PNEUMONIA AND BIGHORN SHEEP: TEST AND REMOVE

Fact Sheet *(7-14-2023)*

PROBLEM STATEMENT

Fatal respiratory disease (pneumonia) and its effects on populations is a primary management concern in most jurisdictions with bighorn sheep. Decades of research have identified *Mycoplasma ovipneumoniae* (*M. ovi*), a bacterium that damages the cells lining the respiratory tract, as a "trigger" that allows other bacteria to invade the lungs, causing pneumonia. To understand *M. ovi* infection dynamics, researchers repeatedly tested free-ranging and captive bighorn ewes from infected herds and found that some always, or almost always, tested positive for *M. ovi*. These long-term carriers can infect newborn lambs that have little immunity. Infected lambs spread *M. ovi* to other lambs in nursery groups, usually resulting in pneumonia-related deaths before 8 weeks of age. Poor to no lamb survival is common in *M. ovi* infected herds and is a pattern that can last for decades.

MANAGEMENT STRATEGY

Experiments identifying and removing carrier ewes (termed Test and Remove) have resulted in the elimination of *M. ovi*-associated pneumonia from bighorn sheep herds, increased lamb survival and improved herd health. Methods like Test and Remove (T&R) were originally developed to control infectious diseases in livestock when there was no effective treatment or vaccine, as is the case for *M. ovi*. Test and Remove protocols for bighorns vary somewhat with local situations. Ewes are generally captured and tested at least twice to confirm carrier status, however, in more remote areas, animals may only be captured and sampled once prior to implementing removals.

Jurisdictions conducting test and remove

Through 2022, T&R has been or is being implemented in 21 bighorn sheep populations (11 Rocky Mountain bighorn, 7 California bighorn, and 3 desert bighorn) in 9 states and 1 province. Results from these and previous trials, combined with those from captive experiments, indicate T&R can be an effective operational management tool to reduce and/or clear *M. ovi* and associated pneumonia from bighorn sheep populations.

The primary objective for any T&R program is to increase lamb recruitment in populations chronically infected with *M. ovi*. Eliminating pathogens that cause respiratory disease in bighorn sheep may also be necessary for reasons other than improving lamb survival, such as reducing disease transmission risk to nearby healthy populations.

CONSIDERATIONS

Test and Remove is just one component of comprehensive bighorn sheep herd health management. The use of T&R to control disease in wildlife is a relatively new concept and, to date, it appears to be an effective tool; however, experimental trials, data collection, and analyses are ongoing.

Wildlife managers choosing to implement T&R may receive negative input from operational staff, agency leadership, non-governmental organizations, or the public since removal of animals from a population to increase their numbers may seem counter-intuitive. Therefore, it is important for all parties to fully understand the disease, control method and concepts, and to deliver timely, effective, and consistent messaging throughout project planning, implementation, and post-treatment monitoring.

The logistics of T&R usually require helicopter use and/or other bighorn sheep capture methods and these, along with laboratory tests and post-treatment monitoring, are expensive. In addition, protocols require multi-year commitments and a substantial investment of agency personnel time, existing and new equipment and supplies, ongoing communication, partnerships, and long-term funding.

SUMMARY

Respiratory disease, particularly pneumonia initiated by *M. ovi*, significantly impacts bighorn sheep throughout their range in the US and Canada. Historically, no effective management strategies have been available to slow or reverse herd declines due to pneumonia. With a better understanding of pathogen and disease dynamics and comparing the selective removal of carrier animals in different systems, T&R is being tested and refined to improve its effectiveness in eliminating *M. ovi* from chronically-infected herds, increasing lamb survival and recruitment, and creating stable and resilient bighorn sheep populations.

More information on wild sheep can be found at https://wafwa.org/initiatives/wsi/

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