

Genomic assessment of the Romanov sheep using high density DNA chips



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Introduction. The Romanov breed significantly differs by its phenotypic (thin tail, not fat) and proliferative traits (multiple fertility and off-season estrus), as well as by its origin (European) from other Russian local coarse wool sheep breeds.

The Romanov ewes are superior to other Russian breeds and the most world breeds by the litter size per lambing in 2.5-3 times.

Due to high prolificacy, the Romanov breed is widely known outside Russia. Associations of the Romanov breeders were created in the USA and Canada. Based on the Romanov gene pool, the Romane breed (or INRA 401) was obtained in France.

However, the Romanov breed is currently in a vulnerable state and is partially replaced by fat - tailed coarse wool breeds with a higher meat productivity (Karachaev, Tuva and Edilbaev).

Aim. It is relevant to analyze the current genetic state of the Romanov breed using powerful DNA tools.



Materials and Methods.

A total of forty-eight tissue samples of the Romanov sheep were collected randomly in various farms.

Sheep were genotyped using Ovine Infinium® HD SNP BeadChip (Illumina, USA). The data were processed in PLINK 1.90 and in the R package "diveRsity".

Results. The observed heterozygosity was 0.368 in the Romanov sheep and exceeded the average value estimated for eleven coarse wool breeds (0.334).

An insignificant heterozygote excess was recorded for all the studied sheep breeds, including the Romanov breed, which was 3% in the Romanov breed and averaged 1% for eleven breeds. Allelic richness was greater in the Romanov breed in comparison with other coarse wool sheep breeds: 1.918 versus 1.883, respectively.

Based on Neighbor Net tree (Fig 1), the Romanov breed was clearly separated from another Russian local coarse wool breeds of Asian origin, which grouped together. The Kuchugur breed was the nearest neighbor of the Romanov sheep due to its European genetic roots.

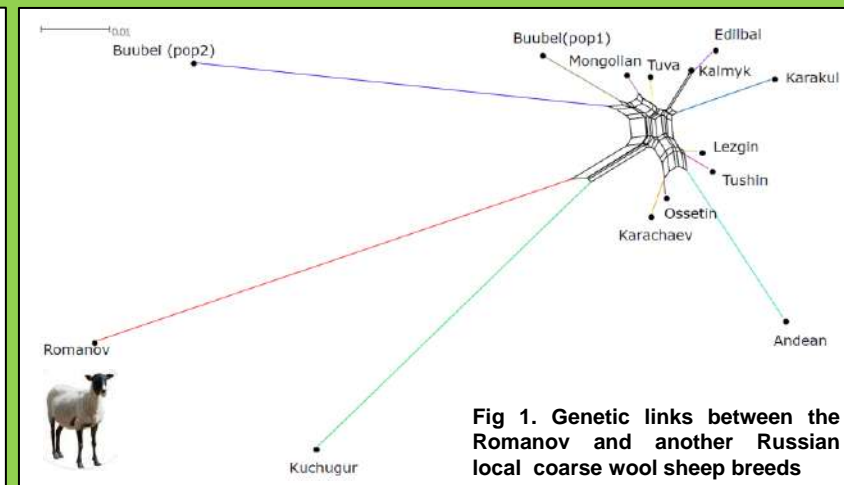


Fig 1. Genetic links between the Romanov and another Russian local coarse wool sheep breeds

Conclusions. Our study shows that the Romanov breed has resource of genetic diversity and is not seemed to be endangered. The studies will be continued to search for genetic variants responsible for high proliferative traits which might be useful as targets for genome editing to improve the reproductive traits of low prolific sheep.

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