Beef Production and Grazing Capacity From a Combination of Seeded Pastures Versus Native Range

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by *Robert Lang*[1] and *Leland Landers*[2]

PREVIOUS RESEARCH has shown that pastures seeded with adapted introduced species in southeastern Wyoming produced from 1½ to 2½ times as great grazing capacity and, in terms of animal gains per acre, from 1½ to 3 times as great as from native shortgrass range.* Seeded pastures, however, should be grazed at the proper stage of growth to attain the greatest benefit in terms of grazing capacity and meat production. Establishing seeded pastures on dryland involves considerable expense, and their productivity decreases with age. It is theorized that in those farming communities of the Great Plains where native range is limited, a combination of seeded pastures used at the proper stage of growth would permit an increase in livestock production with no increase in total acres of grazing land. With this in mind, the authors undertook a study to determine the productivity of a combination of seeded pastures in contrast to that of an equal acreage of native range.

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*Barnes, O. K., and A. L. Nelson, 1950. Dryland pastures for the Great Plains. Wyo. Agric. Exper. Sta. Bul. 302.

METHODS OF PROCEDURE

In the spring of 1952, 120 acres of revegetated abandoned farm land on the Gillette Substation was plowed and seeded with small grain, and 120 acres of native range (mixed shortgrass and midgrass) was set aside for this grazing study. In the following year the 120-acre tract which had been seeded with small grain was fenced into six pastures. Two pastures of 14 acres each were seeded with standard crested wheatgrass, two pastures of 28 acres each were seeded with intermediate wheatgrass, and two pastures of 18 acres each were seeded with Russian wildrye. The grasses were seeded into the grain stubble of the previous year at the rate of 8 lbs. of seed per acre. A legume mixture of 2 lbs. of Ladak alfalfa and 1 lb. of yellow-blossom sweetclover per acre was seeded with the grasses on all pastures.

The grazing sequence was planned for the crested wheatgrass pastures to be grazed in the early spring and to be followed by the intermediate wheatgrass pastures in the summer period, when crested wheatgrass is normally dormant. The Russian wildrye pastures were to be grazed in late summer or fall since this species is highly palatable at any season of the year. The native range was to be grazed throughout its entire growing season.

In 1956 the native range was divided into two approximately equal pastures so that the spring grazing could be alternated from year to year.

Experimental grazing started May 19, 1954. Seven head of yearling Hereford steers were weighed on three consecutive days and entered on each of the two replicates of crested wheatgrass and eight yearling steers on the native range. The steers on the crested wheatgrass pastures were weighed and moved to the intermediate wheatgrass pastures on June 12; they remained on those pastures until July 16, a period of 35 days. The Russian wildrye stand was so poor that pastures seeded with this species were not grazed until the fall of 1955.

In 1954 the native range was grazed for a total of 76 days compared with 59 days on the crested wheatgrass and intermediate wheatgrass pastures combined.

In 1955 the stocking rate was the same as that used in 1954. Grazing started on May 6 and ended September 14 for a total of 134 days on both the native range and the seeded pastures.

The stocking rate on the seeded pastures was too light for proper utilization, and a considerable amount of forage was left on the pastures. This was later harvested for hay. The Russian wildrye pastures were reseeded in the spring of 1955 in an attempt to thicken the stand.

In 1956 the animals were weighed on the pastures on April 25 and removed September 14. A total of 145 days of grazing was attained on both the native range and the seeded pastures.

Grazing of the seeded pastures started with 10 yearling steers entered on each of the 2 intermediate wheatgrass pastures on April 30 in 1957. Two more steers were added to each of these lots on May 20.

Grazing of the native pasture was postponed to May 8, 1957, when eight steers were entered on the south half of this pasture. An additional steer was put on this pasture on May 20.

In 1958, 15 yearling steers were entered on each intermediate wheatgrass pasture on April 26. On this same date, 10 yearling steers were entered on the north half of the native pasture.

Figure 1 shows the periods of grazing for the five years reported in this study. The crested wheatgrass and the intermediate wheatgrass pastures were grazed alternately during the spring and summer since 1956. This was possible because spring rain caused considerable regrowth after the steers had been removed from a pasture, and this regrowth was grazed at a later date. Even with the greater number of animals grazed in 1957, much non-grazed vegetation was harvested for hay from the crested wheatgrass pastures. Still greater animal numbers in 1958 resulted in nearly complete utilization of the available forage on all pastures.

