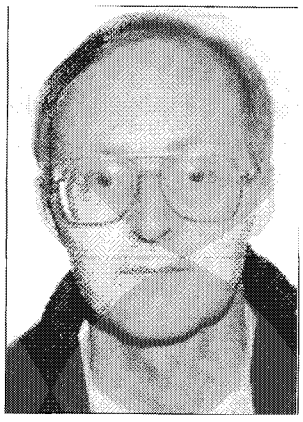
Dissertation



Terje Domaas Josefsen defended his thesis: «Influence of diet on the forestomach mucosa in reindeer calves (*Rangifer tarandus tarandus*)» for the degree of *Doctor scientiarum* of the Norwegian College of Veterinary Medicine (NCVM), Oslo, on May 29, 1997. The title of his lecture was: «Diseases of the gastrointestinal tract of reindeer». The opponents were Dr. Timo Soveri, Univ. of Helsinki, Helsinki, and Prof. Inge Bjerkås, NCVM, Oslo.

Terje D. Josefsen was born in Tromsø in 1959. He finished his veterinary education at the NCVM in Oslo in 1984. After some years in general veterinary practise he was employed by the former Centre of Veterinary Medicine in Tromsø (now Department of Arctic Veterinary Medicine, NCVM) in 1991, on a research project concerning rumen pathology in reindeer. Important co-operating institutions on this project were Dept. of Pathology at the NCVM, Oslo, and Dept. of Arctic Biology at the University of Tromsø. The project was funded by the Norwegian Research Council.

Terje D. Josefsen is currently employed at the National Veterinary Institute in Tromsø.

The thesis is based on four papers:

Josefsen, T. D. and Landsverk, T. 1996. T cell subsets and Langerhans cells in the forestomach mucosa of adult sheep and sheep foetuses. *Vet. Immunol. Immunopathol.* 51: 101–111.

Josefsen, T.D., Aagnes, T. H. and Mathiesen, S. D. 1996. Influence of diet on the morphology of the ruminal papillae in reindeer calves (*Rangifer tarandus tarandus* L.). *Rangifer* 16: 119–128.

Josefsen, T. D., Aagnes, T. H. and Mathiesen, S. D. 1997. Influence of diet on the occurrence of intraepithelial microabscesses and foreign bodies in the ruminal mucosa of reindeer calves (*Rangifer tarandus tarandus*). *J. Vet. Med. A* 44: 249–257.

Josefsen, T. D. and Landsverk, T. Increase in γδ T cells in the ruminal mucosa of reindeer calves (*Rangifer tarandus tarandus* L.) induced by baled grass silage. (*Vet. Immunol. Immunopathol., accepted*).

Abstract: The study investigated the influence of diet on morphological aspects of the forestomach mucosa in reindeer calves. Three approaches were used: Morphometric measurements on ruminal papillae, pathological examination of the forestomach mucosa and immunohistological staining for leukocytes in the forestomach mucosa. An immunohistological study on leukocytes in the forestomach mucosa of sheep was included as a basis of the corresponding study in reindeer.

Reindeer forestomach samples were obtained from 4 groups of 3 free-ranging reindeer calves (Sept.-April), and 11 groups of 3 reindeer calves used in feeding trials with silage, pelleted feed or lichen. Sheep forestomach samples were obtained from 5 adult ewes and 7 sheep foetuses.

Results of morphometric measurements on reindeer ruminal papillae (Paper II) were expressed as group means of an "overall value" (the mean of 4 sample sites), and ranged from 2.3 to 3.4 mm for papillar length, 2.2 to 3.5 mm for cross-sectional perimeter, 85 to 189 papillae/cm² for papillar density and 5.8 to 18.6 for ruminal surface enlargement factor (SEF). Papillar size and density were larger in late summer compared to winter, and larger in animals fed low-fibre silage, high in easily digestible carbohydrates, compared to high-fibre silage, low in easily digestible carbohydrates. The SEF was highest in *atrium ruminis* and lowest in the caudodorsal blind sac.

Histopathological examination of the forestomach mucosa (Paper III) showed the occurrence of intraepithelial microabscesses (IEMAs) and foreign body lesions (FBLs). Both IEMAs and FBLs occurred more frequent in animals fed silage or pellered feed compared to free-ranging and lichen-fed animals. FBLs occurred more frequently in animals with high numbers of IEMAs, and it is suggested that both IEMAs and FBLs are caused by plant particles penetrating the forestomach epithelium. The lesions did not seem to be associated with the nutritional value of the diet, nor influence animal health.

The immunohistological studies in sheep (Paper I) and reindeer (Paper IV) showed that MHC-II+ dendritic cells, interpreted as Langerhans cells, were present in the forestomach mucosa of both species. CD4+ T cells, CD8+ T cells and γδ T cells were demonstrated in sheep, while, due to lack of cross-reacting antibodies, only the γδ T cell subset was demonstrated in reindeer. All leukocytes were mainly located either within or immediately below the epithelium. The number of T cells differed between different sample sites in the forestomachs and between dietary groups, while the numbet of Langerhans cells showed less fluctuations.

It is concluded that morphometric measurements on ruminal papillae reflects ruminal function, while no functional changes were associated with increased frequency of epithelial lesions and increased mucosal γδ T cell density.