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Note

α_{S1} -Cn^D, another allele associated with a decreased synthesis rate at the caprine α_{S1} -casein locus

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Summary — A seventh allele of the caprine α_{S1} -casein locus, called α_{S1} -Cn^D, was observed in French *Alpine* and *Saanen* breeds. Its frequency in a large herd ($N=198$) was 0.025. Like α_{S1} -Cn^B, α_{S1} -Cn^F and α_{S1} -Cn^O, this allele is associated with a decreased synthesis rate, its approximate mean contribution being 0.6 – 0.8 g/l, very close to that of α_{S1} -Cn^F.

goat – α_{S1} -casein – polymorphism – quantitative variations

Résumé — α_{S1} -Cn^D, un autre allèle à taux de synthèse réduit au locus de la caséine α_{S1} -caprine. Un septième allèle du locus de la caséine α_{S1} -caprine, α_{S1} -Cn^D, a été observé dans les races *Alpine* et *Saanen* françaises. Sa fréquence dans un grand troupeau ($N=198$) était de 0,025. Comme α_{S1} -Cn^B, α_{S1} -Cn^F et α_{S1} -Cn^O, cet allèle est associé à un taux de synthèse réduit, sa contribution moyenne étant d'environ 0,6 à 0,8 g/l, donc très proche de celle d' α_{S1} -Cn^F.

chèvre – caséine α_{S1} – polymorphisme – variations quantitatives

Introduction

Grosclaude *et al.* (1987) have recently concluded that the polymorphism of goat α_{S1} -casein is under the control of a minimum of 6 alleles. Alleles α_{S1} -Cn^A, α_{S1} -Cn^B and α_{S1} -Cn^C were found to be associated with a high α_{S1} -casein content (approximate mean contribution of each allele being 3.6 g/l) compared to α_{S1} -Cn^F and α_{S1} -Cn^B which are associated respectively with a low content (0.6 g/l) and an intermediate content (1.6 g/l), while α_{S1} -Cn^O appeared to be a true null allele.

In the same publication, the authors mentioned the presence in the electrophoregrams of some milks, of an additional band, called x, which reacted in immunoblotting with anti- α_{S1} -casein antibodies. We show in the present note that this band corresponds in fact to a seventh allele of the α_{S1} -casein locus.

Material and Methods

Individual milk samples were obtained from the "Station de Testage Caprin" near Moissac, Sainte-Croix Vallée Française, France or from private farms located in west central France. All techniques were as described in Grosclaude *et al.* (1987).

Results and Discussion

Band x (Fig. 2 in Grosclaude *et al.*, 1987), hereafter called D, migrates slightly more slowly than β -casein (Fig. 1) in SDS-polyacrylamide gel. Because of unavoidable variations in the electrophoretic conditions, this band may be masked by the β -casein band, but, in all cases, its presence can be ascertained by immunoblotting.

In order to establish the genetic determinism of fraction D, our family data were screened for the presence of sires transmitting this fraction to their daughters. One such sire, numbered A316, was found, with a total of 16 dam-daughter pairs. In the progeny of this sire, fraction D appeared to be controlled by an allele of the locus α_{S1} -Cn because it was transmitted in alternance with variant F, the proportion of the 2 classes of daughters not being significantly different from the 1:1 ratio (Table I).

In addition, 12 dams possessed fraction D, together with either variant F (9 cases) or variant B- (3 cases). Except in one dam-daughter pair, suspected to be a case of incorrect parentage, these family data were also in accordance with the hypothesis that fraction D is controlled by an allele of locus α_{S1} -Cn. Among their 20 other daughters, issued

