

A HEALTH PROTOCOL FOR DOMESTIC SHEEP USED ON FOREST GRAZING ALLOTMENTS IN ALBERTA AND BRITISH COLUMBIA

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Abstract: The health and condition of domestic sheep used on forest grazing allotments in Alberta and British Columbia (BC) are evaluated before the sheep leave the home farm and periodically throughout the grazing season. The protocol is designed to minimize potential disease problems by ensuring only healthy sheep, in good body condition, are used for forest grazing. It reflects a cooperative relationship among wildlife, forestry, and agricultural managers in conjunction with the forest and sheep industries. Our experience may provide a model for similar situations in other jurisdictions. Although the protocol generally is successful, in 1993 a case was identified where sheep were found in extremely poor body condition and infected with contagious ecthyma (=orf), a viral disease transmissible to humans and wildlife. Forty-five sheep were destroyed and 198 were removed from the site. It is contingent upon government officials, in conjunction with the sheep industry and the forest products companies, to monitor flocks throughout the grazing season in order to ensure compliance with the rules. Wildlife managers should be aware of disease situations on forest grazing allotments and, where problems arise, should monitor wild populations subsequent to removal of domestic sheep.

Sheep silviculture can be an efficient, safe, cost-effective method of improving reforestation success in forest plantation programs. Competition from native grasses and aspen regrowth can severely impair the growth and survival of young conifer seedlings and domestic sheep feed selectively on the competitors, providing opportunity for conifers to realize more efficient growth (O'Brien and Bailey 1987, Sharrow et al. 1989). Other methods of reducing competition, such as scarification and herbicides, are viewed as less "environmentally-friendly" and may not provide the same level of success or cost-effectiveness (Newsome et al. 1993). In addition, benefits accrue to the domestic sheep industry as far as providing additional income and grazing opportunities, particularly for sheep raised in dryland regions.

From a wildlife perspective, domestic sheep on forest grazing allotments have been seen as a potential attractant for predators, a source of disease transmission to free-ranging populations, and possible competitors for wild ungulates (Green 1992). This paper will focus on some of the disease concerns and how they have been addressed in relation to sheep silviculture in Alberta

and BC.

To date, the role of domestic sheep in affecting the health of wildlife species has been variable, although there is ample evidence that some bighorn sheep (*Ovis canadensis*) populations declined subsequent to introduction of domestic sheep onto traditional bighorn ranges (Foreyt and Jessup 1982, Coggins 1988, Coggins and Matthews 1992). In the past, domestic sheep grazed extensively on traditional wildlife range without apparent disease problems in wild populations; however, concurrent surveillance of free-ranging individuals was not conducted.

This paper focuses on the health and welfare of the domestic sheep, before and after they reach the grazing allotment, as a factor that may affect the potential for disease transfer. The paper is presented in three parts: a protocol that averts many potential problems, a disease outbreak that provides evidence that the protocol is not 'fool-proof', and a discussion of the general approach to sheep grazing on forest allotments.

THE PROTOCOL

Alberta and BC have taken great care to avert disease problems on forest allotments. In each province, representatives from various government agencies (including forestry, wildlife, and agriculture), the sheep industry, and provincial veterinary associations developed strict protocols to address the concerns of all parties. The protocols evolved during 10 years of sheep silviculture in BC. Currently, only veterinary-inspected and government-approved sheep can be sent to a grazing allotment.

The protocols are specific as well as far-ranging. They include assessment of the whole herd health of each source flock as well as the specific animals used for silviculture. Prior to transport, sheep are inspected by approved veterinarians for their general health and condition as well as for specific diseases, in particular, sheep foot rot, pseudo-tuberculosis, contagious ecthyma (CE), and internal and external parasites. Any animal with evidence of disease is not approved for sheep silviculture. Immunizations and specific treatments for parasites are identified and must be administered no more than 6-8 weeks prior to transportation to the forest site. Treated animals must be held in isolation and on pastures that have not contained sheep or goats for at least 2 weeks.

