

***Mycoplasma ovipneumoniae* as a Primary Agent of Epidemic Respiratory Disease in Bighorn Sheep (*Ovis canadensis*) Commingled with Domestic Sheep (*Ovis aries*)**

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Abstract: Bighorn sheep are threatened by outbreaks of severe respiratory disease, some of which is associated with domestic sheep contact in the wild. This has been reproduced in captivity: cumulatively, 98% of 90 bighorn sheep experimentally commingled with domestic sheep died within 100 days, whereas 91% of 43 bighorn sheep commingled with other domestic animals survived. Our hypothesis is that *M. ovipneumoniae* is a primary initiating pathogen of epidemic respiratory disease in bighorn sheep. We commingled 4 bighorn with 4 domestic sheep that all tested negative for *M. ovipneumoniae*. One bighorn sheep died of acute pneumonia 90 days later but the other 3 remained healthy for >100 days (P <0.005 vs previous commingling experiments). All domestic sheep remained healthy. *Mannheimia haemolytica* was isolated from the lungs of the dead bighorn sheep. We infected one of the domestic sheep with *M. ovipneumoniae* and penned it with one surviving bighorn sheep. The bighorn sheep subsequently began shedding *M. ovipneumoniae* and developed respiratory disease, while the domestic sheep remained healthy. Shortly after the onset of coughing in the first bighorn sheep, *M. ovipneumoniae* was naturally transmitted to the other 2 bighorn sheep located in pens 7 and 12 m distant. These animals developed respiratory disease, while their domestic sheep pen-mates, which also acquired *M. ovipneumoniae* infections, remained asymptomatic. The bighorn sheep were euthanized and necropsies revealed moderate to severe pneumonia, purulent otitis, and sinusitis. Bacterial lung cultures yielded *Bibersteinia (Pasteurella) trehalosi* and positive PCR tests for *M. ovipneumoniae* were obtained from lungs, sinuses, and middle ears. Histologically, the lung lesions were typical of those reported for mycoplasmal pneumonia in other host species. These results support the hypothesized role of *M. ovipneumoniae* in bighorn sheep respiratory disease outbreaks.

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