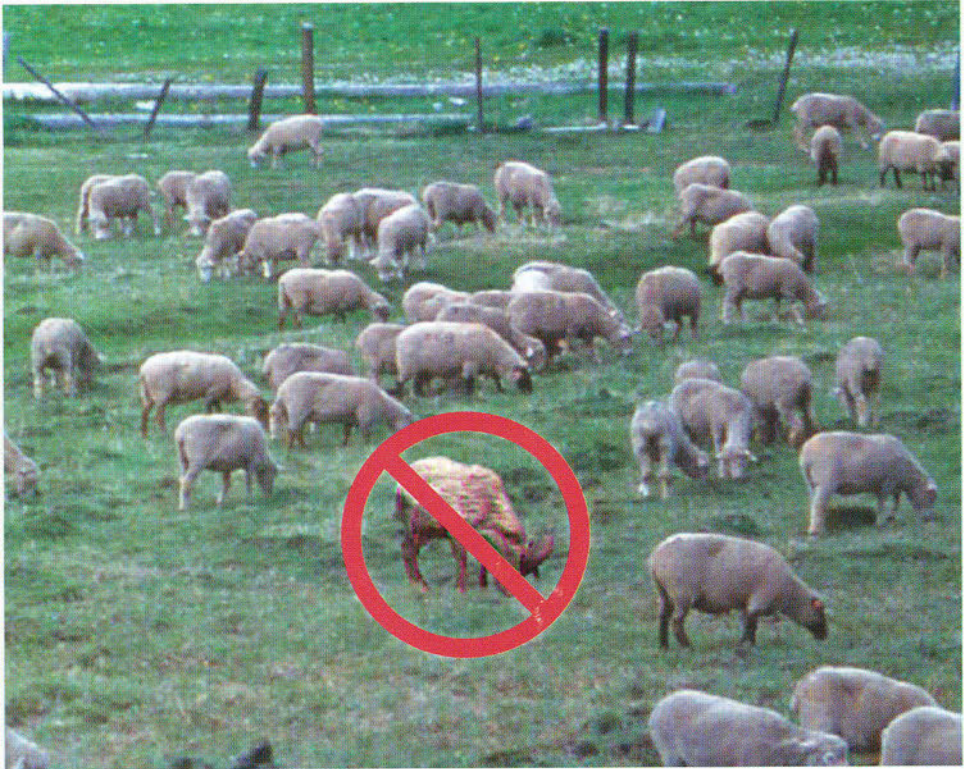


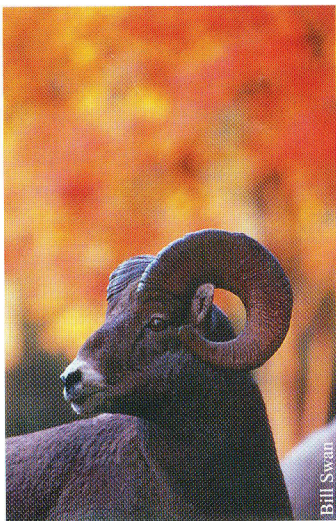
Domestic & Wild Sheep



Reducing the Risks of Disease Transfer

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Wild Sheep



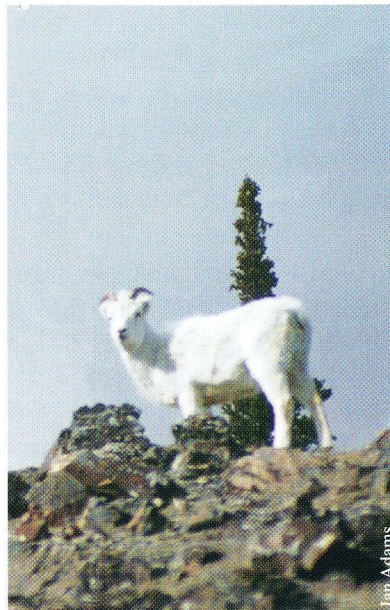
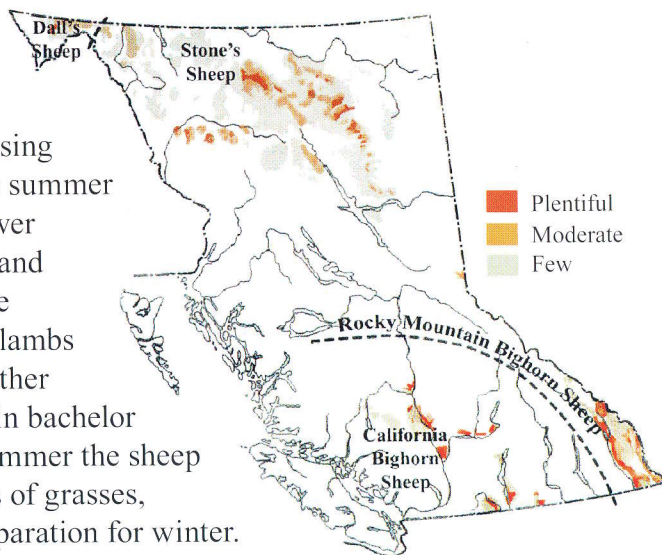
Bill Swan

There are two types of wild sheep in British Columbia; bighorns (*Ovis canadensis*) and thinhorns (*Ovis dalli*). Bighorn sheep are either the Rocky Mountain or Californian variety. Both are known for their thick set of horns which spiral backwards from the top of the head. The smaller California bighorns are found in the Okanagan, Similkameen and south Chilcotin regions. Rocky Mountain bighorns range throughout the Rocky Mountains and the eastern slopes of the Rocky Mountain Trench. The total number of bighorns in British Columbia has been estimated at 6700 animals in recent years.

British Columbia's 12,500 thinhorn sheep occupy the mountainous terrain in the northern third of the province. Somewhat smaller than the bighorns, there are two subspecies of thinhorns with strongly contrasting colouration – the pure white Dall's sheep and the light to dark grey Stone's sheep.

Basic to the biology of wild sheep is their agility on steep rocky terrain and acute eyesight; adaptations used to escape predators. Consequently their preferred habitats are open areas on or near mountainous terrain.

Sheep occupy a series of home ranges and undergo seasonal movements, generally using large alpine areas in the summer and concentrating at lower elevations for breeding and winter-feeding. Over the summer months, ewes, lambs and juveniles band together while adult rams roam in bachelor groups. Through the summer the sheep fatten up on new shoots of grasses, sedges and forbs in preparation for winter.



Jan Adams

Winter and early spring are the most critical times for wild sheep. The weather can be harsh, and sheep may be concentrated on relatively small ranges with poorer quality food. Intensive range use by wild sheep and other species may also result in poor quality and quantity of feed. The resulting malnutrition may affect sheep health particularly if combined with other factors such as severe weather, disturbance, predation, disease, and parasitism.

For some populations of wild sheep, numbers and distribution have changed significantly in the last 100+ years. The remote thinhorn populations are thought to be generally stable in number, fluctuating mostly with severe weather. However, bighorn sheep have declined in numbers throughout their historic range in North America including BC through a series of die-offs. Disease outbreaks, habitat fragmentation and degradation and previously unregulated hunting have been responsible for this decline.

