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PASTURE MANAGEMENT FOR WESTERN NORTH DAKOTA
Project No. 1906

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Complementary Rotation Grazing System at the Dickinson Experiment Station

Summary

The 1985 grazing season was the third year of the complementary rotation grazing system at the ranch headquarters of the Dickinson Experiment Station. The complimentary rotation grazing system consists of a crested wheatgrass (Agropyron desertorum) pasture for spring grazing, a native range three pasture rotation with twice over on each pasture for summer grazing, and an altai wildrye (Elymus angustus) pasture for fall and early winter grazing. The trial compares animal performance and herbage production between two treatments. The east treatment will be interseeded with a pasture type alfalfa and the west treatment will not be interseeded and used as a control. The east treatment was interseeded in the spring of 1984 but the seedlings failed to become established because of the lack of precipitation in July. Pasture type alfalfas (Medicago falcata) are more difficult to establish and the seedlings are less than tolerant of drought conditions than the hay type alfalfas (M. sativa). Within each treatment, the herbage data was compared between the effects of grazing and ungrazing. During the 1983 grazing season both treatments were untreated to establish baseline data.

Complementary grazing uses tame grass or annual crop pastures to add to or complement native range pastures. Research on tame grass and the use of tame grass pastures has been conducted at the Dickinson Experiment Station since 1907 (Waldron 1908). Crested wheatgrass has been included in the studies since 1920 (Moomaw 1922). Grazing studies on crested wheatgrass have been conducted since 1955 (Whitman, Langford, Douglas and Conlon 1963). Grazing research on complementary grazing systems has been conducted since 1972 using steers

(Nyren, Whitman, Nelson and Conlon 1983) and since 1978 using cow-calf pairs (Manske, Nelson, Nyren, Landblom and Conlon 1984).

Crested wheatgrass is still the best spring pasture grass that has been developed for western North Dakota. Crested wheatgrass can be grazed from late April, in most years, until the native range is ready to graze in June. Native range grasses are generally very nutritious in early summer and good animal weight gains can be maintained. The nutritional quality generally decreases in late summer and calf weight gains are generally at the expense of the cow. Tame grass pastures of wildrye are of higher nutritional quality than native range in early fall. Cow and calf weight gains are improved on fall grazed tame grass pastures. Dry cows can graze on altai wildrye until early December without protein supplementation. With supplementation, the cows could graze until the weather dictated their removal.

Procedure

The purpose of this study is to attempt to: Maximize herbage and livestock production, lengthen the grazing season in the spring and fall, improve range condition of native range, and reduce acreage required to carry a cow and calf.

The data that was collected from these pastures were above ground herbage production, species composition by tenpin point frame and 0.1 meter square quadrats, leaf height measurements and phenological phases of eight major graminoid species, and animal performance by weight changes.

Four sample sites were systematically selected for each of the tame grass pastures. Each of the native range pastures had a sample site on each of the four major range sites. Each of the respective range site sample sites were selected for similar soil, slope, and aspect in each pasture.

The above ground herbage production was sampled by clipping the vegetation to ground level inside 1/4 meter square quadrats both inside and outside enclosure cages. The herbage was separated into nine categories, cool short, warm short, cool mid, western wheatgrass, warm mid, warm tall, sedges, forbs, and shrubs. The samples were oven dried at 80^{o}C. The average herbage production for each category and the total production for each site were determined for each clipping period.

Quantitative species composition data were collected by the ten pin point frame method (Levy and Madden 1933, Tinney, Aamodt, and Ahlgren 1937, Heady and Rader 1958, and Smith 1959). One thousand points were read for each sample site. Forb and shrub density data were collected with a 0.1 meter square quadrat. The forbs and shrubs that were rooted within the frame were counted by species in each of the 25 quadrats per sample site.

Animal performance was determined by weight gains or losses. Cattle were weighed on and off each pasture during the scheduled rotation periods. These data were converted into mean weight gain in pounds per day per head and mean weight gain in pounds per acre for the calves, cows and bulls. Twenty four cow/calf pairs of commercial Hereford X Angus were used on each treatment in 1985.

Results and Discussion

The condition of the pastures has improved since the beginning of this study. The plant species composition (table 1) has improved and the herbage production (table 2) has generally improved in relation to environmental conditions. The stocking rate (table 3) has been increased annually as the condition of the pastures has improved.

