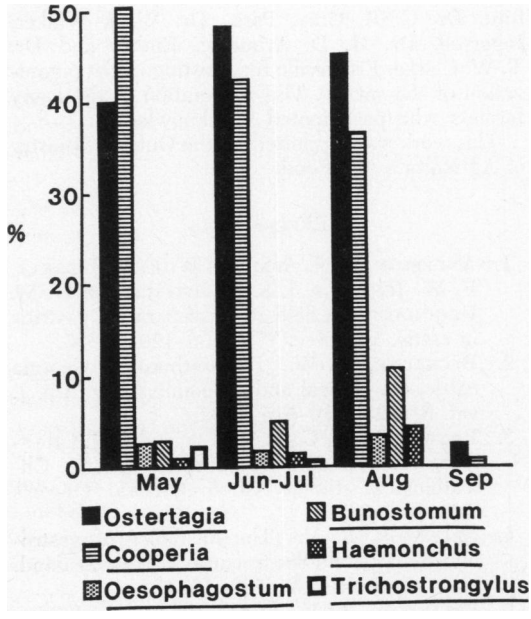

FIGURE 2. Incidence of parasite species as determined by fecal culture.

A higher incidence of positive fecal samples for calves has been reported in Ontario (14) and in Quebec (8). However, in these studies beef and dairy calves were considered jointly. Moreover, neither the year nor time of sampling was specified in the Ontario study and in the Quebec study sampling was repeated several times over a 12-month period but the year was unstated. Since the Ontario study (14) was published, management practices have changed and it is unusual now to find dairy calves on pasture before they are six to nine months. In many instances during the survey in 1970 calves were housed until they were almost one year old and this may account for a reduction in the number of positive samples in this group. Frechette and Gibbs (8) reported that the incidence in Quebec was higher when a simple flotation method was used but the flotation method was not described fully.

The most frequent finding were eggs from the gastrointestinal strongylid nematodes. However, the fecal egg counts were generally low and not unlike those reported previously for Ontario (14) but much lower than those found in Quebec (8). More than 90% of these eggs came from *Ostertagia* and *Cooperia* species. These two genera are quite prevalent in North America (2, 8, 20). They can cause clinical disease when in sufficient numbers (15) and can overwinter successfully in Canada (21).

The highest number of positive fecal samples and GIN fecal egg counts for the On-Pasture group was found in May and June-July sampling periods. This high incidence, therefore, occurred prior to the time when most of the animals were placed on pasture. Frechette and Gibbs (8) reported a similar finding for Quebec. Quite likely these increases resulted from the renewed activity of parasites overwintering in the host in a dormant state (10). When massive numbers of *Ostertagia* parasites are involved, the clinical

signs of Type II or winter Ostertagiosis are produced (1, 11). This egg count increase, like the spring-rise phenomenon in sheep (16, 22), is of great epizootiological significance. It provides a source of heavier than normal contamination on pasture at a time when young and susceptible animals are available in the spring and ensures the perpetuation of the parasite. With the evidence for peak incidence, a suggestion for Ontario farms where gastrointestinal parasitism becomes a problem is to move the animals to another pasture routinely in early July to prevent heavy infections.

The number of positive fecal samples and the fecal egg counts appeared higher in the Fisherville area. Of the seven survey areas, Fisherville is located on an intractable clay of the Haldimand Plain, is the most southerly, the lowest in altitude and has the highest mean temperature and length of growing season (5, 7). These several factors could contribute to high pasture contamination in that area. However, throughout the entire survey there was no evidence of clinical parasitism except for one animal in one herd and a few in another. In fact, most farmers had never considered gastrointestinal parasites a problem, and only a few were aware of deworming procedures for cattle. These findings contrast sharply with the observations of Smith and Archibald (20), who find clinical gastrointestinal parasitism in cattle quite frequently in the Maritimes and especially on reclaimed marshland and other low lying pastures.

