

PROTEIN SUPPLEMENTATION OF DAIRY CATTLE ON MAIZE SILAGE DIETS

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Diets based on silage are being investigated at the Kyabram Research Institute as alternatives to grazed pasture for dairy cattle in the irrigation region of Victoria. Silage produced from summer fodder crops such as maize is low in crude protein (CP) compared with pasture. The study described here investigated the efficacy of four contrasting proteins as supplements for dairy cows in early lactation when fed basal rations based on maize silage.

Four rumen-cannulated cows were fed cottonseed nuts (CSN), meatmeal (MM), rolled lupins (LUP), or rapeseed meal (RSM) in a latin square design. The diets were iso-nitrogenous (16% CP/kg DM) and iso-caloric (11 MJ ME/kg DM) with each protein supplement providing 25% of the daily CP intake.

Voluntary feed intake (VFI), diet digestibility (DMD), fat corrected milk yield (FCM), rumen NH_3 and rumen kinetics (mean retention time (MRT), rumen volume and rumen flow, using Cr - EDTA) were measured for each of the dietary treatments. Rumen digestion of the basal ration or the supplement, was measured with nylon bags (half - times $t_{\frac{1}{2}}$). Mean values, adjusted for cows and periods, are presented in the table.

Milk yield, feed intake, diet digestibility and various rumen measurements from cows on four protein supplements

	CSN	MM	LUP	RSM
FCM (kg)	18.6 ^a	17.8 ^a	16.2 ^b	19.4 ^a
VFI (g/kg BW ^{0.75})	115 ^a	115 ^a	103 ^a	128 ^b
DMD (%)	72.6 ^a	68.5 ^b	71.4 ^a	72.2 ^a
Rumen NH_3 (mg/100 ml)	13.2 ^a	8.6 ^b	13.2 ^a	13.5 ^a
Rumen volume (l)	43.8 ^a	41.4 ^a	45.8 ^a	67.6 ^b
Rumen MRT (h)	6.3 ^a	6.2 ^a	7.8 ^b	6.8 ^a
Rumen flow (l/h)	7.2 ^a	7.0 ^a	6.3 ^a	8.7 ^b
Supplement $t_{\frac{1}{2}}$ (h) (nylon bags) ²	52.1 ^a	113.6 ^b	10.8 ^c	39.6 ^a
Basal ration $t_{\frac{1}{2}}$ (h) (nylon bags) ²	61.5 ^a	73.8 ^a	86.3 ^b	55.0 ^a

Values in same row with different superscript are significantly different ($p < 0.05$).

Although the animals on the RSM diet ate more than other animals this was not expressed in an increased milk yield, the reasons for this are unclear. MM and LUP had different half-times ($t_{\frac{1}{2}}$), and both these differed from CSN and RSM. The low NH_3 value on the MM diet was the result of a lower dietary digestibility, possibly from over heating during MM manufacture. Fat corrected milk yield was depressed on the LUP diet and this was associated with the negative effect the lupins had on the digestion of the maize part of the ration (basal ration t in nylon bags). The LUP diet was also characterised by a significantly longer rumen liquid MRT. Various workers have demonstrated a negative relationship between MRT and microbial protein production (Owens and Isaacson 1977) and this could further reduce nutrients available to animals on the lupin diet.

OWENS, F.N. and ISAACSON, H.R. (1977). Federation Proc. 36: 198.

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