POPULATION STRUCTURE AND GENOMIC INBREEDING IN EUROPEAN SPECTACLED EYE SHEEP

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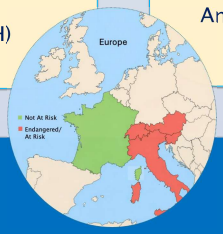
Objective

Spectacled Eye sheep
Rare livestock breeds in AT, IT, CH, SLO (500 to 8,000 animals per country)

Causses du LOT
Common French livestock breed
Phenotypically similar (~100,000)

Population structure (MDS), differentiation (FST) and genomic inbreeding (FROH) analysis



Methods

50K SNP genotype data newly collected samples: AT (n=48), IT (n=5), CH (n=18)

Merged with published SNP data: SLO (n=23), CH (n=53), F (n=20)

Final data set: 167 individuals, ~ 32,000 SNP markers, after quality control.

Analyses: MDS, FST, FROH

Breeds

AT
Carinthian Spectacled Eye Sheep
(Kärntner Brillenschaf)

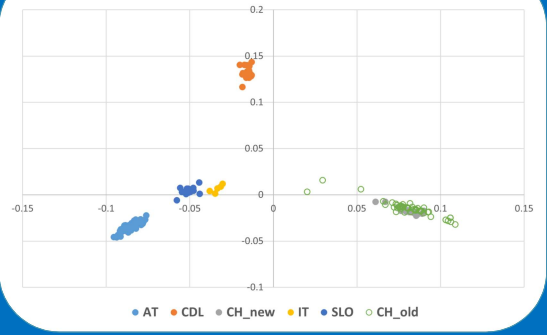
IT
Vilnöss Spectacled Eye Sheep
(Villnösser Brillenschaf)

SLO
Jezersko-Solčava Sheep
(Jezersko-solčavska ovca)

CH
Swiss Mirror Sheep
(Spiegelschaf)

CDL
Causses du LOT Sheep

MDS-Plot



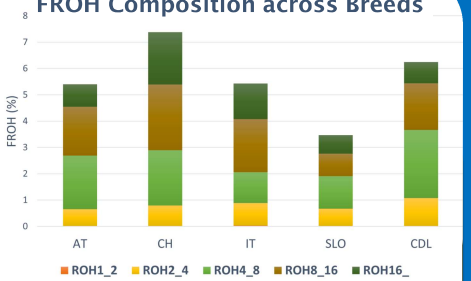
- CH and CDL cluster clearly separate
- IT and SLO cluster closely together
- AT close to IT and SLO in the same quadrant, but distinct.

Pairwise FST

	AT	CH	SLO	IT
CH	0.086			
SLO	0.049	0.077		
IT	0.056	0.071	0.047	
CDL	0.094	0.090	0.081	0.080

- Genetic differentiation (FST) was lowest within SLO and IT (0.047), followed by SLO and AT (0.049).
- Highest genetic differentiation was observed between CDL and AT (0.094), followed by CDL and CH (0.090).

FROH Composition across Breeds



The figure shows genomic inbreeding (FROH) for each breed and its composition across different ROH length classes. Short ROHs indicate older inbreeding, whereas long ROHs reflect more recent inbreeding.

- Highest average FROH for CH (7.29%)
- Lowest average FROH for SLO (3.48%)
- The proportion of recent genomic inbreeding (FROH>16) varied among populations, ranging from 12.9% in CDL to 26.9% in CH.

- ✓ **Distinct genetic clusters among European Spectacled Eye sheep populations with limited gene flow depending on their origin.**
- ✓ **CH most distinct across Alpine countries.**
- ✓ **SLO display lowest average FROH and FST within the Alpine block.**
- ✓ **CDL genetically distinct from the Alpine block, possibly to be considered as source for genetic rejuvenation for smaller populations.**
- ✓ **Genomic characterization of the Spectacled Eye Sheep populations: a potential basis for their management and conservation.**

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