BC Sheep - A Growing Industry

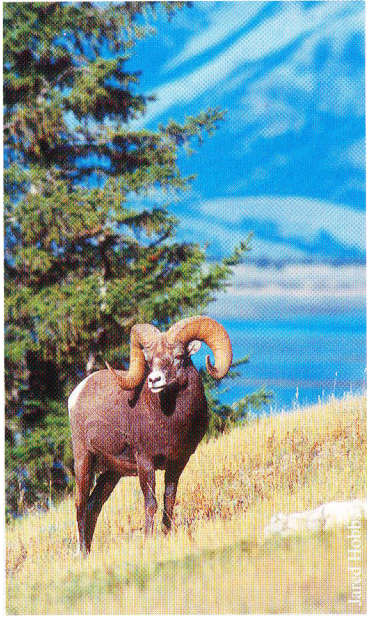
Though the BC sheep industry is relatively small in comparison to dairy and beef, it is growing. Statistics Canada reported about 1500 sheep farms with 84,000 head of domestic sheep and lambs in 2001, a 10% increase from 1996. The industry produces about 65,000 lambs annually, which represent a market gate value of \$7M, and \$10M after processing. Wild sheep also have economic value. In 2000, over \$5M was spent by resident and non-residents on wild sheep hunting and related activities. Viewing and other appreciation activities add significantly to this value. The auction of special permits since 2000 has raised over \$700,000 for conservation work on wild sheep and their habitats.



Bill Swan

of British Columbia

Wild and Domestic Sheep - The Dangers of Disease



Several diseases have caused bighorn die-offs; one key disease being pneumonia resulting from bacterial infection by *Mannheimia haemolytica* (formerly *Pasteurella haemolytica*), often in association with lungworm infestations and other sources of stress.

All ungulates, including wild sheep can carry some strains of *M. haemolytica* without disease. However, wild sheep are highly susceptible to certain strains of this bacterium, which can kill wild sheep very quickly. The strains of *M. haemolytica* most virulent for wild sheep are commonly carried, often without illness, by domestic sheep.

Domestication of sheep brought them into contact with cattle. *M. haemolytica* was transmitted from sheep to cattle where it acquired a virulent gene. It was then transmitted back to sheep in its altered and pathogenic form. But over the millennia domestic sheep were selected for their resistance to the altered organism.

Certain strains of *M. haemolytica*, can kill wild sheep very quickly.

Domestic sheep are not affected by strains carried by wild sheep. Other *Mannheimia* species do not cause disease to either species of sheep without additional stress.

Nose to nose contact is the primary means of transmission of *M. haemolytica* from domestic to wild sheep. Wild sheep are highly social and once an individual is exposed to an infectious organism, it is likely to infect others in the herd, potentially affecting all age classes. *M. haemolytica* infections and die-offs can occur in the absence of contact with domestic sheep. Other animal and environmental factors such as food shortage and reduced forage quality are believed to increase stress on the wild sheep and enhance their susceptibility to outbreaks of bacterial pneumonia.

The primary factors causing or contributing to pneumonia in wild sheep have been identified as:

- exposure to *M. haemolytica* strains from domestic sheep
- infections by other disease organisms
- high stress levels due to poor quality and quantity of feed, severe weather or human disturbance
- extensive lungworm infections.



These factors may act alone or in concert to initiate or perpetuate disease outbreaks.

Individual wild sheep have recovered from signs of pneumonia, but up to 80% of herds may die in outbreaks. In addition, in the early years after a die-off, lambs born to survivors rarely survive and herds often do not regain their previous numbers. Wild sheep that do survive infections are as likely as the rest of the herd to acquire the bacteria again during subsequent outbreaks. Efforts to treat or prevent outbreaks with drugs and vaccines have not been successful; however research on wild sheep disease is ongoing.

Several other diseases are shared by both species. While they are controlled in domestic sheep through farm management; they can contribute to big horn sheep die-offs in the wild.

'...contact between domestic and wild sheep leads to a high risk of disease for wild sheep.'

Most wildlife biologists, veterinarians and researchers have concluded that contact between domestic and wild sheep leads to a high risk of disease for wild sheep. In a study where bighorn and domestic sheep were fenced together in 14 separate enclosures, all the bighorns died in 10, while 50–83% of the bighorns died in the remaining four. Other studies suggest that separation by 15 km or a strong geographical barrier greatly reduces the risk of disease transmission between the two species. Unfortunately, this is often impossible in developed agricultural areas, and other means of separating domestic and wild sheep must be used.

Reducing the Risks

A number of options exist to reduce the risk of disease transmission by separating domestic and wild sheep. It is thought that a separation of at least 13.5 kilometres is the best solution, although in areas where they coexist, other measures can be used to reduce the risk of nose-to-nose contact.

