Comparison of beef cattle management systems: pasture versus drylot year 1 (2009-2010)

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Introduction

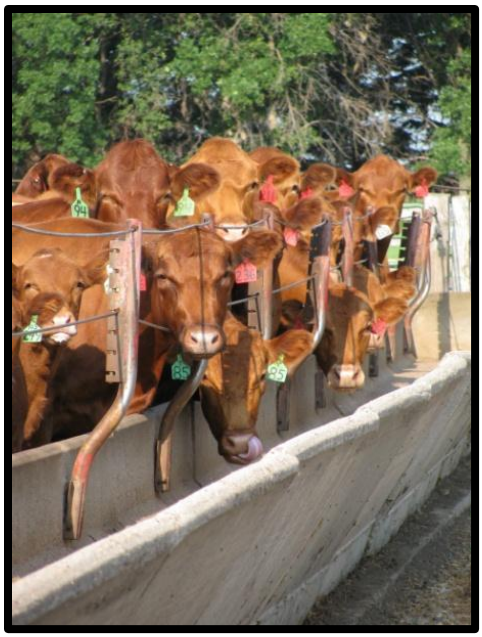
Land is an expensive and limited resource that must be efficiently managed for sustainability. North Dakota is traditionally a cow-calf production state, grazing cow-calf pairs on pasture. Since 1972, the Carrington Research Extension Center has been raising beef cattle in a drylot management system, maintaining a breeding cow herd in a confined drylot or feedlot pens during normal grazing times. This system was implemented to produce more beef per acre of cropland, utilizing forages, crop residues, co-products and off-quality grain.

Modeling studies suggest a typical eastern North Dakota farm of about 2,000 acres with conventional cropping could support approximately 85 beef cows without deliberate feed production on the cropland acres (Anderson and Boyles, 2007). This synergy of crop and livestock development, along with flexibility of marketing, control and treatment of disease, easier artificial insemination breeding systems, low stress at weaning and bunk-broke calves at marketing are all advantages of drylot production.

However, drylot cow-calf production is an intensive management system with daily labor and significant investment of infrastructure and equipment. Challenges compared to pasture management include crowding, disease transfer, environmental stressors, pests, and manure accumulation.

To compare the efficiency and economics of each production system, mature crossbred Red Angus beef cows at the Carrington Research Extension Center were allotted randomly to two management protocols: pasture and drylot. The protocol for each treatment is based on the best management practices for each respective environment.

Variables measured include cow efficiency measured in breeding success and pounds of calf at weaning, steer growth and carcass traits, as well as replacement heifer conception rate. Costs and returns associated with each system will be recorded and compared. This trial will be continued for three years to allow for statistical confidence of recorded observations and economic trends of inputs required for production. This paper is a progress report of the first year's observations.



Cow/calf pairs at bunkline in drylot production management system.

Cow/calf pair grazing pasture in pasture production management system.

Materials and Methods

Seventy-three crossbred Red Angus cow-calf pairs from the Carrington Research Extension Center were randomly allotted into one of two treatments based on 2009 calving performance, with consideration for previous year's calving date and calf birth weight. Treatment 1) Pasture (n = 36; average body weight 1411.3 lbs) and treatment 2) Drylot (n = 37; average body weight 1429.8 lbs).

Each treatment group was assigned to two of four drylot pens at the Carrington Research Extension Center Livestock Unit. Drylot pens allowed a minimum of 400 sq. ft. per pair and 22 inches of bunk space per cow (MWPS-6).

Cows were fed a totally-mixed ration once daily formulated to the recommendations of NRC (1996) primarily consisting of corn silage, wheat straw and condensed distillers solubles and barley hulls. Mixed grass hay/wheat straw was offered free choice along with free access to fenceline waterers. Body weight and body condition scores (1-9 scale) were recorded at three different intervals during the cow-observation period.

On 26 May 2009 cow-calf pairs assigned to the pasture management treatment were transported to 256 acres of mixed, native-grass pasture. Pairs had free access to water provided by a stream that traversed the pasture.

Drylot management pairs were confined in two large drylot pens. After weaning, drylot cows grazed soybean residue for approximately three weeks (until snow cover) as a technique for livestock and crop integration.

Prior to weaning, calves in both treatments were offered creep feed formulated with sunflower meal pellets, corn, rolled field peas and wheat middlings and commercial mineral supplement. Drylot calves (n = 37) were weaned at approximately 176 days of age, whereas the pasture calves (n = 36) were weaned at 208 days of age in accordance with common producer best-management procedures.

