ND1906: Three Pasture Grazing System. D. E. Williams and L. Manske

Summary:

This trial compares animal performance on both a fertilized and unfertilized three pasture grazing system. The three pasture grazing rotation consists of: crested wheatgrass for spring and early summer, native range for mid to late summer, and Russian wild rye for fall. The fertilized pastures are given an annual spring broadcase application of 150 pounds of ammonium nitrate (33-0-0) per acre. Eight cow/calf pairs grazed each of the pastures with the size of all pastures being varied to compensate for the differences in forage production.

Forage production for 1981 (Table 3) increased substantially over that of the previous year and came close to the high production of 1978. In the fertilized Russian wild rye pasture, production was highest in 1981 (3071 pounds/A vs. 2727 pounds/A in 1978). Fertilizer increased the production on crested wheatgrass, native range, and Russian wild rye by 57, 31 and 90 percent, respectively. This increase in production allowed for 32% increase in the length of grazing on the fertilized system for a total grazing period of 164 days vs. 124 days on the unfertilized system.

Forage utilization (Table 2) was higher on native range than in past years, 59 and 69 percent for unfertilized and fertilized native respectively. Fertilized crested wheatgrass pasture was utilized 67% and the unfertilized pasture 61%. The Russian wild rye pastures were utilized 92 and 90% for the unfertilized and fertilized pastures.

Average daily gains (ADG) for calves (Table 2) showed little difference between the fertilized and unfertilized pastures. The tame grass pasture did seem to show higher ADG when compared to the native pastures. Average daily gain on the native fertilized and unfertilized pasture was 1.5 and 1.8 pounds respectively, whereas the crested wheatgrass and Russian wild rye showed average daily gains of 2.1 pounds for the calves. Cows showed gain throughout the 1981 grazing season (Table 2). The ADG for cows was higher on the fertilized tame grass pasture than the unfertilized (one pound vs. .3 pound). The bulls showed a loss of .1 pound per day on the unfertilized crested wheatgrass and maintained weight on the fertilized crested wheatgrass and native pastures. The bulls were removed from the trial after grazing of native pastures had ended.

The four year average (Table 3) of calf ADG shows trends similar to those in 1981. Difference in ADG for calves in the unfertilized and fertilized native pastures is larger (1.8 ADG vs. 1.4 ADG). This is mainly due to the fact that the calves stayed longer on the fertilized native with gains being poorer while grazing during the latter part of the season.

Average gain per acre (Table 2) for the fertilized and unfertilized tame grass and native pastures reveals much as far as difference in calf productivity between these two systems. Calf gains, for 1981, were nearly doubled when comparing fertilized and unfertilized crested wheatgrass and native pastures. Calf gains for the Russian wild rye pasture were higher in the fertilized pasture than the unfertilized, but not to the extent seen in the fertilized crested and native pastures. This is mainly due to the extended grazing of the Russian wild rye into a period in which poorer gains result due to less nutritious forage available.

When considering the difference in gain per acre of calves (for 1981) on the fertilized system vs. the unfertilized system, the additional calf gains produced from the fertilized system paid for the cost of the fertilizer.

The cost of fertilizer in 1981 was $13.35 per acre. Assuming that calves are selling for 60 cents/pound, the fertilized system would have to produce an average of 22 more pounds of calf per acre than the unfertilized system to break even. Calf gains for the fertilized system for 1981 averaged 68 pounds per acre. This amounted to 27 pounds more than those produced on the unfertilized system. The net gain per acre was 5 pounds or a return of $3/acre. The four year average calf gains were 23 pounds per acre higher on the fertilized system. Assuming a four year average cost of fertilizer of $11.55 per acre and the selling of 60 cent calves, 19 pounds more calf gains per acre would have to be produced to break even. The four year average gain per acre was 4 pounds or a return of $3 per acre. When considering the extra cow gains on the fertilized system, fertilizer application becomes more cost efficient.

