Decreased horn Basal Circumference in Bighorn Sheep Rams following Asymptote of Population Growth Curves

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Abstract: Large horn size in harvested trophy bighorn sheep (*Ovis canadensis*) is associated with high monetary return to states and provinces that sell hunting licences. Revenues are directed towards wild sheep management programs, therefore options to produce large rams are of particular concern to wildlife managers. Translocated populations of Rocky Mountain bighorn sheep in alpine habitat in New Mexico grow rapidly, often doubling every 3 yr and produce rams with significantly larger mean horn basal circumference than rams harvested from the source population. The source population exhibited asymptotic growth curves hypothesized to be associated with a density dependent response to resource limitation as reflected in decreased basal horn circumference. In the Pecos Wilderness population started in 1965, basal horn circumference was significantly larger ($P < 0.02$) prior to the asymptote of population growth for mature ($\geq$ 6 yr $_{base}$ = 14.9 in vs. 14.4 in; $_{age}$ = 7.9 yr vs. 8.6 yr) and immature rams (< 6 yr; $_{base}$ = 14.4 in vs. 13.5 in; $_{age}$ = 4.3 yr vs. 4.3 yr). The Wheeler Peak population started in 1993 with 33 bighorn sheep translocated from the nearby Pecos Wilderness population. Harvest of mature rams born post-translocation in Wheeler Peak began in 2000. Mature rams harvested in the Wheeler Peak population had significantly larger ($P < 0.001$) mean basal circumferences ($_{base}$ = 15.7 in; $_{age}$ = 7.9 yr; n = 16) than those harvested simultaneously from the source population ($_{base}$ = 14.1 in; $_{age}$ = 8.4 yr; n = 28). In addition, horn length (39.2 in vs. 35.7 in) and Boone and Crockett scores (184.4 in vs. 164.8 in) were significantly greater for Wheeler rams than for Pecos. To date, rams born after the asymptote of the population growth curve in Wheeler Peak have not been harvested. Minimizing the reduction of horn basal circumference by keeping bighorn populations below carrying capacity is a management goal in New Mexico. The effect of experimentally-lowered populations on horn size have been limited because population reduction using translocation only has not bee effective. Ewe harvests will be required to better understand this relationship.

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