



Selective Removal May Lead to Recovery of Ailing Bighorn Sheep Herds

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ABSTRACT: Bighorn sheep (*Ovis canadensis*), a culturally and economically valuable game species in the west, are suffering from a respiratory disease that has decimated infected populations. Biologists recently theorized that this disease is induced by the bacterium *Mycoplasma ovipneumoniae* (*Mo*) and have hypothesized that the propagation of *Mo* outbreaks stems from a small number of adult bighorns that chronically shed the pathogen. This induces periodic epizootics in the herd, resulting in adult mortalities, poor lamb survival, and ultimately population decline. We test this hypothesis by radio-marking and testing presence of *Mo* in two infected herds of bighorn sheep in the Black Hills, South Dakota, where disease histories had been developed for individual bighorns. In our experimental herd we radio-marked and tested all individuals in the population ($n = 21$ adults, $n = 9$ lambs) and removed chronic shedders based on disease histories; subsequent testing indicates *Mo* no longer persists in this herd. Our control herd ($n = 46$ adults, $n = 19$ lambs) still exhibits the presence of *Mo* and experienced 26% lamb mortality and 13% adult mortality due to pneumonia. The experimental population experienced no mortalities attributable to pneumonia. Adult survival for our control ($\hat{S} = 0.68$, $SE = 0.01$) did not significantly differ ($Z = 1.13$, $P = 0.19$) from our treatment ($\hat{S} = 0.83$, $SE = 0.02$) but may be biologically relevant. Lamb survival for our control ($\hat{S} = 0.16$, $SE = 0.02$) was significantly lower ($Z = 4.73$, $P < 0.01$) than our treatment ($\hat{S} = 0.87$, $SE = 0.04$), which suggests that the selective removal of *Mo*-shedding bighorns reduces pneumonia incidence and mortality in wild populations. This study has implications for wildlife managers across the west, as testing and removing chronic shedders may be more tenable than eradicating entire populations.

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KEYWORDS Bighorn sheep; *Ovis canadensis*; *Mycoplasma ovipneumoniae*; respiratory disease; selective removal; Black Hills; South Dakota.