All adult sheep used on grazing allotments must be shorn, have their feet trimmed, and stand for one hour in a footbath of 20% zinc sulfate solution within 4 weeks of departure. If clean pasture is not available after treatment, the sheep must walk through a second footbath as they are loaded for shipment to the site. Pregnant ewes are not allowed. Small lambs (under 22.5 kg [50 lbs]) are not recommended. Each sheep must be identified with an owner mark and a government-issued ear tag. A health certificate signed by the owner, the contractor, and the veterinarian must be provided to BC or Alberta Agriculture 10 days prior to shipping the sheep and a copy of the certificate must accompany the sheep in transit and be available at the forest site.

The guidelines require that government inspectors visit each grazing allotment within 2 weeks of the sheep arriving at the site. In addition, occasional random inspections are conducted throughout the grazing season. Any sheep that does not meet health requirements in terms of disease or body condition must be isolated and treated. If treatment is not possible, the animal must be returned to the home farm or killed and properly disposed.

Concerns regarding disease and parasites in

sheep dogs or guardian dogs also have been addressed. All dogs used on forest grazing sites must have a valid vaccination certificate for parvovirus, canine distemper, Adenovirus type II, and rabies. Each dog must be treated with an effective anthelmintic 3 weeks prior to arriving at the site and treated again before returning home.

These restrictions are designed to ensure that domestic sheep used on grazing allotments are as disease-free as possible and in the best physical condition. A healthy animal, in good condition, will be better able to withstand the rigours of forest grazing, be more resistant to disease, be less attractive to predators, and less likely to contaminate the environment. However, problems do still arise. It is human nature that rules are not always followed.

THE PROBLEM

In 1993, a problem arose when a group of approximately 1000 sheep mustered from various owners in Alberta and BC was allowed to deteriorate on a grazing allotment near Fort St. John in northern BC. Some sheep with mild clinical signs of CE (otherwise known as soremouth or orf) were seen. In addition, new sheep, unaccustomed to forest grazing, were added to the flock late in the season when the food available was of relatively poor quality. As a result, suitable forage was limited and the sheep were unable to maintain adequate body condition. Contagious ecthyma manifested in the stressed sheep and spread within the flock. These breaches of the protocol were not reported and infected or weak sheep were not isolated or removed. Six hundred sheep from the infected flock were shipped to another allotment in an attempt to decrease the sheep density on the primary site. This action exposed another large flock of sheep and contaminated a second site with CE virus.

When provincial officials (RF and HL) inspected the 2 sites, they found a number of severely debilitated and emaciated sheep. Extensive oral and foot lesions also were present on some sheep. Forty-five emaciated and diseased sheep were considered unfit for travel and were killed at the site. Pox virus was identified in lesions seen on a sample of these sheep examined at the Alberta Agriculture Diagnostic Laboratory in Fairview, Alberta. An additional 198 sheep, considered unfit for sheep silviculture, were ordered off the sites and returned to their owners.

Contagious ecthyma is an infectious pox virus

disease primarily infecting domestic sheep and goats (Karstad 1981). In North America, infections in free-ranging bighorn sheep (Connell 1954, Blood 1971, Samuel et al. 1975, Lance et al. 1981, Jessup et al. 1991), mountain goats (*Oreamnos americanus*) (Carr, 1988, Samuel et al. 1975, Hebert et al. 1977), Dall sheep (*Ovis dalli*) (Smith et al. 1982, Zarnke et al. 1983), and musk-ox (Zarnke et al. 1983) have been described. In addition, caribou (*Rangifer tarandus*), moose (*Alces alces*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), wapiti (*Cervus elaphus*) and pronghorn antelope (*Antilocapra americana*) have been infected experimentally (Lance et al. 1983, Zarnke et al. 1983). Infection with a pox virus similar to CE was considered contributory to death in 2 free-ranging mule deer fawns (Williams et al. 1985). Contagious ecthyma is a zoonotic disease and can infect humans (Carr 1968, Erickson et al. 1974, Jessup et al. 1991).

