Blood meal as a source of histidine for cattle fed grass silage and barley

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Introduction Previous research has shown that cattle fed grass silage are responsive to protected amino acids (Veira *et al*., 1991). Methionine and lysine were suggested as the most limiting amino acids for grass silage diets. Recently, Korhonen *et al*. (2000) have shown that histidine is the first limiting amino acids for dairy cows fed grass silage and barley-based concentrates. However, histidine is not available in a rumen protected form and needs to be provided through dietary ingredients. Blood meal is rich in histidine. This trial was designed to determine the effect of increasing histidine supply through blood meal on N metabolism of cattle fed a grass silage and barley-based diet.

Materials and methods Thirty-two crossbred steers, mean initial live weight 362 (sem 7.1) kg, were blocked by live weight and allocated to one of four dietary treatments in a randomised complete block design. This experiment lasted until the steers reached a minimum of 8 mm backfat. Diets were fed once daily through Calan gates. Animals were weighed after 24 h of fasting on day 0 and two days before slaughter. Dietary treatments consisted of *ad libitum* grass silage:barley mixture (0.50:0.50 DM basis) with four isonitrogenous combinations of blood meal and urea. Diet digestibility and N balance were determined in a 4-period latin square design experiment with 4 animals. Data were analysed using the GLM procedure of SAS. Polynomial contrasts were used to determine if the effect of blood meal was linear, quadratic or cubic.

Results The nitrogen (N), neutral detergent fibre (NDF) and starch contents (g/kg DM) of grass silage and barley were 23.8, 532 and <1 and 19.8, 226 and 339, respectively. Silage NH_3-N was 0.127 of total N, indicating that the silage was not well preserved. Intake, growth and N partitioning results are presented in Table 1.

Table 1 Effect of isonitrogenous combinations of blood meal and urea on steer performance, apparent digestibility and nitrogen partitioning

	Blood meal: Urea combinations (g/d)					*P*	
Item	0:85	100:55	200:30	300:0	Sem	Linear	Quad.
Liveweight gain (kg/d)	1.25	1.23	1.28	1.26	0.05	0.66	0.96
Carcass gain (kg/d)	0.74	0.75	0.72	0.74	0.03	0.78	0.94
DMI (kg/100 kg LW)	2.15	2.05	2.13	2.15	0.06	0.72	0.27
OM digestibility (g/kg)	727	719	714	732	1.76	0.60	0.05
N intake (g/d)	188	186	183	180	12.57	0.20	0.83
Faecal N (g/d)	50	52	52	48	4.23	0.59	0.21
Urine N (g/d)	110	101	98	102	7.40	0.05	0.04
N retained (g/d)	28	33	33	28	8.08	0.78	0.25
Urinary PD (mmol/d)	111	118	102	107	14.94	0.94	0.86
Plasma Urea-N (m*M*)	11.3	10.4	11.2	10.0	0.59	0.21	0.79

There were no significant effects of blood meal on dry matter intake and animal performance. However, the addition of blood meal to the diet had a quadratic effect on OM digestibility, and on the amount of N excreted in urine. The addition of blood meal had no effect on microbial protein synthesis, estimated from urinary excretion of purine derivatives, and did not affect circulating concentrations of urea, suggesting that blood meal reduced N excretion by improving the supply and/or AA profile of dietary rumen undegradable protein (RUP). Other factors, such as energy are likely to have negated any other improvement in animal performance.

Conclusions The addition of blood meal to a grass silage and barley diet had a quadratic effect on OM digestibility and on the amount of N excreted in the urine. In both cases the lowest levels were reached with the addition of 200 g/d of blood meal.

References

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