

# Nutritional status and fatty acid composition of bone marrows in semi-domesticated reindeer

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Nutritional condition of animals has been defined usually as fat deposition in different parts of the body. Fat animals are not necessarily healthy, but animals with relatively high amounts of fat have usually also adequate levels of other resources within the body. Fat is deposited first in bone marrow, then around the kidney, and finally under the skin. Fat content of bone marrow has long been related to the physiological condition of animals (Jackson 1928) and several techniques have been used to determine the marrow fat levels in different *Cervidae* -species (see Nieminen and Laitinen 1986). In this study femur and metatarsal marrow samples were collected from 20 semi-domesticated reindeer (10 calves, 6 hinds and 4 castrated males) maintained in a good nutritional state during October in the southern part of the Finnish reindeer herding area and from 20 starved reindeer (10 calves, 8 hinds and 2 young males) slaughtered at the end of February in northern part of the Finnish reindeer herding area. Bone marrow lipids were extracted with methanol-chloroform (1:1), fractionated on TLC, and their fatty acids were analysed by gas-liquid chromatography. Analysis of bone marrow lipids resulted in the identification of 16 fatty acids from 14 to 20 carbon chain lengths. No significant sex-related differences were found in fatty acid composition of calves during different seasons. Femur marrow triglycerides (TG) were mainly saturated (range 57–67 %), large proportion being palmitic (16:0) and stearic acids (18:0). The proportion of saturated fatty acids was slightly higher during autumn and winter in calves than in hinds. The fatty acid composition increased in unsaturation distally, the major changes being in oleic acid (18:1) which increased from 33 % in femur to 46 % in metatarsal marrow of calves and from 38 % to 57 % of hinds in October. Carcass weight of starved

calves and hinds at the end of February was significantly lower, but fresh weight of red bone marrows was slightly higher than those in October. Starved reindeer had higher proportion of saturated but lower proportion of mono- and polyunsaturated fatty acids in femur and metatarsal marrows than reindeer slaughtered in October. The highest proportion of branched-chain fatty acids was measured in femur of male yearlings and castrated males (1.9 and 2.1 %). Phospholipids (PL) were mainly saturated in femur and metatarsal bone marrows of calves (53 and 51 %) and hinds (56 and 53 %, respectively) in October. Starved reindeer in winter had slightly higher proportions of unsaturated fatty acids in PL of bone marrows than reindeer slaughtered in autumn. Metatarsal fat content in reindeer that has starved to death is higher than femur fat content (Nieminen and Laitinen 1986). Fat mobilization in winter might be more advanced in proximal bones because they are closer to the body and keep warmer. It seems reasonable to expect reduced circulation in capillary networks and retarded metabolic processes in colder extremities. Present results support the suggestion that a negative correlation exists between the degree of fatty acid saturation in the limb and the distance from the body (see Meng *et al.* 1969).

## References:

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