

NOTE

An Investigation of Casein Polymorphism in Sheep Milk

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Casein polymorphism in the milk of Indian Bikaneri sheep was investigated. 59.09% of casein α -F-types, 9.09% of casein α -S-types and 31.82% of casein α -SF-types were observed.

Key words: Casein, polymorphism, sheep, milk.

Polymorphism of milk proteins in cow milk was studied by Aschaffenburg¹, Thompson *et al.*², Woychick³, Néelin⁴ and Schmidt⁵ separately and varying results were reported. Goat milk protein studies were reported by Macha⁶ and by Mittal and Pandey⁷. In an appraisal of casein of different species of animals, Majumdar and Ganguli⁸ have reported the casein (Cn) of cow, buffalo and goat milk by starch gel electrophoresis. They reported that the relative concentration of β -casein was much higher than alphas casein in goat whereas the reverse was true in case of cow and buffalo casein. These workers also could not show the presence of K caseins in the electropherograms. Alais and Jollis⁹ studied the isolation, purification and analysis of sheep milk. Arave *et al.*¹⁰ reported the polymorphism in caseins of sheep milk undertaking starch gel electrophoresis. 592 Milk samples from 6 breeds and crosses between these breeds revealed two variants for 2 casein types, one of α - and another of β -casein. The predominant type of α -casein had 3 bands whereas the variant type (α -Cn AB) had 6 bands. In the β -casein region the predominant type had 3 bands and the variant (β -Cn AB) had a 4th lighter band. A survey of the literature indicates that although a lot of work has been done^{11–16} in this field, but the milk casein polymorphism in the Indian sheep has not received much attention. The present work is an attempt to investigate the casein polymorphism in the milk of Indian Bikaneri sheep.

The Animals: The Indian Bikaneri sheep were maintained at the Department of Physiology U.P., College of Veterinary Science and Animal Husbandry, Mathura. All the animals maintained under usual farm conditions were healthy.

Preparation of Casein: Casein was prepared from the milk of Bikaneri sheep at 1st to 6th week of lactation by isoelectric precipitation using the following method developed by Aschaffenburg¹⁷. The milk was warmed to about 40°C, centrifuged and skim milk siphoned off. 10 mL of this milk was diluted to 40 mL in a 50 mL centrifuge tube by adding doubly distilled conductivity water. The contents were warmed up to 40°C. Casein was then precipitated by adding

1 mL of 1 : 10 glacial acetic acid followed by 1 mL of 1 M CH_3COONa . Casein precipitate was centrifuged after 10 min and the supernatant was decanted off. The precipitate was washed with warm water and was centrifuged again. The supernatant was poured away. 0.2 g of urea was added to wet casein and the precipitate was dispersed to a slightly cloudy solution with careful addition of little doubly distilled conductivity water. Final volume was adjusted to 5 mL of 5 per cent solution of casein. Strips of Whatmann 3 mm filter paper 1 cm wide and 6 cm long were impregnated with protein solution, air dried and were stored in a desiccator for use as protein sample in electrophoresis.

The Casein Polymorphism: The casein polymorphism was studied by disc electrophoresis using the procedure developed by Ornstein and Davis¹⁸.

The sheep casein electropherograms showed a number of bands of varied staining intensity, but the major fractions were in two zones. The fast moving zones were designated as α and the slow moving ones were designated as β as described by Arave *et al.*¹⁰. The α fractions of casein had comparatively the same mobility as that of α fraction of casein cow and buffalo, which is in accord with earlier results reported by Majumdar and Ganguli.

The first type designated as α -F has the fastest mobility, the α -S had the least mobility, while the α -SF showed the intermediate mobility. The results have been given in Table-1 .

TABLE-1
CASEIN POLYMORPHISM IN SHEEP

No. of animals	Alphas Casein types					
	α -F		α -S		α -SF	
	No.	%	No.	%	No.	%
22	13	59.09	02	9.09	07	31.82

The beta casein zone showed only one broad band which took an intense dark stain. No differences were observed in the mobility of this fraction, while Arave *et al.*¹⁰ reported 3 bands in this region.

2-7 Unidentified bands were observed in the zone between the starting point and the beta casein zone.

Arave *et al.*¹⁰ reported 2 variants of α -casein. The predominant type had 3 bands and the variant type had 6 bands. The results reported in Table-1 are in accord with the results reported by Bogdanov *et al.*¹⁹ in the Latvian dark headed sheep.

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