Effects of Range Condition on Livestock Production

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THIS paper is a progress report on a survey to determine the influence of range condition on livestock production. While the data are not adequate to draw final conclusions, the information now available indicates certain tentative conclusions.

Range conservationists, both technicians and ranch operators, frequently need specific information on what can be expected in actual production from a range in different stages of range condition. A number of experiment station tests have shown that moderate grazing is more profitable than heavy grazing. Most such experiments are tests on grazing range in the same condition at different rates, although the result may be a change in range condition over a period of time. Yield studies by clipping support the assumption that the vegetative production is greater on range in top condition. Economic surveys on ranches have not usually been adapted to range condition analysis except for a few ranches analyzed by students of range management to compare the production and income "before and after" improvement.

It is generally conceded that range in good condition is better able to resist erosion and excessive runoff. Adequate figures are lacking on production of livestock for market from range in high condition as compared to range in lower condition to show which range condition yields the greatest returns.

This survey was initiated to obtain case records from typical commercial ranches to answer the question whether a range in good condition is more, or less, profitable than a similar range in poor condition. The Southern Great Plains of New Mexico and Colorado, in the mixed prairie association was selected as the study area because it contains many ranches that have comparable types of range, systems of grazing use, and methods of production.

The breeding cow ranch was selected as the typical ranch operation, and ranches with similar livestock programs were studied to eliminate possible differences in production due to the type of ranching. The ranches studied vary from 2,500 to 116,000 acres, but most of them were between 5,000 and 30,000 acres in size.

Supervisors of Soil Conservation Districts and Soil Conservation Service personnel in the Districts were helpful in selecting ranches because of their knowledge of ranchers and ranch management in their localities.

The ranch operators were contacted and the survey explained to them. If the ranch program appeared suitable for the survey and if agreeable to the operator, the surveyors made a field examination of the ranch and a careful study of the ranch records with the help of the ranch operator. The ranchers were very cooperative. They generally took time to discuss their records and management

problems thoroughly, accompanied the surveyor in examining the ranch for classification, and displayed a keen interest in the survey.

Range Site

The ranches in the survey represent a large area, and because of this a number of site variations would be expected to occur. A site is defined as an area capable of producing essentially similar vegetation when in top or climax condition. Range sites were determined as a part of the field work. While the difference in relative site production could not be determined with accuracy, limited clipping data indicate that differences between sites were not extreme except on bottom land receiving flood water or subsurface water.

The area is predominantly upland plains range site (Table 1). This is the dominant site on all but two ranches. The soil varies from sandy loam to clay loam. Blue grama (*Bouteloua gracilis*) occurs as the major forage plant. Galleta (*Hilaria jamesii*), buffalo grass (*Buchloë dactyloides*), and western wheat grass (*Agropyron smithii*) are the principal forage plants growing in association with it.

The second site in size is the stony and shallow hills and breaks. The major portion of this site is almost as productive as upland, but a small part is very rough and brushy. This site is also widely distributed, occurring on most ranches.

The sand site is not widely distributed and occurs principally on two ranches. The current rates of stocking and the clipping results do not indicate any major difference in the value of this site as compared to the upland site in the same condition.

A major part of the valley bottom site is in only fair condition and affected by gullies which generally reduce its pro-

TABLE 1

*Acreage by range sites and range condition class for each group of ranches**

SITE	RANCHES RATED GOOD CONDITION			RANCHES RATED FAIR CONDITION			RANCHES RATED POOR CONDITION		
	Range condition								
	Good	Fair	Poor	Good	Fair	Poor	Good	Fair	Poor
	acres			*acres*			*acres*		
Upland (mixed prairie grassland)	21,421	22,129	4,490	22,953	74,430	17,866	0	2,467	4,194
Stony and shallow hills and breaks, (brushy hills, pinon-juniper, lava ridges)	5,083	6,779	605	21,357	26,088	2,521	0	1,488	0
Sand	0	0	0	3,900	6,500	2,600	0	0	4,240
Valley (More or less flood irrigated	1,161	1,052	161	2,100	9,977	1,089	75	165	60
Vega (sedges, rushes, grasses—wet part of year)	893	218	0	96	0	0	0	0	0
	28,558	30,178	5,256	50,406	116,995	24,076	75	4,120	8,494
	(63,992)			(191,477)			(12,689)		
Total percentage of range in each condition by ranch groups	45	47	8	26	61	13	1	32	67

* All ranches contained a distribution of range in good, fair, and poor condition as shown this table.

ductive value to about that of the upland site.

