

The role of bighorn ewe infection status in managing pneumonia in lambs

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ABSTRACT: Spillover of the bacterium *Mycoplasma ovipneumoniae* (*M. ovi*) can have long-term negative demographic impacts on *bighorn sheep* (*Ovis canadensis*) populations, principally through chronically low lamb recruitment associated with pneumonia-induced mortality. Despite the devastating respiratory disease epidemics often observed in all age classes on first exposure to *M. ovi*, most survivors eventually clear infection. Some individuals do not however, and they can become persistent carriers. We conducted experiments in free-ranging and captive bighorn sheep to test the hypothesis that recurring pneumonia epidemics in lambs are triggered when persistent carrier dams transmit *M. ovi* to lamb nursery groups. We tested individual sheep repeatedly over at least two consecutive years in two captive research facilities and four free-ranging populations presenting lethal pneumonia in lambs to identify intermittent and persistent carriers of *M. ovi*. We then moved persistent carriers from free-ranging populations to captivity and conducted lamb survival trials in pens with and without persistent carriers. We observed no *M. ovi*, no respiratory disease, and increased lamb survival in populations and pens without carrier ewes, whereas high rates of lamb morbidity, *M. ovi* infection, and low survival were observed in populations and pens with carrier ewes. We also identified cofactors that may contribute to variation in shedding prevalence and persistence. The results of these experiments support the hypothesis that persistent carriers maintain *M. ovi* infection in bighorn sheep populations and are the cause of recurring pneumonia epidemics in bighorn lambs. These results have important implications for the epidemiology and management of pneumonia epidemics in wild sheep populations.

Biennial Symposium of Northern Wild Sheep and Goat Council 22:15; 2020

KEY WORDS: bighorn sheep, carriers, ewes, *Mycoplasma ovipneumoniae*, *M. ovi*, *Ovis canadensis*, pneumonia, recruitment, survival, shedding