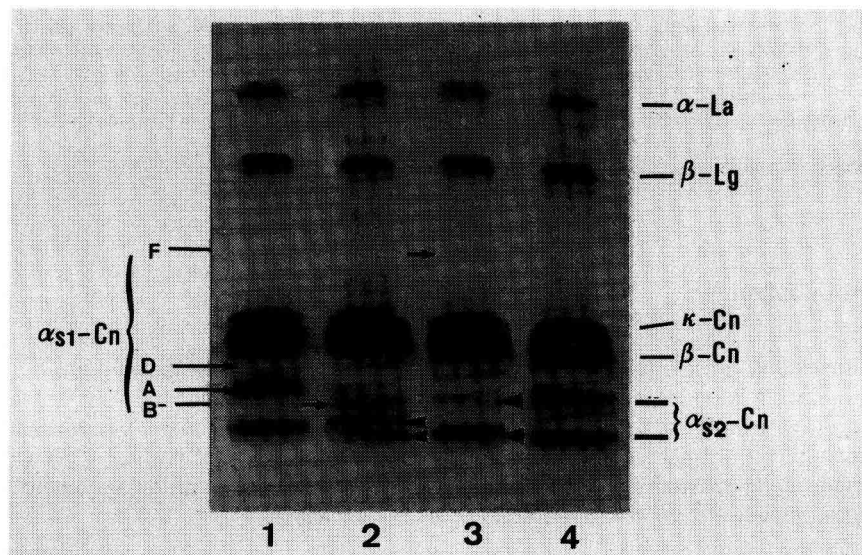


Fig. 1. SDS-polyacrylamide gel electrophoresis of milk from 4 individual goats. Sample 2 is heterozygous at the locus α_{S2} -Cn (α_{S2} -Cn^A/ α_{S2} -Cn^B); the α_{S1} -casein phenotypes are as follows: 1=AD; 2=B-; 3=DF; 4=AB-.

Table 1. Inheritance of α_{S1} -casein D in the family of the sire A 316.

Dams			Daughters	
N°	Genotype*	Phenotype	Genotype*	Allele received from the sire*
1	B-/F	F	F/F	F
2	B-/F	FD	F/D	D
3	F/O	D	D/O	D
		F	F/F	F
4	B-/B	B-D	B-/D	D
		B-F	B-/F	F
5	B-/F	F	F/F	F
6	B-/F	FD	F/D	D
		B-F	B-/F	F
7	B-/F	F	F/F	F
8	A/F	AF	A/F	F
9	C/F	CF	C/F	F
10	B-/B-	B-F	B-/F	F
		B-F	B-/F	F
11	F/F	FD	F/D	D
12	B-/B-	B-D	B-/D	D

* For B-, read α_{S1} -Cn^B, etc... The sire A 316 transmitted α_{S1} -Cn^D 6 times and α_{S1} -Cn^F 10 times to his 16 daughters. All the above data were ascertained by immunoblotting.

from sires which did not transmit fraction D, 8 did and 12 did not receive D, a proportion which again was not significantly different from the 1: 1 ratio.

Grosclaude *et al.* (1987) reported that, curiously, fraction x (here D), present in the milk of certain dams, was not transmitted to their daughters, an observation at variance with the conclusions of the present note. Re-examination of the surviving dam-daughter pairs among the 7 considered by these authors suggests the probable occurrence of 2 parentage errors in this sample. The non-transmission of fraction D in the 5 remaining pairs is attributable to mere chance ($P \approx 0.03$).

Allele α_{S1} -Cn^D is the seventh allele identified at the goat α_{S1} -casein locus. Its frequency in the large *Alpine* herd of Moissac ($N = 198$) was 0.025. It was also observed in the *Saanen* breed. Grosclaude *et al.* (1987) estimated that the frequencies of α_{S1} -Cn^O were 0.05 in *Alpine* and 0.03 in *Saanen*. Because in their data α_{S1} -Cn^D was not distinguished from α_{S1} -Cn^O, these values in fact apply to the combined frequencies of α_{S1} -Cn^O and α_{S1} -Cn^D. The frequencies of each of these 2 alleles are thus rather low in both breeds.

On immunoblots, as well as on SDS-polyacrylamide gels, variant α_{S1} -Cn^D appears much weaker than variants α_{S1} -Cn^A, B or C. Quantification of this variant by rocket-immunoelectrophoresis, carried out on individual milk samples from four animals with the genotype α_{S1} -Cn^{D/F}, indicated that the approximate mean contribution of allele α_{S1} -Cn^D was $\approx 0.6 - 0.8$ g/l, a low value, close to that found for α_{S1} -Cn^F (0.6 g/l). Allele α_{S1} -Cn^D is thus the fourth out of a total of 7 alleles associated with a decreased synthesis rate at the goat α_{S1} -casein locus. The biochemical particularities of variant α_{S1} -Cn^D are under investigation.

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Reference

Grosclaude F., Mahé M.-F., Brignon G., Di Stasio L. & Jeunet R. (1987) A Mendelian polymorphism underlying quantitative variations of goat α_{S1} -casein. *Génét. Sél. Evol.* 19, 399-412