The wet meadow or vega site is too small in area to be significant.

The distribution of sites on the ranches and the similar value of most of the sites appear to justify the conclusion that the site differences do not prevent direct comparison of the ranches.

Range Condition

The surveyor made a field survey of each ranch and mapped range sites and range condition on an aerial map. Range condition was delineated on the basis of four classes—excellent, good, fair, and poor. The basis used is described in the Range Conservation Handbook, Region 6, Soil Conservation Service. Each unit of range mapped was given a numerical rating which represented the estimated depletion. A weighted average of the condition of each ranch was computed from the ratings given to the individual areas. These figures are not necessarily exact values but the relative rank is essentially correct.

All the ranches studied contained considerable variation in range condition. There were poor condition areas and good condition areas on all ranches. Only a small acreage was rated excellent condition, and in the final calculations this was included with the good condition range. Abandoned fields and holding pastures contributed poor condition range on a number of the ranches. Isolated areas not freely grazed and pastures reserved for special purposes resulting in lighter use accounted for some good condition range on fair and poor condition ranches.

The ranches were not classified until the survey was completed. After the range condition was determined, the ranches were grouped into good, fair, and poor condition ranches on the basis of their relative ratings. It may be seen from Table 1 that the acreage of fair condition range exceeds the acreage in good condition for the top ranking group of ranches. The higher relative rating of the good condition is sufficient to increase the average of this group to good condition range.

Ranch Production

The rating of the ranches and the production of market livestock are summarized in Table 2. The average of each condition group is weighted by the size of the ranches to make a true average production of the total acreage in each group.

The ranches in good, fair, and poor condition produced 14.3 pounds, 11.2 pounds, and 8.9 pounds of beef per acre respectively. These differences are significant when we consider the productive ability of the range studied. The increase in production from poor to fair and good condition range is 25 percent and 60 percent respectively. This increase, at an average price of $0.25 per pound for livestock, represents a major increase in gross per acre income ranging from $0.60 to $1.60 per acre.

There is little difference in the rate of stocking for any of the groups of ranches. The good condition group shows a trend toward improvement and is producing more marketable tonnage of livestock, which suggests a higher forage production. It also suggests a more conservative past use which has permitted the good condition ranches to maintain or improve their forage production, enabling them to carry this rate of stocking and continue to improve. Fair condition ranches are producing less forage and are not improving, with a few exceptions, under the present rate of stocking. The poor condition ranches are deteriorating. This emphasizes the importance of cur-

rent forage production and range condition as the basis of correct range stocking.

The trend of the range condition for each ranch was determined by careful estimate. A stable, properly utilized ranch would not be expected to show a rapid trend in either direction so long as there are no extreme weather variations such as prolonged drouth, and none of the ranches in this study has a rapid trend in any direction.

Each of the ranches in good condition indicated a slow rate of improvement. The fair condition ranches showed more variation in trend. Some are improving, some are depreciating, and some show little change. The poor condition ranches are showing evidence of further depreciation in condition. The period of record has been a generally favorable period for range condition improvement due to favorable seasons although some of the ranches had some dry seasons.

The current utilization for the good condition ranches was generally proper. Use of fair condition ranches varied from proper to heavy. Utilization on poor condition ranches was very close.

