

# Behavior of Hereford Cows and Calves on Short Grass Range

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A thorough knowledge of animal behavior is essential for a proper understanding of the application of range management principles. It is, therefore, a remarkable fact that range men generally have given little consideration to the habits of grazing animals, particularly as they relate to desirable range management practices. Although a treasure of experience has undoubtedly been built up by ranchers and range men, little of their knowledge of cattle habits has been recorded in the literature. A Scottish farmer, James Anderson (1797), early developed a system of rotation pasture grazing based largely on his observations of cattle grazing habits. No such development can be traced in the annals of the western range in North America and even the recorded, planned studies are of rather recent date. Working in the Edwards Plateau section of Texas between 1923 and 1927, Cory (1927) developed some interesting comparisons of beef cattle, sheep and goat activities and habits on the range. He followed and observed the animals only throughout the "animal-day," i.e., the time period between arising and going to their rest or bedding down at night, apparently because he was convinced that "animals having gone to their rest will stay at rest during the night." Also, he assumed that the balance of the 24-hour period was spent resting. Cory's greatest interest was in the amount of time

spent in various activities such as grazing, resting, ruminating, idling and drinking water and the differences in time spent on these activities by different kinds of animals.

Similarly, in reporting several years of work with dairy cows and identical twins on pasture in New Zealand, Hancock (1952) emphasized grazing time, speed of grazing, rumination time and rumination rate and pointed out the relation between these activities and environment. These studies revealed the marked elasticity or capacity for adjustment possessed by cattle in their grazing behavior.

W. A. Hubbard (1952) reported several years of observations of beef cattle behavior on Canadian Plains ranges. Although many of the usual animal activities were observed and reported, Hubbard was primarily interested in kind and amount of range vegetation consumed by the animals.

Perhaps the most comprehensive work to come to our attention is that of Weaver and Tomanek (1951). These men recorded the activities of range cattle in Nebraska, throughout 24-hour periods for a typical day, a hot day and a cool day.

## The Study

To determine the behavior of beef cattle on northern Great Plains range, a series of observations was made in connection with a rate-of-stocking study in eastern Montana in 1945. This longtime study was conducted cooperatively by the Northern Rocky Mountain Forest and Range Experiment Sta-

tion, U. S. Forest Service, the Bureau of Animal Industry and the Montana Agricultural Experiment Station, at the U. S. Range Livestock Experiment Station near Miles City, Montana, from 1931 until late 1953 when reorganization transferred the project to Agricultural Research Service, U. S. Dept. of Agriculture, and consolidated the Northern Rocky Mountain Station with the Inter-mountain Forest and Range Experiment Station.

The experimental ranges involved have been described in detail by Hurtt (1951) and Holscher and Woolfolk (1953). Briefly, the primary characteristic of these was the dominance of the short and mid-grasses, such as blue grama, buffalo grass, bluestem wheatgrass and needleandthread grass. In addition, threadleaf sedge occurred commonly on ridges with light soil. Big sagebrush was common, but not dense, on the heavier upland soils. Silver sagebrush occurred in the coulees and valleys. Topography was rolling, except for occasional sharp breaks along the intermittent stream channels. There were no important physical barriers to cattle movements on the summer range where the observations were made. The range vegetation was mostly mature and rather dry when the observations were made.

The cattle observed were 10-year-old purebred Hereford cows and their calves run on three summer ranges stocked at heavy, moderate and light rates. These were half the summer areas constituting the range stocking experiment. There were 10 cows in each area. Calves numbered 8 or 9 per lot. The experimental areas radiated out from a central well and allowed 1.9, 2.5 and 3.2 acres per cow per month for the three rates of stocking.

## Methods of Study

Two series of intensive observations of cattle movements, resting,

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traveling, grazing habits, time of watering and general behavior were made on August 27–29, and October 16–19. Each group under scrutiny was watched continually for 24-consecutive-hour periods. In August the groups in heavily stocked Area A and lightly stocked Area B were observed. In October the observations included these two groups plus the cattle in moderately stocked Area C. The animals in A and B in October were not the same as those observed in August due to rotation of animals between paired areas of similar stocking rate. Only one group of each pair was observed intensively at any given time.

