

**USAHA JOINT WORKING GROUP  
Committee of Wildlife Diseases & Committee on Sheep and Goats  
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**Recommendations on best management practices for domestic sheep grazing  
on public land ranges shared with bighorn sheep**

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### **Introduction**

In October 2007, the United States Animal Health Association (USAHA) Committees on Wildlife Diseases and Sheep and Goats established a working group comprised of staff or members of state and federal animal health agencies, wildlife and public land management agencies, the American Sheep Industry and Wild Sheep Foundation (formerly Foundation for North American Wild Sheep (FNAWS)). The working group was charged with developing best management practices for grazing domestic sheep (and goats) on public lands where contact between domestic sheep and bighorn sheep may occur. This working group concept was subsequently endorsed by USAHA as part of a broader resolution on “Cooperative Research and Management of Wildlife/Livestock Disease Interactions” approved in October 2007. The task of this subcommittee was limited to one specific aspect of domestic sheep management, the interaction of bighorn sheep and domestic sheep on public lands. Consistent with USAHA direction, this document primarily focuses on the domestic sheep portion of best management practices in these situations. A comprehensive list of best management practices for bighorn sheep can be found in the Western Association of Fish and Wildlife Agencies (WAFWA) Bighorn Sheep Working Group Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat (1).

Although public lands grazing is a privilege and agencies are not required to offer alternative allotments for domestic sheep grazing, work group members recognize the historical role that public land grazing has played in sustaining viable working landscapes and rural communities, and that domestic sheep and goats, as well as bighorn sheep, are important to the cultural and ecological heritage of most western states. The work group also recognizes that domestic livestock grazing can be a useful tool for habitat management. The working group, co-chaired by Drs. Walt Cook and Michael Miller, assembled relevant background information and met via multiple teleconferences, email and in person at the 2008 USAHA meeting to develop and discuss recommended best management practices. As per the group’s charge, the recommendations that were developed focus on practices intended to minimize opportunities for interspecies contact on shared range that could lead to transmission of respiratory pathogens. In some recent pneumonia epidemics in bighorn sheep, the cause has been attributed to endemic

respiratory pathogens, and in other epidemics the cause has been attributed to pathogens introduced via interactions with domestic sheep (2). These recommendations do not presume to estimate the probability or risk of contact. Quantifying the risk of interspecies disease transmission between bighorn sheep and domestic sheep in a natural setting is problematic (2). Further research is needed to better understand and estimate the magnitude of potential risk to bighorn sheep arising from interactions with domestic sheep and other wild ruminant species, as well as the risks of endemic disease and potential influences of seasonal and environmental factors on these risks. Indeed, the original USAHA resolution that led to this working group directed federal agencies to fund research on epidemiology and pathogenesis of bighorn/domestic sheep disease interactions.

These recommended best management practices are intended to serve as one element of more comprehensive approaches for managing the health of bighorn sheep populations. We recognize that all of the management practices listed may not be incorporated into some management plans, but offer them as a complete list for consideration. Hopefully these recommendations will complement or emphasize risk reduction practices already in place, and encourage their development elsewhere. Although national in scope, these recommendations do not mandate programs at the state, local, or tribal level. Local primacy dictates that management occurs at the state or regional level whenever possible. The work group members believe that these recommended best management practices represent a viable alternative to terminating domestic sheep grazing on public lands where goals include minimizing the risk of epidemics in bighorn sheep that may result from interspecies contact. However, there are cases where these practices have been considered and mutually judged to be infeasible by responsible agencies and permittees or their representatives in the course of negotiations via established processes for timely conflict resolution. When this occurs, the work group members encourage timely identification of alternative grazing allotments or arrangements to minimize impacts on permittees and interruption of ongoing domestic sheep operations.

#### RECOMMENDED BEST MANAGEMENT PRACTICES FOR GRAZING DOMESTIC SHEEP (AND GOATS) ON PUBLIC LANDS WHERE CONTACT WITH BIGHORN SHEEP MAY OCCUR:

##### Domestic sheep husbandry

1. Select only highly gregarious breeds of sheep (e.g., Merino, Rambouillet, "Western/white-faced ewes", fine wools and crosses thereof) for grazing on shared ranges.
2. Use pregnant domestic ewes or ewe-lamb pairs (i.e., ewes with lambs) for grazing near occupied bighorn sheep habitats; avoid grazing open ewes, yearling replacement ewes and ewes that have lost their lambs because ewes in estrus attract bighorn rams.