The precipitation during the five years of study was variable. The year 1954 was very dry with a little over 5 inches of moisture during the growing season of April 1 to September 30. This accounted for the short grazing season. The year 1957 was a wet year with 11.98 inches of precipitation received in the period of April 1 to September 30. Total and seasonal precipitation data and departure from normal from the Gillette Substation records are presented in Table 1.

TABLE 1—Precipitation Data from the Gillette Substation, 1954-1958

Year	Inches of total precipitation	Departure from 39-yr. av.	Inches of seasonal precipitation (Apr. 1-Sept. 30)	Departure from 39-yr. av.	Percentage of total in seasonal precipitation
1954	9.40	—4.79	5.06	—4.77	53.80
1955	14.09	—0.10	10.99	+1.16	78.00
1956	11.91	—2.28	9.13	—0.70	76.70
1957	15.68	+1.49	11.98	+2.15	76.40
1958	11.00	—3.27	8.08	—1.75	73.45
5 year av.	12.42	—1.77	9.04	— .79	72.79
39-yr. av.	14.19		9.83		

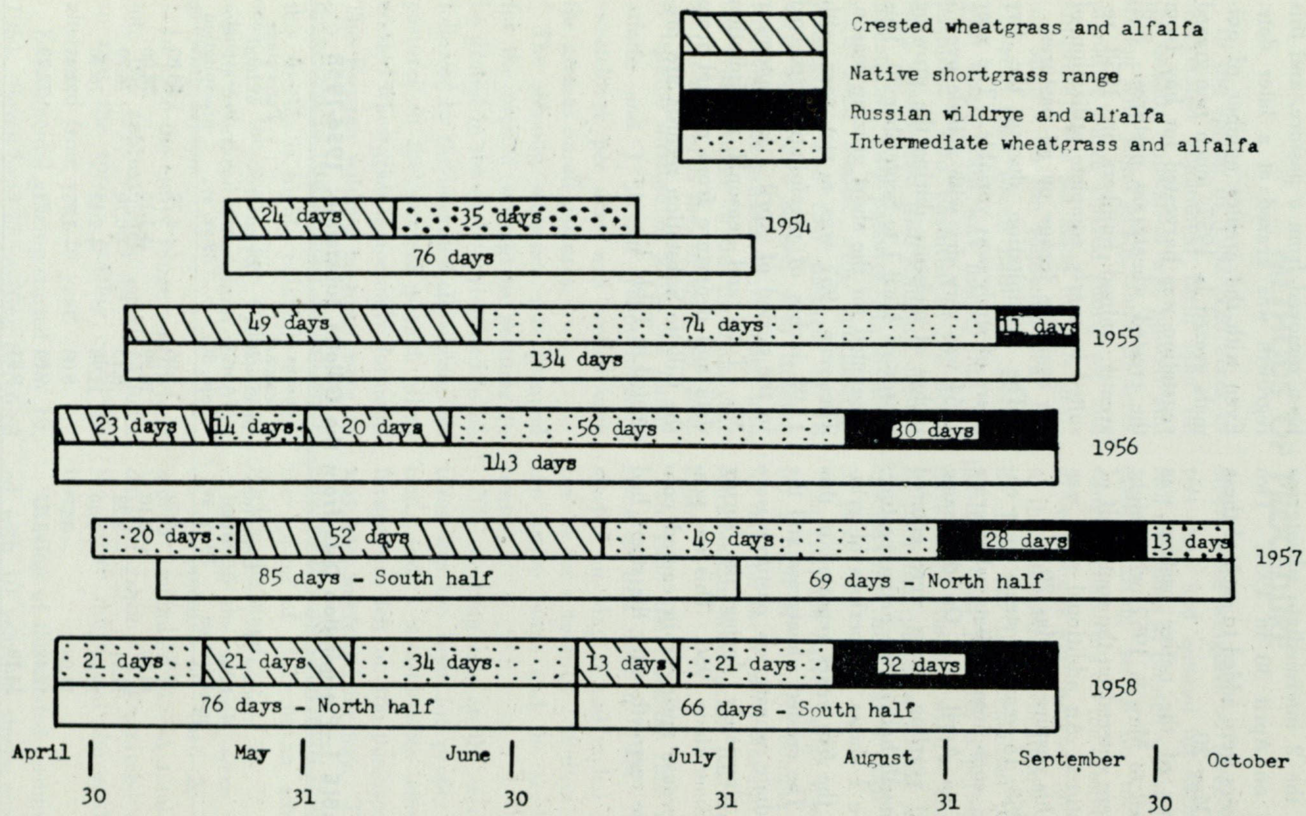

FIG. 1—Grazing periods on the different seeded pastures and on native shortgrass range at the Gillette, Wyoming, Station, 1954-1958.

