Activities of Hereford and Santa Gertrudis Cattle on A Southern New Mexico Range[1]

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Highlight

The Hereford cows spent more time grazing, less time walking, and traveled less distance than the Santa Gertrudis. When compared to results from other locations, there is no apparent relationship between grazing time and quantity of forage per unit area. There were generally 4 grazing periods: about midnight, from daybreak for the next 3 to 3½ hr, midday, and late afternoon for 3 to 3½ hr.

Only a few studies have compared the performance of two breeds of cattle on rangelands of the United States. Although Herefords are the dominant breed in the Southwest, cattle with some Brahman blood may be better adapted to the hot, arid environment. This study was conducted to determine the differences, if any, in performance of Hereford and Santa Gertrudis cattle on rangeland.

Methods

This 3-year study was conducted on the Jornada Experimental Range, 25 miles north of Las Cruces, New Mexico. The climate is typical of the arid phase of the semidesert grassland. There is an extremely variable precipitation, an abundance of sunshine, a wide range between day and night temperatures, and a low relative humidity. The average annual precipitation at Headquarters is 9.01 inches and the average seasonal precipitation (July-September) is 4.99 in. The average maximum temperature for January is 55.6 F and for July 94.7. The average minimum temperature for January is 22.4 F and for July 64.2.

The major plant species are: burrograss *(Scleropogon brevifolius* Phil.); mesa dropseed *(Sporobolus flexuosus* (Thurb.) Rydb.); alkali sacaton *(Sporobolus airoides* (Torr.) Torr.); black grama *(Bouteloua eriopoda* (Torr.) Torr.); broom snakeweed *(Gutierrezia sarothrae* (Pursh) Britt. & Rusby); leather croton *(Croton corymbulosus* Engelm.); and soaptree yucca *(Yucca elata* Engelm.).

The study was initiated in November 1961. Two pastures were used. One contains 2,638 acres and the other 3,610 acres. Both pastures are relatively level, and in each, it is about 3½ miles from water to the far end of the pasture. Each breed was pastured separately and was rotated between the pastures each year about November 1. The test herd consisted of 15 cows of each breed born in 1959. However, additional animals of each breed were stocked as necessary to achieve proper grazing use. The stocking rate varied from 3 to 7 cows per section. A salt-bone meal mix was available near water. Small quantities of a ground concentrate mixture were fed from March 17 through July 3, 1964.

Bulls were with the cows from May 1 to October 1. Most of the Hereford cows calved during the late winter while the Santa Gertrudis cows calved throughout the late winter and spring.

The activities of a cow of each breed were observed for a 24-hour period every 4 weeks during the 3-year period. In addition, from November 1961 to March 1963, a cow from each breed was observed every 4 weeks during the daylight hours. Observations were alternated between breeds. The cows to be observed were selected at random from the test herd of each breed and marked with white paint immediately before the observation period. Each cow in the test herd was observed before any one cow was observed the second time. The cows were observed from a vehicle equipped with a spotlight as an aid for nighttime observations. Two men observed the cows continuously and recorded the time to the nearest minute for each activity. The activities of the cows generally were not affected by the observers or the vehicle.

Results

The data for the 3 years were subdivided to obtain averages for 24-hour, daytime, nighttime, and seasonal activities. Confidence intervals (0.95) were computed for statistical comparisons of means.

The percent of time spent grazing includes grazing-standing and grazing-walking. The percentage shown for nursing also includes a small amount of grazing and standing-ruminating but most nursing time was standing-idle. The standing-idle percentage does not include any of the nursing time. The number of times watering is the actual number of times the cow drank from the water trough or from rain puddles. Rubbing includes the number of times the cows rubbed on rubbing devices and on shrubs. The percentage of time spent walking also includes a small amount of running. The time shown for standing-ruminating also includes a small amount of walking-ruminating.

Yearlong.—Table 1 shows the average activities for the Hereford and Santa Gertrudis cows for the 3-year period. On a 24-hour basis there were 37 observations of each breed. The Hereford cows spent significantly more time grazing and less time

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walking. On a yearlong basis it was estimated that the Hereford cows walked an average of 4.9 miles while the Santa Gertrudis cows averaged 7.8 miles during an average 24-hour period. The Hereford cows also did significantly more rubbing than the Santa Gertrudis cows.

On a daytime-nighttime basis, both breeds spent significantly more time grazing and standing-idle in the daytime, but there were no significant differences between breeds. They also both watered and defecated significantly more times in the daytime. Conversely, both spent significantly more time ruminating, particularly lying-ruminating, at night.

