SEXUAL SEGREGATION IN DESERT BIGHORN SHEEP (OVIS CANADENSIS MEXICANA)

by

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(Acc. 15-I-2003)

Summary

One or several factors could explain sexual segregation, in which males and females of polygynous, sexually dimorphic species form separate herds during most of the year. Bighorn sheep (Ovis canadensis) are polygynous ungulates that exhibit extreme sexual dimorphism and segregate into ram and ewe herds outside of the rutting season. Four major hypotheses for sexual segregation were tested in a population of desert bighorn (O. c. mexicana) at the Red Rock Wildlife Area, New Mexico, from 1999-2001. We collected data on the size,
composition, and location of ram and ewe groups during the summer period of segregation. Activity budgets were recorded for males in ram herds and females in ewe herds, and foraging selectivity was measured for males and females in mixed groups during early rut. Habitat was evaluated by measuring forage availability, ruggedness, and visibility at sites utilized by ram and ewe groups. Ram herds utilized areas with more available forage compared with ewe sites, while ewe groups preferred more rugged terrain than that used by ram groups. Ewe groups occurred much closer to free water sources than did ram groups. Bighorns in ram and ewe groups did not differ in foraging time or selectivity, nor did time spent moving, reclining, or ruminating differ between the sexes as predicted by the ‘activity budget hypothesis’. The results support the predictions of the ‘reproductive strategy-predation-risk hypothesis’, which proposes that males seek more abundant forage in order to build up body condition needed to maximize mating success (even if exposing themselves to greater predation risk), while females choose rugged terrain that minimizes predation risk to themselves and their offspring (even if sacrificing forage abundance). Female bighorns chose sites that provided access to water, also predicted by the ‘reproductive strategy-predation-risk hypothesis’, indicating that lactation-related water requirements may constrain the movements of ewe groups and contribute to patterns of sexual segregation in desert bighorn.

**Introduction**

Sexual segregation, in which males and females live separately outside of the breeding season, is an important problem in behavioral ecology that has received much attention recently (e.g., Main *et al.*, 1996; Bleich *et al.*, 1997; Ruckstuhl & Neuhaus, 2002). Sexual segregation may occur at different ecological scales and within different ‘aggregation units’ (Main *et al.*, 1996; Perez-Barberia & Gordon, 1998), and thus has been difficult to define. We will define sexual segregation as the separation of males and females into different groups for most of the year (‘social segregation’; Conradt, 1998), whether those segregated groups occur in geographically distinct regions (‘ecological’ or ‘spatial segregation’) or use the same area non-synchronously (‘temporal segregation’).

Sexual body size dimorphism, which is associated with polygynous mating systems in ungulates (Weckerly, 1998; Loison *et al.*, 1999; Perez-Barberia *et al.*, 2002), is likely to be a key factor favoring sexual segregation (Mysterud, 2000; Ruckstuhl & Neuhaus, 2002). Bighorn sheep (*Ovis canadensis*) are highly sexually dimorphic. Sexual selection has favored large, powerful males with massive horns that compete for dominance status and access to estrus females during the rut. Fully grown desert bighorn rams ($\bar{x} = 90$ kg) are about twice the mass of adult ewes ($\bar{x} = 48$ kg), making bighorn sheep an excellent species in which to investigate sexual segregation.