

THE MANAGEMENT, CARE, AND PROPAGATION  
OF CAPTIVE NORTH AMERICAN MOUNTAIN SHEEP

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**Abstract:**

The controlled management, nutrition, capture, and transport of Dall sheep (*Ovis dalli dalli*), Stone sheep (*Ovis d. Stonei*), Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) and California bighorn sheep (*Ovis c. californiana*) are discussed. Also observations on breeding, disease, and behavior of the mountain sheep in captivity are cited.

INTRODUCTION

The Okanagan Game Farm is located in the lower end of the Okanagan Valley about 40 miles north of the international border near the city of Penticton, British Columbia. It is at the northern tip of the great American Desert at an elevation of 1,100 feet. The summers are long and hot with temperatures of 100° F. being recorded. The winters are mild with only a few days below 0° F. and only slight snowfall. The annual precipitation is from 10 to 12 inches.

The dry climate was one of the main factors behind the location of the game farm when it was formed in 1967. The farm contains 590 acres of dry benchlands overlooking Skaha Lake. Gently sloping hills lie between the benches with scattered rock outcroppings, shale slides, and various trees and shrubs. It is on these hillsides that the paddocks are arranged providing natural grazing terrain for the animals and good vantage view points for the public. The paddocks average between 10 and 20 acres in area. They are fenced with 5-inch diameter, 10-foot long pressure-treated posts spaced at 20-foot intervals, strung with 6-inch page wire with a special tie, 84 inches high.

Management

Four groups of mountain sheep are maintained at the game farm. The thin horn Dall sheep, Stone sheep, and the Rocky Mountain bighorn sheep are in single herds. Because of large numbers present, the California bighorn sheep are divided into two herds for health reasons.

Hay racks, water troughs, and grain trays are provided at the front of the paddock. Water is obtained from a spring and has a high mineral content. It is provided unless fresh snow which the sheep prefer is on

the ground. These necessities are provided at the front of the paddocks for two very important purposes. First, the sheep must frequent the front to feed and water and thus quickly become accustomed to people observing them. Secondly, only the front of the exhibit is frequented by humans, giving the sheep the rest of the paddock as a safe area used only by them.

Each paddock has several high points and several hidden ravines which the sheep utilize. They survey the outlying areas from the high points and when alarmed hide in the small ravines and gulleys. Each herd has their own sanctuary at a high point at the back of their paddock which they use when severely frightened. None of the sheep paddocks have public access from the sides or back.

The herds by their isolation and natural surroundings show normal sheep behavior patterns which are essential to successful breeding. Each group except the Stone sheep has a mature ram and a young immature ram. This combination allows for pre-rut grouping of males, rut fighting, and interaction and competition for females. Because of the immaturity of the young ram, severe fighting is held in check by natural restraints. A back-up male is kept with the herd if it is safe, or he is kept in a special paddock for rams forming a bachelor herd.

The herds show individual and very particular temporal-spatial feeding patterns. They also have definite nursery areas in their paddocks.

Trees are used for rubbing by the rams and they may be damaged if not protected. Some rams like to "hit" anything, so 12-inch diameter posts are planted as ramming posts, which they use during the rut. No artificial shelters are provided, but shade is necessary on very hot summer days.

Dall sheep have been maintained at the farm since 1971. The core of the herd being a wild caught pair from the Yukon. They are the most placid and even dispositioned of the sheep, calm down quickly, and show no fear of people.

Stone sheep were captured from northwestern British Columbia in 1968. One ram and five ewes formed the nucleus of the herd transplanted to the game farm. One of the first lambs had to be bottle raised and is now our magnificent ram "Stoney". He has been used for publicity programs and commercial advertising.

The nucleus of our Rocky Mountain bighorn sheep herd consisted of two rams and three ewes from the east Kootenay Mountains of British Columbia. The herd now numbers three rams, four ewes, and three lambs.