Although the animals studied did not have the feedlot type of easy acceptance of man, they were accustomed to his comings and goings and to handling at least once a month while being weighed. Their indifference was almost complete to anyone on a horse or in a pickup truck. Therefore, all night observations and most of those made during the day were from horseback, with a pickup being used part of the time during daylight hours.

Group behavior was observed by recording the number of cows and calves engaged in the various activities at 15-minute intervals. For example, the number of cows grazing was recorded at each approximate 15-minute interval. In addition to observations of group activity, an attempt was made to learn the specific sequence of events. This was done by observing in detail all activities of one cow in each of two groups during the August 27–29 series. A small flashlight was used at night when necessary to determine whether or not resting animals ruminated. Only rarely would its use noticeably disturb an animal.

### Results

In this study the cattle were free to move and graze as they wished.

Once each month the various groups were congregated in corrals at the central well for weighing but otherwise were unmolested.

Times spent on various activities were different for calves than for cows but the relative night-to-day patterns were almost identical. Perhaps this can be explained by the fact that 4- to 6-months-old range calves are active grazing animals which tend to move with the herd despite a gregariousness for their age group. At an earlier age the relationships probably would have been vastly different.

### Grazing

In late August, the time spent by cows in gathering herbage averaged 11 hours 38 minutes per 24-hour period for the two groups observed (Table 1). This is considerably longer than the 5 hours, 50 minutes of grazing reported by Cory (1927), but rather similar to the 10-hour period recorded by Hubbard (1952). Also, Johnstone-Wallace and Kennedy (1944) recorded only 7 to 8 hours of grazing time for Hereford and Angus cows on good improved pastures. The cattle in lightly stocked Area B grazed a half hour longer, mostly at night, than did those in heavily

stocked Area A. By late October both groups were grazing a few minutes longer out of each 24-hour period and there was a definite trend toward more daytime and less nighttime grazing by both groups. During the August observation period the cows spent almost three-fourths as much time grazing between 6 p.m. and 6 a.m. as during the daylight hours but during the October period less than half as much time was devoted to night as to day grazing. This shift, further illustrated by Figure 1, was associated with shortening days and cooler temperatures, which caused the cattle to bed down earlier in the evening and to prolong the morning grazing period. The cows in moderately stocked Area C, observed only during the October period, spent considerably less time grazing, especially during daylight hours, than did the other two groups. This lack of a consistent relationship between grazing time and range stocking rate does not mean that stocking has no influence on grazing time, although Hubbard (1952) stated definitely that time spent in various activities was not affected by rate of stocking. Rather, in this case, it seems to directly reflect cow habits growing out of

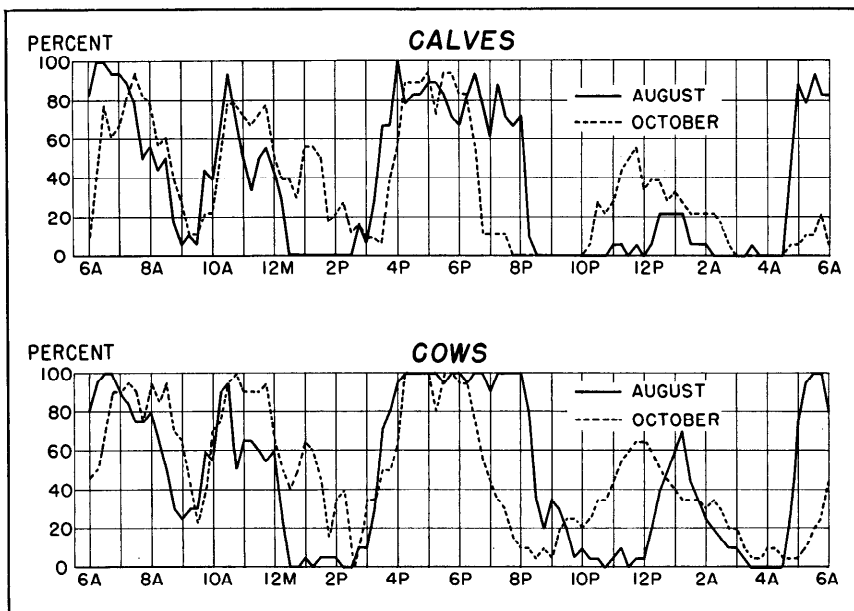


FIGURE 1. Percent of animals grazing at  $\frac{1}{4}$  hour intervals through 24-hour period.