Steers (n = 37) were comingled at the Carrington Research Extension Center's feedlot pens and offered a totally-mixed ration once daily formulated to meet or exceed NRC (1996). A receiving ration

of 56 Mcal/lb was fed for 56 days and a finishing ration of 65 Mcal/lb until harvest. Steers were managed conventionally with ionophores (300 mg/head/day Rumensin) and implanted with terminal combination estradiol/trenbolone acetate growth implant. Steers were harvested when visual appraisal by trained livestock technicians estimated that 60 percent of the steers had reached a quality grade of Choice or better. Steer weights, average daily gain, and carcass characteristics were recorded.

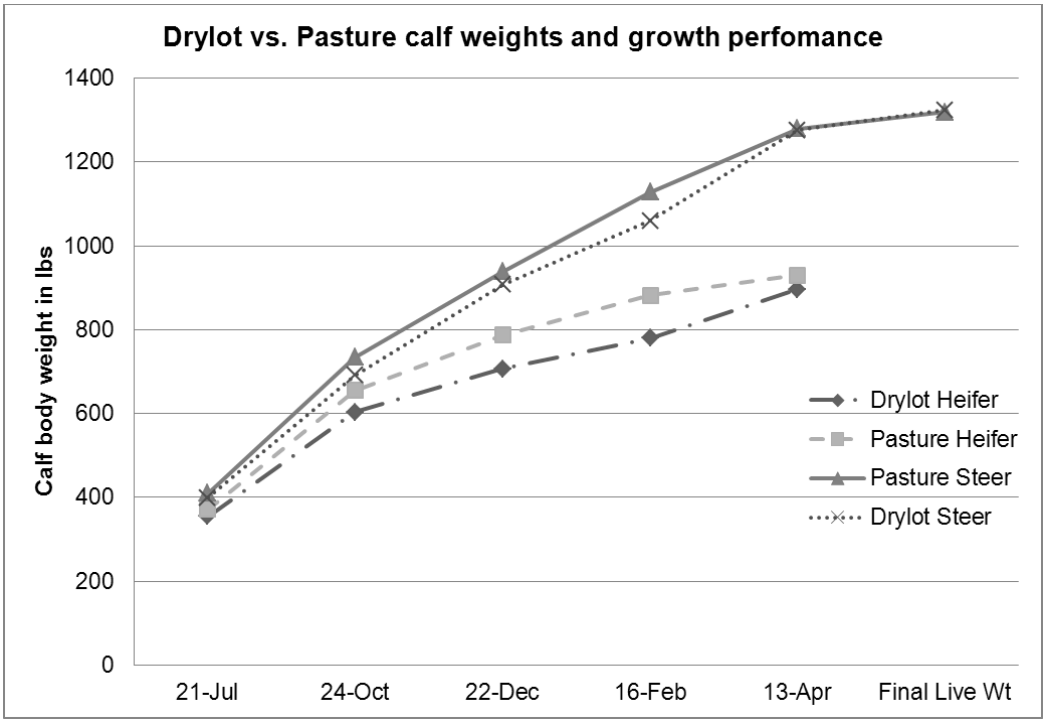
Retained heifers (n = 23) were managed similarly in drylot pens regardless of previous treatment after weaning. Heifers will be sorted back into assigned drylot or pasture treatment groups for the duration of the 3-year trial.

Results

Average calf birth weight for all pasture and drylot calves was 95.6 pounds and 97.5 pounds, respectively, with birth dates of 30 March and 31 March 2009 for the respective treatments. Cow weights at pasture turn-out were 1411.5 pounds for pasture and 1429.8 pounds for drylot treatments, respectively. Calves weighed 231.0 pounds and 244.4 pounds, respectively, for pasture and drylot treatments.

Drylot calves were weaned on day of age 176 and weighed 538.3 pounds. Pasture calves weighed 624.6 pounds on that day but remained in the pasture with the cows. At 208 days of age, the pasture calves were weaned and averaged 705.4 pounds with drylot calves averaging 634.9 pounds on that day.

During the 82-day creep feeding period for drylot calves, feed consumption averaged 7.12 pounds per head per day. Pasture calves were offered creep feed for 114 days and consumed an average of 6.25 pounds per head per day. Calf weights and growth performance are illustrated in Graph 1.



