

# Overwintering of Bovine Gastrointestinal Nematodes in Southwestern Ontario

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## ABSTRACT

Several steers, reared in isolation until approximately six months of age, were placed on a small isolated enclosed pasture from late spring to late fall of 1970, 1971 and 1972. The pasture was left vacant and unused during the winters and early springs. The pasture had been used in previous years by cattle, and in the late spring of 1970 was grazed by cattle known to be passing gastrointestinal nematode eggs in their feces. The steers were slaughtered periodically, and the prevalence of nematode species in the abomasum, small intestine, and large intestine, was determined from random samples of up to 100 adult male worms from each segment. The following nematodes were found in the steers in 1971 and 1972 and survived winters on pasture: *Ostertagia ostertagi*, *O. lyrata*, *Cooperia oncophora*, *C. mcmasteri*, *Nematodirus helvetianus* and *Trichuris discolor*. Two nematodes *Cooperia punctata* and *Bunostomum phlebotomum* known to be present on pasture in 1970, since they were recovered from the steers in that year, were not found in the steers in 1971 and 1972.

## RÉSUMÉ

Après avoir élevé plusieurs bouvillons en isolement, jusqu'à l'âge d'environ six mois, on les envoya sur un petit pâturage isolé et clos, de la fin du printemps à la fin de l'automne, en 1970, 1971 et 1972. On n'utilisa pas ce pâturage durant l'hiver ou au début du printemps. On y avait cependant fait paître des

bovins au cours des années précédentes et, vers la fin du printemps de 1970, on y envoya des bovins qui éliminaient des oeufs de nématodes dans leur fumier. On abattit les bouvillons à différents intervalles. On détermina ensuite la prédominance des espèces de nématodes dans la caillette, l'intestin grêle et le côlon, à partir d'échantillons comptant jusqu'à 100 mâles adultes de chacune de ces trois parties du système digestif. En 1971 et 1972, on recouvra les nématodes suivants qui survécurent sur le pâturage, au cours de la saison hivernale: *Ostertagia ostertagi*, *O. lyrata*, *Cooperia oncophora*, *C. mcmasteri*, *Nematodirus helvetianus* et *Trichuris discolor*. Par ailleurs, on ne recouvra pas *Cooperia punctata* et *Bunostomum phlebotomum* qui étaient présents au pâturage, en 1970, parce qu'on les avait alors recouverts des bouvillons.

## INTRODUCTION

Clinical gastrointestinal nematodiosis occurs in cattle in Ontario (4, 10, 15), but the epizootiology of this complex of diseases is unknown. This report presents information on the overwintering of bovine gastrointestinal nematodes on pasture in southwestern Ontario.

## MATERIALS AND METHODS

In the late spring 1970, four two year old Jersey cows with gastrointestinal nematode eggs in their feces were allowed to graze on an isolated enclosed pasture for approximately three weeks. The pasture was approximately two acres in size, flat,

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**TABLE I. Prevalence of Nematodes in Steers During the Pasture Seasons of 1970 (10 steers), 1971 (14 steers) and 1972 (9 steers)**

Nematode	Number of Steers		
	1970	1971	1972
<i>Ostertagia ostertagi</i>	9	13	9
<i>Ostertagia lyrata</i>	2	4	6
<i>Cooperia oncophora</i>	9	12	7
<i>Cooperia punctata</i>	10	0	0
<i>Cooperia mcmasteri</i>	6	12	7
<i>Nematodirus helvetianus</i>	3	4	2
<i>Bunostomum phlebotomum</i>	2	0	0
<i>Trichuris discolor</i>	1	4	6

well drained, with a mixed stand of grasses, had not been seeded for 15 years, without shade, and had been grazed in previous seasons by other Jersey cattle. On June 10, 1970 the Jersey animals were removed, and ten Holstein steers, five to eight months old, were placed on the pasture. These steers were purchased when they

were one to two weeks old and were reared in confinement to prevent infection with gastrointestinal nematodes. No grain supplement was given to the steers during the time on pasture.

The steers were slaughtered at the rate of one every two to three weeks, commencing September 3, 1970 to determine the parasite burden in the gastrointestinal tract. These steers were housed and starved for 24 to 48 hours prior to slaughter. The abomasum, the first twenty feet of the small intestine, and the major part of the large intestine were ligated, and examined separately. From each segment, the contents were removed and the mucosal surface thoroughly washed. The contents and washings from the abomasum were passed through a stack of three sieves (mesh sizes 60, 100 and 200), and from the small and large intestine through one sieve (mesh size 60). All material on the sieves was removed and resuspended in water. A random sample of up to 100 adult male worms

**TABLE II. Temperature and Precipitation from June 1970 to November 1972 at Elora Research Station, University of Guelph, Elora, Ontario**

Year	Month	Temperature in °F			Precipitation in Inches	
		Mean Maximum	Mean	Mean Minimum	Total	Snowfall
1970	June	73.0	62.8	52.0	1.86	1.86
	July	77.5	67.7	57.6	3.86	
	Aug	77.5	66.2	54.5	2.19	
	Sept	67.0	58.6	49.7	5.74	
	Oct	57.1	49.9	42.3	3.37	Trace
	Nov	42.5	37.2	31.9	2.10	4.9
	Dec	27.7	21.3	14.9	3.58	23.7
1971	Jan	21.7	13.9	6.1	2.12	16.8
	Feb	27.6	20.6	13.6	3.48	12.5
	March	30.5	22.5	14.5	1.58	8.0
	April	46.6	36.6	29.0	1.24	
	May	64.4	52.1	39.8	1.30	
	June	75.6	64.5	53.6	4.28	
	July	74.4	64.4	54.4	5.60	
	Aug	75.2	63.6	52.1	3.34	
	Sept	71.1	61.7	52.3	0.84	
	Oct	63.9	54.4	45.0	1.36	
	Nov	41.1	34.8	28.4	1.68	6.6
	Dec	34.5	27.9	21.4	4.03	8.6
1972	Jan	26.1	18.7	11.3	2.59	14.5
	Feb.	24.9	15.7	6.4	2.05	17.0
	March	29.9	22.3	14.7	3.61	11.4
	April	43.8	35.2	26.5	2.50	4.7
	May	68.3	56.5	44.6	2.90	
	June	68.7	59.0	49.2	3.98	
	July	76.4	66.2	55.6	2.35	
	Aug	74.1	64.3	54.6	1.90	
	Sept	68.6	59.0	49.3	2.41	
	Oct	50.4	42.2	33.9	4.49	0.2
	Nov	36.4	31.5	26.6	2.41	9.3

