

# Row Spacings of Russian Wildrye for Fall Pasture in Southern Saskatchewan

M. R. KILCHER, D. H. HEINRICHS, AND R. W. LODGE

**Highlight:** *In southern Saskatchewan fall grazing resources become acutely short because little growth of grass occurs after early July. Russian wildrye (*Elymus junceus*) cures better than most other grasses and is therefore best for late fall pasture. Over a 9-year period cattle were grazed on stands of Russian wildrye that had been seeded in rows spaced 20, 40, or 60 cm apart. Two stocking rates were used. The animals were weighed periodically and were removed when losses in weight occurred. Up to 5 weeks of grazing were obtained where rows were 60 cm apart and when stocked at one animal on each .43 ha, compared to as low as 3 weeks where rows were only 20 cm apart and stocked at one animal on each .32 ha. Values for crude protein, digestibility, crude fibre and ether extract are given.*

The Canadian sector of the Northern Great Plains Region of North America is cold and semiarid. Swift Current, Sask., is located in about the center of this Canadian sector. The average annual precipitation is 360 mm, of which 167 falls in May, June, and July. About 70% of the seasonal growth of perennial grasses occurs by the end of June (Lodge et al., 1971) causing a critical pasture shortage in the fall. This must be alleviated by a management system that provides adequate amounts of "fairly nutritive cured" grass during the fall.

Russian wildrye (*Elymus junceus*) is drought tolerant and cures well in the field (Lawrence, 1966). It is well adapted to the region as a pasture grass and excels other grasses in

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Authors are, respectively, forage agronomist and forage crops section head, Research Station, Research Branch, Agriculture Canada, Swift Current, Saskatchewan, S9H 3X2; chief of Land Use, (P.F.R.A.), DREE, Regina, Saskatchewan.

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nutritional qualities in the fall (Heinrichs and Carson, 1955; Lawrence and Troelsen, 1964) (Fig. 1).

The effect of plant density on production has been studied but mostly when the grass was harvested for seed. The present study was undertaken to determine the best row spacings for Russian wildrye as a fall pasture.

Average annual precipitation during the 9-year period of this study was 316 mm, compared to the 89-year average of 360 mm.

## Materials and Methods

In October 1964 a 2-replicate test of Russian wildrye was seeded in rows spaced 20, 40, and 60 cm apart on clay loam



Fig. 1. Cattle grazing widely spaced rows of Russian wildrye in early winter at Swift Current, Sask.

**Table 1. Dry matter yields (kg/ha) at commencement of grazing in late September.**

Row spacings and grazing intensity <sup>1</sup>	1966	1967	1968	1969	1970	1971	1972	1973	1974	9-year annual mean
20 cm M	1365	1210	1010	663	705	437	630	370	471	762
20 cm H	1444	910	791	667	765	400	630	480	578	740
40 cm M	1309	1367	1240	867	1070	406	880	610	656	933
40 cm H	1108	848	1000	953	955	423	790	525	565	796
60 cm M	2014	2053	2333	1309	1815	730	1610	655	1152	1519
60 cm H	1523	1247	1250	1178	1560	618	1140	595	1111	1136
Mean	1460	1272	1211	940	1145	502	947	539	756	

<sup>1</sup> M denotes medium heavy grazing; H denotes heavy grazing.

brown soil. The row spacings constituted the main paddocks, which were 2.3 ha in size. Each main paddock was divided into subpaddocks of 1.0 and 1.3 ha to provide two intensity rates of stocking, herein referred to as medium heavy and heavy, respectively.

The 12 paddocks were fenced and provided with water, and a T-shaped spaced slab fence was erected in the middle of each to provide shelter from cold winds.

Commencing in 1966, three head of yearling cattle were put on each paddock on or about October 1 each year for 9 consecutive years. This equates to .33 and .43 ha for each animal for the two stocking rates used. The average weight of yearlings was about 380 kg. Each animal was weighed when put into the pasture and at 12- to 14-day intervals thereafter. They were taken off the paddocks when weight gains ceased or when a decline was measured. Real differences in length of grazing season were determined by subjecting the measurements to Duncan's multiple range test procedure.

Dry matter grass yields were determined each year at commencement of fall grazing in late September.

During 7 of 9 years, evaluation of grass quality was obtained by determining crude fibre (CF), crude protein (CP), ether extract (EE), and organic matter digestibility (OMD) by an *in vitro* technique.

