December 2007 **AG/Beef/2007-01**

When Using Intensive Grazing Practices, Does It Matter How Often You Move Cattle to a New Paddock on Improved, Irrigated Pastures in Utah?

R.D. Wiedmeier,[1] ***A.J. Young***,[1] ***D.R. ZoBell***,[1] and ***D.L. Snyder***[2]
[1]Department of Animal, Dairy and Veterinary Sciences
[2]Department of Economics

Introduction

When grazing beef cattle on improved, irrigated pastures using management intensive grazing procedures, the question that is often asked is how often should cattle be moved to a new paddock; i.e., daily, every other day, etc. The objectives of this study were to determine the effects of moving cattle each day versus each third day on cow-calf productivity, total pasture dry matter (DM) production, and forage quality.

Materials and Methods

The 5-acre pasture used for the study was a well-established (25 years) mixture of older varieties of orchardgrass (35%), tall fescue (38%), meadow brome (12%), and Kentucky bluegrass (15%). Irrigation was via a sprinkler hand-line that covered 0.6 acres/set and would deliver 3.15 inches of water in a 12-hour set. Irrigation water was applied at a rate of 3.15 inches each 28 days, which was dictated by existing water availability. The entire grazing season lasted 180 days each year, so approximately 20 inches of irrigation water was applied each year. It is recommended that irrigated grass pastures receive 30 lbs of nitrogen/acre each 30 days. Since fertilizer application was timed to coincide with irrigation water application, approximately 120 lbs of nitrogen was applied per acre each year, 30 lbs of nitrogen/acre just before each of the four irrigations. Ammonium sulfate was applied as the source of nitrogen using a calibrated broadcast spreader. After application of the ammonium sulfate prills, the pasture was harrowed and then irrigated.

The dimensions of the pasture were 310 ft by 702 ft with the long side in an east-west orientation. The cattle grazed from east to west during each of 4 grazing circuits across the pasture each year. The four grazing circuits were designed to be 45 days each: April 20-June 3, June 4 to July 18, July 19 to September 1, and September 2 to October 16. However, the length of these periods varied with increasing dry matter (DM) requirement of the cow-calf pairs and the changing DM production of the pasture.

Eight straightbred Black Angus cows and their suckling calves grazed the pastures. The average body weight of the cows was 1275 lbs with an average body condition score 5.3. All of the cows were 5 years of age the first year of the study. The same Black Angus bull sired the calves each of the two years of the study. Cows and calves were weighed at the beginning and end of each grazing circuit. Cows received a visual body condition score (BSC) by a single appraiser at each weigh period (1 through 9, with 1 being extremely emaciated, 5 being average, and 9 being extremely obese). Calving began the third week of March so all calves would be born and adjusted by the beginning of the grazing season, approximately April 20th.

The two grazing treatments under management intensive grazing were (1) moving the cattle to a new

paddock every day (24-h) and (2) moving the cattle to a new paddock every three days (72-h). Since there were four grazing circuits across the pasture each year and the study was conducted for two consecutive years, there were eight grazing circuits. These eight grazing circuits were assigned to the two grazing treatments as follows in Table 1.

Table 1. Assignment of grazing treatments to the eight grazing circuits over the two years of the study.

Grazing Circuit	Year 1	Year 2
1	24-h[a]	72-h
2	72-h[b]	24-h
3	24-h	72-h
4	72-h	24-h

[a]24-h, cow-calf pairs receive a new pasture allotment each 24 hours.

[b]72-h, cow-calf pair receive a new pasture allotment each 72 hours.

It was our hypothesis that the grazing treatment assigned on the previous grazing circuit would affect the forage production on the next circuit. So if a 24-h treatment was assigned to the present grazing circuit, its affect on forage production would be associated with the next grazing circuit.

The amount of DM required/cow-calf pair/day was estimated using NRC (1995) equations. The amount (ft^2) of pasture offered was determined by taking four representative clip-plot samples (1.0 ft^2) on the 24-h treatment and 12 samples on the 72-h treatment. Two of these samples were immediately dried in a microwave oven set at full power using the following time setting: 12 minutes, 7 minutes, 3 minutes, 1 minute, then 20 second intervals until a constant weight was achieved. Between each drying period the sample was removed from the oven and allowed to cool for one minute until resuming the drying procedure. These samples were used to determine the instantaneous DM/ft^2 on the paddock. For example, if it was estimated that a cow-calf pair would consumed 40 lbs of DM/day and the clip-plot samples revealed that there was .065 lbs DM/ft^2 with a 4" stubble remaining after clipping, each cow-calf pair would be allowed (40 lbs DM ÷ .065 lbs DM/ft^2) 615 ft^2 of pasture/day. If the eight cow-calf pairs were assigned to the 24-h grazing treatment, they would be given a (615x8) 4920 ft^2 paddock. So the electric polywire cross-fence would be moved (4920 ÷ 310) 15.9 ft. If the cow-calf pairs were assigned to the 72-h treatment the electric polywire cross-fence would be moved (15.9 x 3) 47.7 ft. Adjustments in DM allowance were made each time the cattle were moved to a new paddock. It was important that a 4" stubble height remained after grazing to maintain the vigor of the pasture plants.