Graph 1. Heifer and steer growth performance in pasture vs. drylot management systems.

Steers and heifers in both management groups were similar in weight on July 21. At weaning, the steers were gaining at a greater rate due to management and implants (Table 1). The calves that were managed in the pasture treatment appeared to be growing faster indicated by the greater body weights recorded during the period intervals (Graph 1). The final recorded weights (April 13 for heifers and

slaughter date for steers) appear to be the same. Drylot heifers weighed 896.4 pounds versus 929.5 pounds for pasture, and drylot steers weighed 1324.4 pounds versus 1319.7 pounds for pasture.

Table 1. Gains of heifers and steers from pasture vs. drylot cow management systems[ab]

Item	Treatment	
Steer Perfomance	Pasture[c]	Drylot[d]
	----- lb/d -----	
Period 1 (July to Sept) 70 d	3.41	2.88
Period 2 (Sept to Oct) 28 d	3.40	4.34
Period 3 (Oct to Nov) 30 d	3.26	3.46
Period 4 (Nov to Dec) 28 d	3.33	2.88
Period 5 (Dec to Jan) 28 d	3.33	2.88
Period 6 (Jan to Feb) 28 d	3.43	2.19
Period 7 (Feb to Mar) 28 d	3.47	4.12
Period 8 (Mar to Apr) 28 d	3.34	3.91
Period 9 (Apr to Harvest)	2.26	2.88
Overall ADG	3.25	3.28
Heifer Performance	Pasture[c]	Drylot[d]
	----- lb/d -----	
Period 1 (July to Sept) 70 d	3.01	2.54
Period 2 (Sept to Oct) 28 d	2.93	--
Period 3 (Oct to Nov) 30 d	2.88	--
Period 4 (Nov to Dec) 28d - 56 d	1.55	1.84
Period 5 (Dec to Feb) 56 d	1.69	1.31
Period 6 (Feb to Apr) 56 d	1.46	1.82
Overall ADG	2.26	1.88

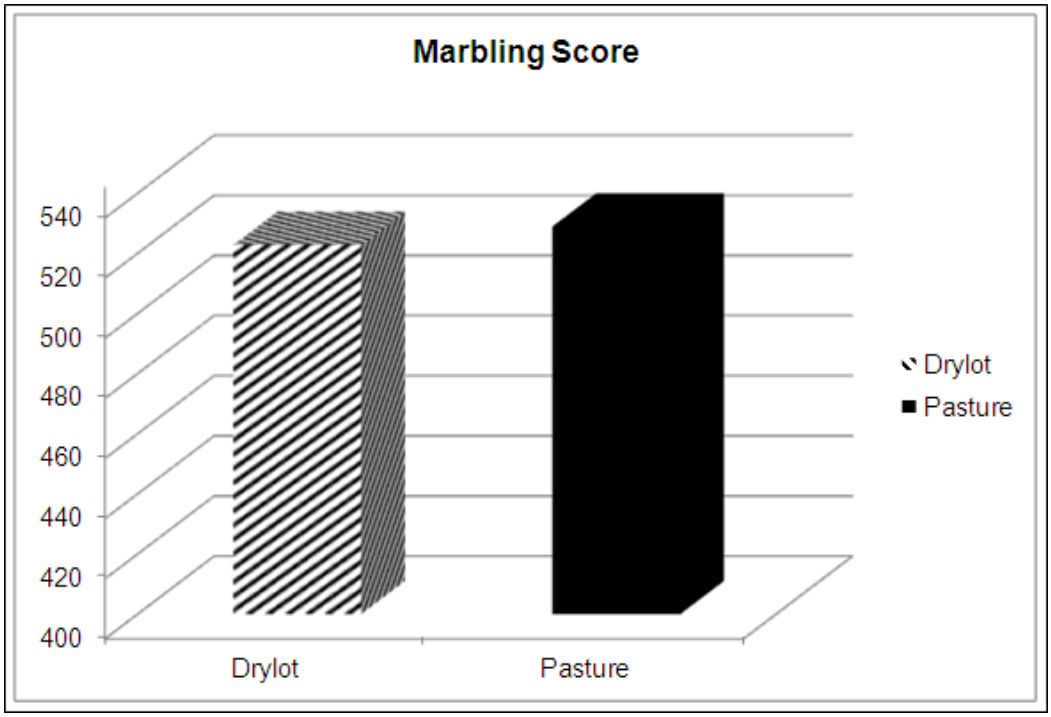
[a]Steer and heifer, drylot and pasture treatments were managed seperately.