Table 1. Average time spent daily by cows and calves grazing, lying, standing and chewing the cud

Activity	Area A				Area B				Area C				Average			
	No. of animals	Day <sup>1</sup>	Night <sup>2</sup>	Total 24 hours	No. of animals	Day	Night	Total 24 hours	No. of animals	Day	Night	Total 24 hours	No. of animals	Day	Night	Total 24 hours
		<i>hr.:min.</i>				<i>hr.:min.</i>				<i>hr.:min.</i>				<i>hr.:min.</i>		
<i>Cows</i>																
August 27-29, 1945	10				10								20			
Grazing		6:39	4:44	11:23		6:51	5:01	11:53						6:45	4:53	11:38
Lying		3:28	5:50	9:18		3:22	4:22	8:17						3:25	5:23	8:48
Standing <sup>3</sup>		1:53	1:26	3:19		1:46	2:04	3:50						1:49	1:45	3:34
Chewing cud		2:06	5:01	7:07		3:21	6:12	9:33						2:43	5:37	8:20
October 16-19, 1945	10				10				10				30			
Grazing		8:12	3:18	11:29		7:56	4:03	12:01		6:22	3:07	9:29		7:30	3:30	11:00
Lying		2:16	7:41	9:58		2:04	7:18	9:20		2:27	7:05	9:32		2:15	7:22	9:37
Standing		1:32	1:01	2:33		2:00	0:39	2:39		3:11	1:48	4:59		2:14	1:09	3:23
Chewing cud						1:11	3:51	5:02		2:07	3:40	5:47		1:39	3:46	5:25
<i>Calves</i>																
August 27-29, 1945	9				9								18			
Grazing		5:21	3:03	8:24		6:13	3:02	9:15						5:47	3:02	8:49
Lying		4:00	7:22	11:22		3:25	7:13	10:38						3:43	7:18	11:01
Standing		2:39	1:35	4:14		2:22	1:45	4:07						2:30	1:40	4:10
Chewing cud		1:35	2:28	4:03		2:27	3:12	5:39						2:01	2:50	4:51
October 16-19, 1945	8				9				8				25			
Grazing		7:45	2:00	9:45		6:13	2:33	8:46		6:19	2:34	8:53		6:46	2:22	9:08
Lying		3:10	8:55	12:05		2:42	8:22	11:04		3:20	8:05	11:25		3:04	8:27	11:31
Standing		1:05	1:05	2:10		3:05	1:05	4:10		2:21	1:21	3:42		2:10	1:11	3:21
Chewing cud						0:32	3:02	3:34		1:54	2:09	4:03		1:13	2:36	3:49

<sup>1</sup> 6 a.m. to 6 p.m.<sup>2</sup> 6 p.m. to 6 a.m.<sup>3</sup> Includes walking while not actively grazing.

certain variations in topography and vegetational subtypes between range areas.

Moderately stocked Area C had by far the most uniform topography and vegetational subtypes. There were no coulees or drainages of consequence and the vegetation of the entire pasture was dominantly blue grama in varying combinations with bluestem wheatgrass and needleandthread grass. Buffalo grass was rare. Thus, there was comparatively little tendency for the animals to select strongly favored areas for close and repeated grazing. In contrast, areas A and B had subtypes varying from almost pure bluestem wheatgrass to buffalo grass, grama, wheatgrass and needleandthread grass, as well as combinations of all these species. These areas also had several gentle but definite drainages which influenced cattle movements. In addition to the physical influence, the stringer subtypes in these coulees provided more succulent herbage, predomi-

nantly buffalo grass and bluestem wheatgrass, than the uplands. As a consequence, very close grazing occurred on these areas, irrespective of stocking rate.

