

Interval of Observation of Grazing Habits of Range Beef Cows

A. B. NELSON,¹ AND R. D. FURR²

Associate Professor and Graduate
Assistant, Department of Animal
Science, Oklahoma State University,
Stillwater.

Highlight

Reasonably accurate estimates of activities of longer duration, such as grazing and ruminating, can be obtained by observations at intervals of 15 or even 30 min. Observations at 15 min or longer intervals failed to give reliable estimates of such activities as walking, sleeping, nursing calves, defecation, urination and drinking.

¹Present address: Professor of Animal Science, New Mexico State University, University Park, New Mexico.

²Present address: Livestock Specialist, Agricultural Extension Service, University of Hawaii, Honolulu, Hawaii.

It is important to know animal grazing behavior in pasture experiments. A large quantity of accurate data may be obtained from continuous observation, but the procedure is laborious. A larger number of animals may be observed with less labor by lengthening the interval between observations. Hughes and Reid (1951), Tayler (1953) and Harker et al. (1954) concluded that observing activities of grazing cattle at 4-min intervals yielded satisfactory results. Sheppard et al. (1957) recorded observations of grazing habits at 30-min to 1-hr intervals, but did not make any observations at night. Hull et al. (1960) compared 15-, 30-, and 60-min observation intervals with continuous observation using four steers in 0.4 acre of irrigated pasture. Among those reporting grazing habits of range beef cattle observed continuously are Dwyer (1961) and Wagnon (1963). This study reports the frequency of observations necessary for an accurate estimate of the activity of range beef cows in a 24-hr period.

Methods

Five 24-hr grazing behavior studies (continuous observation) were conducted with grade Hereford cattle grazing in excellent condition native grass pastures approximately 100 acres in size, eight miles northwest of Stillwater, Oklahoma. The dominant grass species were little and big bluestem (*Andropogon scoparius* and *A. gerardi*), indiangrass (*Sorghastrum nutans*) and switchgrass (*Panicum virgatum*). The topography was gently rolling with some small hills, however, none was steep enough to hinder the natural travel of the cows.

The number of cows observed per study varied from 7 to 11; in three of the studies the cows were suckling calves. The first study began on August 18, 1959, at 10 AM and ended 24 hr later. All other studies started at 5:30 AM. One group of spring-calving cows was observed in one pasture on August 25, 1959, and again on September 25, 1959. A second group was fall-calving cows observed in another pasture on August

18, 1959, September 11, 1959, and July 2, 1960. The activities recorded were grazing, standing ruminating, standing idle, lying ruminating, lying idle, walking, suckling calves and sleeping. Walking included only actual time spent in walking directly from one place to another and did not include time devoted to travel accompanying grazing. Cows were considered to be sleeping when they turned their head to one side and rested it against their body or on the ground with their eyes closed. A record was also made of the distance traveled, and the number of times cattle drank, defecated and urinated. Distance traveled was measured from routes traced on aerial photographs. Results of continuous observations over a 24-hr period were compared with those recorded at 15-, 30-, and 60-min intervals over the same period. At these time intervals the total time spent in a given behavior was calculated on the assumption that the animal remained in a particular pattern from the time of one observation to the next.

Different colored paints or combinations thereof were used to identify individual cattle. Marking the cattle across the back, across the forehead and across the tailhead and pinbone region facilitated identification of individuals from any angle of observation. Small reflective glass beads were dusted on the wet paint as an aid to identification during nighttime.

Observations were made by at least three persons. Usually two persons observed the animals, generally with the aid of field glasses, while the third person recorded the information. Observers were generally at a distance of about 75 and 50 yards from the cattle during the daytime and nighttime, respectively. A pickup truck, to which the cattle were accustomed, was used to follow them in the pasture. At night it was usually necessary for the observers to use a handlamp or spotlight to determine certain activities such as ruminating and sleeping. Disturbance resulting from the use of light appeared to be negligible.

Results and Discussion

A summary of the activities of the cows determined from observations made at the four different time intervals in each of

the five studies is given in Table 1. The variation in relation to size of the mean for activities recorded during continuous observations indicate that, within any individual study, grazing time varied the least.

For most activities the standard deviation increased as the time interval between observation increased. As might be expected, the activities of shortest duration were usually the most variable. For example, the time associated with walking was quite different in two of the studies (August 18 and September 11) when the observation intervals were 15 min instead of continuous; also, the standard deviation was usually markedly increased. When the interval of observation was increased to 60 min, no time whatsoever was

recorded for walking on August 24 and September 11. It seems that for a reliable estimate of walking and perhaps other activities of short duration, the observation interval must be less than 15 min.