[b]Calves were fed according to NRC (1996) nutrient requirements.

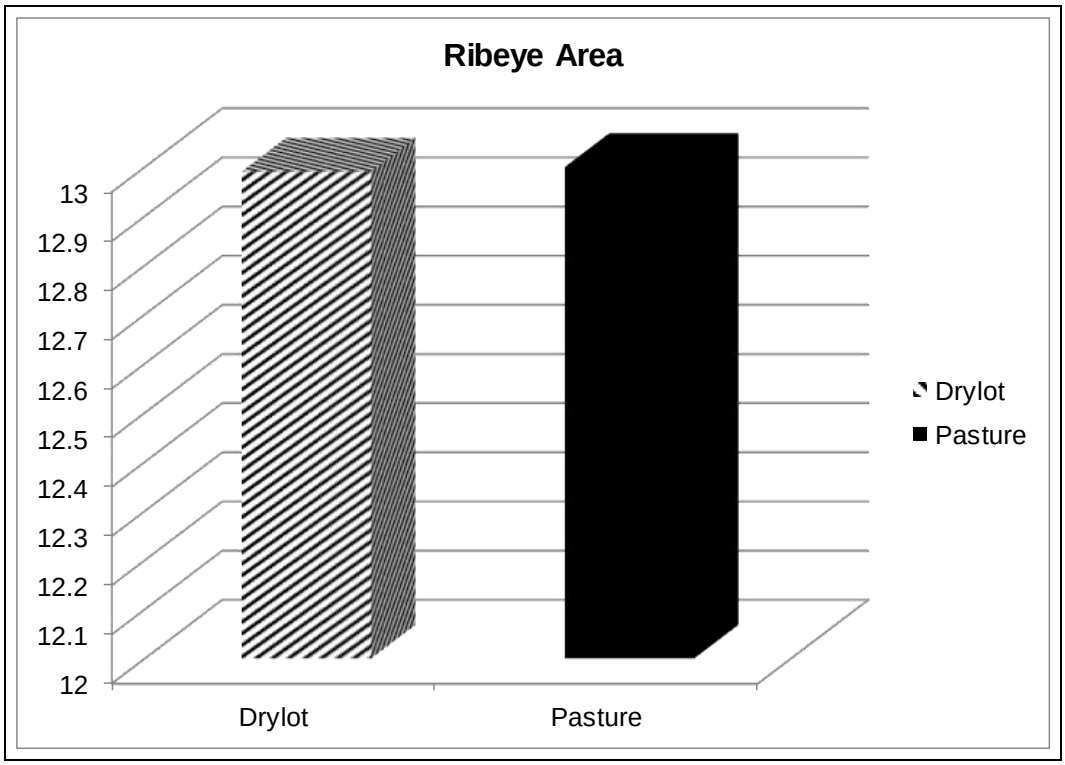
[c]Pasture calves were weaned on 24 October.

[d]Drylot calves were weaned on 22 September.

Steer ADG performance (Table 1) varies between treatments throughout the recording periods observed, but the overall ADG is similar (3.28 lbs for pasture vs. 3.25 lbs for drylot). Carcass value characteristics, marbling score, and ribeye area are illustrated in Graph 2 and Graph 3, along with hot carcass weight (803.64 vs. 831.79 lbs), back fat (0.55 vs. 0.44 in), kidney pelvic heart fat (2.19 vs. 2.39%), dressing percent (0.61 vs. 0.63%) and final yield grade (3.15 vs. 2.64) for drylot vs. pasture management treatment systems, respectively.



Graph 2. Steer marbling score from pasture vs. drylot management systems.



Graph 3. Steer ribeye area measurement of pasture vs. drylot management systems.

Conclusion

With the conclusion of Year 1 observations, pasture versus drylot management systems does not appear to affect the overall performance of the mature cow, developing heifers or growth performance of the steers. The continuation of Year 2 and Year 3 will allow for greater confidence in observed trends of cow efficiency, heifer reproductive performance, and growth and carcass performance of steers. An economic comparison will be reported at the conclusion of Year 3 to determine a long-term average of costs and profits associated with each production system.

Literature cited

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