

Genetic Diversity and Autozygosity of Indigenous SA Sheep Breeds Characterized by Small Population Sizes



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Introduction

Indigenous South African (SA) sheep important genetic resource – Adaptive abilities to harsh environments

- Characterised by **small population sizes**:
- Some at risk of becoming endangered
 - Possibly increase risk for inbreeding and loss of diversity

Mainly utilised in communal and smallholder systems

- Disregarded in commercial sector

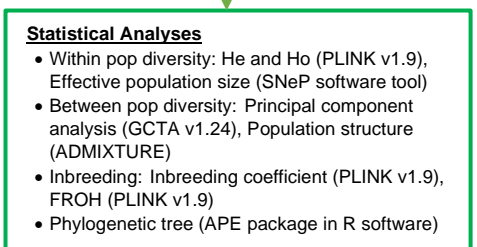
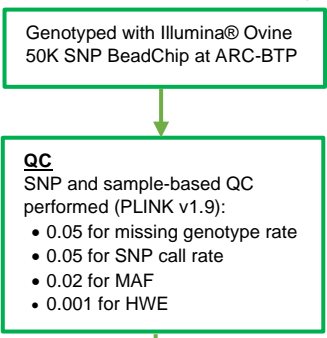
Aim: Investigate genetic diversity parameters and marker- and runs of homozygosity-based inbreeding levels of SA indigenous sheep breeds

Materials and methods

158 animals representing five indigenous SA sheep populations:



Black Headed Persian HP (30) | Damara (30) | Fat-tailed (16) | Namakwa Afrikaner (53) | Pedi (29)



Results

Breed	Ho	He	Fis	FROH	Ne (Current)
BHP	0,352	0,384	0,083	-	36
DAM	0,337	0,382	0,118	0,004	81
FTT	0,326	0,335	0,026	0,008	39
NAM	0,337	0,344	0,022	0,002	55
PED	0,356	0,374	0,049	0,004	90

Table 1 Summary of average observed and expected heterozygosities, inbreeding statistics and effective population size per population

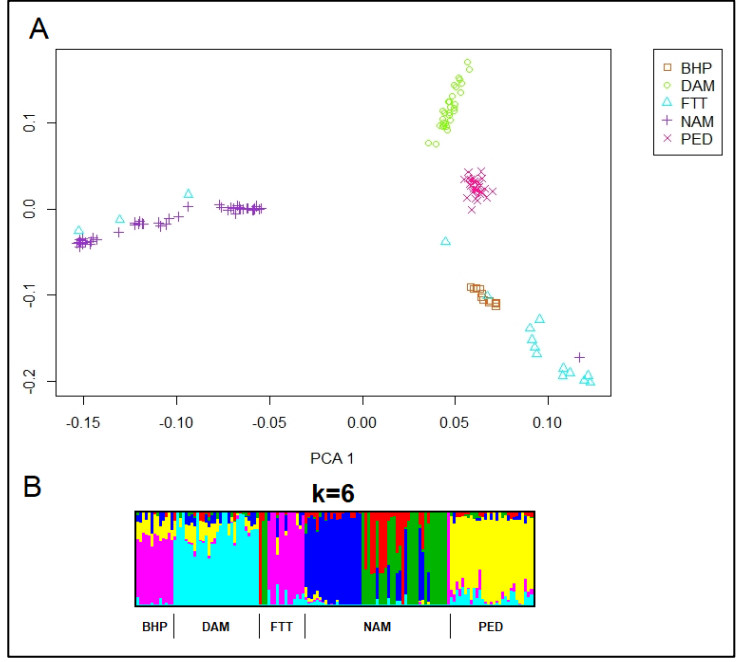


Figure 1 Genetic structure of indigenous South African sheep breeds, according to principle component analysis (A) and model-based clustering (B)

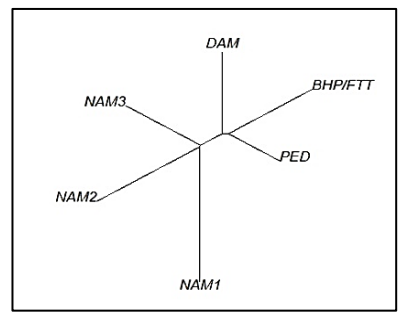


Figure 2 Genetic distance between populations based on pair-wise F_{st} estimates

Conclusion

- **Moderate heterozygosity** levels and relatively large within- and between breed variation
- **Low** overall levels of inbreeding
- The presence of divergent lines and subpopulations within several populations was shown

Despite small population sizes; **sufficient genetic variation** exists to allow effective conservation and sustainable management of these populations

References

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