Beef Production on Lodgepole Pine-Pinegrass Range in Southern British Columbia

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Highlight

Yearling steers on lodgepole pinepinegrass summer range in British Columbia had an average daily gain of 1.75 lb for 103 days per year over a 5-year period. The average gain per acre was 19.3 lb for the season and the average stocking rate was 4.8 acres per AUM. Pinegrass, which provided over 50% of the forage yield, was readily accepted by cattle during early summer but became unpalatable by mid August.

The most important and characteristic range vegetation zone in interior British Columbia is the douglasfir zone. It comprises about 15 of the 19 million acres of grazing land in the Interior. The zone has been described by Tisdale and McLean (1957). The major plant association within the zone is douglasfir-pinegrass, the principal grazing species being pinegrass (Calamagrostis rubescens Buckl.). Lodgepole pine (Pinus contorta Dougl.) is the main seral tree species in the zone.

Few grazing studies have been made in the zone and yet this step is necessary if accurate grazing values are to be assigned.

The Eastern Oregon Experiment Station is conducting grazing studies on pinegrass-dominated range in eastern Oregon (Hedrick, 1966). Indications are that early-summer grazing is the best time of use while the forbs are at peak production and the pinegrass is immature.

The Oregon pinegrass range is markedly different from ours in that the climax tree is grand fir (Abies grandis L.) and the understory contains a higher proportion of shrubs which make up 40% of the forage under moderate shade and about 20% in open areas.



FIG. 1. Plant cover in the experimental fields, Pass Lake, B. C. Dominant tree is lodgepole pine with understory mostly of pinegrass.

Grazing trials were started in 1960 at the CDA Research Station, Kamloops, B.C. The work during 1960 and 1961 was supervised by Dr. H. H. Nicholson, then Animal Scientist at the research station, and for the remainder of the time by the author. The results must be interpreted with caution since there is no assurance that they are representative of the region as a whole. The trials are being continued, however, and extended to other grazing districts.

Study Area and Procedures

The experimental fields lie within the holdings of the Research Station near Pass Lake about 14 miles northwest of Kamloops. They are located in the douglasfir zone between 3400 and 4000 ft elevation. The present tree cover is a medium-dense stand of lodgepole pine alone or mixed with aspen (Populus tremuloides Michx.) (Fig. 1). Throughout the fields there is sufficient douglasfir to indicate a successional trend to that species. Pinegrass is the dominant ground-cover species. Plot records indicate that the species dominates about 80% of the ground area. It is the only grass to contribute significantly to the forage yield. Plots clipped in 1966 indicated that the grasses, forbs, and shrubs had an average distribution by weight of 56, 29, and 15% respectively.

The principal associated shrubs are rose (Rosa nutkana Presl), oregongrape (Mahonia repens (L.) G. Don), whitetop spiraea (Spiraea betulifolia Pall.) and russet buffaloberry (Shepherdia canadensis (L.) Nutt.). The most commonly occurring forbs are heartleaved arnica (Arnica cordifolia Hook.), showy aster (Aster conspicuus L.) timber milkvetch (Astragalus miser Dougl. var. serotinus (Gray) Barneby), creamy peavine (Lathyrus ochroleucus Hook.), and strawberry (Fragaria glauca (Wats.) Rydb.).

Plot records indicated that dominant trees of lodgepole pine had an average diameter at breast height of 9.2 inches, an average age of 72 years and site index of 75.

The topography is rolling and cattle can graze over the entire

Table 1. Number of days on pasture, number of yearling steers on each field, and their average starting weights in a grazing trial on the Pass Lake experimental fields 1960 to 1964.

	No. No. of days on pasture				No. of yearlings on field				Avg starting weights (lb)								
Field	acres	1960	1961	1962	1963	1964	Avg	1960	1961	1962	1963	1964	1960	1961	1962	1963	1964
1	105	106	112	98	100	112	106	6	12	12	8+11*	15	648	508	571	486	459
2	81	106	112	98	72	98	97	6	9	8	11	12	634	537	637	484	476
3	90	106	112	98	100	112	106	6	9	9	12	12	630	532	628	505	479
Avg.	92	106	112	98	91	107	103						637	526	612	492	471

* Eleven animals were moved from Field 2 to Field 1 after 72 days when the former became overgrazed.

area without having to climb steep slopes. Water is available in several places in each field. The fields are fairly similar in their forage cover and topography. The chief differences are that Field 3 contains a small, swampy meadow (about 2 acres) and Field 1 has a few more open patches dominated by Kentucky bluegrass.

Three fields were fenced in the fall of 1959 and continuously grazed during each pasture season from 1960 to 1964. Grazing of the area had been light for a number of years prior to the start of the experiment and there was a good cover of forage species.

There was no fixed grazing period, animals being grazed for as long as possible depending on the forage growth and weather conditions. Yearling steers averaging 548 lb at turn out (Table 1) were used in the test and weighed every 2 weeks throughout the season. The animals were kept on pasture in the fall until the average gain became less than 1 lb/day. In 1960 the fields were obviously undergrazed so that stocking rate was increased the following year and adjusted as available forage dictated thereafter (Table 1). For reporting, yearling steer units were converted to animals units (AU) by multiplying the former by 0.6.

