

COMPARISON OF UNGRAZED AND GRAZED RANGE VEGETATION

Statements are frequently made comparing ungrazed and grazed native range vegetation, usually with the implication that the grazed vegetation does not measure up to the ungrazed. Usually there are little or no factual data given to support these statements. With this situation in mind a study was started in the 1970 season to secure basic data on the differences in growth and production between grazed and ungrazed native range at the Dickinson Station. The grazed vegetation had been heavily grazed late in the fall for the past 13 years, while the ungrazed vegetation had been protected from grazing since the summer of 1961.

Plots were clipped on the ungrazed and grazed vegetation at approximate 2-week intervals throughout the growing season, with less frequent clippings made after the middle of August. A summary of the data obtained from the clippings is given in Tables 1 and 2. The values given in these tables are in g/m² and serve to show the details of vegetation development and change on the areas throughout the season. Tables 3 and 4 are summaries of pertinent data from Tables 1 and 2, but the results are reported in lbs/acre.

Considering that maximum usable forage production was reached by August 18 on both the ungrazed and grazed areas, it is apparent that the overall production for the season on the grazed area was somewhat less than on the ungrazed area. On this date the production for the season totaled 2,247 lbs/acre on the ungrazed area and 1,752 lbs/acre on the grazed area. Actual grass production, exclusive of forbs of all kinds, was 1,766 lbs/acre on the ungrazed area and 1,505 lbs/acre on the grazed area, a difference of only 17.3% in favor of the ungrazed vegetation.

The composition of the yield on August 18 was quite different between the ungrazed and grazed vegetation, as shown in Table 5. On the ungrazed site needle-and-thread (*Stipa comata*) made up 41.7% of the yield, while on the grazed site this species made up only 22.9% of the yield. While the production of western wheatgrass (*Agropyron smithii*), was over 30% more on the ungrazed site than on the grazed

site, the contribution of this species to the ungrazed production was only 13.4% of the total on this treatment. This species was 10.1% of the total yield on the grazed treatment. One of the major differences in the composition of the vegetation under the two treatments was the real and the percentage contribution of blue grama grass (Bouteloua gracilis) to the production of each of the areas. On the ungrazed area blue grama produced only 258 lbs/acre, 11.5% of the total yield from this treatment. On the grazed area the production of blue grama grass was 534 lbs/acre, 30.5% of the total yield from this treatment.

The yields in this trial were obtained by clipping all vegetation to the ground surface. Grazing by cattle cannot result in such intensive use, and usually a cover grazed by cattle would have as a very minimum a 1-inch stubble after the grazing period was over. At a height of 1-inch almost 50% of the weight of blue grama grass still remains on the ground. Thus the amount of grazable forage produced by the vegetation on the grazed area was further reduced by this difference in cover composition between the vegetation on the two areas.

Prairie sandreed (Calamovilfa longifolia) was of some importance in the vegetation of the ungrazed area but was present only in trace amounts in the grazed vegetation. This species, with a yield of 148 lbs/acre made up almost 7% of the total production on the ungrazed area. Plains reedgrass (Calamagrostis montanensis), on the other hand, was present in the grazed vegetation, where it produced 136 lbs/acre – 7.8% of the total -, while it was present only in significant amounts on the ungrazed area.

Production of forbs of all kinds totaled 481 lbs/acre on the ungrazed area, and only 248 lbs/acre on the grazed area. The ungrazed forb production was 21.4% of the total yield on this area, while the grazed forb production was 14% of the total yield on that treatment.

The production differences between the ungrazed and grazed vegetation could be summarized by saying that the total production of grass was slightly greater on the ungrazed than on the grazed area.

Composition differences, especially the larger proportion of the short blue grama grass in the grazed

vegetation, resulted in the proportion of usable forage on the ungrazed area being somewhat greater than the amount of usable forage produce on the grazed area. The total production of forbs (dry weight) was greater on the ungrazed than on the ungrazed area, although the actual number of forb individuals was greater on the grazed vegetation.