RESULTS

Grazing capacity and steer gains, both in terms of per-acre and per-steer day, are presented graphically for the five years of study in Figure 2.

The grazing capacity from the combination of seeded pastures has exceeded that from native range by about 5 to 23 steer days per acre. The pounds of beef per acre has been from two to three times as great from the seeded pastures as from native range. However, in two years (1955 and 1957) very favorable amounts of precipitation occurred during the growing season (see Table 1).

The average gain per steer per day has been very similar from the native range and from the seeded-pasture combination, and there has been a general downward trend in this factor over the five-year study period. This may be accounted for by grazing the steers later into the fall than was the case in 1954 (the first year of the study). Animal gains during the last part of the grazing season, on both seeded and native pastures, were small; besides, in many instances, individual steers showed a loss in weight during this period even though plenty of cured forage was available.

Average gains per head per day were similar from the seeded pastures and from the native range during the first part of the grazing season. For example, in 1957 the gains per steer per day from the two types of pastures were 2.20 lbs. for 112 days and 2.11 lbs. for 104 days, respectively. These gains may be compared with .10 and .78 average pound of gain per steer per day from seeded and native pastures respectively, during the last one-third (50 days) of the 1957 grazing season. In other years the daily gains during the latter part of the grazing season were higher from seeded pastures than from native range.

The fact that the average steer gain per day from both types of pastures was so nearly alike would indicate that in neither case was forage utilization too close. Any significant degree of overgrazing would most surely be reflected in the gain per steer per day.

The amount of forage remaining on the pastures at the end of the grazing period was checked for the years 1955 through 1957 either by clipping randomized plots or, as was the case in 1955 and 1957, by harvesting surplus forage from certain pastures for hay and calculating the tonnage in the stack. Chemical analysis of the hay harvested from the crested wheatgrass and alfalfa pastures after grazing in 1957 showed an average crude-protein content of 4.53 percent. Forage remaining after grazing in 1958 was not measured because of early and persistent snow cover.

The approximate amount of vegetation remaining after grazing from 1955 to 1957 may be noted from Table 2.

