Genetic Resistance To Disease In Wild Sheep

KAREN M. RUDOLPH, Idaho Department of Fish and Game, Wildlife Health Lab, 16569 S. 10th Ave., Caldwell, ID 83607 U.S.A.
TRICIA HOSCH-HEBDON, Idaho Department of Health and Welfare, Idaho State Health Laboratory, 2220 Old Penitentiary Road, Boise, ID 83712 U.S.A.
DALE E. TOWEILL, Idaho Department of Fish and Game, 600 S. Walnut, PO Box 25, Boise, ID 83712 U.S.A.

Abstract: Genetic resistance is an inherent ability of a previously unexposed animal to resist infection when exposed to pathogens. Because such resistance is genetically coded, it is transmitted from parent to offspring. Studies of genetic resistance to disease have been done on species including mice, man, elk and bison. In all studies an important molecular component of genetic resistance has been identified as an `Nramp' (Natural resistance-associated macrophage protein) gene. We examined DNA extracted from tissue and blood samples from 295 Rocky Mountain, 46 California, and 82 desert bighorn sheep and 12 Stone's sheep to characterize the presence, prevalence, and function of the Nramp gene. In bighorn sheep, the Nramp gene occurs in three forms, or alleles (Nramp allele 1, 2, and 3). Preliminary data suggest that one form, Nramp allele 1, protects from intracellular pathogens such as *Brucella abortus* and possibly *Mannheimia* spp. and *Pasteurella* spp. We determined the Nramp genotype of 425 bighorn sheep samples, and calculated the frequency of each Nramp genotype based on bighorn sheep subspecies. Nramp allele 1 was identified in 26% of 82 desert bighorn sheep (*Ovis canadensis nelsoni*), in 1% of 295 Rocky Mountain bighorn sheep (*O. c. canadensis*), and was not found in 46 sampled California bighorn sheep (*O. c. californiana*) or the 12 sampled Stone's sheep (*O. dalli stonei*).