Observations of microclimatic conditions on the two sites showed that the large accumulation of dead material (litter) on the soil surface in the ungrazed area had a considerable influence on microclimatic factors. The grazed soil was warmer by several degrees than the ungrazed soil, and for most of the season it was drier, containing less soil moisture in the upper 4 feet than did the ungrazed area. Wind movement over the grazed area was appreciably greater than over the ungrazed area.

These studies are being continued with the objective of determining the influence of specific climatic factors on forage production by grazed and ungrazed range vegetation.

Table 1. Herbage dynamics on the ungrazed treatment (1) at the Dickinson Site – 1970 season.

Species	Gm/m ² at clipping times								
	May 25	June 10	June 24	July 8	July 22	Aug. 4	Aug. 18	Sept. 17	Oct. 17
Stipa comata	26.2	33.8	49.6	77.4	100.8	118.3	105.1	105.5	103.7
Agropyron smithii	4.0	7.4	26.5	23.9	29.0	27.2	33.8	34.6	12.9
Calamovifa longifolia	--	3.3	7.8	8.8	9.9	--	16.6	30.0	20.0
Bouteloua gracilis	1.2	4.8	10.4	19.4	25.9	20.4	28.9	29.8	25.0
Carex eleocharis	1.7	7.5	7.5	11.3	8.4	12.2	10.3	9.1	16.4
Miscellaneous grasses	--	--	5.8	3.1	0.3	0.4	3.3	4.4	5.2
Artemisia ludoviciana	2.6	11.9	18.7	19.9	37.7	36.3	42.6	83.0	52.9
Other perennial forbs	1.0	3.3	14.9	22.3	5.5	21.4	6.3	21.2	2.0
Biennial forbs	0.5	1.1	12.8	8.0	5.2	8.2	4.3	1.0	3.5
Annual forbs	--	0.1	0.9	4.8	0.2	0.5	0.7	1.3	0.9
TOTAL standing crop	37.2	73.2	154.9	198.9	222.9	244.9	251.9	319.9	242.5
Standing dead (previous year's)	331.3	383.2	345.5	276.1	333.8	331.0	271.8	352.5	286.0
Litter	796.7	604.2	538.3	523.4	626.8	624.9	661.5	607.0	648.8
TOTAL biomass	1165.2	1060.6	1038.7	998.4	1183.5	1200.8	1185.2	1279.4	1177.3
Selaginella densa	3.0	--	1.1	1.4	--	0.8	0.2	0.2	--
TOTAL with Selaginella	1168.2	1060.6	1039.8	999.8	1183.5	1201.6	1185.4	1279.6	1177.3

Table 2. Herbage dynamics on the grazed treatment (4) at the Dickinson Site – 1970 season.

Species	Gm/m ² at clipping times								
	May 25	June 10	June 24	July 8	July 22	Aug. 4	Aug. 18	Sept. 17	Oct. 17
<i>Stipa comata</i>	8.3	24.0	30.1	35.0	42.1	56.1	45.0	47.9	46.9
<i>Agropyron smithii</i>	--	5.5	6.2	10.6	11.7	7.9	19.8	16.3	11.1
<i>Calamagrostis montensis</i>	21.5	19.1	23.4	26.6	27.1	19.9	15.3	20.6	22.3
<i>Koeleria cristata</i>	5.5	12.3	6.4	18.0	13.3	18.5	16.8	10.3	15.9
<i>Bouteloua gracilis</i>	4.2	18.3	42.0	37.8	50.6	46.1	59.9	56.0	59.9
<i>Carex eleocharis</i>	4.6	6.8	16.9	13.7	13.8	11.0	11.5	8.1	7.5
Miscellaneous grasses	--	1.5	0.9	0.1	1.1	0.2	0.4	--	--
<i>Artemisia ludoviciana</i>	--	--	--	3.0	1.6	3.4	4.2	5.2	--
Other perennial forbs	4.3	11.1	16.9	21.6	24.0	21.8	18.3	33.2	20.8
Biennial forbs	--	--	--	--	--	0.1	0.2	--	0.2
Annual forbs	--	1.4	5.9	5.0	4.1	3.4	5.0	12.3	2.1
TOTAL standing crop	48.4	100.0	148.7	171.4	189.4	188.4	196.4	209.9	186.7
Standing dead (previous year's)	17.4	18.7	26.3	29.3	58.2	49.8	35.6	24.9	17.8
Litter	94.8	87.2	91.1	100.2	169.4	202.4	209.3	198.7	205.7
TOTAL biomass	160.6	205.9	266.1	300.9	417.0	440.6	441.3	433.5	410.2
<i>Selaginella densa</i>	43.6	30.6	54.3	42.4	35.6	45.1	25.9	47.6	70.8
TOTAL with Selaginella	204.2	236.5	320.4	343.3	452.6	485.7	467.2	481.1	481.0