While much of the upland subtype in Area B was lightly utilized, the cows in this area spent one-third or more of their grazing time on the fully utilized stringer types. From the standpoint of filling their bellies, this procedure was obviously highly inefficient, and may account for these animals grazing slightly longer than those on the heavily stocked range. The inefficiency of use of this area was also suggested by current cow weights which were about equal or only slightly higher than those of the cows on moderately stocked range. They consistently outweighed the animals in the heavily stocked areas, however.

The cows in heavily stocked Area A, on the other hand, were more the gleaner type. While these animals favored to some extent the closely grazed stringer subtypes,

they were much more inclined to make a vigorous sweep over all vegetational subtypes in the area. Their more intensive grazing was not reflected in total time spent in this activity. Thus it may be inferred that the A cows probably worked harder to subsist than either the C or B cows because stocking rate reduced available forage, and, to a lesser degree, distribution of vegetational subtypes and topography influenced the efficiency with which herbage was gathered.

Further evidence of a consistent tendency of cattle to heavily graze the bottom or stringer subtypes is furnished by published utilization records (Holscher and Woolfolk, 1953). Bluestem bottom subtypes were more heavily grazed over several years than any other vegetational subtype in all areas. Other subtypes received lighter use with the greatest difference in use between upland and bottom subtypes occurring under light stocking.

As a general rule the calves followed closely the behavior of their mothers at least in those activities which affected location in the pastures. Weaver and Tomanek (1951) on the other hand, found that calves slowed the movement of the herd and sometimes caused the formation of two groups, one with and one without calves. Section and subtype grazed within an area were usually consistent for both cows and calves. The amount of time actually spent grazing by the calves was somewhat shorter at both observations. In the August observation Area B calves spent 2 hours 38 minutes less time grazing than did their mothers and in Area A the difference was 2 hours 59 minutes. The average time spent grazing by the two calf groups in August was 8 hours 49 minutes, or 2 hours 49 minutes less than their mothers. This difference was undoubtedly due to the fact that considerable milk was received from their mothers, thus reducing their need and desire for additional herbage. The greater need of growing animals for rest would also tend to reduce the time spent in active grazing (Fig. 1). By October the calves were spending more time per day grazing than observed in August. This can be explained by the slightly greater age of the calves and the reduction in milk supplied to them due to curing of the range herbage and the natural tendency for milk flow to decline with increasing age of the dependent calf. The three groups averaged 9 hours 8 minutes of grazing time, just 1 hour 52 minutes short of the time spent by the cows. At this observation the Area C calves grazed only 36 minutes less than their mothers but the B calves were  $3\frac{1}{4}$  hours behind in grazing time during the 24-hour period.

#### Traveling

As observed in this study and presented herein, traveling refers to

the total distance covered in all activities during a 24-hour period. In Table 1, time spent traveling is included with grazing and standing time. Travel is most important, of course, as it relates to distribution of grazing use. Anyone who has studied grazing habits is familiar with the difficulties of separating traveling from grazing and just idle wandering.

The cattle in Areas A and B traveled approximately 2 miles per 24-hour period in each of the August and October observations. Those in moderately stocked Pasture C traveled only about one-half that distance during the October observation. Average travel per cow in her to-and-fro grazing was probably at least one-half again as much as her overall circuitous travel. Only the cows in heavily stocked Area A made a relatively complete sweep of the pasture. As with length of time spent grazing, distance traveled appeared to be related to the intensity of utilization and to variety of vegetational subtypes. Area C, lacking a variety of subtypes and having a minimum of highly selective and heavily utilized range, and an adequate supply of herbage, apparently did not provide the incentive for travel which existed in the other areas. Area B had adequate herbage but a conglomeration of vegetational subtypes. Area A also had many small subtypes but, in addition, lacked adequate herbage for the cattle.

Travel was almost entirely restricted to periods of active grazing during daylight and to those times when animals went in to water. Cows on lightly and moderately stocked range showed some inclination to walk directly to water without grazing along the way. Those on heavily stocked range, on the other hand, usually grazed to water and again away from water instead of walking directly. Weaver and Tomanek (1951) ob-

served a tendency of cattle to always walk directly to and from water. Only a minor fraction of total travel occurred during darkness—even when the animals were grazing.