The Rocky Mountain sheep are adjacent to one herd of California bighorn sheep which makes for an easy comparison between these two types of bighorn sheep. But during the rut (Sept.-Jan.) the mature rams try to fight through the fence. Because of the chance of severe injury we had to erect a special retaining fence to separate the two paddocks.

The nucleus of our California bighorn herds was captured from nearby

wild herds in early 1969 under permit from the British Columbia Fish and Wildlife Department. M-99 was used to capture two rams and 12 ewes which produced 12 lambs (one died) in May of 1968-1969.

Plans have been initiated to fence off 90 acres on the game farm during the 1975-1976 period in a joint research program with British Columbia Fish and Wildlife to study nutritional needs of California bighorn sheep in the Okanagan Valley. The sheep will be caught and let loose on plotted areas to determine their grazing patterns at different times of the year.

### Breeding

The natural conditions of the game farm enhance normal behavior patterns which produce a normally high reproductive rate in the captive herds as also seen in wild herds. Breeding records are presented in Table 1. The offspring that are produced by the captive herds are sold if the herd sizes are optimum for the area of their particular paddock. The young are sold to other zoological institutions in Canada and the United States. In selling these animals we serve several vital needs in assuring a future for mountain sheep. We provide captive acclimated sheep that are accustomed to captive food and fences. These sheep will provide thousands of people with a better insight into the life of mountain sheep if they are exhibited properly. They will also provide future reserves of breeding herds which may at some date be part of reintroduction projects. An important side benefit is that wild-caught animals are in less demand so that death due to capture, stress, or failure to acclimate are greatly reduced.

### Nutrition

All the sheep graze their paddocks extensively. We have now begun a regular summer watering program which provides good grazing throughout the summer months. In addition, good quality alfalfa hay with 18-21 percent protein is available at all times. Hay is fed in racks with a trough underneath to minimize waste. Special grain pellets are also fed once a day at an average rate of 3-4 ounces for each individual sheep. The pellets are composed of the following components:

<u>Parts</u>	<u>Ingredients</u>
300	linseed meal
400	ground corn
720	oats
400	bran
150	molasses
20	de-florinated phosphorous
10	Vitamin A (20,000 units/lb.)
<u>2,000</u> Total	

In addition, browse is supplied in the form of orchard prunings, willow, and poplar. A block of common cobalt salt is provided and utilized by the sheep.

Table 1. Breeding record of four groups of mountain sheep at the Okanagan Game Farm.

California bighorn	Rocky Mountain bighorn	Stone sheep	Dall sheep
<u>1969</u>			
12 ewes, 12 lambs (1 ewe didn't lamb)* (1 ewe had twins) (1 lamb died)		2 ewes, 2 lambs (2 lambs died)	
<u>1970</u>			
12 ewes, 12 lambs (3 lambs died of pneumonia)		5 ewes, 5 lambs (1 born dead)	
<u>1971</u>			
10 ewes, 7 lambs	3 ewes, 3 lambs	6 ewes, 6 lambs	
<u>1972</u>			
10 ewes, 11 lambs (1 ewe had twins) (2 lambs born dead) (1 died of pneumonia) (1 hung in fence)	5 ewes, 4 lambs (1 ewe not bred)*	6 ewes, 6 lambs (2 male lambs killed by male)	
<u>1973</u>			
10 ewes, 9 lambs (1 ewe with broken leg didn't have lamb)*	5 ewes, 4 lambs (1 ewe with broken leg didn't have lamb)*	6 ewes, 6 lambs	3 ewes, 3 lambs
<u>1974</u>			
10 ewes, 10 lambs (1 set twins) (2 lambs died)	5 ewes, 4 lambs (1 ewe didn't lamb)*	6 ewes, 5 lambs	3 ewes, 3 lambs
<u>1975</u>			
11 ewes, 10 lambs (2 lambs died) (1 ewe didn't lamb)*	4 ewes, 3 lambs	5 ewes, 3 lambs	4 ewes, 3 lambs

\*Note two ewes captured in the wild both had broken front legs that had healed up but were stiff. One Rocky Mountain bighorn ewe failed to have a lamb and was killed by an adult ram. Six ewes were lost in 1974, one Rocky Mountain bighorn, three California bighorn, two Stone sheep; in all six the teeth were badly worn and all were quite old.

