

A comparison of the fertility of Holstein Friesian and Norwegian Dairy Cattle under low and high nutrient input systems

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Introduction Until relatively recently, breeding programmes for Holstein Friesian (HF) dairy cattle have focused selection procedures on increasing milk output with little emphasis on secondary traits such as fertility. As a result the fertility of the Holstein Friesian dairy animal is currently declining in the UK. This decline in fertility causes particular problems in seasonal calving dairy herds, where compact calving is crucial to overall performance of this system. In the Norwegian dairy cattle (NC) breeding programme, emphasis has been placed on a multi trait selection procedure including fertility and disease resistance. There is evidence that this selection procedure has resulted in improved fertility within the NC population. The present study is part of an overall programme comparing the performance of HF and NC cattle with respect to food intake, animal performance, nutrient utilisation, behaviour, health, fertility and longevity. The objective of the present study was to investigate possible differences in fertility between the two breeds when offered either a high or a low nutrient input diet based on grass silage.

Materials and Methods Thirty-two HF heifers (PIN₍₀₀₎ £44) and thirty-two NC heifers (total merit index = 10.1) were purchased in Holland and Norway respectively and arrived at the Institute approximately one month prior to calving. The Dutch animals were representative of the top 1% of the UK HF population and the NR animals represented the top 5% of the NR cattle population in Norway. The heifers had a mean age at calving of 25.5 and 25.8 months for the HF and NC heifers respectively. The mean calving dates of the two groups of animals were 16 February and 10 February and the mean post-calving weights were 502 and 473 for the HF and NC heifers respectively. Post calving animals were blocked and allocated to either a low or high input system, based on grass silage (Keady *et al.* 2000). Milk samples were taken twice weekly for progesterone analysis from calving until the animals were confirmed in calf. Animals with prolonged anovulation post partum, determined by milk progesterone <3 µg/l for 45 days or more were given fertility treatments. The breeding season commenced on the 11th April and lasted for 12 weeks. To remove sire effects, animals across breeds and treatments were allocated to insemination with either HF or NC semen. No fertility treatments were given to animals for the first six weeks of the breeding season. After six weeks, fertility treatments were given to animals with no observed oestrus, to help maximise the number of animals in calf in the short breeding period.

Results Whilst small numbers of animals are involved in the present study, results indicate a trend towards fewer days to onset of luteal activity with the NC animals compared with HF animals (Table 1). There is also evidence that more of the HF animals had prolonged anovulation postpartum. No difference was observed in conception rate to first and second insemination, for either all the animals on the experiment, or those animals that had onset of luteal activity by day 45. Level of nutrient input did not appear to have any effect on the fertility parameters recorded.

Table 1 The effect of input system and genotype on reproductive performance

Breed (B)	Input Systems (IS)				Sem	Significance		
	High		Low			B	IS	B*IS
	HF	NC	HF	NC				
All animals								
Number of animals	16	16	16	16				
Days to onset of luteal activity	38.5	28.7	38.1	32.3	4.32	NS	NS	NS
						(P=0.078)		
Days to first observed heat	49.6	49.5	50.2	37.9	4.73	NS	NS	NS
Days to first insemination	69.8	75.5	72.6	80.8	4.34	NS	NS	NS
Conception rate to first and second service (%)	87.5	87.5	75.0	68.8				
Number of animals with prolonged anovulation postpartum	6	3	7	4				
Animals not in calf at end of breeding period (number)	2	1	4	3				
Animals with onset of luteal phase by day 45								
Number of animals	10	13	9	12				
Conception rate to first and second service (%)	80.0	84.6	88.9	75.0				

Conclusions This study suggests that onset of cyclicity after calving occurred more quickly with NC than with HF cattle. Furthermore, there was a trend towards a lower incidence of prolonged anovulation with NC cattle. These effects may be related to reduced mobilization of body reserves of NC cattle in early lactation (Keady *et al.* 2000).

References

Keady, T.W.J., Crawford, A.D. and Mayne, C.S. 2000. A comparison of the Holstein Friesian and Norwegian cattle breeds for milk production at two levels of nutrient intake. *Proceedings of BSAS* (This meeting)