Anders Mårell

Biography

Anders Mårell (born 1971) successfully defended his doctoral thesis "Summer feeding behaviour of reindeer: a hierarchical approach" October 27, 2006, at the Swedish University of Agricultural Sciences (SLU), Umeå, Sweden. Opponent was Professor Emeritus David R. Klein (Institute of Arctic Biology, University of Alaska Fairbanks). Professor Kjell Danell (SLU), Dr. Annika Hofgaard (Norwegian Institute for Nature Research), Dr. John Ball (SLU) and Dr. Lars Edenius (SLU) have been supervisors for the thesis.

Anders Mårell obtained a Master of Science in Forestry at SLU in Umeå in 1997. He began his postgraduate studies in 1998 at the Climate Impacts Research Centre, Abisko Scientific Research Station, Sweden. He successfully defended his "Licentiate thesis" (Skoglig Licentiatexamen) on "Summer feeding behaviour of female reindeer and its relation to the food resource" in 2001 at SLU in Umeå. He worked as scientific coordinator for the COST Action E25 "European Network for Forest Ecosystem and Landscape Research" (www.enfors.org) between 2001-2005. Since 2006, he is working at the French Mediterranean Forest Research Institute in Avignon where he is involved in a European research project on fire ecology and behaviour in the Mediterranean region.

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Thesis

Mårell, A. 2006. Summer feeding behaviour of reindeer: a hierarchical approach. Doctoral thesis, Faculty of Forest Sciences. – *Acta Universitatis Agriculturae Sueciae* 2006:56. Uppsala. ISSN 1652-6880. ISBN 91-576-7105-2.

The thesis was based on the following papers:

Mårell, A. Reindeer habitat selection: Does plant species diversity matter? (Submitted manuscript).

Mårell, A., Ball, J. P. & Hofgaard, A. 2002. Foraging and movement paths of female reindeer: insights from fractal analysis, correlated random walks, and Lévy flights. – *Canadian Journal of Zoology* 80: 854-865.

Mårell, A. & Edenius, L. 2006. Spatial heterogeneity and hierarchical feeding habitat selection by reindeer. – *Arctic, Antarctic, and Alpine Research* 38: 413-420.

Mårell, A., Hofgaard, A. & Danell, K. 2006. Nutrient dynamics of reindeer forage species along snowmelt gradients at different ecological scales. – *Basic and Applied Ecology* 7: 13-30.

Summary: Reindeer (*Rangifer tarandus* L.) plays an important role ecologically, economically, as well as culturally in northern Fennoscandia, where reindeer husbandry traditionally has considered winter to be the bottleneck for reindeer. Recent studies have shown that summer feeding conditions control reindeer population dynamics through indirect effects on winter survival and reproductive success.

The thesis analyses seasonal plant nutrient dynamics, their spatial patterns and reindeer summer foraging behaviour at different levels simultaneously. The aim was to test the underlying assumptions behind the hypothesis that reindeer select the new emerging growth (highly digestible and protein rich) and move into new areas as the emergence of new growth proceeds along climatic gradients. The studies were done in a mountainous landscape of sub-arctic northern Sweden used by the semi-domesticated reindeer herd belonging to Gabna Sami community.

The study on plant nutrient dynamics of four forage species (*Betula nana* L., *Eriophorum angustifolium* L., *Rumex acetosa* L. and *Vaccinium myrtillus* L.) revealed that plant nitrogen concentrations (and thus protein content) related to snowmelt patterns. It was further shown that reindeer selected areas with high landcover diversity, and thus might respond to any landscape heterogeneity that results from varying snowmelt patterns. Within landscapes, reindeer selected species rich plant communities with high abundance of preferred food plants (deciduous shrubs, herbs and graminoids) and fed where food biomass was high, predominantly that of birch and willow species. Contrary to predictions of the tested hypothesis, it was concluded that reindeer responded to food quantity rather than quality at intermediate (i.e., within plant communities) levels of feeding habitat selection. Feeding habitat selection at higher (i.e., feeding area and plant community selection) and lower (i.e., plant species and parts selection) levels indicated the importance of food quality and was thus in agreement with the tested hypothesis. The results have

implications for land management as they show the importance of maintaining heterogeneous alpine landscapes for reindeer husbandry. Furthermore, reindeer husbandry needs to be practised at a level that maintain species rich and diverse plant communities. These plant communities were shown to be important feeding habitats, at the same time as they may contribute to national and European nature conservation goals.

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