

DGAT1 GENOTYPE AFFECTS THE RESPONSE OF DAIRY COWS TO SHORTENED OR NO DRY PERIOD

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Abstract

Shortening or omitting the dry period of dairy cows is of interest because it limits the negative energy balance in early lactation, mainly due to a reduction in milk yield postpartum. The enzyme acyl-CoA: diacylglycerol acyltransferase 1 (DGAT1) has a role in triglyceride synthesis and the DGAT1 K232A polymorphism is known to affect milk yield and milk fat percentage of dairy cows. We hypothesize that in dairy cows the DGAT1 polymorphism affects the response in energy balance (EB) to shortening or omitting the dry period.

The objective of this experiment was to study the effects of the DGAT1 polymorphism on milk yield and EB for cows with a shortened or no dry period, compared with cows with a conventional dry period. Holstein-Friesian dairy cows (N=167) were randomly assigned to three dry period lengths (0, 30 or 60 days). Feed intake and milk yield were recorded daily from week 8 precalving till week 12 postcalving and averaged per week. Energy balance was calculated weekly. Data are expressed as LSMEANS \pm SEM.

Precalving, milk production was 14.1 ± 0.7 kg/d during week -8 till 0 for cows with no dry period and 7.1 ± 0.7 kg/d for cows with a shortened dry period, and was not affected by DGAT1 genotype ($P=0.37$). Postcalving, cows with no dry period produced less milk (Table 1) and had an improved EB, compared with cows with a shortened or conventional dry period. Moreover, both milk production and EB postcalving were affected by genotype * dry period length interaction. Specifically, for cows of the DGAT1 AA and KK genotypes the difference in EB between no dry period and a conventional dry period was larger than for cows of the AK genotype.

In conclusion, DGAT1 genotype influences the response in milk yield and EB of dairy cows to shortening or omitting the dry period.

Table 1. Dry matter intake (DMI; kg/d), milk production (kg/d) and energy balance (EB; kJ/kg^{0.75} *d) of dairy cows in early lactation after 0, 30 or 60 days dry period and per DGAT1 genotype (AA, AK or KK) (LSMEANS \pm SEM).

	0 days dry			30 days dry			60 days dry			SEM	P-values		
	AA	AK	KK	AA	AK	KK	AA	AK	KK		Dry period (D)	Genotype (G)	D×G
DMI	23.0	22.5	22.4	22.7	23.2	22.7	23.2	23.4	22.9	0.4	0.31	0.63	0.68
Milk	32.1	35.1	28.9	41.2	37.8	36.3	45.3	42.8	40.6	1.2	<0.01	<0.01	0.02
EB	70	-34	56	-113	-38	-35	-173	-138	-136	25	<0.01	0.45	<0.01