was taken from the different segments of the gastrointestinal tract, and the worms were identified to species. After mid-November 1970, the pasture was left vacant and unused during the winter and early spring.

On June 10, 1971 and June 12, 1972, 14 and nine steers respectively were placed on the pasture. The steers were obtained and reared in a manner similar to those previously described. Identical procedures as outlined for the 1970 calves were carried out except that the slaughtering of calves began on June 29, 1971 and July 11, 1972. In each year the pasture was left vacant and unused after mid-November until the following spring.

It was not possible to record daily weather conditions on the pasture. Data were obtained from the nearest weather station, approximately three miles from the pasture, at the Elora Research Station, Ontario Agricultural College, University of Guelph.

## RESULTS

Species of nematodes recovered from the steers are given in Table I. Where *Ostertagia lyrata* was found, it comprised approximately 10% of the *Ostertagia* spp. In 1970, approximately 30% of the *Cooperia* spp was *C. oncophora*, 65% was *C. punctata*, and 5% was *C. mcmasteri*. In 1971 and 1972, *C. oncophora* comprised more than 80% of the *Cooperia* spp and *C. mcmasteri* less than 20%. The meteorological data for the period of June 1970 to November 1972 are recorded in Table II.

## DISCUSSION

The data in this report represent part of some information being derived from field experimentation on the epizootiology of bovine nematode gastroenteritis in southwestern Ontario. At least six nematodes can overwinter on pastures in On-

tario — *Ostertagia ostertagi*, *O. lyrata*, *Cooperia oncophora*, *C. mcmasteri*, *Nematodirus helvetianus* and *Trichuris discolor*. Two nematodes, *C. punctata* and *Bunostomum phlebotomum*, known to be present on pasture in 1970, were not found in the experimental steers in 1971 or 1972. Species of *Ostertagia*, *Cooperia* and *Nematodirus* have been found in North America (2, 11). Good overwinter survival for the preparasitic stages of *O. ostertagi*, *C. oncophora* and *N. helvetianus* on pasture has been recorded in the United States (5, 6, 7, 8, 14), England (12, 13), and the Maritimes, Canada (20). In the Maritimes, *N. helvetianus* survived two winters on marshland pastures, but few if any *O. ostertagi* and *C. oncophora* survived two winters (18). Overwinter survival of the preparasitic stages of *O. lyrata* and *C. mcmasteri* is not as well known. However, *C. mcmasteri* accounted for a significant proportion of the *Cooperia* burden in these steers.

Other abomasal parasites, *O. trifurcata*, *O. circumcincta*, *Trichostrongylus axei* and *Haemonchus* species, have been found in small numbers in cattle in Ontario (16). *O. trifurcata* and *O. circumcincta* are normally parasites of sheep and there is no record of previous use by sheep on this pasture. However, these nematodes can overwinter on pasture in Canada (1, 19). *Trichostrongylus axei* can be found in cattle, sheep and horses and can overwinter on pasture in Canada (1, 19). *H. contortus* in sheep does not overwinter on pasture in Canada (1, 19).

*Cooperia punctata* is a common and widely distributed parasite of cattle (11), is more pathogenic than *C. oncophora* (9), and overwinters successfully on pasture in more southerly latitudes (5, 22). The infective larvae can survive freezing at -10°C for 1.5 hours (3), but the absence of *C. punctata* in the 1971 and 1972 steers suggest that the parasite may be unable to overwinter on pasture in southwestern Ontario. Interestingly, the majority of the *Cooperia* spp in the 1970 steers were *C. punctata* and it may be that the biology of this parasite favours a rapid build up of infections in the summer.

*Bunostomum phlebotomum*, a hookworm which is more common in warmer areas (11), has been found previously in southwestern Ontario (16). The preparasitic stages are destroyed easily by winter temperatures (11). *Trichuris discolor* has been found in North America principally in

southern areas of the United States (9), and a clinical outbreak has been reported in Canada (21). Not much is known about the epizootiology of such infections, but the eggs are considered to be resistant to temperature extremes.

The weather data, from a meteorological station approximately three miles from the pasture, were not the actual climatic data for the pasture area, but they did represent the prevailing conditions in the region. The survival of nematodes on pasture is dependent not only on air temperature, but also on the presence of snow cover, moisture, and the extent of the pasture mat. Snow cover prevents temperature fluctuations at ground level, and a well developed mat has the same effect. Clinical parasitism is common in cattle in the Maritimes (20), but is not as common in dairy cattle in southwestern Ontario (16). Differences in climate might be responsible for these differences in infections.

Measures for the control of nematode infections in cattle in southwestern Ontario cannot be formulated until there is more information on the epizootiology of nematode infections. However, the highest fecal egg counts in dairy cattle in southwestern Ontario have been found in May through early July, and it has been suggested that where clinical parasitism is a problem, animals should be moved routinely to another pasture in early July to prevent the build up of heavy infections in these animals and on pasture (16).

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