The larger standard deviation in all studies for any activity at the 60-min interval of observation as compared with continuous observation does not appear to be associated with the difference in mean time associated with that activity. Illustrative of this is a comparison of grazing time at the different intervals of observation on September 11. The average time spent grazing was 673, 686, 693, and 671 min for continuous, 15-, 30-, and 60-min intervals of observation, respectively. However, the standard deviation was more than

Table 1. Activities of range beef cows for a 24-hr. period as determined at different intervals.

Date and Interval	Grazing		Walking		Ruminating				Idle			
	Min	SD ^a	Min	SD	Min	SD	Min	SD	Min	SD	Min	SD
July 2, 1960 (10 cows)												
Contin.	536	35.8	26	8.8	133	58.1	443	67.4	192	34.3	110	25.3
15 min.	523	45.0	21	14.5	134	63.8	452	61.8	207	44.0	103	30.4
30 min.	482	60.9	21	20.2	147	72.7	453	47.9	225	45.3	111	56.7
60 min.	456	120.9	24	31.0	162	89.7	396	106.6	270	76.2	132	108.8
August 18, 1959 (11 cows)												
Contin.	586	35.8	47	7.6	188	48.1	364	52.2	170	36.7	85	32.2
15 min.	573	37.8	19	9.7	187	47.6	361	48.1	207	47.3	93	36.0
30 min.	619	36.2	3	9.1	177	60.7	368	52.1	175	42.0	98	42.6
60 min.	638	72.4	6	18.1	169	88.3	382	48.5	169	79.9	76	66.2
August 25, 1959 (10 cows)												
Contin.	576	23.7	34	3.6	280	55.8	242	44.0	204	31.8	104	50.4
15 min.	582	30.7	28	14.9	300	36.8	228	56.0	195	55.2	107	50.2
30 min.	612	42.9	33	9.5	297	53.8	228	69.6	168	53.3	102	51.4
60 min.	660	56.6	0		258	89.7	246	77.2	169	73.8	108	62.0
September 11, 1959 (11 cows)												
Contin.	673	34.3	9	6.3	131	44.5	413	63.3	81	26.3	133	44.2
15 min.	686	37.4	1	4.5	120	39.7	420	64.3	87	29.1	126	49.4
30 min.	693	41.3	3	9.1	120	40.2	403	64.8	90	46.5	131	54.1
60 min.	671	75.0	0		153	62.1	393	77.6	76	54.3	147	67.7
September 25, 1959 (7 cows)												
Contin.	634	55.3	15	9.8	106	60.7	373	70.5	134	34.9	178	47.3
15 min.	647	57.7	13	18.2	105	60.0	367	61.1	124	28.3	184	49.5
30 min.	651	68.7	9	14.7	99	66.4	377	71.1	116	20.7	188	61.8
60 min.	634	90.7	17	29.3	60	69.3	343	108.0	129	64.1	257	75.2
Average (Weighted) Activities												
Five Dates of Observation												
Contin.	600	60.4	27	15.8	171	80.1	368	90.8	156	56.1	118	48.8
15 min.	601	71.0	16	15.4	173	85.5	366	96.3	166	65.3	118	51.0
30 min.	611	86.3	14	17.4	171	89.4	366	96.4	156	64.2	122	58.9
60 min.	612	114.9	9	21.2	166	97.4	354	98.9	163	78.5	136	93.1
^a Standard deviation												

* Standard deviation

double for 60-min interval as compared with continuous observation. Usually, variation increased most when the interval of observation was increased from 30 to 60 min, e.g., on September 11 the standard deviation was 41.3 at the 30-min interval vs. 75.0 at the 60-min interval.

Harker et al. (1954) found that the error introduced by observing grazing habits at 4-min intervals rather than continuously was inversely proportional to the time spent in each activity. Hull et al. (1960), who compared

15-, 30- and 60-min intervals with continuous observation on the behavior of four steers over a 24-hr period in 0.4 acre of irrigated pasture, reported wide individual variation in animal behavior patterns.

In general, for activities of longer duration (grazing and ruminating) the variation and mean were not altered greatly up to but not including 60-min intervals of observation. Times spent in each of these two activities during each hour on July 2 when observed at the different

time intervals are illustrated graphically in Fig. 1. No time was recorded for either activity because 6:30 and 7:30 AM at the 60-min interval of observation even though an average of 24 min was noted for grazing time at the 30-min interval of observation. Standing idle was the main activity other than grazing during this particular hour. Another example of considerable variation is during the time from 8:30 to 9:30 P.M. when 36 min of grazing and 6 min of ruminating were recorded for the 60-min observation interval vs. 18 min of grazing and 30 min of ruminating for the 30 min interval.