3. Maintain a band size of less than 900 ewes with single lambs (1,800 total) or 700-800 ewes with twin lambs (2,100 to 2,400 total), or of less than 1,500 dry ewes or yearlings.
4. Require instruction/training and supervision for ranch (i.e. camp tenders and shearers) and agency staff members and frequent instructions to the shearers concerning locations where forage and water is available for domestic sheep and monitor that the grazing standards and guidelines are being followed.
5. Require instruction/training and supervision for ranch (i.e. camp tenders and shearers) and agency staff members and frequent instructions to the shearers concerning recognizing bighorn sheep and allowable methods for preventing contact between bighorn sheep and domestic bands.
6. Place more experienced, informed, and responsible shearers on allotments located nearest to bighorn sheep habitats.
7. Place mature and effective guard dogs and herding dogs with domestic sheep (at least 2 of each per band). Female dogs in heat should not be placed on allotments.
8. Conduct full counts of all individual ewes when moving onto and off of each allotment.
9. Maintain an appropriate ratio of marker sheep within bands; depending on local needs and conditions, ratios should be no fewer than 1 marker for every 100 adult sheep. More markers may be required when dictated by local conditions.
10. Count marker sheep on a regular basis, immediately any time sheep scatter and more frequently (e.g., once or twice per day) if required under local grazing agreements. It is customary to count marker sheep when they are bedded and this should be encouraged. After sheep scatter, complete a full count as soon as reasonably possible.
11. Place bells on at least 1 in every 100 mature ewes to serve as warning, and for identification and location of sheep relative to other sheep.
12. Select camp locations and bedding grounds that are acceptable to sheep and encourage sheep to remain within the bedding grounds.
13. Select herder's camp, nighttime bedding ground, and midday (siesta) bedding ground locations that maintain communication between guard dogs and herding dogs by smell, sound (barking) and sight, and to take advantage of differences in the sleep cycles of guard dog and herding dog. If grazing federal lands, comply with established "bed ground" standards. Construct temporary electric or boundary fences in congregation areas (e.g., bed grounds) where feasible.
14. Truck in water (if needed) to prevent straying.

15. In situations where sheep are difficult to observe because of dense vegetation or difficult terrain, always count marker sheep after emerging from such conditions.
16. Increase shepherd vigilance on bright moonlit nights because sheep may rise to graze under these conditions.
17. Truck domestic sheep through “driveway” areas that include occupied bighorn sheep habitat where interspecies contact is considered likely by the land management agency staff in consultation with the state wildlife management agency staff. It is not always possible to truck sheep into certain rugged areas; in these cases other arrangements may need to be made.
18. Do not trail more than 5 miles per day and stop trailing when sheep or lambs show signs of fatigue. Provide for a “babysitter” or removal of lagging sheep when trailing. Follow additional agency guidelines (where applicable) on federal lands.
19. Remove sick or physically disabled domestic sheep from the band.
20. Require that shepherders use communication equipment such as cellular or satellite phones or two-way radios (when service is adequate) and location equipment such as global positioning system (GPS) receiver to report and record grazing movements and encounters with bighorn sheep. Seek cost-sharing partnerships for providing electronic and other equipment when an operator changes grazing management practices for the sole purpose of minimizing domestic sheep contact with bighorn sheep; these partnerships could include wildlife management agencies and private organizations.
21. Have shepherders use a log book or other record keeping aids to record GPS locations, counts, losses, and other information as needed or required.

### Domestic goat husbandry

Because domestic goats are less gregarious than domestic sheep and have a greater tendency to stray or disperse, the work group recommends that domestic goats are not grazed in occupied bighorn sheep habitat.

When goats are grazed near bighorn sheep for weed control or other purposes, electric fencing can be used to keep the two species apart. Pack goats used in bighorn sheep habitats should be tethered when not being trailed.

