Genetic Paternity And Horn Size In Bighorn Sheep: Evolutionary And Management Implications

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Abstract: We used molecular genetic paternity analysis to determine the parentage of 83 bighorn sheep (*Ovis canadensis*) lambs born between 1995 and 2000 at Ram Mountain, Alberta, Canada. We could assign the paternity of 64 lambs at a high level of statistical confidence (95%). Within each season, the most successful ram sired an average of 35.5% of the lambs with assigned paternity, and a single ram sired 26.1% of all lambs over the 6 mating seasons. Although a few large horned, mature (age 8+) rams had very high reproductive success, younger rams sired approximately 50% of the lambs. Mixed effects models indicated that mating success increases as a non-linear function of age, with horn length increasingly positively correlated with mating success in older rams. These results suggest that young or small rams achieve mating success through alternative mating tactics that are less dependant on body and weapon size, such as coursing and blocking. Sexual selection is therefore likely to have age-dependent effects on traits such as agility, body and horn size. Preliminary analyses of the pedigree indicate that horn length is highly heritable in this population ($h^2 = 0.70$). Because large horned rams do not achieve most of their mating success until after they have reached legal status, less restrictive trophy management regimes are likely to deplete genetic variation for large horns by removing genetically superior rams from the gene pool before they have a chance to pass on their genes for large horns. Smaller horns and increased precocial maturity are the likely evolutionary responses in populations with a history of intense trophy harvesting.

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