EFFECT OF NUTRITION AND GENETICS ON THE QUALITY OF MILK

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The introduction by the dairy industry of payment schemes based on the protein content of milk has made it desirable to find cost-effective on-farm methods of manipulating protein content. Increasing the level of undegradable dietary protein (UDP) provides a short term method of increasing milk protein, but results from previous studies have been inconsistent, with some trials reporting a positive response (O'Mara *et al.* 1991), and others reporting either no change (DePeters *et al.* 1992) or a decrease in milk protein content (Forster *et al.* 1983). In all cases, however, milk yield was consistently increased. This study was conducted to investigate the effects of genetic merit and feeding UDP on milk protein quality.

Eighty-two multiparous Holstein-Friesians were assigned to groups of high and low genetic merit, according to their Australian Breeding Value (ABV) for fat + protein (ABV>30 and ABV<15, respectively). Cows entered the study no less than 3 weeks prior to calving, when they were randomly allocated to 1 of 2 diets: HIPRO, with 45% of crude protein (CP) provided as UDP, and LOPRO, with a UDP level of 15% of CP. Both diets were isoenergetic and isonitrogenous (11 MJ ME/kg and 21% CP for lactating cow rations), and were fed as total mixed rations (TMR), comprising of concentrate pellets, luceme and oaten chaff. An electronic neck transponder allowed each cow unique access to 1 feeding gate only, thus enabling accurate daily dry matter intakes to be recorded. Total mixed rations were fed *ad lib*, and cows had no access to pasture for grazing. Average weekly milk yields were measured, and milk samples collected once each week for the first 10 weeks of lactation for fat and protein analysis.

Table 1. Effect of high UDP (hipro) vs low UDP (lopro) and high ABV vs low ABV on milk yield and composition, averaged over days 0-70 of lactation

	Diet		ABV	
	Hipro	Lopro	High	Low
Milk Yield (kg/day)	39.71[a]	36.00[b]	38.75	36.78
Protein (P, %)	3.08	3.09	3.07	3.10
Protein yield (kg/day)	1.26[a]	1.13[b]	1.22	1.16
Fat (F, %)	3.40	3.38	3.54[x]	3.23[y]
Fat yield (kg/day)	1.38[a]	1.22[b]	1.38[x]	1.22[y]
F + P Yield (kg/day)	2.63[a]	2.36[b]	2.60[x]	2.37[y]

Values with different superscripts differ significantly (P≤0.05).

Preliminary results indicate a significant effect of UDP on average milk (P≤0.02), protein (P≤0.01), fat (P≤0.05) and fat + protein (P≤0.01) yields. In all cases, feeding UDP increased the yields of milk components. Milk protein content was unaffected by feeding increased UDP (P=0.81). The high ABV group had significantly higher fat content (P≤0.05), fat (P≤0.04) and fat + protein (P≤0.02) yields. As expected, stage of lactation had a significant effect on all outcomes (P≤0.01), and the interaction between diet and stage of lactation was significant for milk yield (P≤0.01). All other interactions between group and stage of lactation were not significant.

Feeding high UDP increased the yields of milk and milk constituents; however contents of these components were unchanged. ABV had no effect on milk protein content or yield, with fat content, yield and fat + protein yield higher for high ABV cows.

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