Preliminary results evaluating horn traits of economic importance in sable antelope *(Hippotragus niger niger)*

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Summary

Much of the economic value of wildlife can be attributed to horn size for trophy hunting. To date, no quantitative genetic analysis has been done in sable antelope.

Results indicate a sex effect for all the studied traits and suggesting that it is not economically viable to measure horn length after 54 months of age.

Continuous horn growth throughout the lifetime of sable is suggested by the formation of ring posts, but is often masked by horn attrition and inadequate measuring techniques. An inbreeding coefficient of 0.0043 suggest adequate genetic diversity in the studied population. Heritability estimates of horn traits varied from 0.085-0.52, while genetic correlations ranged from 0.1 to 0.6 with the highest correlation found between horn length and tip to tip. More data are required to support these results.

Aim

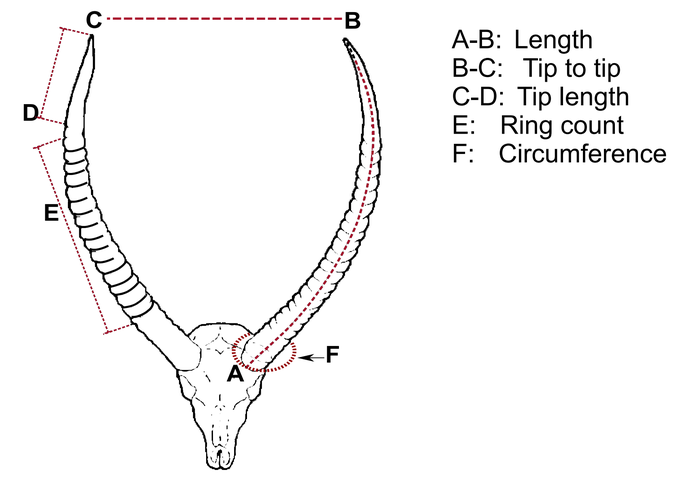
To estimate genetic parameters for the economically important horn traits of sable antelope and develop recording guidelines for these traits.

Materials and Methods

Horn performance records and genomic verified pedigrees were provided by Wildlife Stud Services. Horn traits (Figure 1) were measured according to the RW, SCI and alternative systems (Van Rooyen et. al, 2016).

The dataset was filtered using R software (R Core Team, 2017). A Markov chain Monte Carlo (MCMC) multi-trait analysis (Hadfield, 2010) was used to estimate (co)variance components and heritabilities for the different horn traits.

Figure 1: Horn measuring techniques of sable antelope according to the SCI, RW and alternative systems



Results

Variance components and heritabilities (h^2) and their associated posterior standard deviations (SD) for sable antelope horn traits

	Parameter			
Trait[1]	σ_a^2 (SD)	σ_{pe}^2 (SD)	σ_e^2 (SD)	h^2 (SD)
SHLL	1.628 (0.865)	1.114 (0.962)	16.316 (0.788)	0.085 (0.045)
SHLR	1.598 (0.838)	1.025 (0.917)	16.020 (0.770)	0.086 (0.044)
SHCL	0.071 (0.017)	0.059 (0.018)	0.557 (0.029)	0.103 (0.023)
SHCR	0.071 (0.017)	0.058 (0.018)	0.560 (0.029)	0.103 (0.023)
SHTT	2.037 (1.286)	3.203 (1.165)	3.242 (0.196)	0.237 (0.145)
SHTL	1.235 (0.324)	0.514 (0.274)	0.710 (0.042)	0.520 (0.146)
SHTR	1.202 (0.316)	0.508 (0.270)	0.830 (0.043)	0.498 (0.119)
SHRL	4.449 (0.916)	0.452 (0.376)	14.859 (0.810)	0.224 (0.042)
SHRR	4.455 (0.913)	0.460 (0.374)	14.944 (0.811)	0.224 (0.041)

Trait: SHLL = Left Horn length; SHLR = Right Horn length; SHCL = Left Horn circumference; SHLR = Right Horn circumference; SHTT = Horn tip to tip; SHTL = Left Horn tip; SHTR = Right Horn tip; SHRL = Left Horn ring; SHRR = Right Horn ring

σ_a^2 =additive genetic variance; σ_{pe}^2 =permanent environmental variance; σ_e^2 = residual error variance

Conclusions and recommendations

¤ Growth in horn length of male and female sable antelope stabilizes by the age of 49 to 54 months, suggesting that it is not economically viable to measure onwards.

¤ Post-mature horn growth takes place, but is masked by the rate of horn attrition and inadequate measuring techniques.

¤ Management practices of the studied sable population (mostly in captivity) did not affect the performance or genetic integrity negatively.

¤ Horn ring count is not an accurate estimation of age for sable antelope.

¤ Heritability estimates for sable horn traits varies from low to high, and genetic correlations between horn traits are not strong enough to establish reliable indicator traits.

¤ The small sample sizes and/or protocol recording issues suggest that more data and further studies are required to confirm the results of the present study.

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