TABLE 2

Range condition and beef production, breeding cow ranches

RANCH	AVERAGE RANGE CONDITION	TYPE OF OPERATION	STOCKING RATE PER ANNUM	AVERAGE PRODUCTION PER ACRE
			Acres	Pounds
		Good Condition Ranches		
1	Good	Cow-calf-yearling; some steers purchased	3.5	15.1
2	Good	Cow-calf	2.2	12.2
3	Good	Cow-calf-yearling; some steers purchased	2.7	16.0
4	Good	Cow-calf-yearling	2.9	17.5
5	Good	Cow-calf-yearling	2.1	17.6
		Weighted averages	2.8	14.3
		Fair Condition Ranches		
6	Fair	Cow-calf-yearling	2.6	9.7
7	Fair	Cow-calf-yearling	3.1	12.0
8	Fair	Cow-calf; some yearling	3.7	9.5
9	Fair	Cow-calf; some yearling	3.6	10.1
10	Fair	Cow-calf-yearling; some steers purchased	2.7	11.1
		Weighted averages	3.1	11.2
		Poor Condition Ranches		
11	Poor	Cow-calf	3.2	5.8
12	Poor	Cow-calf-yearling	2.7	11.3
		Weighted average	2.9	8.9
		Weighted Average All Ranches		
			3.0	11.9

The seasonal forage production has been at least fairly good for most of the period reported by the ranches. An extended drouth would probably reduce the yields of livestock shown here.

reason the survey included such information factors as calf crop, death loss, feeding practices, systems of grazing, time of calving, time of sale, age classes of sale animals, and other facts that

TABLE 3

Livestock management and grazing practices

RANCH NO.	CALF CROP	WEANING AGE	WEANING WEIGHT AVERAGE	AGE OF HEIFERS AT FIRST CALF	LENGTH OF BREEDING SEASON	WEIGHT OF YEARLINGS			GRAZING SYSTEM
						Steers	Heifers	Age	
	Percent	Months	Pounds	Years	Months	Pounds	Pounds	Months	
Good Condition Ranches									
1	93	6.5	363	2	6	730		19	Continuous
2	91	6.0	360	3	4.5				Continuous
3	95	7.0	440	2	10				Cont. defin. winter & summer pasture
4	95	8.5	480	2	5	710		18	Continuous
5	90			2	6	Mixed 672		18	Cont.with occas.past. deferment
Fair Condition Ranches									
6	80			3	5	675	600	17	Cont. defin. winter past.
7	86			2	4	740	715	19	Cont., occas. past. deferment
8	92	8.0	444	2 3 2	6				Continuous
9	90	8.0	445	3	6				Continuous
10	85	6.5	350	2	4				Continuous
Poor Condition Ranches									
11	80	6.5	357	2 3	6				Continuous
12	90	7.0	385	2	6	540 shortage yrl.		16	Continuous

MANAGEMENT FACTORS

The pounds of livestock sold is the actual measure of ranch production. The number of animals and management practices are not essential calculations for this survey. It seemed advisable, however, to take into account management practices that might have some influence on beef production. For this

might have a bearing on the beef production. Information on some of these practices is presented in Table 3.

Supplemental feeding practices vary. All ranches used concentrate supplements for short periods in storms, and most but not all made a regular practice of feeding protein concentrate during a part of the winter season. Most ranches added rough-

age for short periods during stormy weather. Many of the ranches fed mineral supplements occasionally. Two ranches in the fair condition group fed minerals throughout the year, and both are near the top production for that group. It may be that this practice has increased their beef production.

The age of calves at time of sale varied widely depending on time of calving. Late calves are held over to next season and sold as yearlings on some ranches which sell calves as the principal market product. Calves on the good condition ranches weighed more on a weight for age basis than on fair or poor condition ranches. However, calf weights are reasonably high on all ranches.

Calf crops were high on most ranches with only two ranches reporting less than 85 percent calf crop. The average by ranch groups is highest on the ranches in good condition.

Cow weights averaged heavier on the good condition ranches, but cows on several of the fair condition ranches equaled the best weights found.

There appears to be a variation in management practices that may influence production in some cases. For example, one of the best units studied from the standpoint of range condition has a lower production than the group average. Late calving is practiced because of late, cold, spring weather, and calves are sold at an early age and light weight in the fall. If protection and a management program for earlier calving were developed so that calves are seven to eight months old by fall sale time, the per-acre production could probably be materially increased.

