The effects of monensin supplementation to lactating cows of different genetic merit

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Monensin, a rumen modifier, increases the proportion of glucogenic rumen volatile fatty acids (VFAs) and decreases the proportion of lipogenic VFAs when fed to lactating dairy cows (2). By supplementing cows in early lactation with monensin, daily milk yields have been observed to increase (2). However when cows are offered a diet which supplies enough glucose precursors to meet the cow's metabolic demands, increased gluconeogenesis due to monensin supplementation may cause a hormonally instigated reduction in body fat mobilisation and consequently a decrease in the supply of free fatty acids required for milk fat synthesis (1). This effect may be more pronounced in cows with a lower genetic potential for milk production as their mammary gland's requirement for glucose is lower.

Twelve multiparous Holstein Friesian cows were blocked according to the number of previous lactations with each block containing two cows of high genetic merit (HBV) and two cows of low genetic merit (LBV) for milk production. Genetic merit was assessed by the Australian Breeding Value (ABV) of each cow. Monensin (none and 320 mg per day) and genetic merit were assigned as a 2x2 factorial arrangement of treatments. Monensin supplementation commenced at approximately 28 days prepartum and ended 56 days postpartum. Diets were formulated to provide 110% of NRC recommendations (3).

Observation	Monensin			Genetic Merit		
	0 mg	320 mg	SE	HBV	LBV	SE
Dry matter intake (kg)	21.6[2]	23.2	0.52	22.7	25.1	0.57
Daily milk yield (kg/day)	31.5	31.2	1.37	27.2[3]	26.3	1.36
Milk fat yield[1] (g/day)	1264[2]	1152	59	1266[3]	1150	59
Milk protein yield (g/day)	944	917	16	962	899	14
Glucose[1] (mg/dl plasma)	61.7[2]	64.7	2.16	64.7	63.7	2.14
Non-esterified fatty acids[1] (meq/l serum)	728[2]	597	102	748[3]	576	102

[1] Significant monensin x genetic merit interaction detected ($P<0.05$)

[2,3] Significant difference between main effects ($P<0.05$)

Dry matter intake was in excess of NRC recommendations. A higher plasma glucose concentration and the lower serum non-esterified fatty acids concentration recorded for the LBV cows supplemented with monensin suggests reduced fat mobilisation in these cows which may have resulted in a decreased supply of fatty acids to the mammary gland and consequently a decreased daily milk fat yield. These results indicate that monensin may have detrimental effects on milk fat yield if fed with a high quality diet to cows of limited genetic potential.

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3. National Research Council. Nutrient requirements of dairy cattle (6th ed) Washington DC: National Academic Press, 1989.