



Hard faeces reingestion in the Mountain hare *Lepus timidus*

By H. HIRAKAWA

Forestry and Forest Products Research Institute,
Toyohira, Sapporo, Japan

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Leporids are known to reingest their own faeces. This fact first became widely accepted thanks to the rediscovery and confirmation of MOROT'S (1882) study by MADSEN (1939) and TAYLOR (1939). They showed that the domestic rabbit produces hard and soft types of faeces and reingests all soft faeces by taking them directly from the anus. The soft faeces, which had not been known until that time, was subsequently identified as being derived from fermented digesta in the caecum rich in vitamins and proteins (EDEN 1940; HUANG et al. 1954; KULWICH et al. 1953; THACKER and BRANDT 1955). Later, soft faeces were found in the stomachs or colons of many other leporid species (HAMILTON 1955; HEWSON 1962; LAYNE 1958; LECHLEITNER 1957; SPENCER 1955; WATSON and TAYLOR 1955). As a result, it became understood that caecotrophy (reingestion of soft faeces) was a normal physiological digestive process widely practiced in the leporids.

Hard faeces are produced when the separation process at the proximal colon selectively diverts fluid and fine particles of digesta to the caecum (BJÖRNHAG 1972; CHEEKE 1987; EHRLIN et al. 1983; HÖRNICKE et al. 1984; PICKARD and STEVENS 1972; RUCKEBUSCH and HÖRNICKE 1977). Hard faeces are hence composed mostly of poorly digestible large particles and had not been regarded as being normally reingested. However, the frequent reingestion of hard faeces was recently reported in the domestic rabbit (EBINO et al. 1993). Moreover, the Japanese hare *Lepus brachyurus* was observed to reingest all the hard and soft faeces excreted during daytime rest (HIRAKAWA 1994). Based on the various pieces of evidence, HIRAKAWA (1994) suggested that the reingestion of all daytime hard faeces should be a normal practice in leporids. In this communication, the reingestion of hard faeces in the mountain hare *L. timidus* is reported as the evidence to support the prediction.

The reingestion activities during the daytime rest were observed during the first two weeks of September 1995 in two mountain hares: a male kept in a large outdoor enclosure (32 m × 28 m) and a female in a small roofed pen (3 m × 4 m). Both were caught in February 1995 in Sapporo and had been fed with commercial pellets. Natural vegetation was also available to the male. They were accustomed to rest at some fixed sites on the ground (forms), which were monitored by video recording from dawn until dusk.

The male hare entered the form at around sunrise (4:50), and left it at around sunset (18:00). The reingestion bouts for hard faeces (repeated faeces-taking actions each followed by mastication) occurred 3 times ($n = 7$, range: 2–5) within an hour after the hare entered the form (Fig. 1). Then, soft faeces reingestion (one faeces-taking action at a time without mastication) started at 5:40 ($n = 13$, range: 5:21–5:57) and occurred 14 times ($n = 10$, range: 13–18) until early afternoon. Reingestion bouts for hard faeces began again at 13:38 ($n = 12$, range: 12:46–14:19) and occurred 4.6 times ($n = 11$, range: 3–7) until the hare left the form. Thus, the hare reingested all hard as well as soft faeces while resting in the form. Supplemental observation showed a similar reingestion pattern in the female.

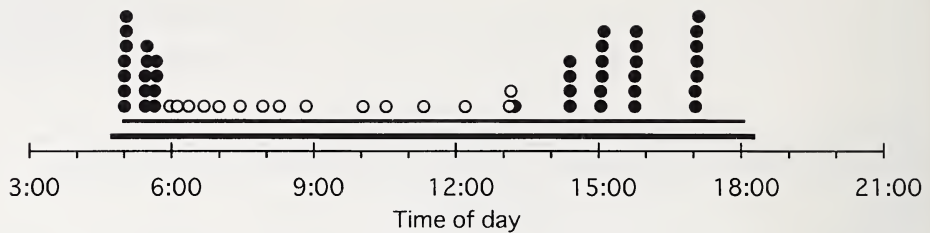


Fig. 1. Faeces reingestion activities of a male mountain hare during one day. Each circle represents a single faeces-taking action; solid circles are for hard-faeces-taking action followed by mastication; open circles for soft-faeces-taking action with no mastication. The thick horizontal bar indicates the time during which the form was observed. The thin horizontal bar indicates the period when the hare was in the form. Circle piling indicates that faeces-taking actions occurred in a bout.

The results of observation showed essentially the same pattern of reingestion of daytime hard and soft faeces in the Japanese hare *L. brachyurus* (HIRAKAWA 1994). The only notable difference was that the morning reingestion bout for hard faeces occurred several times in the mountain hare whereas it occurred usually once in the Japanese hare. However, both of these observations were conducted for a limited number of individuals, hence it is not known whether the difference is interspecific.

The excretion of soft faeces in the mountain hare is reported to occur from the morning to the early afternoon as in many other leporid species (FLUX 1970; HEWSON 1962; PEHRSON 1983; PSHENNIKOV et al. 1988). This matches with the period in which the behaviour of soft faeces reingestion was observed in this study. Hence, the generality of the present observation is supported.

This is the second leporid species in which reingestion of all daytime hard faeces was observed. The temporal and behavioural patterns of reingestion in the mountain hare was also essentially the same with those in the Japanese hare. This strongly suggests that the reingestion of all hard faeces during daytime rest is a normal habit in leporids. However, to assure the conclusion, the study on the species other than *Lepus* is further required.

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Author's address: Dr. HIROFUMI HIRAKAWA, Forestry and Forest Products Research Institute, Hitsujigaoka 7, Toyohira, Sapporo 062, Japan.

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