### Strays & commingling responses

1. Develop a commingling detection and response protocol that includes the following:

- a. reporting bighorn sheep (including a count and GPS location) that are attempting to associate with domestic sheep bands;
  - b. reporting stray or missing domestic sheep to the land management agency;
  - c. immediate, two-way notification (between permittee and land management agency) of actual commingling sightings;
  - d. a post turn-off stray domestic sheep removal protocol;
  - e. a protocol for removing individual commingling bighorn sheep;
  - f. where feasible, collect standardized diagnostic samples on stray domestic sheep and commingling bighorn sheep;
  - g. instructions for domestic sheep herders to not leave sick domestic sheep behind when trailing or moving from or between allotments.
2. Develop and follow a plan for locating and reacquiring (dead or alive) stray sheep. If a domestic sheep is determined to be missing, the permittee will immediately initiate a comprehensive search and notify the land manager.
  3. Allow/encourage the permittee or producer and appropriate agency representatives to remove any stray domestic sheep in areas where interspecies contact could occur.
  4. Allow/encourage the permittee or producer and appropriate agency representatives to haze bighorn sheep that appear intent on commingling.
  5. Allow/encourage the permittee or producer and/or appropriate agency representatives to remove commingling bighorn sheep.
  6. Where not already established, develop or clarify legal authorities for removing stray domestic sheep from public lands by lethal means.
  7. Encourage voluntary allotment monitoring by permittees or independent observers in conjunction with federal and state agencies; where used, independent observers should receive prior training from permittees or agency personnel.
  8. Develop pilot incentive/recognition programs to foster and recognize compliance, cooperation, and cost-sharing in efforts to prevent commingling of bighorn sheep and domestic sheep on shared ranges.

#### Allotment boundary & habitat manipulations

1. Review domestic sheep allotment boundaries and/or use and reconfigure where appropriate and feasible to avoid or minimize overlap with critical bighorn sheep habitat. Where feasible, use strategies and techniques including:
  - a. geographic/topographic barriers that enhance species separation;
  - b. seasonal or spatial separation through domestic sheep grazing management.
2. Undertake habitat enhancements that improve bighorn sheep habitats (both summer and winter range) outside allotment boundaries and/or attract bighorn sheep away from domestic sheep allotments.

3. Undertake water developments to enhance bighorn sheep distribution or to move domestic livestock away from preferred bighorn sheep foraging areas by augmenting available natural water sources.
4. Where appropriate and feasible, determine the number of domestic sheep animal unit months (AUMs) that overlap bighorn sheep habitat and negotiate among cooperators (state, federal, industry, private) to locate potentially available replacement AUMs or allotments if necessary.

#### Other bighorn sheep management practices

1. Manage for bighorn sheep population densities and distribution that reduce potential for interspecies contact.
2. Use hunting and/or other means to discourage bighorn sheep from using domestic sheep allotments where alternative suitable habitats are available.
3. Use hunting and/or other means to discourage bighorn sheep from staying in proximity to or approaching domestic sheep bands.
4. Remove all sick or dead bighorn sheep encountered.

The foregoing best management practices are based on current understanding about the circumstances leading to pasteurellosis epidemics in bighorn sheep after contact with domestic sheep. Improved understanding about this relationship and about controlling respiratory diseases in sheep in general should allow refinement of these practices. Research needs to be funded; federal, state and non-profit agencies and organizations are all encouraged to fund research. For example, developing methods that decrease the occurrence or severity of pneumonia and pasteurellosis in either domestic or bighorn sheep, including the development and use of vaccines, immunostimulants, or long-acting therapeutic agents, might lead to advances in managing both. Outcomes of such research could aid in decreasing risks posed by interspecies interactions, or decreasing bighorn sheep susceptibility to pathogens. In developing biologic and therapeutic agents as tools, future research should focus not only on safety and efficacy of the products, but also on the potential for practical use in free-ranging populations.

The work group members recognize that this issue is controversial. Indeed, many of the recommendations found here were not reached via consensus but through majority opinion. This has been an important issue throughout the western United States. Several other working groups both at the state (e.g. Wyoming, 3) and national level (Western Association of Fish and Wildlife Agencies, 1) have convened working groups to address this issue. It is our hope that the list of options provided here will assist land and wildlife

managers and permittees to reduce conflicts and minimize the risk of disease transmission.

**References:**

1. Western Association of Fish and Wildlife Agencies (WAFWA). 2007. Wild Sheep Working Group, Initial Subcommittee. Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat, June 21, 2007. 27 pp.

<http://www.wafwa.org/documents/wswg/WSWGManagementofDomesticSheepandGoatsinWildSheepHabitatReport.pdf>

2. Miller, M. W., Knowles, D. P., and M. S. Bulgin. 2008. Pasteurellosis Transmission Risks between Domestic and Wild Sheep. Council for Agricultural Science and Technology (CAST) August 2008. 8 pp.

3. Wyoming State-wide Bighorn/Domestic Sheep Interaction Working Group  
<http://gf.state.wy.us/wildlife/sheep/index.asp>