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

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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 ($CaCl_2$) had been added before measuring coagulating aptitude.

| RPML | 0[2] | Methionine + Lysine[3] | SE | RPML effect |
|---|---|---|---|---|
| *Milk composition* | | | | |
| 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 |
| *Coagulating properties* | | | | |
| 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