αS1-CnD, another allele associated with a decreased synthesis rate at the caprine αS1-casein locus

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Note

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

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Summary — A seventh allele of the caprine $\alpha_{S1}$-casein locus, called $\alpha_{S1}^D$, was observed in French Alpine and Saanen breeds. Its frequency in a large herd (N=198) was 0.025. Like $\alpha_{S1}^B$, $\alpha_{S1}^F$ and $\alpha_{S1}^O$, 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 $\alpha_{S1}^F$.

Introduction

Grosclaude et al. (1987) have recently concluded that the polymorphism of goat $\alpha_{S1}$-casein is under the control of a minimum of 6 alleles. Alleles $\alpha_{S1}^A$, $\alpha_{S1}^B$ and $\alpha_{S1}^C$ were found to be associated with a high $\alpha_{S1}$-casein content (approximate mean contribution of each allele being 3.6 g/l) compared to $\alpha_{S1}^F$ and $\alpha_{S1}^O$ which are associated respectively with a low content (0.6 g/l) and an intermediate content (1.6 g/l), while $\alpha_{S1}^O$ 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-$\alpha_{S1}$-casein antibodies. We show in the present note that this band corresponds in fact to a seventh allele of the $\alpha_{S1}$-casein locus.
Material and Methods

Individual milk samples were obtained from the "Station de Testage Caprin" near Mois-sac, 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 αs1-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 αs1-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 αs2-Cn (αs2-Cn/αs2-Cn); the αs1-casein phenotypes are as follows: 1=AD; 2=B-; 3=DF; 4=AB-.](image-url)
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 = 0.03).

Allele αs1-CnD is the seventh allele identified at the goat αs1-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 αs1-CnO were 0.05 in Alpine and 0.03 in Saanen. Because in their data αs1-CnD was not distinguished from αs1-CnO, these values in fact apply to the combined frequencies of αs1-CnO and αs1-CnD. 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 αs1-CnD appears much weaker than variants αs1-CnA, B or C. Quantification of this variant by rocket-immunoelectrophoresis, carried out on individual milk samples from four animals with the genotype αs1-CnDF, indicated that the approximate mean contribution of allele αs1-CnD was 0.6 – 0.8 g/l, a low value, close to that found for αs1-CnF (0.6 g/l). Allele αs1-CnD is thus the fourth out of a total of 7 alleles associated with a decreased synthesis rate at the goat αs1-casein locus. The biochemical particularities of variant αs1-CnD are under investigation.
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Reference

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