Table 1. Forage Production and Utilization during the Grazing Periods – Grazing Systems Trial 1978-1981

Pastures	Pastures Size Acres	Year	Period Grazed	Days In Period	Forage Produced Lbs/acre	Forage Utilized Lbs/acre	Forage Left On Ground Lbs/acre	Period Utilization
Crested Wheatgrass (unfertilized)	16	1978	5/22-6/19	28	2030	1068	962	53
		1979	5/22-6/22	31	1675	1174	501	70
		1980	6/23-7/7	14	663	263	400	40
		1981	5/21-6/23	33	1649	1014	635	61
Crested Wheatgrass (fertilized)	8	1978	5/15-7/10	56	5060	3426[1/]	1634	68
		1979	5/22-6/22	31	2243	1713	530	76
		1980	6/23-7/7	14	1198	688	510	57
		1981	5/15-6/16	33	3589	1742	847	67
Native Grass (unfertilized)	18	1978	6/19-8/14	56	1954	1141	813	58
		1979	6/22-7/20	28	1195	290	905	24
		1980	7/7-7/23	16	825	120	705	14
		1981	6/24-7/28	35	1906	1122	784	59
Native Grass (fertilized)	12	1978	6/19-8/14	56	1954	1141	813	58
		1979	6/22-7/20	28	1195	290	905	24
		1980	7/7-7/23	16	825	120	705	14
		1981	6/17-8/4	49	2505	1731	776	69
Russian Wild Rye (unfertilized)	16	1978	8/14-9/29	46	1760	1320	440	75
		1979	7/20-8/23	34	1280	1033	247	81
		1980	7/23-8/12	20	414	381	33	92
		1981	7/29-9/22	56	1612	1483	129	92
Russian Wild Rye (fertilized)	16	1978	9/15-11/9	55	2727	1963	764	72
		1979	7/20-8/30	41	1754	1386	368	79
		1980	7/23-8/12	20	602	530	72	88
		1981	8/5-10/26	82	3071	2764	307	90

1/ 625 lbs/acre of hay were removed in early September.

Table 2. Average Forage Production and Utilization – Grazing Systems Trial 1978-1981

Pasture	Size (Acres)	Days Of Grazing	Forage Production (lbs/A)	Forage Utilized (lbs/A)	Left On Ground	Percent Utilization
Crested Wheatgrass (unfertilized)	16	26	1504	880	624	58
Crested Wheatgrass (fertilized)	8	33	2772	1892	880	68
Native Grass (unfertilized)	18	34	1470	668	802	45
Native Grass (fertilized)	12	40	2404	1456	948	60
Russian Wild Rye (unfertilized)	16	39	1266	1054	212	83
Russian Wild Rye (fertilized)	16	49	2038	1661	377	82

Table 3. Weights and Gains of Cows and One Bull – Grazing Systems Trial 1978

Pastures	Period Grazed	Days In Period	No. of Cows & Bull 1/	Avg. Initial Wt/Cow Lbs.	Avg. Final Wt/Cow Lbs.	Avg. Gain/hd Lbs.	Avg. Daily Gain/hd Lbs.	Avg. Gain/A Lbs.
Crested Wheatgrass (unfertilized)	5/22-6/19	28	10 (0)	990	1044	55	2.0	34
Crested Wheatgrass (fertilized)	5/15-7/10 6/12-7/10	56 (28)	(10) (1)	958 (885)	1066 (1000)	108 (115)	1.9 (4.1)	135 (14)
Native Grass (unfertilized)	6/19-8/14	56 (56)	10 (1)	1044 (1115)	1069 (1145)	25 (30)	0.4 (0.5)	14 (2)
Native Grass (fertilized)	7/10-9/15 (7/10-8/7)	67 (28)	10 (1)	1066 (1000)	1008 (1040)	-58 (40)	-0.9 (1.4)	-5 (3)
Russian Wild Rye (unfertilized)	8/14-9/29	46	10	1070	1084	14	0.3	9
Russian Wild Rye (fertilized)	9/15-11/9	55	10	1008	1092	84	1.5	52

1/ ( ) indicates data pertaining to bulls.

