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Brief Communication

THE FOX AS A DEFINITIVE HOST FOR SARCOCYSTIS RANGI FROM REINDEER (RANGIFER TARANDUS TARANDUS)

Members of the genus Sarcocystis have an obligatory two-host life cycle. The cysts in the musculature of the intermediate host (a prey animal) are infectious for the definitive host (a predator), which passes sporocysts with the faeces after gametogony and sporogony have taken place in the lamina propria of the intestine.

Recent investigations have shown that the domestic reindeer (Rangifer tarandus tarandus) in northern Norway is the intermediate host for 6 species of Sarcocystis (*Gjerde* 1984 a, d), whereas the wild reindeer in southern Norway has been found to be infected with 3 of these species (*Gjerde* 1984 b, c). Various canines have been found to be definitive hosts for S. grueneri and S. tarandivulpes (*Gjerde & Bratberg* 1984, *Gjerde* 1984 c, e), whereas the definitive hosts for S. hardangeri, S. rangi, S. rangiferi, and S. tarandi so far have been unknown. The present paper reports the first experimental transmission of S. rangi to a fox.

During the legal hunting season in 1984, samples of the oesophagus and diaphragm were obtained from a wild reindeer shot in the Setesdal Vesthei wild reindeer area in southern Norway. Several sarcocysts were micro-isolated from the fresh muscle tissue under a stereoscopic microscope and classified according to their size, shape and cyst wall structure as described previously (*Gjerde* 1984 a, b, d).

The musculature examined contained numerous cysts of S. tarandivulpes and S. rangi. The spindleshaped cycts of S. tarandivulpes were 470—1000 μm long and 55—220 μm thick and had minute knob-like cyst surface protrusions. The slender cysts of S. rangi were 4000—10 000 μm long and 75—125 μm thick, and had fine, hair-like cyst surface protrusions. This is the first report of S. rangi infection in the wild reindeer in southern Norway.

Since the fox was known to act as a definitive host for S. tarandivulpes, it was necessary to isolate the cysts of S. rangi from the muscle tissue in order to determine whether the fox was a suitable definitive host for the latter species also. Because of the marked difference in length, the cysts of S. rangi could be distinguished from the cysts of S. tarandivulpes in situ. About

50 typical cysts of S. rangi (several mm long) with a small amounts of the surrounding tissue were excised with scissors, stored in 0.9 % NaCl solution at 4°C overnight, and given to a blue fox (Alopex lagopus) by stomach tube. At the time of inoculation, 5 days had elapsed since the reindeer had been killed. The fox had been conventionally reared at the Research Farm for Fur-Bearing Animals, Heggedal, but had never been given raw meat. Faeces were collected daily from day 4 to day 20 post inoculation and examined for sporocysts by means of a flotation technique using a $NaCl/ZnCl_2$ solution.

Sarcocystis sporocysts were first detected in the faeces of the fox on day 11 after inoculation, and the fox was still passing sporocysts when the experiment was discontinued on day 20 post inoculation. Only a few sporocysts were seen in the faecal samples on each day. The sporocysts were typical of Sarcocystis and contained 4 elongate sporozoites and a granular sporocystic residual body. The sporocysts measured 13.3—15.5 (14.6 ± 0.5) × 9.5—11.3 (10.2 ± 0.4) μm; n = 55. Their mean length to width ratio was 1.44.

The present experiment showed that the fox is a suitable definitive host for S. rangi. Since the Sarcocystis species do not have a very strict definitive host specificity, other canines will probably also serve as definitive hosts for this species. S. rangi is the third Sarcocystis species of reindeer which has been found to use the fox as a definitive host. The sporocysts of S. rangi were on average slightly larger than the sporocysts of S. tarandivulpes and S. grueneri (*Gjerde* 1984 c). However, as the size ranges of the sporocysts of the 3 species overlap, sporocyst size cannot be used as a criterion for differentiating between the 3 species in the definitive host. Moreover, the prepatent period of S. rangi (11 days) was similar to the prepatent periods of S. grueneri and S. tarandivulpes (10—12 days) (*Gjerde* 1984 c).

In the present experiment, 50 cysts of S. rangi were sufficient to cause the shedding of a detectable number of sporocysts by the fox. In a similar experiment, about 150 cysts of S. tarandivulpes were isolated from the oesophagus of another wild reindeer and given to a silver fox (Vulpes vulpes) by stomach tube. This fox also shed typical Sarcocystis sporocysts, thereby confirming the previously reported life cycle of that species (*Gjerde* 1984 c).

Skeletal musculature of naturally infected reindeer usually harbours cysts of several (up to 5) species simultaneously

(*Gjerde* 1984 a, d). After ingestion of such muscle tissue by a suitable definitive host, sporocysts belonging to more than 1 species might be shed, making it impossible to determine with certainty which species the sporocysts belong to. On the other hand, the sporocysts shed by the 2 foxes inoculated with isolated cysts of S. rangi and S. tarandivulpes, respectively, belonged to a particular species. Thus the inoculation of isolated cysts is a useful method for determining the definitive hosts of a given Sarcocystis species and for obtaining sporocysts of a single species from the definitive host.

Further experiments are needed to elucidate the development of S. rangi in the intestine of the fox and to determine the infectivity of this species for other canines. It would also be of interest to infect the reindeer experimentally with sporocysts of S. rangi to determine its development in the intermediate host.

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