

THE EFFECT OF FREQUENT FEEDING ON EATING AND RUMINATION BEHAVIOUR IN SHEEP FED ONLY ROUGHAGE DIET

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Introduction

According to Gordon and Tribe (1952), it was shown that the growing sheep produced greater body weight gains when offered their daily ration in 8 small feeds than they did when given same quantity and quality of food in one feed, and that the total time spent ruminating by frequently fed sheep was markedly shorter than that by singly fed sheep when the continuous observations were made on the ruminating behaviour of two sheep from each group over 72-hour period. Then, Gordon (1961) has also shown that total rumination time, the number of period of rumination and the total number of boli were found to bear no relationship to the increased efficiency of food utilization by sheep when they received the ration in small frequent feeds. In this study, the eating and rumination behaviour were investigated in sheep offered their daily ration of hay in 2, 4 and 8 small feeds.

Materials and Methods

Three Japanese Corriedale wethers, each weighing 28-30 kg, were used repeatedly. The sun-cured hay was made from a predominantly Italian-ryegrass pasture, and was cut to about 10 cm long before feeding. Chemical composition (as % D.M.) of hay were as follows: organic matter, 93.0; crude protein, 7.9; crude fat, 2.6; crude fibre, 35.4; nitrogen free extract, 47.1.

The experimental animals were kept in metabolism cages throughout the experimental period. One-half of the daily ration was given at 09:00 h and the other half at 21:00 h in trial I. In trial II, one-fourth of daily ration was given at 09:00, 15:00, 21:00 and 03:00 hrs, respectively. One-eighth of the daily ration was given at 09:00, 12:00, 15:00, 18:00, 21:00, 24:00, 03:00 and 06:00 hrs, respectively, in trial III. During 5-day sampling period daily time spent chewing during eating and ruminating was measured by the method of Harumoto

and Kato (1979). The other experimental procedures were as described earlier (Fujihara, 1980).

Results and Discussion

As shown in table 1, the eating time tended to be shorter with 4 and 8 times feeding than with 2 times feeds, and therefore, eating rate was slightly faster with 4 and 8 times feeding than with 2 times feeding.

Rumination appearance (lag time after feeding) was significantly longer in sheep offered the daily ration in 4 or 8 small feeds than in sheep given the ration twice a day, though there was no significant difference in results between 4 small feeds and 8 small feeds. This might indicate that a tactile stimulation caused by coarse particle of newly ingested food to the receptor on the rumen wall (Freer et al., 1962) is obviously a secondary factor inducing the rumination after feeding.

The daily time spent ruminating was 613.2, 653.2 and 597.6 minutes in sheep when they received the ration in 2, 4 and 8 small feeds, respectively. The daily number of boli regurgitated was slightly more in sheep offered their ration in 4 and 8 small feeds than in those offered the ration in 2 feeds. Then, cyclic rate defined by Gordon (1961), as total rumination time (seconds) per number of boli, with 8 small feed was slightly shorter than those with 2 and 4 meals. The daily number of rumination periods was slightly more in sheep when their daily ration was given twice a day than in sheep given their ration 4 or 8 times a day.

On the rumination efficiency, rumination index (Fujihara, 1980), as time spent ruminating per 100 g dry matter eaten, was slightly high with 4 times small feeds as compared with those in 2 or 8 meals a day. The number of chews per bolus, bolus time (average time in seconds spent chewing per bolus) and the chewing rate were almost the same in all the feeding treatments.

As described above, Gordon and Tribe (1952)

TABLE 1. EATING AND RUMINATION BEHAVIOUR IN SHEEP OFFERED THEIR DAILY RATION IN 2, 4 OR 8 SMALL FEEDS

	Trial I	Trial II	Trial III
Time spent eating (min)	186.5 ± 12.2 [#]	170.1 ± 7.1	174.9 ± 0.3
Rate of eating (g D.M./min)	3.5 ± 0.2	4.0 ± 0.1	3.7 ± 0.2
Rumination appearance*	172.0 ± 73.8	302.9 ± 32.1	392.9 ± 108.7
Time spent ruminating (min)	613.2 ± 17.6	653.2 ± 44.3	597.6 ± 20.7
Daily number of boli	538.9 ± 36.8	568.2 ± 36.8	561.4 ± 16.3
Daily no. of rumination period	27.9 ± 6.0	23.3 ± 3.9	22.7 ± 4.8
Cyclic rate**	68.3 ± 1.0	67.1 ± 2.0	63.9 ± 0.9
Rumination index***	93.7 ± 1.3	95.1 ± 5.6	91.2 ± 1.2
No. of chews per bolus	65.3 ± 0.7	66.4 ± 3.2	66.3 ± 2.4
Bolus time	54.2 ± 2.6	53.4 ± 2.1	52.5 ± 1.4
Chewing rate	72.5 ± 2.6	74.5 ± 1.0	75.7 ± 2.3

[#] Mean ± S.E. of 3 sheep.

*Lag time after feeding.

**Total rumination time(s)/no. of boli regurgitated.

***Time spent ruminating/100 g D.M. eaten.

reported that the daily time spent ruminating obviously decreased in sheep given chopped hay mixed with concentrate when they were fed 8 times daily at approximately hourly intervals between the hours at 9:00 a.m. and 5:15 p.m. as compared with that when they received its daily ration as one large feed at 9:15 a.m. In the present study, however, there was no clear difference in daily time spent ruminating as well as other parameters consisting rumination behaviour, when the sheep received their daily ration in 2, 4 or 8 times at equal interval. From these facts, it can be obviously suggested that the rumination behaviour in sheep would not be influenced by changing the feeding frequency when they were offered only roughage feed.

(Key Words: Feeding Frequency, Rumination, Sheep)

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