Effect of Restricted Time of Access to Grass Silage on Voluntary Intake of Lactating Dairy Cows Housed in Free Stall Barn

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Voluntary intake of forage by dairy cows is regulated predominantly by rumen capacity, fill during a meal and the passage rate of digesta. On general grounds concerning these factors, forage intake might be markedly influenced by the time of access to the diet. The response of forage intake to time restriction of access, however, is not well documented in a loose housing system based upon self-feeding of grass silage. The present experiment was carried out to examine the effect of restricted time on silage intake in lactating cows housed in a free stall barn.

Materials and Methods

Twelve lactating Holstein-Friesian cows (mean live weight 626 kg; 10 in mid or late lactation, 2 in early lactation) were used in a 4×4 Latin square design to examine the effect of 2, 5, 10 hr and free access to a grass silage (moisture 72%, CP 9.4% and C. Fiber 34.2% on DM basis, pH 4.3) on voluntary intake of the silage. They were housed in a free stall barn. The silage was given at 10 AM in individual troughs equipped with an electronic door which enabled an intake estimation for each cow, and the remainder was taken away from the troughs at 8 AM the next day. No feed was available during milking in the parlour. Consequently, in free access, the silage was available for 21-21.5 hr daily.

After evening milking, 4-5 kg of Orchardgrass hay (CP 11.5%, C. Fiber 32.5% on DM basis) was given in the same troughs individually, and the remainder was weighed at 8 AM on the day after. Approximately 45% of TDN requirement (calculated from live weight and milk production just before the experiment) was given as a concentrate (CP 14.7%, C. Fiber 6.5% on DM basis). The daily amount of

フリーストール飼養の搾乳牛のサイレージ採食に及ぼす給飼時間制限の影響: 佐藤 博・工藤吉夫・三島哲夫 (北海道農業試験場 札幌市 061-01)

concentrate was given in 4 meals at 6 hr intervals using an electronic feeder (Feed station).

Each experimental period was 12 days. The intakes of silage, hay and concentrate were measured everyday, and the intakes from the last 5 days were analyzed statistically by least significant difference.

Results and Discussion

Mean milk production was comparatively low (16 kg daily) in consequence of the late lactational stage in many cows used. There was little refusal of the concentrate allowed. Mean daily intakes of the concentrate and hay in each treatment were 6.1–6.2 and 3.2–3.7 kg (DM), respectively. Daily DM intake of 9.2–9.9 kg from the concentrate and hay represents 1.45–1.6% of live weight.

Silage intake at each time access is shown in Fig. 1. Mean DM intake from the silage was 6.5, 8.6, 10.4 and 11.8 kg daily for 2, 5, 10 hr and free access to the silage. The intake was reduced to 56, 74 and 89% of the free access group's by time restriction to 2, 5 and 10 hr, respectively. The intake of the 2 and 5 hr access group was significantly lower than that of the free access group, but that for 10 hr was not significantly different. On an average, the cows took up 23.1 kg (fresh) of the silage in 2 hr of access period. This indicates that the cow's eating rate was more than 190 g (fresh)/min.

Concerning maximum DM intake, most figures were less than 20 kg daily^{1,2}. In the present cows housed in a free stall barn, daily DM intake from all the diets was 16.4, 18.2, 20.0 and 21.0 kg for 2, 5, 10 hr and free access treatment, respectively. These figures were equivalent to 2.6, 3.0, 3.2 and 3.3% of their live weight.

It has been suggested that 6 hr access is probably an adequate period for stall fed

Fig. 1. Decrease in silage intake by restriction of time access to silage. Figures in parenthesis are mean of 12 cows.

cows to maximize their silage intake¹⁾. FREER and CAMPLING³⁾ observed for hay feeding that an increased time access from 5 to 24 hr resulted in only a 20% higher intake.

Similarly to the present results, however, a considerable decrease of silage intake was reported by HARB and CAMPLING⁴⁾. They observed a grass silage intake of 8.94 and 12.22 kg (DM) daily for 5 and 22 hr access in group housed dairy cows receiving 1 kg concentrate everyday. Forage intake is influenced negatively by concentrate feeding²⁾. In very limited access time, however, it is reasonable that forage intake may be more influenced by eating behaviour (e.g., eating rate, competition) rather than by concentrate given. Present results indicate that shortening of access time to 2 or 5 hr daily is inadequate for enough intake of silage.

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