

Genetic diversity of the Latvian Dark-headed sheep breed according to single nucleotide polymorphisms compared with breeds bred in Latvia

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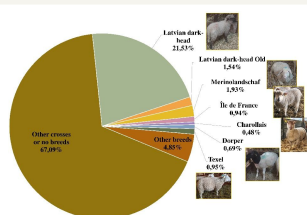
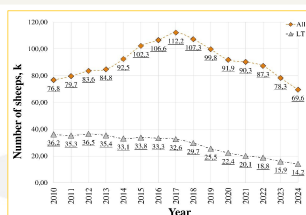
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INTRODUCTION

Sheep in Latvia

In 2001, the **Sheep Breeders Association** officially began operating in Latvia, which is authorised to carry out selection work in sheep breeding. Currently, **10 sheep breeding programs** have been approved. Only breed selected in Latvia – **Latvian dark-head (*Latvijas tumšgalve*; LT)**.



Latvian Dark-Head breed

Was created by crossing local Latvian sheep with Shropshire and Oxfordshire rams imported from Sweden and England. The first pedigree or breeder's book for LT rams was issued in 1939.



Currently live weight of ewes of LT breed is about 55 – 65 kg, rams - 95 – 120 kg, wool cut 3.5 – 4.5 and 5.0 – 6.0 kg, respectively. The average fertility of ewes is 150 – 160%.

The **LT breed fully adapts** to local environmental conditions and holds cultural significance, contributing to traditional lifestyles, landscape preservation, and regional identity. Therefore, **genetic studies on LT are crucial for conserving** its diversity and **informing future breeding programs**.

AIM

This study **aimed** to evaluate the genetic diversity within the Latvian dark-head breed and compare it with that of other commonly raised sheep breeds in Latvia.

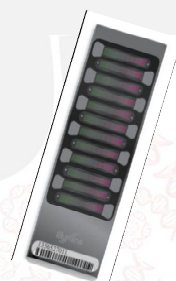


METHOD

For the first time, purebred lambs from sire rams representing major breeds in Latvia were genotyped using the Illumina Ovine SNP50 BeadChip®



Breed		N
Latvian dark-head	LT	135
Merinolandschaf	ML	26
Romanov	ROM	14
Île de France	IF	33
Charollais	CH	14
Dorper	DOR	15
Texel	TEX	22



Genetic diversity was assessed by **real minor allele frequency (MAF)** analysis, and breed-specific markers were identified by locating **fixed SNPs (MAF = 0)** unique to each breed and breed type, analyzing 48'981 SNPs after quality control.

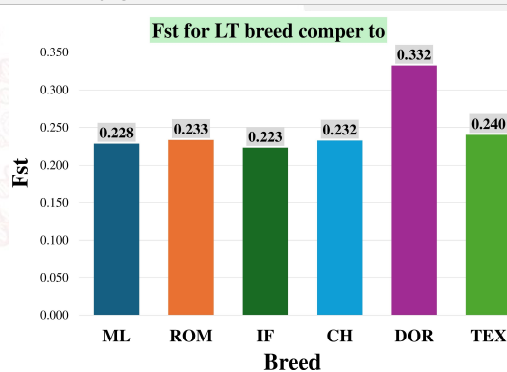
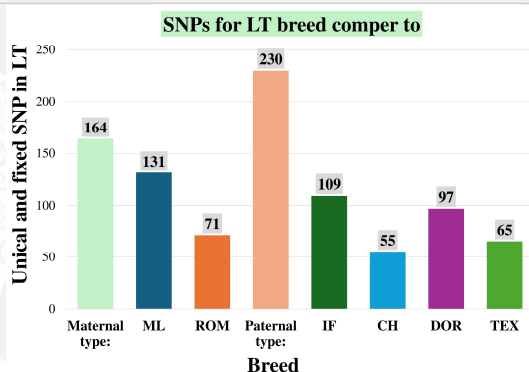
RESULTS & DISCUSSION

In the **Latvian dark-head breed samples**:

- **27'561 (63.49%) SNPs highly polymorphic** (MAF 0.3 – 0.5)
- **3'169 (5.66%) SNPs rare** (MAF <0.01)
- **2'668 (4.82%) SNPs fixed** (MAF = 0)

Among **all fixed SNPs**, from **55 (2.06%) to 131 (4.91%) SNPs** were unique to the LT breed compared to other breeds.

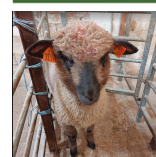
Latvian dark-head breed samples have high or very high (F_{ST} 0.22 – 0.33) genetic differentiation from other breeds.



CONCLUSION

The OvineSNP50 panel provides a sufficiently informative set of molecular markers for distinguishing the LT breed and monitoring its genetic diversity. Given the high level of polymorphism, the data also holds potential for future studies in genetic selection and breed improvement.

FUTURE WORK



Increase the number of lambs in breed groups to enhance variation and refine genetic diversity analyses.