The genetic diversity and origin of the Belgian Milksheep using pedigree and genomic information

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Introduction

The Belgian Milksheep is a local breed with excellent milk characteristics, mostly for cheese production. The active population size is low (< 500 animals) and the breed seems at risk.

Objectives

Characterize genetic diversity in the active population based on pedigree and genomic information

Study the relation with other milk sheep breeds

Material and Methods

Material

- 8284 pedigree records of sheep (born from 1980 to 2016)
- 144 Belgian Milksheep, 22 Flemish sheep and 22 Friesian Milksheep genotyped (50K and 15K)
- Sheep HapMap genotypes (74 sheep breeds)

Methods

- Pedig (Boichard, 2002) and PopReport (Groeneveld et al., 2009)
- PLINK v1.9 (Chang and Purcell, 2016) and R-packages

Results

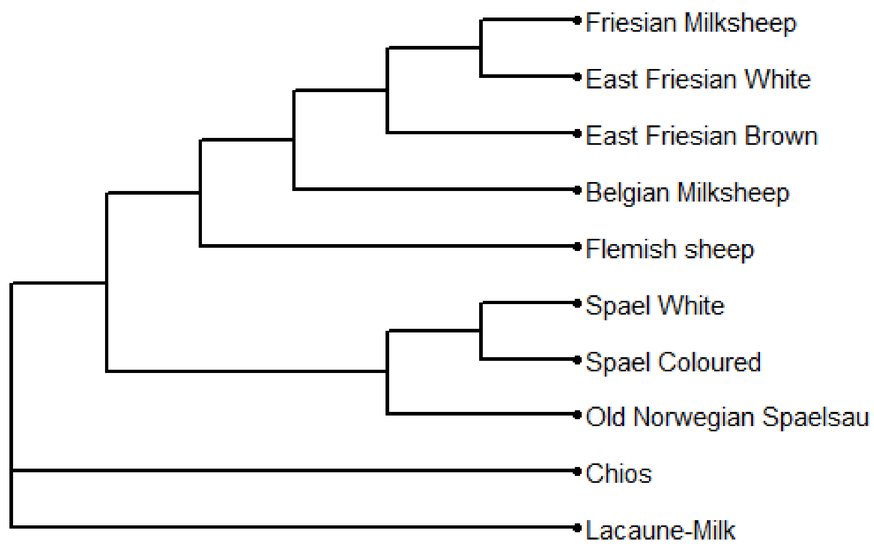
Pedigree (2010-2016)

- 128 – 201 litters annually born
- Average inbreeding coefficient between 10.0% and 13.5%
- Rate of inbreeding increased 2.1% to 3.5% per generation
- Effective population size estimated at 24 animals

Genomics

- Effective population size estimated at 19 animals
- Inbreeding coefficient F_{ROH} = 11.94%
- Closest related to Friesian Milksheep, than to the Flemish Sheep

Neighbor-joining tree on Saitou & Nei's distances



Conclusion

The effective population size (19 to 24) was estimated far below the FAO-guideline of 100 animals and the average inbreeding coefficient was estimated around 12%.

The Belgian Milksheep is closest related to the Friesian Milksheep and the East Friesian sheep and next to the Flemish sheep. These breeds are most suitable for exchange of breeding animals.

This research creates awareness about the risk of extinction.

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