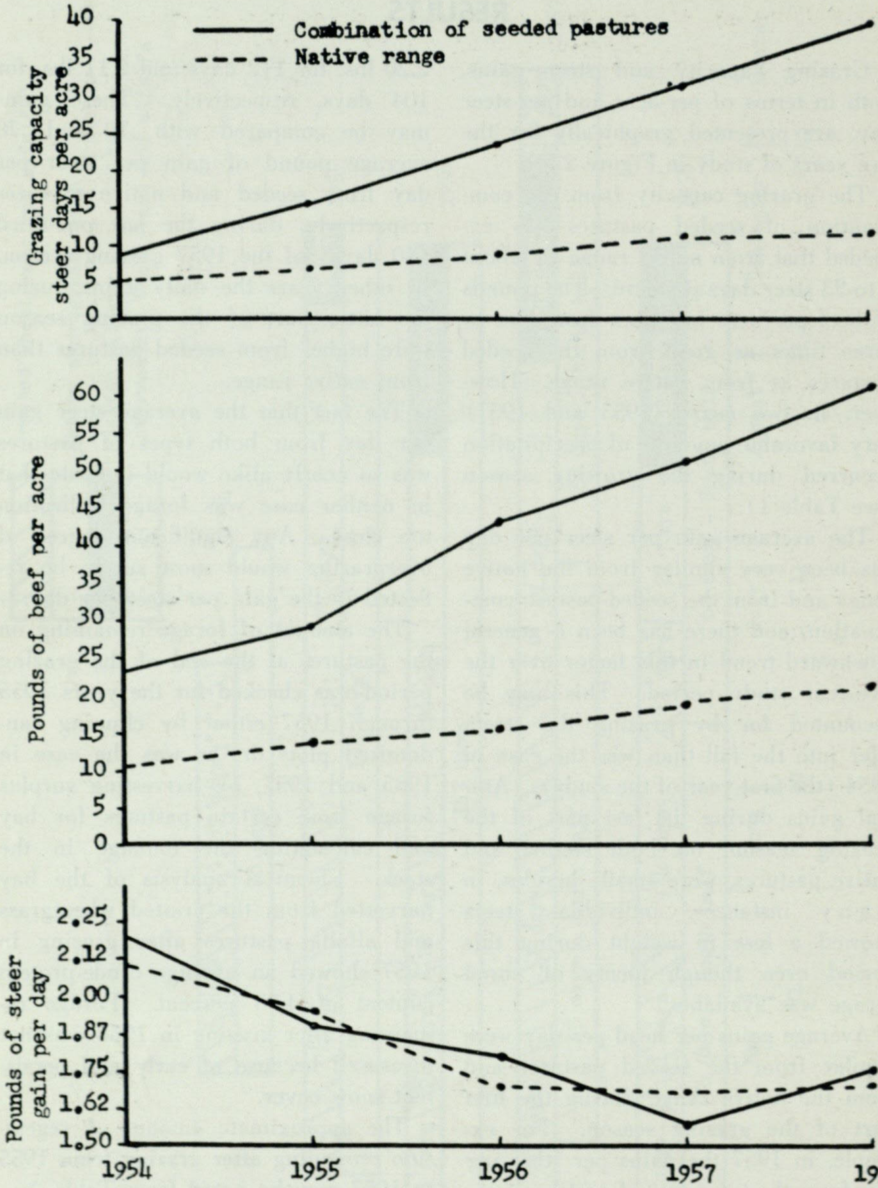

FIG. 2—Grazing capacity, pounds of beef produced per acre, and pounds of steer gains per day from a combination of seeded pastures and from native shortgrass range at the Gillette, Wyoming, Station, 1954-1958.

TABLE 2—Pounds of Vegetation per Acre Remaining after Grazing Four Types of Pastures, 1955 to 1957 Inclusive

		Pounds per acre air-dried		
		Grass	Alfalfa	Forbs
Crested wheatgrass and alfalfa pastures	1955	480	150	372
	1956	828	120	74
	1957	1000*	164	75
Intermediate wheatgrass and alfalfa pastures	1955	745	60	188
	1956	534	112	184
	1957	938	98	264
Russian wildrye and alfalfa pastures	1955	......	......	......
	1956	......	......	......
	1957	348	174	235
Native range	1955	273	.....	50
	1956	372	.....	31
	1957	321	.....	120

*Stack measured hay yield.

ANIMAL GAINS FROM INDIVIDUAL SPECIES

TABLE 3—Steer Gains per Head per Day from Individual Seeded Species and from Native Range During Comparable Grazing Periods

	Year	Gain from seeded species	Gain from native range
Animal gains from crested wheatgrass and native range during comparable periods of grazing	1954	2.00	1.20
	1955	2.45	2.33
	1956	2.37	2.91
	1957	2.56	2.50
	1958	1.72	1.70
	Average	2.22	2.13
Animal gains from intermediate wheatgrass and native range during comparable periods of grazing	1954	2.65	2.74
	1955	1.62	1.51
	1956	1.51	1.46
	1957	1.60	1.93
	1958	2.12	1.90
	Average	1.90	1.91
Animal gains from Russian wildrye and native range during comparable periods of grazing	1954	......	......
	1955	1.62	2.77
	1956	0.30	0.67
	1957	1.31	−0.12
	1958	0.90	1.40
	Average	1.03	1.18

The individual species were not grazed at exactly the same time each year, and yearly climatic differences caused differences in the stage of growth and in succulence of both the native and seeded species. Generally, the crested wheatgrass and the intermediate wheatgrass pastures were grazed in the spring and early summer during the period of rapid growth, and the Russian wildrye was utilized in late summer and early fall, when all species on both the seeded pastures and native range were largely matured.

Although it is not possible to make exact seasonal comparison of gains between the pasture types, the fact that all animals were weighed when those on the seeded pastures were changed from one species to another makes it possible to compare the gains from a seeded species with those from the native range for comparable periods of grazing. These data are summarized in Table 3. There was considerable variation between years and pasture types within years, but there was little difference in pounds of gain per steer per day during the same period of grazing regardless of pasture type.

