

Effect of feed space allowance and period of access to food on the performance and behaviour of dairy cows offered a silage based diet

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Introduction Meeting the higher nutrient requirements of high yielding dairy cows remains a key challenge on many dairy farms. 'Non-nutritional' approaches which may allow higher food intakes to be achieved involve optimising the feed barrier environment and adopting improved feeding practices. This may involve improving both the availability and accessibility of food. One of the main feed barrier factors which might be expected to have an effect on food intake is available feed space per cow. While feed space allowances per cow have decreased on some farms as herd size has increased, there is considerable variation in optimum feed space allowances cited in the literature. In addition, while it is normally considered prudent to ensure that dairy cows have access to food at all times, management practices on farms may on occasions result in cows running out of food for a period of time before fresh food is offered. To address these issues, an experiment was undertaken to examine the relationship between feed space allowance per cow, and period of access to food, on the performance of dairy cows.

Material and methods Forty-eight Holstein-Friesian dairy cows were used in a continuous 2 x 2 factorial design experiment (10 weeks duration). Thirty two cows were multiparous (mean lactation number, 3.5), while the remaining were primiparous. Eight multiparous and four primiparous cows were allocated to each treatment, with cows a mean of 141 days calved when the study commenced. Throughout the experiment cows were kept in four adjacent but visually isolated pens (12 cows per pen) of equal size and similar layout (16 cubicles per pen). Within each pen cows accessed food via a 'post and rail' type feed barrier. Treatments examined comprised two horizontal feed space allowances (15 and 40 cm/cow), and two periods of access to food (unrestricted and restricted). With the former, uneaten feed was removed at 08.00 h, while feeding took place at 09.00 h. With the latter, uneaten feed was removed at 06.00 h, while feeding was delayed until 12.00 h. Fresh food was offered *ad libitum* with all treatments. Food was offered daily in the form of a complete diet comprising forage and concentrates (60 : 40 DM basis), the forage component of the diet comprising grass silage and maize silage (60 : 40 DM basis). Group intakes were recorded daily, but were not analysed statistically due to the unreplicated nature of the intake data. The effect of feed space allowance and period of access to feed on mean animal performance during the experiment was analysed by ANOVA, with individual cows used as the experimental unit.

Results Total DM intakes were 18.1 and 18.2 kg/day with the 'restricted feeding time' treatments (15 and 40 cm respectively) and 17.8 and 18.1 kg/day with the 'unrestricted feeding time' treatments (15 and 40 cm respectively). None of milk yield, milk composition, or end of study live weight and condition score were significantly affected by treatment ($P > 0.05$).

Table 1 Effect of feed barrier space allowance per cow, and time of access to feed, on the performance of lactating dairy cows

	Restricted feeding time		Unrestricted feeding time		SEM	Significance		
	15 cm	40 cm	15 cm	40 cm		Space	Time	Interaction
Total DM intake (kg/day)	18.1	18.2	17.8	18.1				
Milk yield (kg/day)	29.8	30.7	29.2	29.5	0.61	NS	NS	NS
Milk fat (g/kg)	39.4	41.0	40.5	41.2	0.68	NS	NS	NS
Milk protein (g/kg)	32.9	32.6	32.5	33.6	0.42	NS	NS	NS
Milk lactose (g/kg)	47.3	47.7	46.6	46.9	0.59	NS	NS	NS
Somatic cell count (000/ml)	354	230	470	585	123.2	NS	NS	NS
End of study condition score	2.5	2.5	2.6	2.5	0.06	NS	NS	NS
End of study live weight (kg)	620	618	636	628	9.2	NS	NS	NS

Conclusions Feed space allowance had no significant effect on any of the performance parameters examined within this experiment. Thus from a cow performance point of view, it would appear that a feed space allowance of 15 cm per cow may be adequate for mid lactation cows. In addition, restricting the period of time during which cows had access to food had no effect on cow performance, even at a space allowance of 15 cm/cow. However, within the current study this feeding time restriction was applied continuously throughout the experiment, and cows appeared to become accustomed to this scenario. It is possible that not having access to food on random occasions (ie occasionally running out of food) may actually be more stressful for cows than a regular period without access to food.

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