## Results

### Dry Matter Yields

From 1966-74 yields ranged from an overall average of 502 kg/ha in 1971 to 1,460 in 1966 (Table 1). The 9-year average for interrow spacings were 751, 864, and 1,328 kg/ha for the 20-, 40-, and 60-cm spacings, respectively (Fig. 2). It should be noted that these differences in yields were not uniform in



**Fig. 2.** Mid-summer growth of Russian wildrye showing 20-cm row spacings on the left and 40-cm on the right.

quantity from one spacing to another. Yields from the 40-cm spaced stands were only 15% greater than those from the 20-cm stands, while those from the 60-cm stands were 77% greater (Table 2).

**Table 2.** Percent increase in yield by row spacings on basis of 20 cm = 100%.

Grazing intensity	20 cm	40 cm	60 cm
M	100	122	199
H	100	108	154
Overall mean	100	115	177

### Feed Quality

Neither row spacings nor intensity of use contributed to important differences in nutritional quality of the forage despite there being more seed culms in the wider row stands (Table 3).

**Table 3.** Nutritional quality of grass at two stages.

	Row spacing and grazing intensity <sup>1</sup>	Late Sept. samples	
		Range of values	6-year mean
Crude protein (%)	20 M	5.2 to 7.0	6.2
	H	5.0 to 7.5	6.2
	40 M	5.3 to 7.0	5.9
	H	4.9 to 6.7	5.8
	60 M	5.1 to 6.6	5.9
	H	5.4 to 6.8	6.2
Organic matter digestibility (%)	20 M	45.6 to 54.0	50.4
	H	46.4 to 57.2	52.3
	40 M	44.2 to 54.7	49.8
	H	46.1 to 57.1	51.4
	60 M	45.4 to 55.7	50.3
	H	46.3 to 56.6	51.9
Crude fibre (%)	20 M	30.0 to 33.7	31.4
	H	30.5 to 33.4	31.4
	40 M	27.3 to 34.2	31.3
	H	30.6 to 34.2	31.8
	60 M	30.7 to 35.2	32.6
	H	30.0 to 35.0	32.0
Ether extract (%)	20 M	4.0 to 6.4	4.9
	H	3.7 to 6.1	5.0
	40 M	3.9 to 6.2	4.8
	H	3.4 to 6.2	4.8
	60 M	3.5 to 6.1	4.9
	H	3.7 to 6.2	4.7

<sup>1</sup> M denotes medium heavy grazing; H denotes heavy grazing.

**Table 4. Final cattle weight gains or losses (kg).**

Row spacings and grazing intensity <sup>1</sup>	Average of 6 animals									9-year annual mean
	1966	1967	1968	1969	1970	1971	1972	1973	1974	
20 M	20	40	30	4	-5	-38	-29	23	42	9.0
H	-7	34	21	7	10	-34	-48	-14	46	1.7
40 M	32	46	27	-16	-1	-42	-24	1	59	9.1
H	15	35	26	-16	-20	-14	-53	-21	44	-0.4
60 M	27	37	40	-11	1	-50	-29	17	48	8.9
H	40	31	14	-14	-22	-48	-35	-1	37	1.3
Year mean	21.2	37.2	26.3	-9.0	-6.2	-37.7	-31.8	.8	46.0	

<sup>1</sup> M denotes medium heavy grazing; H denotes heavy grazing.

**Grazing Period**

The treatments did not cause as great a difference in carrying capacity as the dry matter yields tend to indicate (Fig. 3 and Table 1). The 20-cm spaced stands provided from 23 to 25 days of grazing on the average, compared to 33 to 37 days provided by the 60-cm spaced stands. Differences due to stocking rates within spacing treatments were greater for the 40- and 60-cm spaced stands than within the 20-cm spaced stands.