Seasonal.—Table 2 shows the average seasonal activities for the Hereford and Santa Gertrudis cows. During the 3-year period there were nine or ten 24-hour observations during each season. The Santa Gertrudis cows spent significantly less time grazing in the winter than the Hereford cows during any season. The Santa Gertrudis cows spent significantly more time standing-idle in the spring than in the fall, lying-idle in the winter than in the summer, and nursing calves in the summer than in the spring. The Herefords spent significantly less time walking in the fall than did the Santa Gertrudis during the fall, spring, and summer. The Santa Gertrudis spent more time walking in the summer than the Herefords in any season. It was estimated that the Herefords walked 5.3, 5.2, 4.6, and 4.3 miles during a 24-hour period in the fall, winter, spring, and summer seasons, respectively, while the Santa Gertrudis walked 8.0, 6.1, 8.3, and 9.1 miles during the same respective seasons.

An examination of the seasonal data for the daytime revealed that the Hereford cows spent more time ruminating in the fall than in the winter. The Herefords rubbed oftener in the winter and summer than they did in the fall and defecated oftener in the fall than in the spring. The Santa Gertrudis rubbed oftener in the winter than any other season.

An examination of the nighttime seasonal data showed that

Table 1. Yearlong activities of Hereford and Santa Gertrudis cows[1].

Item	24-Hour		Daytime		Nighttime	
	H[2]	SG[2]	H	SG	H	SG
Observations (no.)	37	37	58	58	37	37
Grazing (%)	42.8^{b}	37.2^{a}	49.9^{b}	46.5^{b}	34.7^{a}	29.6^{a}
Ruminating, total (%)	31.0^{a}	30.8^{a}	21.1^{a}	19.5^{a}	41.3^{b}	40.3^{b}
Standing-ruminating (%)	8.6^{a}	6.8^{a}	8.9^{b}	7.3^{ab}	8.5^{ab}	5.6^{a}
Lying-ruminating (%)	22.4^{a}	24.0^{a}	12.2^{a}	12.2^{a}	32.8^{b}	34.7^{b}
Standing-idle (%)	7.5^{a}	7.5^{a}	10.2^{b}	10.8^{b}	5.0^{a}	3.5^{a}
Lying-idle (%)	9.9^{a}	10.1^{a}	7.5^{a}	7.1^{a}	12.1^{a}	13.4^{a}
Walking (%)	6.5^{a}	12.1^{b}	9.2^{ab}	13.4^{b}	4.8^{a}	11.5^{b}
Nursing (%)	1.6^{a}	1.6^{a}	1.4^{a}	1.6^{a}	1.8^{a}	1.6^{a}
Nursing (no.)	2.7^{a}	2.4^{a}	1.2^{a}	1.1^{a}	1.4^{a}	1.3^{a}
Watering (no.)	1.0^{a}	1.5^{a}	0.8^{b}	1.3^{b}	0.1^{a}	0.2^{a}
Salting (no.)	0.1^{a}	0.5^{a}	0.1^{a}	0.5^{a}	0.0^{a}	0.0^{a}
Rubbing (no.)	1.1^{b}	0.1^{a}	0.6^{b}	0.1^{a}	0.6^{ab}	0.0^{a}
Defecating (no.)	6.5^{a}	6.5^{a}	4.1^{b}	4.2^{b}	2.8^{a}	2.5^{a}
Urinating (no.)	5.9^{a}	6.5^{a}	3.4^{a}	3.8^{a}	2.8^{a}	3.2^{a}

[1]Entries on the same line having the same superscript are not significantly different (0.05 level). The 24-hour value should not be compared with either the daytime or nighttime values.
[2]H = Hereford, SG = Santa Gertrudis.

Table 2. Seasonal activities of Hereford and Santa Gertrudis cows[1].