These studies indicate that the accuracy desired by the experimenter will tend to dictate the most desirable observation interval. It appears that reasonably accurate estimates of the activities of longer duration can be obtained by observations at intervals of 15 or even 30 min. This is in agreement with the results of Hull et al. (1960) who observed steers on irrigated pasture. The primary purpose of the longer interval would be to allow the experimenter to observe more animals.

Summaries of the miscellaneous activities from a record of continuous observation are given in tables 2 and 3. In order to determine accurately these activities they must be recorded at intervals of less than 15 min.

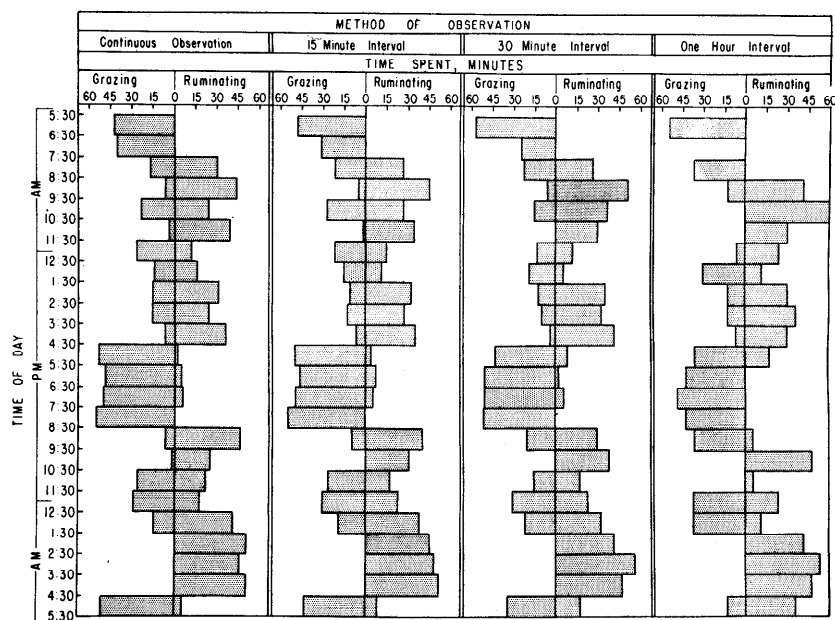


Fig. 1. Grazing and ruminating times of range beef cows when observed continuously and at 15-, 30-, and 60-minute intervals, July 2, 1960.

Table 2. Miscellaneous activities of beef cows on the range in a 24-hour period.

	July 2, 1960		August 18, 1959		August 25, 1959		September 11, 1959		September 25, 1959	
Activity	Avg	SD ^a	Avg	SD	Avg	SD	Avg	SD	Avg	SD
Avg. distance traveled, mi.										
Day	1.92	—	2.81	—	2.26	—	1.64	—	1.52	—
Night	0.23	—	0.92	—	0.65	—	0.36	—	0.65	—
Total	2.15	—	3.73	—	2.91	—	2.00	—	2.17	—
Time walking, min	26.0	8.8	47.0	7.6	34.0	3.6	9.0	6.3	15.0	9.8
Time sleeping, min ^b	30.6	16.1	—	—	—	—	26.6	13.4	27.0	15.9
No. of drinks of water ^c	2.0	—	—	—	2.0	—	1.4	—	—	—
No. of defecations	7.8	1.7	8.0	3.9	2.1	1.6	6.4	3.2	3.6	1.4
No. of urinations	1.5	1.1	5.0	3.8	1.5	0.8	2.4	1.4	1.6	0.8

^a Standard deviation.

^b No record kept on August 18 and 25.

^c No record kept on August 18. Cattle did not drink on September 25 which was relatively cool with a very heavy dew.

Table 3. Observations of calves with their dams on the range.^a

Date of Study	Age of calves mo.	Nursing periods		Total time spent nursing	
		No	SD ^b	Min	SD
July 2, 1960	8	2.4	1.6	18.1	14.6
August 25, 1959	6	3.2	1.2	23.7	8.8
September 25, 1959	7	3.6	1.0	27.3	12.9

^a In 24-hour period.^b Standard deviation.

Therefore, values for the different intervals of observation are not given.

Summary

Five 24-hr. grazing behavior studies (continuous observation) were conducted with grade Hereford cows grazing native range pastures. The number of cows varied from 7 to 11; in three of the studies the cows were suckling calves.

Results of continuous observation were compared with those obtained from observations at

15-, 30-, and 60-min intervals. Reasonably accurate estimates of the two major activities, grazing and ruminating, were obtained in each study from observations at 15- and 30-min intervals. Estimates of these activities obtained from observations at 60-min intervals were quite variable. Observations at 15-min intervals failed to give reliable estimates of such activities as walking, sleeping, nursing calves, defecation, urination and drinking.

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