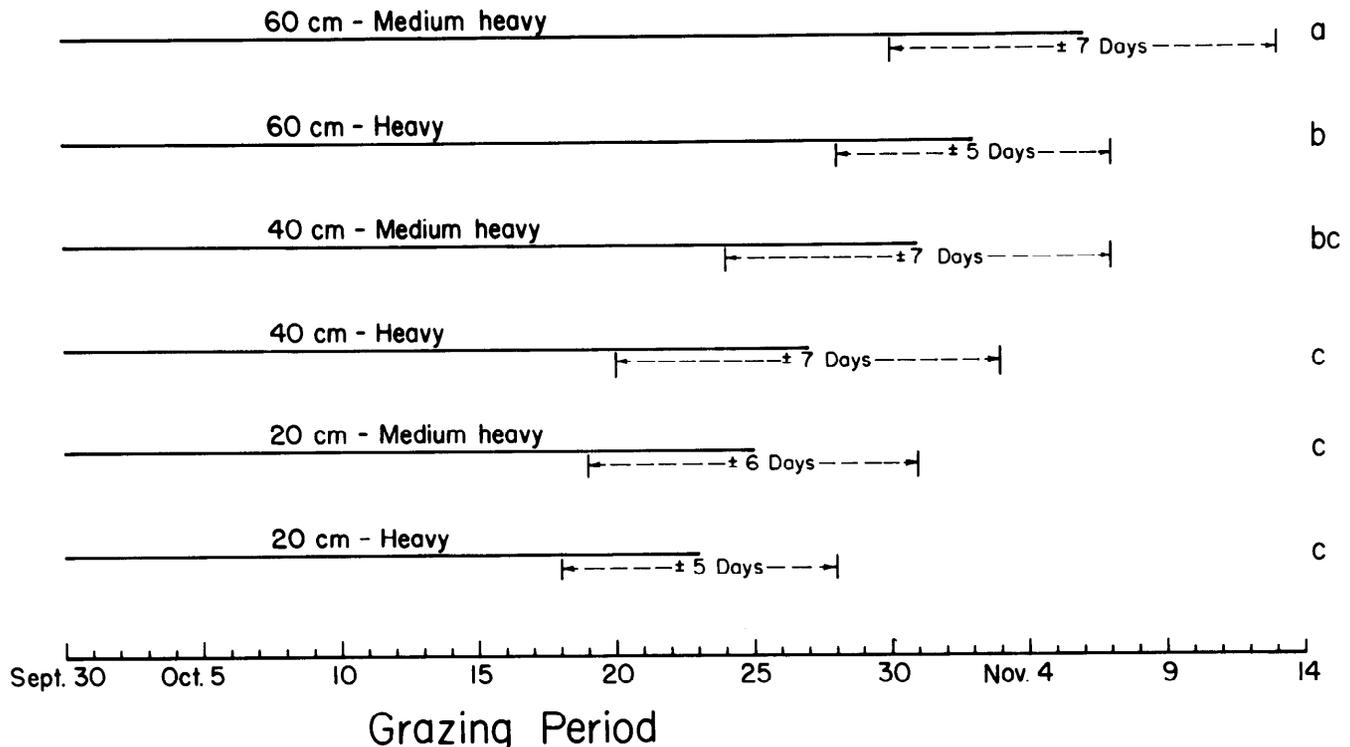
**Cattle Weights**

Throughout the experiment both gains and losses were recorded for the cattle on each treatment (Table 4). The net result was a small 9-year average annual weight gain for all of the medium heavy grazed pastures and a loss or near loss on all heavily grazed pastures. What it really amounted to was a maintenance of weight through the grazing period. Perhaps of more interest is the pattern of gain and loss within the grazing period that contributed to the maintenance level outcome. The average animal gain during the first grazing period up to first weighings was usually in excess of 1 kg per day (Table 5).

**Table 5. Distribution of average weight gain or loss (kg) per animal at successive 2-week weighings through grazing period.**

Row spacings and grazing intensity <sup>1</sup>	9-year average of 6 animals			Overall 9-year mean
	First weighing (after 2 weeks grazing)	Second weighing (after 4 weeks grazing)	Last weighing (at termination)	
20 M	23.1	5.9	-20.0	9.0
H	17.0	-0.3	-15.0	1.7
40 M	31.0	14.1	-36.0	9.1
H	33.1	0.7	-33.4	-0.4
60 M	30.0	6.2	-23.3	8.9
H	31.4	5.0	-35.1	1.3
Overall avg weighing means (gains or losses)	27.6	5.3	-27.1	

<sup>1</sup> M denotes medium heavy grazing; H denotes heavy grazing.



**Fig. 3. Mean length of fall grazing period showing a variation during the 9-year period as affected by row spacings and stocking rate.**

But, during the next 10 to 14 days the gains were small or absent. During the last period of use all cattle lost weight to the approximate weight level at which they went into the grazing test.

### Discussion

Lack of a better association between dry matter yield and grazing time as influenced by row spacing can be attributed to stemminess. Although individual plants have larger crowns and hence more leaves when grown in more widely spaced rows, they have proportionately more seed culms than do plants growing in rows which are more closely spaced. Cattle will not normally eat stems of Russian wildrye and will only take them after all available leaves have been grazed. By this time the cattle are obtaining insufficient feed for maintenance, and weight losses occur rather suddenly. Additionally, the weather became increasingly colder about the time that all leaf material was consumed so that maintenance requirements were increasing while feed supply was decreasing.

Although the intensity of use treatments were designated as medium heavy and heavy, they were in fact both considerably heavier than those a producer would most likely employ. Snowfall through November and most often into mid-December is usually low enough to permit grazing. If the stocking rate was adjusted to .75 ha per animal instead of the .32 and .43 used in this trial, the fall-winter grazing period could well extend to 2 months instead of the 5 weeks maximum obtained. This, in fact, is currently being obtained by stockmen in this area.

### Literature Cited

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