



Fatal Pneumonia in Bighorn Sheep Lambs: The Critical Role of *Mycoplasma ovipneumoniae* Carrier Ewes

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ABSTRACT: *Mycoplasma ovipneumoniae* is a candidate primary etiologic agent of pneumonia in bighorn sheep (*Ovis canadensis*). Introduction of *M. ovipneumoniae* into bighorn populations may result in severe all-age epizootics (5-100% mortality), followed by years of pneumonia-induced mortality in lambs (20-100% mortality). Recurrent lamb pneumonia in post-epizootic bighorn populations significantly reduces recruitment, impairing population growth and threatening population viability. It is hypothesized that ewes that are chronic nasal carriers of *M. ovipneumoniae* serve as the source of transmission of this pathogen to lambs. During the peri- and post- natal periods, initial dam-lamb infections are amplified by lamb-lamb transmission within lamb social contact networks, exposing all lambs in the group to the pathogen, even if only a small proportion of the dams are carriers. Captive bighorn sheep were used to test the hypothesis that the presence of *M. ovipneumoniae* carrier ewes within a nursery group precipitates lamb pneumonia outbreaks. Post-epizootic bighorn ewes (n=6) were commingled and longitudinally sampled for *M. ovipneumoniae* carriage over a 2-year period. One carrier and five non-carriers were identified. In 2017, these ewes were placed into two pens, with pen C1 (carrier 1) containing the carrier and one non-carrier ewe, and pen N (non-carrier) containing four non-carrier ewes. Both lambs born in pen C1 developed pneumonia, while the four lambs born in pen N remained non-pneumonic and survived. In 2018 we will repeat this experiment after moving the non-carrier ewe in pen C1 to pen N, and replacing her with two non-carrier ewes previously held in pen N. We have also added two additional pens (C2 and C3) containing one or more chronic carrier ewes. We predict all lambs born in the carrier pens will develop pneumonia, while all lambs born in pen N will again remain non-pneumonic. If this prediction holds true, both here and in parallel experiments at South Dakota State University, our hypothesis for the role of carrier ewes in precipitating pneumonia outbreaks in lambs will be strongly supported.

Biennial Symposium of the Northern Wild Sheep and Goat Council 21:113; 2018

KEY WORDS Bighorn sheep; *Ovis canadensis*; pneumonia; *Mycoplasma ovipneumoniae*; epizootic; carrier ewes; lamb mortality; captive animal study.