Summary

On three to four occasions in 1970 fecal samples were taken from young dairy cattle in four herds from each of seven areas in Southwestern Ontario. No more than 33% of the fecal samples examined at any one sampling period were positive for eggs and oocysts of gastrointestinal parasites. The number of positive samples was highest in May and late June –early July. The incidence in calves not pastured, and in calves and yearlings pastured, never exceeded 20% and 40% respectively. There was little evidence of clinical parasitism.

Gastrointestinal nematode eggs were the most frequent finding. However, only 2% of all fecal samples examined from the calves had fecal egg counts greater than 50 eggs per gram and no more than 6% of the calves and yearlings on pasture had counts in excess of 100 eggs per gram. It was found from fecal cultures that 90% of these eggs came from *Ostertagia* and *Cooperia* species. Coccidial oocysts were the next most frequent finding.

Résumé

À trois ou quatre reprises, au cours de l'année 1970, on préleva des échantillons de fèces chez des jeunes bovins laitiers, dans quatre troupeaux de chacune de sept régions du sud-ouest de l'Ontario. Environ 33% des échantillons examinés à l'une ou l'autre période d'échantillonnage contenaient des oeufs ou des oocystes de parasites gastro-intestinaux. C'est en mai, à la fin de juin et au début de juillet qu'on décela le plus grand nombre d'échantillons positifs. La fréquence du parasitisme chez les veaux gardés à l'étable, ainsi que chez les sujets âgés d'un an ou moins et envoyés au pâturage, ne dépassa jamais 20 et 40%, respectivement. Les cas de parasitose clinique étaient à peu près inexistants.

Les oeufs de nématodes gastro-intestinaux s'avérèrent les plus fréquents. Toutefois, seulement 2% de tous les échantillons des veaux contenaient plus de 50 oeufs par gramme. Environ 6% des veaux en paissance et âgés d'un an ou moins recélaient plus de 100 œufs par gramme de fèces. Des coprocultures révélèrent que 90% de ces oeufs provenaient d'espèces de *Ostertagia* et *Cooperia*. Les oocystes de coccidies représentaient les formes parasitaires venant en second lieu, du point de vue fréquence.

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ANALYSE DE VOLUME

Veterinary Pathology. Fourth Edition. H. A. Smith, T. C. Jones et R. D. Hunt. Publié par the Macmillan Company of Canada Limited, Toronto. 1972. 1521 pages. Prix $34.75.

Depuis sa première édition, en 1957, ce livre est devenu un classique en médecine vétérinaire. A la suite de la mort du Dr. Smith, un nouvel auteur, le Dr R. D. Hunt a contribué à la préparation de cette nouvelle édition du volume.

Le volume conserve sa présentation originale, mais possède un plus grand nombre de pages. Cette augmentation dans l'épaisseur du volume est due à l'addition d'une grande quantité de nouvelles connaissances acquises en pathologie ces dernières années, et à l'addition de plusieurs photographies obtenues de la microscopie électronique. Ces dernières contribuent à une meilleure compréhension de plusieurs phénomènes pathologiques rencontrés chez les animaux. L'addition d'une liste de références très complète à la fin de chaque sujet important, fait de ce volume une source d'informations très valable pour ceux qui ont à travailler un problème particulier. Le chapitre qui traite des maladies du rein montre une grande amélioration depuis la dernière édition car il décrit très bien plusieurs concepts modernes sur ces maladies.

Ce volume imprimé sur un papier de très bonne qualité présente des reproductions photographiques tant macroscopiques que microscopiques excellentes et très représentatives. Sa qualité qui se compare très avantageusement avec les grands classiques de la pathologie humaine est un excellent reflet du niveau d'excellence atteint dans cette science fantastique qu'est la pathologie vétérinaire.

Ce livre destiné aux étudiants en médecine vétérinaire et aux vétérinaires qui ont un contact étroit avec les maladies animales, offre une source d'informations très complète, concise et facile à lire. Tout vétérinaire qui déside demeurer à la fine pointe du progrès ferait une bonne acquisition en se procurant ce volume. *Michel Morin.*