In traveling, the calves usually accompanied the cows rather closely although some tendency to straggle along behind each main group was noted. Their total distance covered was perhaps somewhat less than for cows due to their habit of straggling, then cutting corners to catch up with the main group. As the calves grew older there was a tendency to spend less time away from the group and any cow would serve as guide and companion to a given calf until his own mother reappeared.

#### Resting

When the cows were not actively grazing they were usually resting. This includes all of the lying time and most of the standing time summarized in Table 1. About half of their time was given to this state of inactivity, irrespective of stocking intensity. This may mean that a cow tends to rest a certain length of time each day whether her belly is full or not. About three-fourths of their rest was taken lying down, the remainder just standing still. The cows lay down on the average almost an hour longer each 24-hour period during the October observations than in August. Night lying, however, increased by about 2 hours while daytime siestas decreased about an hour between August and October. Here again, seasonal progression is suggested as an influence. Standing, which includes walking while not actively grazing, did not appear to be influenced by stocking intensity or season of observation except that there was a shift toward less nighttime and more daytime standing in October.

On the average the calves spent about two hours more time resting during each 24-hour period than

did the cows. Most of their rest was taken lying down. This activity occupied 11 and 11½ hours per 24-hour period in the August and October observations, respectively. About three-fourths of this lying down time was recorded during the night. Their standing time averaged 3 to 4 hours per 24-hour period with about a third of it recorded at night. This was very similar to the standing time recorded for cows except that the division between dark and daylight periods was more equable with cows.

#### Chewing the Cud

Of all observations, determination of cud chewing at night was most difficult. Even with the aid of a flashlight, it was not always possible to get a clear view of individual animals without risking disturbance of their rest.

This difficulty in observation may account for some of the variation in ruminating time between groups and dates of observation. While the possibility of change in cud-chewing time with season and herbage availability should not be overlooked, it is evident from these data that range cows spend approximately 7 out of each 24 hours chewing the cud. This activity is indulged simultaneously with resting, either when the animals are lying down or just standing quietly.

Calves spent only slightly more than half as much time ruminating or chewing the cud as did the cows. This again perhaps traces to milk in the diet and the proportionately smaller amount of herbage harvested. There was also a tendency to spend more time ruminating at night than in the daytime, in fact more cud chewing was done at night than in the daytime by both cows and calves.

#### Distribution of Activities

During the regular group observations made in August, one cow each in areas A and B was observed

continuously and in detail through a 24-hour period. This information (Fig. 2) characterizes group behavior and indicates not only the amount of time spent in various activities but the sequence of events. The striking similarity in the general patterns of behavior of the two cows, one on heavily stocked and the other on lightly stocked range, deviated in only two important respects. The grazing periods of cow A in the heavily stocked area were more continuous than those of cow B in the lightly stocked area, and cow A grazed during the night while cow B did not. This tendency toward more

about dawn and grazed actively for 2 to 3 hours. Erratic resting for 1 to 2 hours was followed by another period of grazing which usually lasted until near noon. At this time the groups ordinarily came in to the central well for water and then rested for 1 to 3 or more hours. Between 3 and 4 p.m. intensive grazing again got underway. This grazing began to taper off shortly after sundown and the passage of twilight found most of the cows bedded down and ruminating. Contrary to frequent opinion, however, the cattle did not always remain bedded down for the night. Often a 2- to 3-hour rest period was fol-