Lambs taken from the paddocks for one reason or another (broken leg or one of the set of twins where the mother has been unable to feed both) are fed a formula of one part condensed milk to one part boiled water with multivitamins added.

Diarrhea occasionally has been a problem and sulfamethazine has been used with good results.

#### Diseases and mortality

The main concern when handling mountain sheep is stress. Several parasites are normally found in sheep; but after a period of extreme stress, parasitic infections may cause death due to the weakened condition of the animal. Lungworm infestations are the most common. We have had two deaths attributable to lungworms, both animals had been stressed by capture and transport.

Most lamb losses have resulted from the lamb becoming entangled in a fence.

The sheep pens are extremely dry due to the climate and the high ground which they occupy. This arid soil is a deterrent to completion of parasitic life cycles. It also helps eliminate hoof rot. Although all the paddocks have extensive rocky areas, some overgrowth of hooves does occur. Hooves are trimmed at the time of capture for vaccination, or in extreme cases a capture is made just to trim hooves. Long hooves have also been noticed in wild-caught animals.

Anti-worm medicine in the form of piperazine or thiabendazole is administered twice a year in food or water.

Wood ticks (Dermacentor andersoni) which cause tick paralysis are endemic to the Okanagan area. Many wild birds are attracted to the farm and it is not uncommon to see blackbirds and magpies perched on the back of the sheep and other animals. We also have peacocks, Guinea fowl, and wild turkeys at large. These birds help to control tick and insect populations.

#### Capture and transport

In order to capture wild sheep, we have used primarily a Palmer "cap-chur" gun and M-99 (0-5 mg plus 0.25 cc Anastran and 1 cc Hyosine made up to 3 cc with water to fill the dart). Nalorphine HCl or Nalline has been used as an antidote and found useful to bring the animal back up to the desired level of anesthesia. Sheep have been darted from a distance of 40 to 50 yards with an ideal shot being high up on the rump or shoulder. The sheep were immobilized in 5 to 8 minutes. Penicillin, sevite (for white muscle disease prevention), and vitamin E were given by injection after capture. The animals were led off the mountains semi-conscious or hauled out in crates on sleds pulled by snowmobiles.

When releasing animals into new surroundings it is essential to have a tame captive nucleus with which the released sheep will run. They then learn the boundaries of the paddock by following the herd not by crashing into fences.

For handling purposes in the paddocks we first try to capture the sheep by grabbing them (if we can) when feeding since they are used to their keepers and come quite close when they are grained. This method works occasionally, but most of the time we use large nylon nets 8 feet high and 100 feet long. The net is fixed at one end to the fence. One person pulls the net up to trap the animals to be captured. The herd is moved, not stampeded but coaxed along, into position by three or four people. We have not lost or injured any sheep in this way and feel it is superior to tranquilizing them since the risk of injury is greater due to improper dart placement or an overdose of drugs than by netting. After capture, the sheep are placed in small dark crates in which they quiet down quite quickly. In capturing and handling sheep in their paddocks, any panting and running brings an immediate end to our efforts. We do not want to stress the sheep and try again at a later date.

#### CONCLUSION

The experience gained by maintaining Dall, Stone, Rocky Mountain, and California bighorn sheep at the Okanagan Game Farm has shown that it is possible to breed and raise healthy sheep in a confined area. With proper diets, surroundings, and isolation natural mountain sheep behavior patterns will occur. The young produced provide a valuable stock for other zoological institutions. The captive breeding herds can provide the necessary sheep, when the proper time comes, to be relocated into parts of the original range of mountain sheep.