Table 4. Weights and Gains of Cows and One Bull – Grazing Systems Trial 1979

Pasture	Period Grazed	Days In Period	No. of Cows & Bull 1/	Avg. Initial Wt/Cow Lbs.	Avg. Final Wt/Cow Lbs.	Avg. Gain/hd Lbs.	Avg. Daily Gain/hd Lbs.	Avg. Gain/A Lbs.
Crested Wheatgrass (unfertilized)	5/22-6/22	31	10 (1)	970 (1190)	1038 (1110)	67 (-80)	2.2 (-2.5)	42 (-5)
Crested Wheatgrass (fertilized)	5/22-6/22	31	10 (1)	976 (1135)	1064 (1110)	88 (-25)	2.8 (-0.8)	110 (-3)
Native Grass (unfertilized)	6/22-7/20	28	10 (1)	1038 (1110)	1080 (1135)	42 (25)	1.5 (1.9)	23 (2)
Native Grass (fertilized)	6/22-7/20	28	10 (1)	1064 (1110)	1084 (1130)	19 (20)	0.7 (0.7)	16 (2)
Russian Wild Rye (unfertilized)	7/20-8/23	34	10 (1)	1080 (1135)	1098 (1160)	18 (25)	0.5 (0.7)	11 (1.5)
Russian Wild Rye (fertilized)	7/20-8/30	41	10 (1)	1084 (1130)	1124 (1140)	41 (10)	1.0 (0.2)	26 (0.8)

1/ ( ) indicates data pertaining to bulls.

Table 5. Weights and Gains of Cows and One Bull – Grazing Systems Trial 1980

Pasture	Period Grazed	Days In Period	No. of Cows & Bull 1/	Avg. Initial Wt/Cow Lbs.	Avg. Final Wt/Cow Lbs.	Avg. Gain/hd Lbs.	Avg. Daily Gain/hd Lbs.	Avg. Gain/hd Lbs.
Crested Wheatgrass (unfertilized)	6/23-7/7	14	7	1127	1108	-19	-1.4	-8.3
Crested Wheatgrass (fertilized)	6/23-7/7	14	7	1089	1075	-14	-1.0	-12.2
Native Grass (unfertilized)	7/7-7/23	16	7 (1)	1108 (1050)	1108 (1095)	0 (45)	0 (2.8)	0 (2.5)
Native Grass (fertilized)	7/7-7/23	16	7 (1)	1075 (1095)	1065 (1105)	-10 (10)	-.6 (.6)	-5.8 (.6)
Russian Wild Rye (unfertilized)	7/23-8/12	20	7 (1)	1108 (1095)	1141 (1160)	33 (65)	1.6 (3.2)	14 (4)
Russian Wild Rye (fertilized)	7/23-8/12	20	7 (1)	1065 (1105)	1134 (1155)	69 (50)	3.5 (2.5)	30 (3)

1/ ( ) indicates data pertaining to bulls.