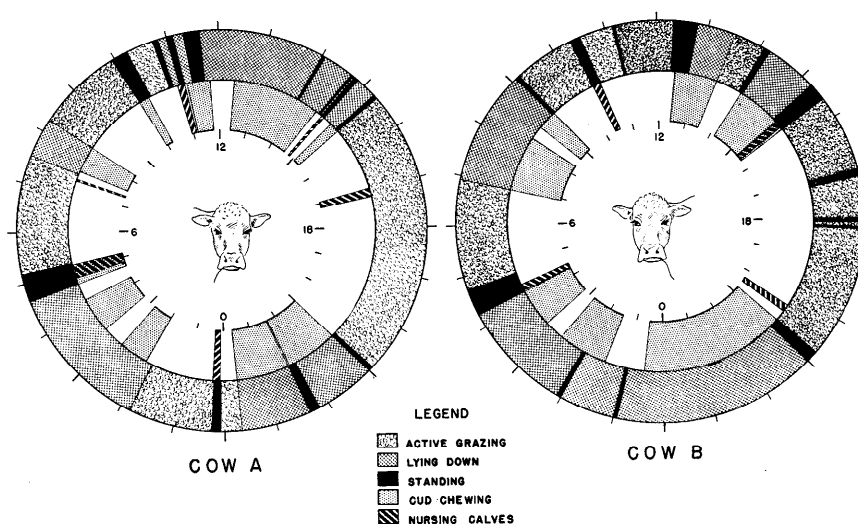


FIGURE 2. Consecutive activities over a 24-hour period of two Hereford cows on heavily (A) and lightly (B) stocked short-grass range pastures, August 27-28, 1945.

continuous and active grazing under heavy stocking was previously pointed out. It probably indicates the need for greater expenditure of energy to acquire the forage needed on heavily stocked range where herbage is sparse. Night grazing under heavy stocking, however, was no more common than under light stocking. Rather, the longer afternoon grazing of cow B probably accounts for her capacity to get by without night grazings.

There were four rather distinct periods of active grazing, as shown in Figure 2, during each 24 hours. The cattle usually began their day

lowed by grazing for about 2 hours around midnight, as in the case of cow A. During this time the animals stayed close together and grazed near where they had first lain down. This lack of travel may account for the prevalent assumption that no grazing occurs at night. Morning almost invariably found the groups very near where they bedded down the preceding evening.

The longest continuous periods indulged in each activity were recorded during the individual cow observations. Cow A, for example, grazed continuously for 5 hours and 35 minutes between 3 and 9 p.m.,

then at 5 a.m. stood erect and still for 32 minutes, following nearly 3 hours of continuous lying. Her calf nursed for 20 minutes during the standing rest period. Cow B, on the other hand, exceeded others observed in lying down and in cud chewing. This cow remained lying down from about 9 p.m. until 4:20 a.m. with only a brief standing stretch at 1 a.m. and another at 2 a.m. During this period cow B chewed her cud continuously for 3¾ hours.

Regularity of nursing periods, suggested by group data, was further indicated by the studies of individual cows. Each cow provided four full nursings at nearly uniformly spaced intervals. Weaver and Tomanek (1951) found that nursing occurred irregularly at inopportune times either when the calf was hungry or the cow felt discomfort. Cory (1927), on the other hand, concluded that calves were suckled three times a day, morning, noon and night for periods of 10 to 15 minutes each. Cow A's calf attempted two additional feedings but did not persist. Average time spent nursing ranged between 7.4 and 11.6 minutes (Table 2). Observed periods were somewhat shorter during the mid-October observations than they were in late August. This suggests a trend toward diminishing milk production with increasing age of calf and perhaps with change in season.

During the times of observation a total of 155 nursings occurred. Although some occurred throughout the day and night, there were distinct peaks of activity at about 6-hour intervals. To some extent the time of maximum nursing activity appeared to coincide with the beginning and end of rest periods, but in addition the individual calves appeared to suckle at fairly regular intervals. High nursing activity just after midnight coincided with, and may in part have been the cause for, the night

Table 2. Number and length of nursing periods per calf per 24-hour period

Items	Area A		Area B		Area C
	8/27-8/28	10/18-10/19	8/28-8/29	10/17-10/18	10/16-10/17
Average number of nursings					
Day <sup>1</sup> .....	2.44	1.50	2.00	1.34	1.50
Night <sup>2</sup> .....	2.11	1.50	1.78	1.55	2.25
Total, 24 hrs.....	4.55	3.00	3.78	2.89	3.75
Number of observations.....	14	9	6	11	18
Ave. length of nursing period (min.).....	11.2	7.4	11.6	9.3	10.1

<sup>1</sup> 6 a.m. to 6 p.m.

<sup>2</sup> 6 p.m. to 6 a.m.

grazing. On the average, each calf nursed 3.6 times per day. Night nursing was about as frequent as during the day.

