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Brief Communication

An Attempt to Evaluate the Spreading of *Taenia saginata* Eggs in the Environment

Taeniid eggs may be transmitted either abiotically by e.g. sewage disposal, rainfall and water streams or biotically by vectors as herbivores, birds and insects. Among the insects especially the flies may play an important role as shown in New Zealand by *Lawson & Gemmell* (1983, 1985). The fly-borne transmission may take place over long distances. *Lawson & Gemmell* (1983) evaluated that the majority of eggs would be deposited within 1.6 km from their point of origin, but some eggs might be spread even longer.

The present experiment was set up to study whether *Taenia saginata* eggs could be spread by insects under natural conditions in Denmark. *T. saginata* eggs in human faeces were deposited on the ground close to the pasture which was subsequently grazed by 8 calves. The calves were at the same time part of a field trial of ostertagiasis, where the animals acquired moderate to high worm burdens.

The experimental field, which was situated on Zealand near Copenhagen, measured 100×40 m. It was divided longitudinally in 2 separate plots, which were each grazed by 4 first season grazing jersey calves of 5–6 months of age at introduction to the plots on July 14, 1987 (Fig. 1). On each of 2 dates, i.e. July 1 and July 14 500.000 fresh *T. saginata* eggs mixed into 2 kg of human faeces were deposited on bare ground 1.5 m from the fence of the long side of one of the plots. This distance was considered sufficient to prevent the dispersal by rainsplash, which was found to transport other parasites over lateral distances up to 63 cm (*Grønvold* 1984). The site of disposition was chosen to favour spread under Danish conditions, where westerly winds prevail. The minimum distance from the faecal deposition to the 2 groupes of calves was 1.5 and 21.5 m, respectively (Fig. 1). A 5 cm plastic rim

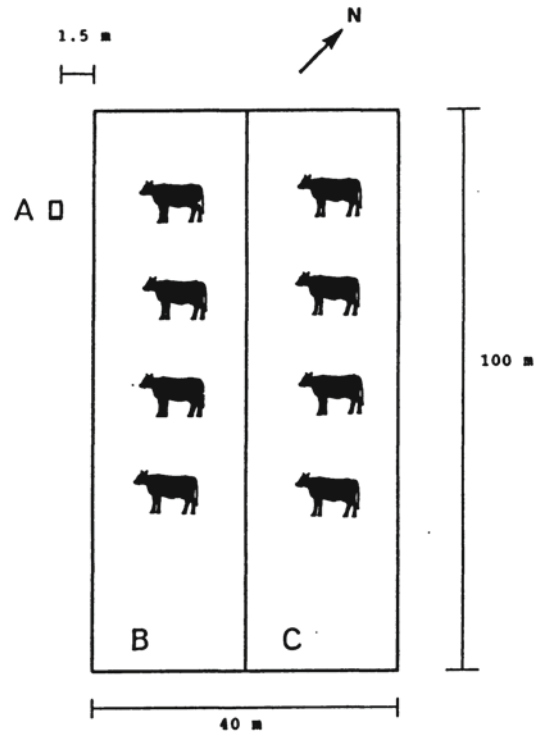

Figure 1. Outline of the experimental field:
A: The site of the experimental deposition of faeces with 500.000 eggs of *Taenia saginata*.
B and C: The 2 plots grazed by each 4 calves.
(The geografical North is indicated by arrow).

around the faeces was placed to prevent the direct flow by streaming water. Shade and protection from spread by larger animals was provided by a wire fence partly covered by leaves. During the days following the first disposal the weather was sunny with temperatures up to 25°C and weak mainly westerly winds. Faeces were occassionally moistened by water spraying. Around the second disposal there was a gradual change to lower temperatures, rain, and strong mainly easterly winds.

The experimental calves were slaughtered at September 9, i.e. 10 and 8 weeks after the first and second disposal. Post mortem examination for cysticerci included carefull slicing of the heart, oesophagus and head musculature of all 8 animals. The 4 calves that had been grazing nearest to the site of deposition were examined further by slicing the total sceletal musculature of the symmetrical half of the carcasses. No cysticerci were found in any of the calves despite the fact that *T. saginata* are reported to be visible from 2 weeks after infection (*McIntosh* 1960).

For evaluation of the infectivity of the *T. saginata* eggs 1 control calf was infected orally with 5000 eggs from the actual batch. At slaughter this calf when examined by the procedure described above harboured a total number of 2500 cysticerci.

Evaluation of the insects involved was made by direct inspection and by the placing of 4 insect traps 0.5–5 m's from the experimental faecal deposit (*Jespersen* 1987a). Species of *Calliphora* and various smaller insects were observed on the faeces mainly during the first days after each deposition. Of 68 insects catched by the traps 7 were identified as belonging to the *Muscidae,* but none of the genus *Calliphora* (*Jespersen* 1987b). The whole batch of insects was administered to a calf on August 26. This calf was slaughtered 13 weeks later, but no cysticerci were found by slicing following the most comprehensive of the techniques described above.

Blood samples were drawn at regular intervals from all calves during the experimental period, and subsequently tested for antibodies against a *T. saginata* antigen by an Enzyme Linked Immunosorbent Assay (ELISA), modified after *Harrison* (1981). The control calf which had received 5000 oncospheres orally, showed a marked increase in titer from 4 weeks p.i. Among the 8 calves grazing the experimental fields 2 animals belonging to different groups showed an increase in titer during the experimental period. Whether this was actually associated with the uptake of *T. saginata* eggs remains unclear, but in theory it could be explained by the repeated uptake of small doses of eggs which may stimulate the immune-response more than does a high number of eggs given as a single dose (*Gemmell & Johnstone* 1977).

This experiment failed to demonstrate any transmission of *T. saginata* eggs from the site of deposition to the experimental animals grazing the nearby pasture. Being well aware of the fact that the experimental design did not allow detection of transmission in all directions it still seems possible to draw some tentative conclusions: It is not likely that spreading by insects under the weather conditions and transmission distances here described will account for a massive outbreak of cysticercosis, i.e. with many cases of heavily infected animals.

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