ECONOMIC ADVANTAGE OF SEEDED PASTURES

As previously noted, the seeding of pastures is an expensive procedure which involves the actual costs of seedbed preparation, seed, etc., and the loss of grazing on the area during the time required for seedling establishment. In this study a detailed record of expenses and receipts was kept for the 120 acres seeded. These items are summarized as follow:

Item	Costs	Receipts
Small grain seed	$ 192.40	
Grass and legume seed	951.90	
Labor @ $1.00 per hr. preparing seedbed, planting and harvesting small grain and planting grass and legumes	492.00	
Gasoline, oil, grease (same operations as above)	156.53	
Sale of small grains produced		$1,757.30
Total cash costs and receipts	$1,792.83	$1,757.30
Loss of beef production for 2 yrs. (3926 lbs. @ $21.21 cwt.)	832.70	
Total costs not including depreciation, repair, or interest	$2,625.53	
Net cost of establishing 120 acres of seeded pastures not including depreciation, repair, or interest	868.23	
Net cost per acre	$ 7.24	

The net cost of establishing the 120 acres involved was $7.24 per acre, but this does not include depreciation, repair, or interest on the investment in machinery. Nor was there any credit allowance for A. S. C. payments to encourage the establishment of permanent grasses.

If the costs were to be based on local custom-farming rates, which would obviously include depreciation, repair, and interest and a monetary return for the operation, the cost of establishing the seeded pastures would be $13.35 per acre if no credit were allowed for A. S. C. payments. These calculations are summarized as follow:

Item	Cost	Receipts
Plowing 120 acres @ $3.00 per acre	$ 360.00	
Tandem discing @ $1.50 per acre	180.00	
Drilling grain @ $1.25 per acre	150.00	
Combining grain @ $4.00 per acre	480.00	
Drilling grasses and legumes @ $1.50 per acre	180.00	
Small grain seed	192.40	
Grass and legume seed	951.90	
Loss of beef production for 2 years (3926 lbs. @ $21.21 cwt.)	832.70	
Sale of small grains produced		$1,757.30
Total	$3,359.53	$1,757.30
Net cost of establishing 120 acres of seeded pastures	$1,602.23	
Net cost per acre	$ 13.35	

During the five years that the 120 acres of seeded pastures were grazed after establishment, they produced 14,169.60 more pounds of beef than on an equal area of native range. The additional production each year is summarized below:

Year	Additional pounds of beef
1954	652.80
1955	1,730.40
1956	3,201.60
1957	3,740.40
1958	4,844.40
Total	14,169.60

Considering this 14,169.60 lbs. of beef to be valued at $21.21 per cwt., the additional beef would be worth $3,005.37, and thus the cost of establishing the pastures, using the custom rates, with some profit, would have been recovered by the end of the fourth year of grazing.

Assuming that the seeded pastures will remain productive without additional costs (such as fertilization or renovation) for a total of ten years, a considerable economic advantage could be shown for a combination of seeded pastures compared with an equal area of native range.

SUMMARY

A study to compare grazing capacity and beef production from a combination of seeded pastures grazed at their optimum period of growth with native range was initiated at the Gillette Substation in 1954.

The seeded pastures consisted of standard crested wheatgrass for spring grazing, intermediate wheatgrass for summer grazing, and Russian wildrye for fall grazing. Each of these species was seeded with alfalfa and yellowblossom sweetclover. The native range was a mixture of shortgrasses, midgrasses, and forbs with some big sagebrush present in the composition.

Yearling Hereford steers were used as experimental animals, and weight records were taken periodically, so that gains could be calculated by either specific dates or for specific pastures.

Animal gains per day were similar for both seeded and native pastures. Gains per acre and grazing capacity were from 2 to 3 times as great from the combination of seeded pastures as from native range. The differences between pasture types were greater in 1957 and 1958 than in the three previous years of test.

Clipped plots showed that in 1955, 1956, and 1957 a considerable amount of forage remained on all pastures after grazing. Utilization was not measured in 1958 but was judged to be nearly complete.

When costs were calculated on a local custom-rate basis and no credit allowance was made for A. S. C. payments, the cost of establishing the seeded pastures plus some profit was realized during the first four years of grazing. As these seeded pastures may well be expected to be productive for an additional six years, with little or no additional costs, it could be assumed that this combination of seeded pastures would show considerable economic advantage over an equal acreage of native range.

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