In a sheep grazing experiment on northern plains range (Woolfolk, 1949), direction and extent of travel of unherded sheep were found to be strongly influenced by wind velocity and direction. In this case, however, travel of the groups of cattle under the prevailing conditions appeared to be dominated by other factors as already pointed out. Only during the last day of observation, when a strong, cool northwest wind prevailed, was some tendency to turn from the wind observed. It is well known, of course, that in the winter cattle often drift with the wind, especially if it is filled with snow. Likely, the conditions during the period of observations were not severe enough to produce a definite response. One peculiar daytime directional response was observed, however. In lying down, the animals almost unanimously faced into the sun. This was observed time and again, especially during the middle of hot summer days. At night, however, facing was indiscriminate. Facing into the sun would probably tend to reduce heat absorption, especially in white-faced animals. The habit, however, appeared to persist at least well into the sunny fall days after its usefulness for this purpose had long since ceased to exist.

### Discussion

The results of this study give credence to the common opinion among range men that ideal range management and use should be based on easily recognized vegetational types. Contour fencing in foothill and mountain range country provides a partial approach to this type of management. In the Plains the situation is still difficult, despite easier topography, due to the complex mixture of vegetational types. It is still possible, even under these recognized difficulties, to effect broad segregations of Plains vegetational types for seasonal, at least summer and winter, use.

It is possible also that differential cattle weights and gains might be associated with the vegetational subtypes and the current level of utilization on each. The inefficiency of grazing the already fully utilized bottom type in all pastures has been pointed out. The cattle, undoubtedly would have fared better on another subtype where herbage was more abundant although perhaps slightly less succulent. Weight data, unfortunately, are not available and could not have been made available in this study to nail down this point.

In addition to the range and livestock management possibilities indicated, the study also points out some of the basic needs of range cattle. For optimum welfare, range management should provide ample forage for the necessary fill, thus

leaving preferably more than half the time free for rest and rumination. Too widely spaced watering places on large range areas would tend to effect a reduction in the amount of time available for grazing and resting and therefore contribute to lower welfare of the animals. An earlier view of watering place distribution was tied to the maximum distance the animals were able to walk daily throughout the season. From this study and others cited herein the amount of time available, over and above that required for foraging and resting, seems a more important consideration.

Still unresolved apparently is the question of the effect of rate of range stocking on cattle habits. Even though cows on heavily stocked range grazed approximately the same length of time daily as cows on lightly stocked range in this study there was some evidence of more vigorous foraging effort by the A cows and a general impression that they worked harder for their subsistence than the other groups. The reduction of grazing time to 7 or 8 hours out of 24 on good improved pastures (Johnstone-Wallace and Kennedy, 1944) is strong evidence that the supply of herbage has a considerable effect on length of time spent grazing. Hubbard (1952) was unable to detect any correlation between rate of stocking and grazing time on Canadian Plains ranges. It seems likely that the subjective type of observations made both by the authors and by Hubbard were not sufficiently refined to detect small differences in habits even though

animal weights and other factors showed effects of stocking rate in the same studies.

### Summary

Observations of individuals and groups of cows and calves on northern Great Plains summer range provided information on the amount of time spent on major activities and the sequence of activities during 24-hour periods in August and October. The observations were made in 1945 in connection with a long-time rate of stocking study conducted cooperatively by the Northern Rocky Mountain Forest and Range Experiment Station, U. S. Forest Service, the Bureau of Animal Industry, U. S. Department of Agriculture, and the Montana Agricultural Experiment Station. The following major conclusions were drawn from the study.

1. The relationship between rate of range stocking and cattle habits was not clear cut although a tendency toward more vigorous foraging by cows on heavily stocked range was noted. Observers formed a definite impression that cows on heavily stocked range worked harder for a living than did cows on lightly stocked range.

2. On the average in late August and mid-October cows on northern Great Plains range spent slightly less than half their time gathering herbage. In the August observation period 11 hours 38 minutes were devoted to grazing but by mid-October this was reduced to eleven hours. Daytime grazing was increased and nighttime grazing decreased in October compared to

the August observation. Calves tended to spend 2 to 3 hours less time grazing each 24 hours than did their mothers.

3. The balance of the day on the average was spent resting, i.e., lying down and standing still. Cud chewing was concurrent with resting for 5 to 8 hours daily. On the average, calves rested longer each day than did the cows.

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