The turn out dates for 1960 to 1964 inclusive were June 30, June 16, July 6, July 3, June 5. The closing dates were October 14, 6, 12, 11, and September 25, except that Field 2 was closed on September 13 and 11 in 1963 and

Table 2. Average daily gain of yearling steers, gain per acre, and average carrying capacity of three Pass Lake experimental fields for 5 years (1960 to 1964).

	Avg	daily	, gain	(lb)	Gain per acre (lb)				Stocking rate (ac/AUM)			
Year	1	2	3	Avg	1	2	3	Avg	1	2	3	Avg
1960	1.85	1.98	1.78	1.87	11.2	15.5	12.6	13.1	8.2	6.4	7.1	7.2
1961	1.89	1.85	1.98	1.91	24.2	23.0	22.2	23.1	3.9	4.0	4.5	4.1
1962	1.82	1.36	1.60	1.59	20.4	13.2	15.7	16.4	4.5	5.2	5.1	4.9
1963	1.53	1.79	1.61	1.64	13.0	17.5	21.5	17.3	4.7	5.1	3.7	4.5
1964	1.81	1.85	1.60	1.75	29.0	26.9	24.0	26.6	3.1	3.4	3.3	3.3
Avg	1.78	1.77	1.71	1.75	19.6	19.2	19.2	19.3	4.9	4.8	4.7	4.8
The a	verag	es joii	ned by	y lines	are no	ot sigr	nificar	tly di	fferent	at the	e 5%	level

expressed by Duncan's Multiple Range Test.

 $1.91 \quad 1.87 \quad 1.75 \quad 1.64 \quad 1.59 \quad 26.6 \quad 23.1 \quad 17.3 \quad 16.4 \quad 13.1 \quad 3.3 \quad 4.1 \quad 4.5 \quad 4.9 \quad 7.2$

1964 respectively because of overgrazing.

The plant cover was estimated from sample plots using the method of Daubenmire (1959). Forage yield was determined in 1966 by clipping five 9.6 ft² plots at random at each sample-plot site.

Plant nomenclature follows that of Hitchcock et al. (1955).

Results and Discussion

The fields compared well both as to animal performance and carrying capacity. The 5-year average daily gain of 1.75 lb for 103 days (Table 2) compares favorably with the 1.40 lb average for 74 days obtained over 7 years on a sedge meadow in the same district (McLean, Nicholson, and van Ryswyk. 1963).

The time of removal of the animals from the range greatly influenced the seasonal average daily gain because of reduced gains in the fall (Table 3). On the test fields the dates of first loss of weight of any animal in the fall was recorded on October Table 3. Average daily gains (lb) of yearling steers on Pass Lake experimental fields by 14-day weigh periods for 5 years (1960 to 1964).

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per.	1960	1961	1962	1963	1964
1	3.70*	3.71	2.45	3.00***	3.29
2	2.62	0.85	2.49	2.20	2.35
3	1.67	3.36	1.36	1.73	2.24
4	2.83	2.33	1.59	1.53	1.46
5	1.34	1.60	1.64	0.92	2.17
6	1.96	1.06	0.89	0.66	2.01
7	1.07	1.77	0.75	0.29 -	-0.17
8	86**	0.57			0.30

* Weigh period 15 days; ** 7 days; *** 16 days.

14, 6, 12, 11 and September 11, for the years 1960 to 1964 respectively. There was no significant difference in the average daily gain between years (Table 2).

On a nearby similar range on which yearling steers were weighed on and off, the average daily gains were 1.5, 1.3, 1.6, and 1.9 lb. The dates the latter range was closed in the fall were October 1, 6, September 15, and 16 respectively.

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The decline in daily gain as the season advances is most likely largely a result of the drop in nutrient value of the feed available. A decline in crude protein and phosphorus was demonstrated by McLean and Tisdale (1960) who collected most of their samples from the same general area in which the grazing trial was conducted. The lower feed value of pinegrass as compared with associated forbs and shrubs was especially marked. Dr. D. M. Bowden, Animal Scientist, CDA Research Station, Agassiz, B.C. carried out in vitro digestibility analysis on a series of pinegrass samples collected in 1965 from the experimental fields. The digestibility values dropped from about 65%at the end of May to 57, 53, 48, and 37% at the end of June, July, August, and September respectively.

The above results suggest that animals that are to be sold in the fall should be taken off forest range in early September or have their diets supplemented if they are to maintain their rate of gain. The average carrying capacity of 4.8 acres/AUM is considered to represent a realistic figure for the fields. In interpreting this value for range management purposes, however, it must be remembered to allow for such factors as distance from water and accessibility.

Understocking of the fields in 1960 accounts for the lower gain per acre and the greater number of acres required per AUM for that year (Table 2).

The average gain per acre over the 5 years for the 300 acres was 19.3 lb for the season which, if beef was sold for $25\phi/lb$ would return nearly \$5.00/acre.

The fields were rotationally grazed during 1965 and 1966 by yearling heifers, starting dates being June 1 and 3 respectively. The fields were grazed for 108 and 112 days and produced average daily gains of 1.68 and 1.69 lb. The average gains per acre were 24.6 and 26.8 lb for the two years respectively.

Much better utilization of pinegrass was obtained by the earlier turnout in the past 2 years as it was readily acceptable throughout June. On the other hand it became very unacceptable by mid August. Despite the earlier season of use, the average daily gains were not appreciably better than those from the first 5 years.

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