Table 6. Weights and Gains of Cows and One Bull – Grazing Systems Trial

Pasture	Period Grazed	Days In Period	No. of Cows & Bull 1/	Avg. Initial Wt/Cow Lbs.	Avg. Final Wt/Cow Lbs.	Avg. Gain/hd Lbs.	Avg. Daily Gain/hd Lbs.	Avg. Gain/hd Lbs.
Crested Wheatgrass (unfertilized)	5/21-6/23	33	8 (1)	1138 (1045)	1148 (1040)	10 (-5)	.3 (-.1)	5 (-.3)
Crested Wheatgrass (fertilized)	5/15-6/16	33	8 (1)	1010 (1190)	1042 (1190)	32 (0)	1.0 (0)	32 (0)
Native Grass (unfertilized)	6/24-7/28	35	8 (1)	1148 (1040)	1161 (1040)	13 (0)	.4 (0)	6 (0)
Native Grass (fertilized)	6/17-8/14	49	8 (1)	1042 (1190)	1044 (1190)	2 (0)	.1 (0)	1.3 (0)
Russian Wild Rye (unfertilized)	7/29-9/22	56	8 (0)	1161 (0)	1180 (0)	19 (0)	.3 (0)	19 (0)
Russian Wild Rye	8/5-10/26	82	8 (0)	1044 (0)	1127 (0)	83 (0)	1.0 (0)	41 (0)

1/ ( ) indicates data pertaining to bulls.

Table 7. Weights and Gains of Calves – Grazing Systems Trial 1978-81

Pasture	Year	No. of Calves	Avg. Initial Wt/Calf Lbs.	Avg. Final Wt/Calf Lbs.	Avg. Gain/hd Lbs.	Avg. Daily Gain/hd Lbs.	Avg. Gain/hd
Crested Wheatgrass (unfertilized)	1978	10	180	228	48	1.7	30
	1979	10	160	218	58	1.9	36
	1980	7	256	288	31	2.2	14
	1981	8	155	224	69	2.1	34
Crested Wheatgrass (fertilized)	1978	10	152	255	103	1.8	129
	1979	10	171	252	81	2.6	101
	1980	7	261	286	25	1.8	22
	1981	8	148	221	73	2.2	73
Native Grass (unfertilized)	1978	10	228	328	100	1.8	56
	1979	10	218	275	57	2.0	32
	1980	7	288	320	32	2.0	12
	1981	8	224	286	62	1.8	27
Native Grass (fertilized)	1978	10	255	342	87	1.3	73
	1979	10	252	291	39	1.4	32
	1980	7	286	313	26	1.6	15
	1981	8	221	296	75	1.5	50
Russian Wild Rye (unfertilized)	1978	10[1/]	328	410	82	1.8	51
	1979	10	275	352	77	2.3	48
	1980	7	320	365	45	2.2	20
	1981	8	286	412	126	2.2	63
Russian Wild Rye (fertilized)	1978	10	342	426	84	1.5	52
	1979	10	291	368	77	1.9	48
	1980	7	313	369	56	2.8	24
	1981	8	296	459	163	2.0	81

1/ one calf died 9/24/78.

Table 8. Four Year Average Weights and Gains of Cows, Calves, and One Bull, Grazing Systems Trial – 1978-81

Pasture	Class Of Cattle	Avg. Initial Weight (lbs)	Avg. Final Weight (lbs)	Avg. Gain/hd (lbs)	Avg. Daily Gain/hd (lbs)	Avg. Gain/A (lbs)
Crested Wheatgrass (unfertilized)	Calf	188	239	51	1.9	28
	Cow	1056	1084	28	.8	18
	Bull	1117	1075	-42	-1.3	-2.6
Crested Wheatgrass (fertilized)	Calf	183	253	70	2.1	81
	Cow	1008	1062	54	1.2	66
	Bull	1070	1100	30	1.1	3.7
Native Grass (unfertilized)	Calf	239	302	63	1.8	32
	Cow	1084	1104	20	.6	11
	Bull	1079	1104	25	1.0	1.6
Native Grass (fertilized)	Calf	253	310	57	1.4	42
	Cow	1062	1050	-12	-.2	1.6
	Bull	1099	1116	17	.7	1.4
Russian Wild Rye (unfertilized)	Calf	302	385	83	2.1	45
	Cow	1105	1126	21	.7	13
	Bull	1115	1160	45	1.9	2.7
Russian Wild Rye (fertilized)	Calf	310	405	95	2.0	51
	Cow	1050	1119	69	1.7	37
	Bull	1117	1141	30	1.3	1.9