Buffer Zones:

In order to maintain complete separation between domestic and wild sheep, buffer zones can be established. However, because juvenile wild rams commonly travel outside their primary range and domestic sheep can stray from the main flock if not fenced well, buffers can fail.

Fencing:

Fencing may be the most effective way to ensure wild sheep do not come in contact with domestics where large buffer zones are not practical. Contact the B.C. Sheep Separation Program Coordinator to learn what type of fencing to minimize the risk of physical contact between wild and domestic sheep best fits your circumstances.

Guardian Dogs:

Guardian dogs in combination with fencing offer another solution. Working from inside the fence, true livestock guardian dogs of accepted breeds recognize animals not of "their flock" and create a noise barrier between the domestics and the perceived threat. They must not, however, be allowed to run free outside the sheep pasture.



Grazing Restrictions:

Grazing systems that limit concurrent use of rangelands by wild and domestic sheep are an important risk reduction tool. On public lands in Northern regions of the province, domestic sheep used for vegetation control on reforested cutblocks are not permitted to graze closer than 15 km from wild sheep. Time of year is an important factor. The greatest risk of contact likely occurs in the spring and autumn when wild sheep are moving between winter and summer ranges. These ranges may cover large areas, particularly for rams. Domestic sheep owners should be aware of these seasonal migrations, being especially careful with their sheep and

vigilant for stray wild sheep during the spring and during the rut in the fall and early winter.

Why should you care?

A cooperative approach by sheep producers and wildlife managers is the most effective way of maintaining separation between domestic and wild sheep. Contact with domestic sheep is dangerous for wild sheep, and preventing contact between the species will reduce the risk of disease transmission.

All citizens of British Columbia have a responsibility towards our natural heritage; healthy populations of wild sheep are an important part of this natural legacy. These same populations are also economic resources for hunting, tourism, and wildlife viewing. British Columbia needs both domestic and wild sheep populations. In order to have a prosperous domestic sheep industry, and healthy populations of wild sheep, producers and wildlife managers must work together to accommodate the needs of both species.



For more information...



BC Sheep Separation Program Coordinator

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Frequently Asked Questions

I only keep one or two sheep to train dogs, for my own use, or as pets. Am I putting wild sheep at risk?

Yes, if you live near wild sheep. Any contact between wild and domestic sheep is potentially deadly to wild sheep. The best way to ensure the safety of wild sheep from diseases passed on by domestic sheep is to maintain separation between the two species.

My sheep don't look sick-does my flock have Mannheimia (Pasteurella)?

Both domestic and wild sheep carry strains of *M. haemolytica*, some of which may or may not produce harmful effects. Domestic and wild sheep have immunity to different strains of the bacteria and therefore your flock may carry a strain that is harmless to the flock but deadly to wild sheep.

Can I immunize my flock?

Vaccinations for harmful strains of *M. haemolytica* for domestic sheep do exist, but these vaccines bolster the immunity of only domestic, not wild sheep to infection from the bacteria. Furthermore, vaccination of domestic sheep will not prevent wild sheep from contracting the bacteria because the harmful strains of *Pasteurella* will still be present; they will just not cause illness in the vaccinated domestic sheep. Currently, there are no effective vaccines for wild sheep.

What do I do if I see a wild sheep in my flock?

If you see a wild sheep in or near your flock it is essential that you contact RAPP (<http://www.env.gov.bc.ca/cos/rapp/rapp.html>)

If the two species of sheep have been commingling, depending on the circumstances the wild sheep may need to be destroyed to prevent the spread of potentially fatal diseases to its herd.

I have domestic sheep in close range to wild sheep, but can't afford better fencing. What can I do?

Contact the BC Sheep Separation Program Coordinator Jeremy Ayotte on 250 804-3513 or by email jeremy.ayotte@gmail.com to discuss options for reducing the risk to wild sheep.