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Influence of genetic variant for αS1 casein and diet nitrogen content on milk production characteristics, and plasma nutrients and insulin profile in early and mid lactation goats

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The aim of this study was to determine the effects of the 3 main genetic variants of αS1 casein (Mahé *et al*, 1993, Genet Select Evol, 26, 151-157) on milk characteristics and plasma profile during the period of early-mid lactation in dairy goats.

Thirteen alpine or saanen multiparous goats, homozygotous for the genetic variant of αS1 casein in milk were allotted in a 3 x 3 x 3 latin square design according to their genotype (variant AA : n = 4 ; EE : n = 4 ; FF : n = 5), and to the level of CP (Low (L) : 12 %, medium (M) : 16 %, and high (H) : 20 % CP/DM) in a complete diet (0.93 UFL/kg DM), constituted on a DM basis with alfalfa hay (30 %), ensiled sugar beet pulps (40 %) and concentrate (30 %). During the first 2 wks *post-partum*, the goats were fed *ad libitum* on the M diet. The 3 experimental diets were fed for 4 wks-periods, in the following order for each variant : AA : diet M, L, and H ; EE : H, M, and L ; FF : B, H, and M. Milk production and DM intake (measured on 3 days), fat, protein, lactose, urea and ash content of milk were recorded each wk from wk 1 to 15 of the trial. Plasma glucose, urea, NEFA and insulin were recorded each wk from wk 1 to 6 and each 2 wk from wk 7 to 15, after milking and before morning distribution of the diet.

During the 2 first wk of trial, goats of variant FF had numerically lower DMI : 2.12, 2.22, 1.9 kg/d for variant AA, EE and FF respectively (NS). Milk production was 3.30, 3.47, and 3.06 kg/d (NS), fat content (g/kg) was 56.3, 53.7 and 51.6 (P<0.08), CP content (g/kg) was 46.0, 39.9, and 37.5 (P<0.007), respectively. There were differences neither for ash, lactose or urea content of milk, nor for any plasma nutrients and insulin concentrations.
During the period wk3-wk15, DMI was 2.8, 3.0, 2.3 (sem = 0.5, P<0.02), for variant AA, EE and FF respectively. Milk production (Table) was lower in FF variant, probably because of a low milk production during the first period (diet L). Variant AA had the highest, and variant FF the lowest mammary synthetic activity for CP, fat and lactose (non significant) content of milk, as observed by Mahé *et al* (1993). In contrast with previous results (Bas *et al*, 1992, Ann Zoot, 42, 200-201), urea concentration in milk (or in plasma) was not different among variants. Blood glucose was reduced in AA variants all along the trial.
Increasing CP content of the diet only increased plasma and milk urea concentration, as well as plasma NEFA, (probably as a result of the non significant increase in milk production).

In conclusion, the mechanisms by which variant AA increased milk CP and fat content need to be studied in interaction with CP content of the diet, particularly in the beginning of lactation.

	Genetic Variants			CP content of diets				(P<)	
	AA	EE	FF	B	M	H	sem[1]	Variant	Diet
Milk, l/j	4.9[a]	4.9[a]	3.9[b]	4.4	4.6	4.7	0.2	0.16	NS
Fat, g/kg	38.2[a]	36.1[a]	33.0[b]	35.6	35.1	36.5	0.8	0.08	NS
CP, g/kg	33.7[a]	30.8[b]	28.8[c]	30.7	31.2	31.4	0.5	0.03	NS
Ash, g/l	8.0	7.8	8.2	7.9	7.9	8.1	0.2	NS	NS
Lactose, g/l	47.9	46.5	45.6	46.7	47.0	46.3	0.6	NS	NS
Urea, mg/l	0.35	0.40	0.37	0.21[a]	0.41[b]	0.50[c]	0.03	NS	0.001
Glucose, g/l	562[a]	665[b]	616[b]	621	612	609	18	0.12	NS
NEFA, µEq/l	232	206	210	149[a]	226[b]	272[c]	24	NS	0.006
Urea, mg/l	368	374	386	212[a]	394[b]	522[c]	32	NS	0.001
Insulin, µU/ml	4.5	11.5	8.5	8.4	8.1	8.1	3.2	NS	NS

[1] sem = standard error of the mean.