Table 3. Plant material on the ungrazed site at selected dates in the 1970 summer season. (Oven-dry weight – lbs/acre).

Species	Dry weight – lbs/acre		
	June 10	July 8	August 18
Stipa comata	302	690	938
Agropyron smithii	66	213	302
Calamagrostis montanensis	-	-	-
Calamovilfa longifolia	29	79	148
Koeleria cristata	-	-	-
Bouteloua gracilis	43	173	258
Carex eleocharis	67	101	92
Miscellaneous grasses	-	28	29
Artemisia ludoviciana	106	177	380
Other perennial forbs	30	199	56
Biennial forbs	10	71	38
Annual forbs	1	43	6
Total standing crop	654	1774	2247
Standing dead	3418	2463	2424
Litter	5389	4669	5901
Total – all plant material	9461	8906	10,572

Table 4. Plant material on the grazed site at selected dates in the 1970 summer season. (Oven-dry weights – lbs/acre).

Species	Dry weight – lbs/acre		
	June 10	July 8	August 18
Stipa comate	214	312	400
Agropyron smithii	49	95	177
Calamagrostis montanensis	170	237	137
Calamovilfa longifolia	-	-	-
Koeleria cristata	110	161	150
Bouteloua gracilis	163	336	533
Carex eleocharis	61	122	103
Miscellaneous grasses	13	1	4
Artemisia ludoviciana	-	27	37
Other perennial forbs	99	193	163
Biennial forbs	-	-	2
Annual forbs	13	45	45
Total standing crop	892	1529	1751
Standing dead	167	261	318
Litter	778	894	1867
Total – all plant material	1837	2684	3936

Table 5. Percentage composition by species of current plant production on ungrazed (U) and grazed (G) sites at selected dates in the 1970 season.

	<u>June 10</u>		<u>July 8</u>		<u>Aug. 18</u>	
	U	G	U	G	U	G
Stipa comata	46.2	24.0	38.9	20.4	41.7	22.9
Agropyron smithii	10.1	5.5	12.0	6.2	13.4	10.1
Calamagrostis mont.	-	19.1	-	15.5	-	7.8
Calamovilfa longifolia	4.5	-	4.4	-	6.6	-
Koeleria cristata	-	12.3	-	10.5	-	8.6
Boutelous gracilis	6.6	18.3	9.8	22.1	11.5	30.5
Carex eleocharis	10.2	6.8	5.7	8.0	4.1	5.9
Misc. grasses	-	1.5	1.6	0.1	1.3	0.2
Artemisia ludoviciana	16.3	-	10.0	1.8	16.9	2.1
Other perennial forbs	4.5	11.1	11.2	12.6	2.5	9.3
Biennial forbs	1.5	-	4.0	-	1.7	0.1
Annual forbs	0.1	1.4	2.4	2.9	0.3	2.5
TOTAL STANDING CROP	100.0	100.0	100.0	100.0	100.0	100.0