Table 1. Total % Basal cover, 1982 & 1984

	Live Vegetation	Litter	Soil
1982	30	54	16
1984	36	63	1

Table 2. Mean Herbage Production in Lbs/Acre

	1983	1984	1985
Crested Wheatgrass	1663	1661	2142

Native Range			
Clayey (18%)	1337	1142	1701
Sandy (26%)	1416	1231	1976
Shallow (28%)	1084	884	1277
Silty (18%)	1618	1413	1901
Altai Wildrye	2020	4058	4115

Table 3. Stocking Rate

	acres/AUM				
	S.C.S. recommended	1983	1984	1985	1986 projected
# Cow-calf pairs	13	16	19	24	26
Crested Wheatgrass		0.83	0.90	0.72	0.69
Native Range	4.07	3.33	2.75	2.10	2.00
Altai Wildrye		2.70	0.63	0.84	0.58

Animal weight gains (table 4) have been good on the complementary rotation grazing system. The calf gains have been close to or above 2 pounds per day. Cow gains have been acceptable except in 1985 on the altai wildrye

pastures when a winter storm prohibited grazing in early December. Cows on season long native range grazing systems generally experience a weight loss in late July or early August through the removal date. The cows on this system have not experienced this customary weight loss until September or early October.

Table 4. Animal Weight Gain in Pounds

	Mean gain/day/head (ADG) and mean gain/acre (G/A)							
	Crested Wheatgrass		Native Range		Altai Wildrye		System	
	ADG	G/A	ADG	G/A	ADG	G/A	ADG	G/A
1983								
Cow	2.65	97.9	0.82	7.4	0.51	5.7	1.10	11.4
Calf	1.76	65.0	2.21	19.9	1.52	17.0	2.06	21.7
1984								
Cow	3.11	105.3	0.25	2.8	0.02	1.0	0.46	7.4
Calf	2.14	72.4	1.96	21.7	1.16	35.3	1.81	25.5
1985								
Cow	2.20	93.4	0.50	7.3	-1.90	-68.4	0.17	3.1
Calf	1.88	79.8	1.99	28.9	2.58	51.6	2.05	33.

The grazing season on the complementary rotation grazing system at the Dickinson Experiment Station has been 217 days (7.1 months) between 1 May to 31 December with the potential to expand to 255 days (8.4 months) between 20 April to 31 December. This is compared to the traditional grazing season of 183 days (6 months) from 15 May to 15 November.

The acreage required to feed a cow and a calf for the 7.1 months on the complementary grazing system in 1985 was 11.58 acres . It would require 24.42 acres to feed the same cow and calf on a 6 month season long grazing system on native range alone in the same area.

If a livestock producer used a complementary grazing system similar to the one used at the Dickinson Experiment Station, he could: Lengthen the grazing season, reduce the acreage required to feed a cow and calf, and increase the amount of saleable beef from his unit.

Literature Cited

Heady, H.F. and L. Rader. 1958. Modifications of the point frame. Journal of Range Management. Vol ll (2):95-96.

Levy, E.B. and E.A. Madden. 1933. The point method of pasture analysis. New England Journal of Agriculture. Vol. 46:267-279.

Manske, L.L., J.L. Nelson, P.E. Nyren, D.G. Landblom and T.J. Conlon. 1984. Complementary grazing system, 1978-1982. Proceedings North Dakota Chapter of the Society for Range Management. Dickinson, North Dakota. pp 37-50.

Moomaw, Leroy. 1922. Report of the Dickinson substation, 1920-1921. Agricultural Experiment Station, North Dakota Agricultural College. Bulletin 160.

Nyren, P.E., W.C. Whitman, J.L. Nelson and T.J. Conlon. 1983. Evaluation of a fertilized 3-pasture system grazed by yearling steers. J. Range. Manage. 36:354-358.

Smith, Justin G. 1959. Additional modifications of the point frame. Journal of Range Management. Vol. 12(4):204-205.

Tinney, F.W., O.S. Asmodt and H.L. Ahlgren. 1937. Preliminary report of a study on methods used in botanical analysis of pasture awards. Journal of the American Society of Agronomy. Vol. 29(10):835-840.

Waldron, L.R. 1908. First annual report of the Dickinson Sub-Experiment Station for the year 1908. N. Dakota Agricultural Experiment Station Agricultural College, North Dakota.

Whitman, W.C., L. Langford, R.J. Douglas and T.J. Conlon. 1963. Crested wheatgrass and crested wheatgrass-alfalfa pastures for early-season grazing. N. Dakota Agricultural Experiment Station. Bulletin 442. 24 p.

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