The type and age of animals sold obviously will influence gross income because different classes of cattle sell for different prices per pound. The sale of cull cows is normally an important part of the total sales on all the ranches examined. As nearly as could be determined, cows made up approximately the same average percentage of sales from all ranches although the number fluctuated from year to year. No price differences due to quality of market livestock could be discovered.

It is not intended to refine this study to determine net profit. However, the information does indicate that all the groups have a similar price range for all livestock sold. The management practices are fairly similar, so gross income and profit should be expected to have the same general relationship for each group of ranches.

The explanation of the difference in market livestock production is explained by a combination of small differences. There is no great difference in calf crops, death losses, or weights of livestock, but the balance is always in favor of the ranches in good condition. There is a greater calf loss in the lower condition ranches, and the culled cows are lighter. The net results are quite significant, however, and the production and income are considerably increased as range condition improves. The livestock were better fed on the good condition range and responded to the better feed with greater beef yields.

Steer Ranches

There is an increasing practice in this area of grazing steers during the summer months. A number of ranches have disposed of cow herds and operate entirely as steer units. This has the advantage of eliminating the hazard of livestock on the range during the winter season. It has the disadvantage of heavy grazing use during the summer which is the critical growing period of the forage grasses.

A few steer ranches were analyzed in this survey. These ranches grazed steers from approximately May 1 to October or

November with a part of the steers on the ranch during winter in a few cases. The length of the grazing period averaged 5 months, extending to 8 months in a few instances. Most of the steer ranch records are for short periods, and steer grazing has not been practiced long enough to attribute present range condition to grazing by steers. However, the present trend is downward on most of the steer ranches.

The rate of stocking ranged from 11 to 16 acres per steer yearling. The daily gain was 1.3 to 1.8 pounds, averaging 1.6 pounds per day for the grazing period which is considered a satisfactory rate of gain. The per-acre gain ranged from 16 to 24 pounds per acre.

The highest daily gain of 1.8 pounds per steer day came from a poor condition ranch now stocked correctly at 16 acres per steer, which produced 16 pounds of gain per acre—the lowest per-acre yield recorded. The second highest rate of gain, 1.7 pounds per day, was from the ranch with the highest production per acre, 24 pounds. This ranch was the only steer ranch rating good condition and not on a downward trend. Its present high production is undoubtedly a result of its good condition. The per-acre production was consistently higher on the steer ranches with the best condition range.

The per-acre production is greater on steer ranches than on breeding herd ranches because steer ranches are not utilizing any forage in maintaining a breeding herd during the dormant season. This operation requires a heavy annual cash outlay to purchase the cattle, and the gain or beef produced usually has some costs to pay that do not occur on a cow ranch. There is an element of risk in grazing steers from possible unfavorable price changes and possible unfavorable forage production with unsatisfactory weight gains.

Summary

A survey was made of representative commercial cattle ranches in the Great Plains section of Colorado and New Mexico to determine the influence of range condition on production of market livestock. Range site and range condition maps were prepared by field survey. Ranch records were used to obtain the weight and quantity of livestock sold. Notes were made on livestock and range management practices. The data included calf crop, death loss, seasonal use practices, sale weights and other facts about the ranch operation. This data helped determine the adequacy of sale weights to represent normal ranch production.

The measure used for ranch production was the total weight of livestock marketed.

The ranches averaging good condition marketed an average of 14.3 pounds of cattle per acre.

The ranches averaging fair condition marketed 11.2 pounds of cattle per acre.

The ranches averaging poor condition marketed an average of 8.9 pounds of cattle per acre.

The better condition ranches have improved to such an extent that the forage production is increased. These ranches are stocked on the basis of forage production, not to maintain a fixed rate of stocking.

Several ranches were studied which are devoted chiefly to summer grazing of steers. There are indications that the use during summer only may produce good gains and high total beef production, but heavy summer use results in a downward trend. Steer ranches showed greater total livestock production from range in good condition than from range in a lower condition.