

Food intake and feeding behaviour of Holstein-Friesian and Jersey x Holstein-Friesian crossbreed dairy cows

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Introduction The Holstein-Friesian (HF) is the dominant dairy cow breed on Northern Ireland dairy farms, a reflection of the high efficiency of the breed for milk production. However, achieving high levels of food intake within grassland based milk production systems can be challenging, especially when compared with concentrate based production systems. While increased food intakes can be achieved through management strategies, there is anecdotal evidence suggesting some cow genotypes are more suited to forage based systems than others. The current experiment was designed to compare food intake, feeding behaviour and grazing behaviour of HF and Jersey x Holstein-Friesian (JxHF) crossbred dairy cows when offered conserved forage based diets and when grazing.

Materials and methods This experiment involved twenty-eight (14 HF and 14 JxHF) primiparous dairy cows (mean calving date, 20 February). At the start of the experiment cows were a mean of 96 days calved, while the HF and JxHF cows had a mean liveweight of 512 and 421 kg, respectively, and a mean daily milk yield of 23.6 and 22.5 kg/day, respectively. During two 10-day indoor periods, cows were maintained in two visually isolated genotype groups and had access to feed via a Calan Gate feeding system. Cows were offered a mixed ration consisting of forage and concentrates (66:34 DM basis) with the forage component of the diet comprising grass silage and maize silage (60:40 DM basis). Refused food was removed at 09:00 and replaced with fresh food each day. In addition, each cow was offered 1.0 kg concentrate/day in the parlour, 0.5 kg during each milking. Food intakes and feeding behaviour of individual cows (feeding time and number of meals) were automatically recorded during the final five days of each period using the Calan gate system. Cows then commenced grazing, with the two genotypes grazing in separate groups, with a minimum distance of 30 m always maintained between groups. A flexible rotational grazing system was adopted, with fresh herbage allocated daily after pm milking. Average pre- and post-grazing sward heights (measured using a rising plate meter) were 9.1 cm (s.d. 1.2) and 5.2 cm (s.d. 1.5), respectively. During the grazing period cows were offered 2.0 kg concentrate/cow/day in the parlour. Cows completed three grazing periods (28, 35 and 28 days in duration). During the final 12 days of each period herbage intake was estimated using the n-alkane technique while grazing behaviour was recorded using grazing behaviour recorders (2 x 24 hour periods/cow). Throughout the experiment milk yield was recorded daily while milk fat and protein concentrations were determined weekly. Data were analysed using repeated measures REML analysis.

Results Genotype had no significant effect on milk fat plus protein yield ($P>0.05$), while the HF cows were approximately 75 kg heavier than the JxHF cows ($P<0.001$). When housed indoors, HF cows had a significantly higher dry matter intake than JxHF cows ($P<0.05$), although genotype had no effect on either total feeding time or on the number of meals/day. During the grazing period genotype had no effect on daily dry matter intake, while dry matter intake per kg liveweight^{0.75} ($P<0.05$) and time spent grazing ($P<0.01$) were higher in JxHF cows. HF cows had more grazing bouts each day ($P<0.01$)

Table 1 Effect of cow genotype on mean performance during the experiment and on food intake and feeding behaviour

	Genotype		s.e.d	Sig.
	HF	JxHF		
Cow performance (study mean)				
Fat + protein yield (kg/day)	1.47	1.42	0.037	NS
Liveweight (kg)	499	424	15.2	***
Indoor period				
Daily dry matter intake (kg/cow)	18.5	17.1	0.67	*
Daily dry matter intake (kg/kg liveweight ^{0.75})	0.17	0.18	0.004	NS
Total feeding time (min/day)	248	236	18.0	NS
Number of meals per day	16.1	16.0	1.04	NS
Grazing period				
Daily dry matter intake (kg/cow)	17.0	16.3	0.83	NS
Daily dry matter intake (kg/kg liveweight ^{0.75})	0.16	0.17	0.005	*
Total grazing time (min/day)	531	582	18.8	**
Grazing bouts per day	9.3	7.7	0.45	**

Conclusions Despite being significantly lighter, JxHF cows produced a similar fat + protein yield as HF cows. Although intakes were higher with the HF cows on the indoor system, none of the behavioural parameters measured were affected by genotype. However, when expressed on a metabolic liveweight basis the higher DM intakes of the JxHF in a grazing system highlighted their greater intake potential compared to HF cows. In addition, JxHF cows appeared to have a higher grazing drive evidenced by their increased grazing time and fewer grazing bouts.

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