Item	Fall		Winter		Spring		Summer	
	H[2]	SG[2]	H	SG	H	SG	H	SG
Observations (no.)	9	9	10	10	9	9	9	9
Grazing (%)	42.4^{b}	40.5^{ab}	40.8^{b}	31.8^{a}	42.5^{b}	38.0^{ab}	45.8^{b}	39.2^{ab}
Ruminating, total (%)	33.9^{a}	31.8^{a}	33.1^{a}	35.7^{a}	27.0^{a}	28.7^{a}	30.0^{a}	26.8^{a}
Standing-ruminating (%)	11.3^{a}	7.6^{a}	9.4^{a}	7.8^{a}	5.3^{a}	4.8^{a}	8.4^{a}	7.0^{a}
Lying-ruminating (%)	22.6^{a}	24.2^{a}	23.7^{a}	27.9^{a}	21.7^{a}	23.9^{a}	21.6^{a}	19.8^{a}
Standing-idle (%)	8.9^{ab}	4.5^{a}	7.1^{ab}	6.6^{ab}	7.8^{ab}	11.0^{b}	6.2^{ab}	7.9^{ab}
Lying-idle (%)	9.2^{ab}	9.0^{ab}	11.1^{b}	16.4^{b}	11.3^{ab}	8.4^{ab}	8.1^{ab}	6.0^{a}
Walking (%)	4.1^{a}	11.4^{bc}	7.2^{ab}	9.0^{abc}	7.8^{ab}	12.7^{bc}	7.0^{ab}	15.6^{c}
Nursing (%)	1.1^{b}	2.3^{bc}	0.0^{a}	0.0^{a}	3.1^{bc}	0.9^{b}	2.3^{bc}	3.3^{c}
Nursing (no.)	2.2^{b}	3.1^{bc}	0.0^{a}	0.0^{a}	4.8^{bc}	1.5^{b}	3.9^{bc}	5.2^{c}
Watering (no.)	1.4^{ab}	1.9^{b}	0.9^{a}	1.0^{ab}	0.6^{a}	1.0^{ab}	1.1^{ab}	2.0^{ab}
Salting (no.)	0.0^{a}	0.4^{a}	0.2^{a}	0.3^{a}	0.2^{a}	0.0^{a}	0.1^{a}	1.4^{a}
Rubbing (no.)	0.1^{a}	0.0^{a}	2.0^{a}	0.2^{a}	1.3^{a}	0.2^{a}	0.9^{a}	0.2^{a}
Defecating (no.)	7.4^{a}	6.1^{a}	7.0^{a}	6.6^{a}	5.1^{a}	6.3^{a}	6.4^{a}	7.0^{a}
Urinating (no.)	5.4^{a}	8.1^{a}	5.5^{a}	5.4^{a}	6.4^{a}	4.9^{a}	6.3^{a}	7.9^{a}

[1]Entries on the same line having the same superscript are not significantly different (0.05 level).
[2]H = Hereford, SG = Santa Gertrudis.

the Herefords walked less in the fall than in the spring and summer. During the fall the Santa Gertrudis walked more than the Herefords at night.

Miscellaneous Observations.—When the cattle grazed plants that had both green and dry portions, they would try to eat only the green portions, frequently letting the dry portion drop from their mouths. This is probably one of the major reasons why a clipped forage sample is generally not a good approximation of the cow's diet.

The Herefords were frequently in small groups, 4 to 8 cows per group, while the Santa Gertrudis all stayed together more frequently. When the small groups of Herefords came together, as at water, they would regroup. The activities of the Santa Gertrudis as a group were more uniform than those of the Herefords; e.g. all of the Santa Gertrudis cows would graze more nearly at the same time, lie down at the same time, etc. When the Santa Gertrudis cows lay down, one cow sometimes made the others stand up. The Santa Gertrudis cows walked faster and ran more than the Hereford cows. The Santa Gertrudis cows frequently permitted calves other than their own to nurse them, but the Hereford cows only rarely allowed this.

The Santa Gertrudis were easier to round-up than the Herefords because they were usually together, and once they were started toward the corrals they generally kept going until they arrived. However, the Santa Gertrudis cows were more difficult to handle in the corrals in operations such as weighing and taking blood samples.

During and shortly after rainfall, cattle drank water from any low place where water collected such as wheel tracks, paths, foot prints, and natural depressions. On some winter days the cattle did not water.

Discussion and Conclusions

A study of the activities of range animals is important to an understanding of animal performance. Hancock (1953) reported that the behavior of an animal on rangeland is conditioned by factors such as the environment, quantity of forage, digestibility of forage, forage species available, and the individual animal. In this study the activities of range animals varied little by season. The Santa Gertrudis spent a little less time grazing in the winter and more time lying-idle than in other seasons; this may be related to the weather but probably is because they had no nursing calf. There was little seasonal difference in nighttime grazing, the Herefords actually grazed more in the fall, which would also indicate that the weather had little effect on the activities of the animals. An examination of the data for the 6 hottest days of the 3-year period (maximum temperatures ranged from 95 to 107 F) showed no difference in the grazing time between breeds or when compared to cooler days. Ittner et al. (1954) reported that the Brahmans and Brahman crosses grazed more than Herefords and Shorthorns during the daytime in summer on irrigated pasture in the Imperial Valley of California.

