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Effect of rumen protected methionine and lysine on milk composition and on cheese yielding capacity

C Hurtaud, H Rulquin, R Vérité

INRA, Station de Recherches sur la Vache Laitière, 35590 Saint-Gilles, France

Postruminal infusions of lysine and methionine, the most limiting amino acids with maize silage diets, increase milk protein and casein contents (Le Hénaff *et al*, 1990, *Reprod Nutr Dev*, Suppl, 2, 237s; Rulquin *et al*, 1990, *Reprod Nutr Dev*, Suppl, 2, 238s). The effect of rumen protected methionine and lysine (RPML) (Smartamine ML™) on milk composition and on coagulating properties for cheese making was compared to a negative control. It was examined on different diets in 4 Latin square experiments with 16 dairy cows/experiment (Rulquin *et al*, 1994a, *J Dairy Sci*, 77, Suppl, 1, 347; Rulquin *et al*, 1994b, *Ann Zootech*, 43, 245; Rulquin *et al*, 1994c, *Ann Zootech*, 43, 246). Protein concentrates varied either in nature (corn gluten meal or treated soya-colza meal or blood meal) to provide a wide range of absorbable lysine and methionine or in amounts to meet 100 or 120 % of protein requirements. Experimental data were adjusted for "period", "nature or level of protein supplement" and "protein x RPML interaction" and analysed using the GLM procedure of SAS (SAS® User's Guide, Statistics, Version 6 Edition, 1987).

RPML significantly increased milk true protein and casein contents (1.9 and 1.6 g/kg

respectively). The casein/protein ratio did not change in contrast to results on duodenal infusions of methionine (Pisulewski *et al*, 1994, *Ann Zootech*, 43, 244). RPML had no effect on casein composition nor on colloidal calcium content but significantly decreased the colloidal calcium/casein ratio (4.6 %). This might be due to the secretion of the extra casein via a calcium-independent pathway (Knight *et al*, 1994, *Liv Prod Sci*, 39, 129-137). Laboratory cheese yield increased significantly (1.7 % units) in accordance with the increased casein content. Rennet coagulation time increased significantly (1.7 min) possibly due to the decrease in the colloidal calcium/casein ratio (Remeuf *et al*, 1991, *Lait*, 71, 397-421). RPML tended to decrease time of firming and to enhance firmness.

RPML had a positive effect on milk protein and casein contents and on most of technological properties. The latter would even have been improved to a greater extent if native colloidal calcium content of milk had been greater or if calcium (CaCl₂) had been added before measuring coagulating aptitude.

RPML	O ²	Methionine + Lysine ³	SE	RPML effect
<i>Milk composition</i>				
True protein content (g/kg)	32.0	33.9	1.21	<0.001
Casein content (g/kg)	26.0	27.6	1.13	<0.001
Casein/true protein (%)	81.2	81.5	0.70	0.153
Colloidal calcium (mg/kg)	908	919	58.86	0.507
Colloidal Ca/casein (p 1000)	34.9	33.3	2.32	0.012
<i>Coagulating properties</i>				
Cheese yield (DM) (%)	40.0	41.7	1.34	<0.001
Rennet coagulation time (R) ¹ (min)	14.9	15.6	1.32	0.041
Time of firming (K20) ¹ (min)	7.0	6.7	1.11	0.245
Firmness (A30) ¹ (mm)	35.9	36.9	5.27	0.465

¹ Results from Formagraph analysis

² In one trial, control treatment included 15 g of methionine

³ 10 to 15 g/d of methionine and 24 to 34 g/d of lysine