All samples were stored in paper bags. The samples microwaved for instantaneous DM determination were not used for proximate analysis. The remaining samples were dried in a forced-air oven set at 60^o C for 72 hours. These samples were then ground to pass a 1 mm screen and stored. Since forage was composed of only grass species, proximate analysis was conducted using near infrared reflectance spectrophotometry. Samples were taken each day during each of the grazing circuits. Each grazing circuit lasted 35 to 52 days depending on forage supply and the DM requirement of the cow-calf pairs. Samples taken during each grazing circuit were divided into three groups: first third of the days, second third of the days, and last third of the days. These groups of samples were then proportionately composited. This resulted in three composite samples being analyzed for each grazing circuit. The average crude protein and net energy for maintenance for these three samples is shown in Table 2.

Results and Discussion

When cow-calf pairs graze improved, irrigated pastures using management intensive grazing procedures, moving the cattle to a new paddock each day resulted in a statistically significant (P<.001) increase in total yearly forage DM production of 13.6% compared to when cattle were allowed a new paddock every three days (Table 3).

We estimate that it requires approximately 6840 to 7200 lbs DM/cow-calf pair/grazing season. When the cattle were changed to a new paddock each day, 8364 lbs more DM was produced compared to when cattle received a new paddock every three days. Hence the 24-h paddock treatment resulted in an increase in carrying capacity of over one cow-calf pair/year. On a practical basis this means the 5-acre pasture was able to carry 9 cow-calf pairs during a 180-day grazing season by changing the cattle to a new paddock every 24-h, but only 8 pairs could be carried if the paddocks were changed each 72-h.

The cows and calves performed well during both years of the study commensurate with their breeding and genetics. Daily body weight gains exhibited by the calves during the four grazing periods each year of the study are reported in Table 4.

Table 2. Crude protein and energy content of forage samples taken during each grazing circuit.

	Year 1			Year 2		
Grazing Period	DM %	CP % of DM	NEm, Mcal/lb DM	DM %	CP % of DM	NEm, Mcal/lb DM
1	23.17	18.25	.711	24.11	19.24	.723
2	24.53	17.64	.678	24.73	17.93	.705
3	24.97	18.18	.661	25.08	18.88	.675
4	23.89	19.25	.694	24.71	19.39	.709

Table 3. Total yearly forage dry matter production when cattle were given a new paddock each day or every third day.

Grazing Circuit	Grazing Treatment	
	Each 24-h, lbs DM	Each 72-h, lbs DM
1	18,125	15,573
2	17,276	14,484
3	17,400	16,444
4	16,940	14,876
Total DM/yr, lbs	69,741	61,377
Total DM/yr, tons	34.87	30.69
Total DM/yr, tons/acre	6.97	6.14

Table 4. Average daily gain of calves as affect by daily versus every third day changing of pasture paddocks, lbs

	Year 1		Year 2	
Grazing Period	24-h	72-h	24-h	72-h
1	1.86	-----	-----	1.92
2	-----	2.11	2.33	-----
3	2.56	-----	-----	2.84
4	-----	3.17	2.87	-----

Combining the data in Table 4, calves under the 24-h paddock change system gained 2.41 lbs/day during the entire grazing period. Calves under the 72-h paddock change system gained 2.51 lbs/day during the same period. However, these daily gains were not statistically different (P = .46).

This experiment was designed mainly to detect differences in total yearly DM production when paddock changes are made daily versus every three days on improved, irrigated pastures when management intensive grazing practices are used. Consequently there was no statistical difference in the daily gain of calves due to grazing treatment.

Cows made slight improvements in body weight and body condition score during the grazing season both years of the study (Table 5). Here again no statistical difference in cow performance could be detected due to grazing treatment.

Table 5. Body weight change and body condition score of cows as affect by daily versus every third day change of pasture paddocks.

	Year 1				Year 2			
	24-h		72-h		24-h		72-h	
Grazing Period	BW	BCS	BW	BCS	BW	BCS	BW	BCS
1	+37	5.5	-----	-----	-----	-----	+30	5.6
2	-----	-----	+24	5.3	+27	5.7	-----	-----
3	+12	5.3	-----	-----	-----	-----	+3	5.2
4	-----	-----	-3	5.1	+5	5.3	-----	-----

Conclusion

The results of this study definitely show that when cow-calf pairs graze improved, irrigated grass pastures and when management intensive grazing procedures are used, one can expect a 13.6% increase in yearly DM production when cattle are moved to a new paddock each day versus every three days. This of course translates into a 13.6% increase in the carrying capacity of the pasture without a change in animal performance or forage quality. However, the labor cost is tripled if the paddocks are changed each day versus every three days. An economic analysis indicates that the increase in carrying capacity, which translates into a reduction in feed cost, and the increase in labor cost resulted in a nearly dollar for dollar trade-off. This of course applies only if extra labor was hired. However, if more efficient use was made of existing labor, the daily changing of paddocks would be economically advantageous.