In this study the 24 hr period was divided generally into the following grazing intervals: about midnight, from daybreak for the next 3 to 3½ hr, midday, and late afternoon for 3 to 3½ hr. The major difference for both breeds between winter and summer was the length of time spent grazing at midday; during the winter it was generally 1 to 1½ hr, while in summer it was generally 2 to 2½ hr. The major difference between breeds was the time spent grazing about midnight; the Hereford cows generally spent about 2½ hr grazing at this time, while the Santa Gertrudis cows only spent about 1 hr.

The time spent grazing during the summer is similar to Oklahoma results (Dwyer, 1961) and yearlong grazing was similar to California results (Wagnon, 1963). This would indicate that there is not a close relationship between grazing time and quantity of forage per unit area because both of those areas have higher production than the experimental area in this study. The winter grazing was less than Texas results (Box et al., 1965) where forage production is also higher than on the experimental area. The perennial grass herbage production on the experimental pastures averaged 139 lb/acre of air-dry herbage over the 3-year period.

Lofgreen et al. (1957) presented evidence that the ratio of ruminating time to grazing time is related to the TDN content of the forage grazed. In this study the ratios for the Hereford cows were 0.80, 0.81, 0.64, and 0.66 for the fall, winter, spring, and summer, respectively, while for the Santa Gertrudis cows they were 0.79, 1.12, 0.76, and 0.68. All ratios except the one for the Santa Gertrudis during the winter, agree with California results where the overall ratio was 0.71 (calculated from data presented by Wagnon, 1963). The 1.12 ruminating-to-grazing ratio, calculated for the Santa Gertrudis during the winter, agrees closely with a ratio of 1.08 calculated from Oklahoma data presented by Dwyer (1961). Each breed spent about 31% of the time ruminating, about 75% of which was while lying. The total time spent resting (ruminating plus idling) was about 48.5% of the time for each breed. About 68% of the resting time was spent lying.

One of the major differences between breeds was the time spent walking and the distances traveled. The Santa Gertrudis

spent nearly twice as much time walking as the Herefords and traveled an average of about 3 miles more per day. The estimates of distance traveled by the Herefords are surprisingly similar to those made in Oklahoma (Dwyer, 1961) and in Texas on a non-supplemented area (Box et al., 1965) even though those study areas were smaller than the pastures used in this study. This suggests that the approximate upper limit of travel for Hereford cattle is 4 to 5 miles. The additional travel by the Santa Gertrudis was particularly obvious within a day after some rainfall when their tracks could be seen at widely spaced locations within the pasture. This was not true in the pasture stocked with Herefords.

The Santa Gertrudis spent more time nursing calves in the summer than in the spring because they calved late.

The average number of daily defecations varied seasonally from 5 to 7 with no difference between the 2 breeds. This is substantially lower than reported by Dwyer (1961) for prairie rangeland during the summer; by Wagnon (1963) for green forage on California ranges; and by Johnstone-Wallace and Kennedy (1944) for Kentucky bluegrass-white clover pastures. This would indicate a relationship between number of defecations and the succulence of vegetation. The number of defecations on dry winter forage in the Texas Panhandle (Box et al., 1965) was lower than reported in this study. In this study the average number of urinations varied seasonally from 5 to 8. This is similar to results reported by Dwyer (1961); lower than reported for green California range (Wagnon, 1963); and higher than reported for dry California range (Wagnon, 1963) and dry Texas range (Box et al., 1965). This may also be related to the succulence of vegetation.

Summary

A 3-year study was made of the activities of Hereford and Santa Gertrudis cattle under southern New Mexico conditions. The Herefords spent significantly more time grazing than the Santa Gertrudis, particularly about midnight, but there was no evidence that weather conditions affected the grazing time of either breed. Actually both breeds grazed more at midday during the summer than in the winter. In comparing results from other locations, there seems to be no close relationship between grazing time and quantity of forage per unit area.

One of the major differences between breeds was that the Santa Gertrudis spent more time walking (12.1% vs. 6.5%), and traveled further (7.8 miles vs. 4.9 miles), than the Herefords.

When the number of defecations and urinations are compared with other locations, and when a relationship with degree of forage maturity is assumed, it would indicate that the forage consumed yearlong was intermediate between dry, leached forage and succulent, green forage.

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