

POSTNATAL CHANGES IN ASPARTIC ENZYMES OF GOAT'S GASTRIC CHIEF CELLS ON THE MILK DIETS

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Introduction

The dietetic changes affect the postnatal development in the digestive systems of ruminants (Huber, 1968; Tamate et al., 1962). In the calf, the milk feeding keeps on secreting the chymosin in the gastric chief cells, and the solid-like feeding induced the pepsin secretion (Andrén et al., 1981; 1982).

This paper describes that the maternal milk and substitutional milk feedings affect the patterns of the gastric aspartic enzymes production in the goat's stomachs.

Materials and Methods

In total 18 male goats were used in the present study. Two new born animals were sacrificed 12 hours after birth without any diet. Five animals maintained by maternal milk alone were killed on days 8 after birth. Eight animals weaned on days 14 and maintained by substitutional milk (made of mainly soy meals and skim milk) there after were killed on 34 and 70 days. Other three animals maintained by conventional diet were sacrificed on adult. Each sample of the gastric glandular region was analyzed with the immunoblot (Le-Gender and Matsudaira, 1988), the ELISA (Johnson et al., 1978) and the immunohistochemistry (Banks, 1979) for aspartic enzymes.

Anti-chymosin serum used in the present study has been confirmed the crossreactivity to pro-chymosin and anti-pepsinogen to the pepsin by Andrén et al. (1981; 1982) in the cattle. Before use, we confirmed the crossreactivities of the sera to the respective enzyme from the goats obtained by gelfiltration (data not shown).

Results

Immunoblot after the 10% SDS-PAGE

The anti-chymosin serum reacted at about 37 kDa bands to the crude goat's samples and purified bovine chymosin. The anti-pepsinogen serum did at about 40 kDa to the goat's samples and purified bovine pepsinogen. The immunoreactive levels of the blotting bands showed the same patterns as the ELISA.

The levels of prochymosin and pepsinogen by ELISA

The prochymosin were kept at high levels by the maternal and substitutional milk feedings, but the levels of pepsinogen increased gradually with following ages (table 1).

Histochemical data

The anti-chymosin and anti-pepsinogen reactive cells distributed mainly in the gastric chief cells. The numbers of immunoreacted cells seemed to correlate with the data by ELISA.

Discussion

The levels of the chymosin in the bovine abomasal tissue is kept on high levels by the milk feedings (Andrén et al., 1981; 1982). In the present study, immunophysicochemical (immunoblotting and ELISA) and immunohistochemical analysis revealed that the levels of prochymosin was kept high by the milk feeding also goats. It was also confirmed the maternal milk affected on the pepsinogen production to be reduced in the goat. The reason, however, was not clear.

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TABLE 1. AMOUNTS OF PROCHYMOSIN AND PEPSINOGEN IN THE GOAT'S ABOMASAL TISSUE BY ELISA (MG/G) (MEAN \pm SE)

Sample stage	(Numbers)	Prochymosin	Pepsinogen
At Birth	(2)	5.5 \pm 0.6	4.3 \pm 0.7
Maternal milk stage	(5)	7.5 \pm 2.8	2.2 \pm 0.7*
Substitutional milk stage	(8)	6.8 \pm 1.4	4.4 \pm 0.4
Adult	(3)	0.7 \pm 0.2*	10.5 \pm 0.4*

*Statistically different ($p < 0.05$) from the respective values obtained at birth.

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