THE EFFECT OF DIETARY PROTEIN ON MILK COMPOSITION

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An experiment was conducted to investigate the effect of dietary protein on milk composition, particularly milk protein content and casein content.

Twelve multiparous, midlactation Friesian cows were assigned to either a high protein (HP, 18%) or low protein (LP, 12%) diet. The two diets were isoenergetic but contained different levels of degradable and undegradable protein. Cows were fed ad libitum and water intake was unrestricted. The trial lasted five weeks. Milk and blood samples (coccygeal artery/vein) were collected every three days, and cows were weighed and body condition scored during blood sampling. The mean results for the five week period were:

Parameter	HP cows	LP cows	P value
Dry Matter Intake (kg/day)	22.3	19.7	0.01
Milk Yield (L/day)	25.5	19.8	0.01
Protein %	3.2	3.3	0.11
Protein Yield (g/day)	80.8	64.4	0.01
Casein %	2.5	2.5	0.74
Casein Yield (g/day)	63.7	49.2	0.01
Fat %	4.4	4.1	0.05
Fat Yield (g/day)	112.9	80.7	0.01
Bodyweight (kg)	576	578	0.03
Condition Score (1-5)	2.9	3.1	0.48
Plasma 3-hydroxybutyrate (mM)	2.9	1.3	0.01
Free Fatty Acids (mM)	0.29	0.28	0.77
Urea (mM)	6.3	2.5	0.01
Glucose (mM)	3.5	3.7	0.30
Insulin (ng/mL)	0.77	0.76	0.82

There was a significant ($P<0.01$) effect of time on all these parameters except insulin. The lack of response of milk protein content to dietary protein intake is a problem often reported in the literature (DePeters and Cant 1992). In our case, the extremely high plasma urea levels in the HP cows would suggest that much of the protein fed was not used by the cow, but deaminated and excreted. Two possible explanations for this could be an imbalance of energy or protein, or a higher dietary protein degradability than anticipated. Although there was only a moderate increase in milk protein content in both HP and LP treatments, there was a marked increase in protein and casein yield per day for cows on the HP diet. Cows responded to the higher protein intake by increasing plasma 3-hydroxybutyrate concentrations in support of the higher milk yields.

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