The virus is quite common and cannot be diagnosed in carrier animals (Jubb and Kennedy 1970). It is an opportunistic invader when animals are in poor condition or have cuts and abrasions in the mouth. Thus, crusted lesions often occur in the nose and oral regions and may spread to other body regions as they become contaminated. For example, infected lambs may contaminate a ewe's udder. Scabs which fall from the lesions contain virus particles that can remain infective for more than 20 years (Livingston et al. 1960).

DISCUSSION

It is important to keep such problems in perspective. In 1993, approximately 44,000 domestic sheep were used on 34 forest grazing allotments in BC. Significant disease or health concerns occurred on only 5 allotments. Three of these involved persistent foot rot and 2 involved CE. Other than the case at Fort St. John, these problems were dealt with as outlined in the health protocols and the situations were resolved. We can assume that, given the nature of the vegetation on forest allotments, some sheep will damage the oral mucosa, thereby increasing the risk of CE. The protocol appears to provide a reasonable approach to managing the problem.

Contagious ecthyma also must be kept in perspective. The disease tends to be minor and self-limiting in adult animals but can cause severe lesions that impair feeding and growth (and

perhaps survival) in young bighorns, Dall sheep, and mountain goats (Samuel et al. 1975, Hebert et al. 1977, Dieterich et al. 1981, Zarnke et al. 1983). Most reports of the disease in wild sheep and goats have been associated with human-related foci of infections, such as artificial salt blocks (Blood 1971, Samuel et al. 1975), contaminated hay (Jessup et al. 1991), or salt residues remaining at oil and gas well sites (Morgantini, Spruce Grove AB, pers. comm.) The disease is not considered a major mortality factor in bighorn sheep (Lance 1982) and it is unlikely that it would establish in free-ranging cervids (Lance et al. 1983). There is a zoonotic concern for persons handling infected animals and, although the virus causes painful blisters (Jessup et al. 1991), it generally is self-limiting and lesions are fully resolved within a month (Erickson et al. 1974).

MANAGEMENT IMPLICATIONS

A cooperative working relationship among resource managers and industry provided the basis for the protocol described herein. Benefits generally accrued to all parties and time-consuming destructive confrontation was avoided. The protocol may be applicable to similar situations in other jurisdictions.

We believe that prevention is the best treatment. Implementation of a strict health protocol before and after sheep arrive at the grazing site can help limit the potential for disease outbreaks and, thus, limit the risk associated with disease transfer from domestic to wild stock. It improves the general welfare of the sheep and also may minimize the attraction of predators to the site. Healthy sheep also provide more effective grazing pressure.

The guidelines will not prevent all disease situations and should not be considered the solution to all the disease concerns of wildlife managers. However, they can preclude the use of animals with overt disease conditions and those in poor body condition. In order to be fully effective, adherence to the protocols must be monitored throughout the grazing season. The sheep industry and forest companies also must recognize the value of maintaining healthy sheep on the allotments and, thus, provide additional incentive for evaluation of the sheep.

Ideally, domestic sheep should not be grazed on range used by bighorns or mountain goats, in order to minimize the immediate potential for disease transfer to wild populations. However,

forest grazing allotments contaminated with scabs from domestic sheep infected with CE could remain a potential focus of infection for many years after the sheep have left. The areas could be used subsequently by wild sheep and goats or for human recreational purposes. Wildlife managers are encouraged to maintain contact with agriculture and forestry officials in order to be aware of areas of sheep silviculture and to remain informed regarding the health of the sheep on each allotment. In areas where disease occurs, particularly CE, wildlife managers should monitor free-ranging populations for the presence of lesions. The virus could become a factor in the health of young bighorn sheep or mountain goats, a particular concern in remnant or introduced populations under stress.

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