Acta vet. scand. 1987, *28*, 459–461.

Brief Communication

A Field Experiment on Rain Splash Dispersal of Infective Larvae of Ostertagia Ostertagi (Trichostrongylidae) from Cow Pats to Surrounding Grass

Ostertagia ostertagi is an important trichostrongyle nematode parasite of cattle in several countries, including Denmark. It leaves its host as eggs with faeces. After hatching it develops in the cow pat up to the third and infective stage, which is then transmitted to the surrounding grass.

A range of biotic factors, such as fungi (*Bizzell & Ciordia* 1965), earthworms (*Grønvold* 1979), slugs (*Grønvold & Nansen* 1984), insects (*Tod et al.* 1971) and birds (*Grønvold* 1984a) may be responsible for passive transmission of trichostrongyle larvae. However, there are no indications that any of these factors play a major quantitative role in larval transmission.

In a preliminary experiment it was shown, that rain splash dispersal of infective larvae of Cooperia spp. of cattle is a possibility (*Grønvold* 1984b). The purpose of the present field experiment was to evaluate the quantitative role of splash dispersal of infective O. ostertagi during rainy weather.

Fresh faeces containing a monoculture of O. ostertagi eggs were collected from an infected donor calf. Ten kg of faeces were mixed in a cement blender to obtain an even distribution of the parasite eggs. The faeces, containing 150 eggs per gram, were weighed out in portions of 1 kg, which were then formed as cow pats (diameter: 20 cm; height: 3 cm) These were placed on a grass plot some 20 km west of Copenhagen on 1. July 1987. Five cow pats (control cow pats) were placed on the soil surface in 1 row. At the same occasion another row of 5 cow pats placed in buckets (cow pats in buckets) was made (Fig. 1), to prevent infective larvae from actively migrating out on the grass or being passively transported by water run-off. The distance in between the cow pats was 2 m.

Grass samples were collected by cutting the grass 0.5 cm above the soil surface within distances of 0–20 cm, 20–40 cm and 40–60 cm from the edge of the cow pats 28 and 50

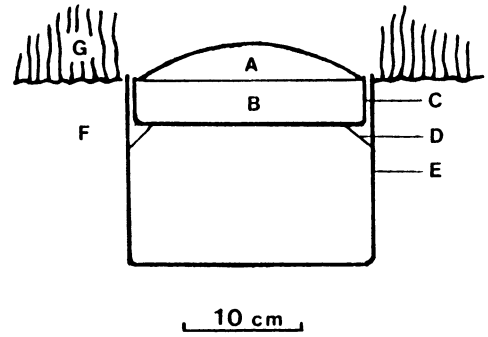

Figure 1. Cow pat placed in a bucket to prevent transmission of infective trichostrongyle larvae from faeces (A) to grass (G) by active migration or by passive water run-off. A cow pat (A) was deposited on top of the soil compartement (B), which totally filled the small bucket (C). The small bucket (C) was supported by 4 small metal legs (D) in the centre of the upper open end of a big empty bucket (E). The big bucket (E) was dug into the soil (F) with the open upper end in level with the soil surface. The only connections between the small bucket (diameter: 20 cm) and the big bucket (diameter: 21 cm) were the 4 metal legs (D).

Table 1. Numbers of infective Ostertagia ostertagi larvae from grass sampled at different distances from the edge of control cow pats and cow pats in buckets. The samples were taken 28 and 50 days after the start of the experiment. (N.D.: Not determined).

Distance from the edge of the cow pats (cm)	Numbers of infective Ostertagia ostertagi larvae per kg dry grass			
	Day no. 28		Day no. 50	
	Control cow pats	Cow pats in buckets	Control cow pats	Cow pats in buckets
0–20	29 125	39 238	24 038	23 649
20–40	N.D.	N.D.	2 654	3 838
40–60	N.D.	N.D.	815	1 077

days after the start of the experiment. Grass sampled around each row of cow pats constituted one sample. Infective O. ostertagia larvae were isolated and enumerated according to *Jørgensen* (1975) and *Mwegoha & Jørgensen* (1977).

Larval counts in the grass collected around the cow pats 28 and 50 days after the start of the experiment are shown in Table 1. It appears that the majority of infective larvae were transported to the grass collected within 20 cm from the edge of the cow pats. It is also evident that the differences between grass larval counts around control cow pats and around cow pats in buckets were insignificant.

The present experiment allows no precise quantitative calculation of the proportion of infective O. ostertagi larvae transported by splash droplets, as the 2 groups of cow pats were disturbed differently. During the entire experimental period of 50 days the control cow pats disappeared totally, most likely due to high earthworm activity in the soil. It is known that earthworm activity in non-protected cow pats results in a reduced transmission of infective trichostrongyle larvae to the surrounding grass (*Grønvold* 1988). The cow pats in buckets, however, were more or less protected from attack by earthworms. But during the course of the experiment from day 28 to day 50 the small buckets (Fig. 1(C)) were flooded and the cow pats (Fig. 1(A)), which were soaked with water, lost their integrity. It must be expected that the transmission of infective larvae from the soaked and disturbed cow pats in buckets was also reduced to some unknown degree.

Despite the above mentioned difficulties in comparing the results based on the two groups of cow pats, some important conclusions can nevertheless be made. During the experimental period the conditions for splash dispersal were good as 121.8 mm of rain fell during the first 28 days and 73.7 mm fell in the period from day 28 to day 50. The mean temperature in the whole period was 14.4°C. Water run-off from the cow pats in small buckets (Fig. 1(A)) was collected in the big buckets (Fig. 1(E)), which at the end of the experiment were almost filled with water. This finding indicates that active migration in water films or passive transport of infective larvae by water run-off from cow pats in buckets to the surrounding grass was of limited importance. As biotic factors are expected to play only a minor role, the present results strongly suggest that rain splash is quantitatively a very important, if not the

most important, factor for dispersal of infective O. ostertagi larvae to grass under climatic conditions such as those described. However, also in other climate regions like North America (*Williams & Bilkovich* 1973) and Australia (*Barger et al.* 1984) rain is a most important factor responsible for transmission of trichostrongyle larvae from cow pats to grass, and larval transmission is very restricted in dry periods.

Acknowledgements

I wish to thank Dr. Jens Wolstrup and technician Annette Kørner for their valuable help.

The experiment was supported by the Danish Agricultural and Veterinary Research Council, grant no. 13-3716.

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(Received December 4, 1987).

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