

Characterisation of genetic diversity in domestic sheep

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Sheep and goats were domesticated at the end of the Mesolithic period. No one of domestic species is likely to have had only one use, but the sheep provides more products than any other: meat, fat and milk for food, bone and horn for implements, as well as skins for clothing and gut for containers. Unlike in cattle, wild populations of presumptive ancestors (Urial, Mouflon and Argali) of domestic sheep still exist, but origin of the modern domestic sheep remains uncertain (Ryder 1984). Hiendleder *et al.* (1998) analysed mtDNA and found that one of the two main mitochondrial lineages in sheep is similar to Mouflon type. For the other lineage they did not find similar connection to any of the three wild species. Mouflon could be derived from an early domesticated sheep stock (Hiendleder *et al.* 1998). So it may be inappropriate to call Mouflon as one of ancestors of domestic sheep. The importance of maintenance of domestic animal diversity has been emphasised in several reports (Hall and Bradley 1995; Kantanen *et al.* 1999). Domestic animal diversity is critical for food security and essential to meet unpredictable future requirements. It is important not to permit the erosion of this diversity. Study of neutral molecular variation can help in making management decisions objectively. Currently there are three international projects studying sheep diversity: European (EU-project), African (ILRI) and Northern Eurasian (Nordic Genebank for Farm animals (NGH), The Academy of Finland, Ministry of Agriculture and Forestry in Finland). Together these will give a global knowledge of genetic diversity of domestic sheep.

NGH funded Nordic-Baltic project "Origin and Genetic Diversity of North European Sheep Breeds" is carried out in co-operation between several Scandinavian and Baltic institutes and laboratories, including Danish Institute of Agricultural Sciences in Denmark, Norwegian College of Veterinary Medicine in Norway, Swedish University of Agricultural Sciences in Sweden, Agrifood Research Finland (MTT) in Finland, Agricultural Research Institute in Iceland, Lithuanian Veterinary Academy in Lithuania and Institute of Animal Sciences of Estonian Agricultural University in Estonia. In this project microsatellite and sequence diversity of mtDNA control region in sheep are analysed. Four Baltic breeds were originally included in the project. For Baltic questions, the characterization is expanded to six Baltic breeds: Lithuanian Coarsewooled (30), Lithuanian Blackfaced (30), Estonian Native (Ruhnu) (24) and Latvian Darkhead (32) have been analysed and Estonian Blackheaded and Estonian Whiteheaded sheep breeds will be analysed later. Blood samples were collected and DNA was extracted from 116 unrelated animals (sample sizes of each breed in parentheses). Due to small population size, less than 30 individuals were collected from Estonian Native (Ruhnu) breed. These sheep breeds are well adapted to the local conditions, are known for hardiness, some have special wool types in different colours. Lithuanian Blackfaced, Latvian Darkhead and Estonian Whiteheaded sheep combine uniform semifine wool of high quality with early maturity and good meat traits. Lithuanian Coarsewooled sheep is highly fertile and produce large litters but the body conformation is less compact than of heavy meat type breeds. The market demand for heavy and muscular lamb carcass with high lean meat content is unfavourable for this breed in competition with the heavy breeds.

The aim of the Baltic study is to evaluate within breed diversity, to investigate genetic diversity in the sample of Baltic native sheep breeds and genetic relationship between Baltic and Nordic sheep breeds. To demonstrate the historical development and the degree of uniqueness of Baltic sheep breeds, more genetic data from neighbouring areas is needed. The information will be available from other parts of Northern Eurasian sheep project. This knowledge is needed when decision concerning management of genetic resources of Baltic sheep and conservation of unique populations for future breeding strategies needs to be made (e.g. Hall and Bradley 1995).

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