

## RECENT ADVANCES IN THE DIAGNOSIS AND TREATMENT OF PSOROPTIC SCABIES IN BIGHORN SHEEP

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Abstract: Psoroptic scabies, caused by mites in the genus Psoroptes, has been seen with increasing frequency in recent years in bighorn sheep (Ovis canadensis spp.). This disease can cause high morbidity and mortality as evidenced by the ongoing epizootic in the San Andres National Wildlife Refuge, New Mexico. To assist in the control of bighorn scabies, we recently developed a serologic assay which offers promise for identifying scabies-endemic populations, screening bighorns prior to relocation, and monitoring response to treatment. Sustained-release implants of ivermectin are also being used successfully to treat infested free-ranging bighorns, and biobullets containing these implants are being developed.

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Psoroptic scabies is an important disease of domestic and wild ungulates caused by infestation with ectoparasitic mites in the genus Psoroptes. This paper provides a brief history of the disease and outlines recent developments in diagnosis and treatment. Much information in this paper is presented in greater detail elsewhere, and interested readers should refer to those papers for specific information (Boyce et al. 1991a, 1991b; Jessup et al. 1990).

## HISTORICAL OVERVIEW

Early observers were convinced that bighorn sheep contracted scabies from domestic sheep because die-offs occurred following the introduction of domestic sheep and cattle onto bighorn sheep ranges. Epizootics were documented as early as 1859 in Colorado (Packard 1946, Seton 1929, Wright et al. 1933), the 1870's and 1898 in California (Jones 1950), and population declines were seen in Wyoming, Oregon and Montana in the late 1800's (Hornaday 1901, Bailey 1936, Honess and Frost 1942). More recently bighorn scabies has been seen in Nevada, Arizona, Oregon, Washington, and Idaho (Cater 1968, Decker 1970, de Vos et al. 1980, Foreyt et al. 1985). Since 1978, a scabies epizootic has caused the dramatic decline of a bighorn sheep population in the San Andres Mountains, New Mexico (Lange et al. 1980), and in the last 2 years several populations of bighorns in California have been found to be infested with Psoroptes sp. (Boyce et al., 1991a). Additional bighorn populations are likely to be found infested as managers examine animals more closely.

The questions of host specificity and species identification of Psoroptes spp. mites remain unresolved. Sweatman (1958) classified Psoroptes spp. mites in North America into 5 species based on location on the host and length of the adult male's outer opisthosomal setae. Researchers have succeeded in transferring mites between host species, and successful cross-matings of P. ovis from sheep and P. cuniculi from rabbits also suggest that host-specificity is low (Wright et al. 1981, 1983, 1984). Ongoing morphometric and immunologic investigations are providing additional evidence that Psoroptes sp. mites may not be host-specific (Boyce et al. 1991b). In particular, the finding that sympatric mule deer and bighorn sheep shared Psoroptes sp. mites that were morphologically indistinguishable from each other strongly suggests that these 2 hosts may have been infested with the same species (Boyce et al. 1991b).

#### DIAGNOSIS AND TREATMENT

Psoroptes sp. infestations have typically been diagnosed by examining skin scrapings or ear swabs (National Research Council 1979). Serologic tests for scabies have been developed for cattle, domestic sheep and rabbits, and recently Boyce et al. (1991a) developed a sensitive serodiagnostic test for bighorn scabies. The bighorn seroassay offers promise for identifying scabies-endemic populations, for screening bighorns prior to relocation and for monitoring response to treatment. Once infested animals are identified it may be essential to implement effective control strategies. Ivermectin administered subcutaneously at 200 µg/kg (Ivomec, MSD-AGVET, Rahway, New Jersey) has effectively controlled Psoroptes sp. infestations in cattle, but this formulation has been ineffective in infested bighorn sheep (reviewed by Muschenheim 1988). Our preliminary studies indicate that prolonged, high doses of ivermectin will eliminate mites on bighorn sheep, and subcutaneous implants of ivermectin (Drummond and Miller 1984) are now being used successfully to treat free-ranging bighorns in California. These devices are an effective way to administer ivermectin to free-ranging bighorn sheep because they protect treated animals against reinfestation while other members of the population are being treated. Our efforts are now directed at incorporating ivermectin implants into biobullets that will facilitate the treatment of remote, free-ranging populations.

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