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Expanded abstract

Serum fatty acid composition in reindeer calves during peak suckling period

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Neonatal reindeer, in common with other newborn mammals, are completely dependent on milk at birth. Reindeer milk is particularly rich in fat (Arman 1979, Eloranta *et al.* 1990), and supplies all the energetic and dietary needs of the calves until the age of 3-4 weeks when they start to ferment green vegetation (cf. Noble 1981). Serum fatty acid profile of semi-domesticated reindeer during the monogastric period has been little studied. The status of certain polyunsaturated or essential fatty acids which play a role in many physiological functions, e.g. in the development of immunity, is also poorly known. Our objectives were: (1) to characterize serum fatty acid composition in reindeer calves, (2) to compare the status of serum essential fatty acids (mainly linoleic acid, 18:2) in newborn and growing reindeer, and (3) to identify the effect of milk lipids on serum fatty acid composition of calves during peak suckling period.

Reindeer were from the experimental herd of the Finnish Reindeer Herders' Association, located in Northern Finland (69°10'N). Altogether 18 calves of both sexes were examined from birth to the age of three weeks. Feed concentrates containing 7% crude fat (wt/wt, by dry matter, 4% rapeseed oil) were offered to the mothers. Mothers had been freely grazing during winter prior to the study, or fed with concentrates. Blood samples were taken from calves within 12 hours of birth, and 1-4, 5-9, 10-15 and 16-20 days *post partum.* Mothers were milked by hand at about 10 days after calving. Serum and milk lipids were measured enzymatically. Lipids were extracted with methanol-chloroform, purified by the method of Folch *et al.* (1957) (modified by Moilanen & Nikkari 1981) and methyl esters of fatty acids were analysed by gas liquid chromatography.

Serum triglyceride concentration of the calves (1.0 ± 0.08 mmol/l) did not vary significantly during the first three weeks of life. Serum cholesterol concentration increased from 2.2 ± 0.06 to 2.9 ± 0.13 mmol/l during the first three weeks. A total of 16/18 fatty acids from 14 to 20 carbon chain lengths were identified in serum triglycerides and cholesteryl esters, respectively. Oleic acid (18:1) predominated both triglycerides and cholesteryl esters by 35-40% at birth. Oleic acid was followed by palmitic (16:0) and stearic acid (18:0) in serium triglycerides, but by palmitic and palmitoleic acid (16:1) in cholesteryl esters. Triglycerides increased in saturation from 53 to 57% during the first week, while cholesteryl esters were enriched by polyunsa-

turated omega-6 series fatty acids from 15 to 48%. Triglyceride stearic acid increased from 14 to 20% by the third week of age while oleic acid decreased from 39 to 30% at the same time. Cholesteryl esters linoleic acid increased from 11 to 43% while oleic acid decreased from 37 to 30% during the first week, and a-linolenic acid (18:303) increased from 1.3 to 1.9% during the second week. At the age of three weeks, serum cholesteryl esters were polyunsaturated by 58%, and linoleic acid was the major acid by 51%.

Milk lipids (mean 9.5 ± 0.7%) were highly saturated both in the mothers which had been freely grazing during preceeding winter (65% saturated) or in those fed concentrates (62% saturated) (cf. Eloranta *et al.* 1990). There was a significant positive correlation in the essential fatty acids of serum triglycerides or cholesterol esters of the calves and milk triglycerides of their mothers during peak calving period (Table 1). No statistical difference was found in fatty acid composition of milk triglycerides between the two groups of females. Milk phospholipids of females fed concentrates contained more omega-6 series polyunsaturated acids (linoleic acid; 5.8 to 4.5%, $P < 0.01$) compared to milk of females which had grazed natural pasture during winter.

In conclusion, significant changes occur in serum fatty acid composition in reindeer during the first three weeks of life. Serum triglycerides increase in saturation, while cholesteryl esters are enriched by polyunsaturated omega-6 series fatty acids. In agreement with previous findings in the lamb and the bovine calf (Noble 1981), the essential fatty acid status of reindeer appears poor at birth. However, absorption and retention of polyunsaturated omega-6 series fatty acids, partifularly linoleic acid from milk lipids is efficient during the first week. Improvements in the dietary supply of essential fatty acids may thus be important for the viability and well-being of calves during the critical postparturient period. The capacity to increase polyunsaturated fatty acid content of the milk fat through a simple manipulation of maternal diet may however be limited by rumen biohydrogenation processes.

Table 1. Correlation between the essential fatty acids of serum lipids of reindeer calves and milk triglycerides of their mothers during peak suckling (ca. 10 days *post partum*).

Milk triglycerides Fatty acid	Serum triglycerides	Serum cholesteryl esters
Linoleic acid (18:2ω6)	0.553*	0.531*
Linolenic acid (18:3ω3)	0.689**	0.273
Arachidonic acid (20:ω6)	0.496*	0.072
n	17	18

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