

SEASONAL GROWTH PATTERNS OF BIGHORNS CORRELATED WITH
RANGE CONDITIONS AND ENDOPARASITE LOADS

by

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Data obtained from bighorn sheep winter ranges in Jasper, Banff, Waterton Lakes and Kootenay National parks for the period 1966-69 indicate a direct correlation among forage production, ungulate stocking rates, endoparasite loads and overwinter weight losses. Table 1 compares data from two winter ranges in each of Jasper, Banff, and Waterton Lakes parks. parasite data are from Bandy (1968) and Uhazy (1969).

Table 1. Forage production, stocking rates (days-use/acre), lungworm loads and overwinter weight losses from two bighorn sheep winter ranges in each of Jasper, Banff and Waterton Lakes parks, 1967-69.

Park	lbs. Forage Per Acre	Animal (Days-Use Per Acre)	Lungworm Per Gram of Feces	% Samples** Heavy load Parasites	Ave. Ewe Wts.(lbs)		Winter*** Wt. loss
					Fall	Spring	
Jasper	133	71	2,375	48	169 ^{16*}	133 ¹¹	20
Banff	205	75	626	17	158 ⁸	141 ⁶	11
Waterton	428	29	594	0	166 ³	144 ¹⁶	13

* Sample size.

**% fecal samples with 1,200⁺ lungworm larvae per gram fecal material

***Winter weight loss as a percent of fall weight.

The above table indicates that although fall weights are similar in Jasper and Waterton, that mature ewes in Jasper sustain a 20 percent overwinter weight loss while foraging on an unproductive range (133 lbs. forage/acre), under a high stocking rate (71 days-use/acre) and while supporting a high lungworm load (2,375 larvae/gram of feces). Conversely, in Waterton where the range is over three times as productive,

the stocking rate only 41 percent as heavy, and the lungworm load only 25 percent as great, mature ewes lost only 13 percent of their fall weight. In Banff where forage production is somewhat greater than in Jasper but where the stocking rate is similar, ewes lost only 11 percent of their fall weight. The greater weight loss in Jasper seems due in part to the lungworm load being four times greater than that in Banff.

Table 1 shows that 48 percent of the fecal samples from six herds in Jasper contained heavy lungworm loads (1200 + larvae/gram of feces), compared with 17 percent from four herds sampled in Banff, and 0 percent from two herds sampled in Waterton during 1967-69.

The influence of total endoparasite loads on bighorn sheep lamb weights is presented in Table 2.

Table 2. Relationship of body weight to endoparasite loads of five female bighorn sheep lambs in Jasper and Banff National Parks; 1966-69 (Uhazy 1969).

	0.8 Yr. 56 lbs.	0.9 Yr. 44 lbs.	0.5 Yr. 76 lbs.	0.6 Yr. 65 lbs.	0.7 Yr. 48 lbs.
NEMATODES	No. 1	No. 2	No. 3	No. 4	No. 5
<u>Protostr. stilesi</u>	heavy	mod.	light	light	
<u>Protostr. rushi</u>	0	4	0	0	0
<u>Marshallagia marsh.</u>	1270	962	21	32	0
<u>Other Marsh., Ostert.,</u> <u>& Teladorsagia spp.</u>	1961	1943	61	44	0
<u>Nematodirus spp.</u>	4806	4022	200	19	831
<u>Trichuris ovis</u>	303	371	108	21	25
CESTODES					
<u>Moniezia expansa</u>	3	1	40	0	0
Totals	8345	7303	430	116	856

Table 2 shows that the three weekend ewe lambs (nos. 1, 2, 5) averaged only 49 lbs. during the winter and had an

average endoparasite load (excluding lungworms) of 5,501 compared with an average weight of 70 pounds and a parasite load of 273 for the two normal lambs.

Bandy (1968) found an average of 550 Eimeria (coccidia) per gram of feces in the Stoddard Creek and Columbia Lake herds south of Kootenay Park during January-March 1966 six months prior to the 75 percent die-off of these herds, and an average of only 115 Eimeria during January-March 1967, immediately after the die-off. He also reported an average of 660 Eimeria per gram of feces for the Graveyard and Vermilion Lakes herds in Jasper and Banff respectively during January-March 1967 where populations were high but where no die-off was occurring. He also found Nematodirus and Marshallagia spp. higher (199) prior to the die-off than after the die-off (110). Cowan (1951) reported heavy parasitism by Ostertagia and Nematodirus in three confined bighorns that were in a moribund condition.

Fall Weights and Condition

ram lambs averaged 70.3 pounds and ewe lambs 65.3 pounds during the falls of 1966 to 1969 in Jasper and Banff. Ram lambs gained an average of 6.4 pounds over winter compared with 4.4 pounds for ewe lambs.

Rams increased in weight until at least six years of age when they averaged 274 pounds in the fall. The heaviest ram weighed was a 10 year old at Jasper which weighed 301 pounds on November 14, 1968. At this time the rut had been in progress for two weeks. Mature rams in Jasper lost 50 to 70 pounds during the 60 day rutting period of November and December. One eight-year old ram lost 35 pounds during 32 days of rutting (1.1 lbs./day) between November 15 and December 17. Full curl rams averaged 297.5 pounds in mid November and 235.0 pounds in January and February after the rut.

Spring Weights and Condition

The average spring weight of eight rams (6 yrs.+) in Jasper was 230 pounds, a decrease of 22.7 percent from their fall weight. Mature ewes (3 yrs.+) had only a 20.0 percent overwinter weight loss in Jasper compared with 13.0 percent in Waterton. In summary, there appears to be no significant difference between fall weights in Jasper and Waterton, indicating that summer ranges in both parks are adequate to permit

bighorns to attain the prime condition of 165 to 170 pounds for mature ewes and 290 to 310 pounds for full curl rams in late October. Lungworm loads up to 1000 larvae per gram of feces have little effect in increasing winter weight losses above that due to range, climate and rutting stresses. However, an average lungworm load of 2,375 larvae per gram of feces was associated with a 20 percent weight loss in ewes compared to an 11 percent weight loss where the lungworm load was only 626 larvae per gram of feces but where stocking rates and forage production were quite similar. None of the lungworm loads were heavy (1200 + larvae per gram of feces) where the forage production was 428 pounds per acre and the stocking rate only 29 animal days-use per acre. With a stocking rate of 75 animal days-use per acre on a winter range producing only 205 pounds forage per acre, 17 percent of the fecal samples were heavily parasitized with lungworms. When forage production decreased to 133 pounds per acre and the stocking rate remained high (71 animal days-use per acre) the fecal samples averaged 2,375 lungworm larvae per gram of feces.

Literature Cited

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