Best Management Practices for Winter Care of the Cow Herd – Confinement versus Open Grazing

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Garland Dahlke, Research Scientist, Iowa Beef Center, Iowa State University
David Bruene, Beef Teaching Herd Superintendent, Iowa State University

Summary and Implications

The objective of this study was to evaluate whether the effects of winter grazing or confinement for winter care of beef cows in Iowa would have any impact on the physical condition of the cow or the calf born to the cow in spring. It appears that where feedstuff quality is similar between scenarios, there was no difference.

Introduction

Best management practices for winter care of the cow herd occasionally come into question when local law enforcement officials receive calls from individuals concerned with cold weather exposure of cattle that are observed in open fields grazing swaths or stockpiled forage rather than having the shelter of a building. Low temperature, water accessibility and feed availability are all items that become debated and can be difficult for producers to explain to both law enforcement officials and to the general public who are becoming increasingly unfamiliar with livestock. Likewise, an objective measure such as gross scale weight when used to compare treatment differences is not always clear when animal behavior modifies eating patterns and subsequent gut fill. Therefore, actual carcass changes in the cow and the survivability of the in-utero calf during this time need to be the outcomes on which should focus.

Materials and Methods

Three management groups of cows in their second or greater parity of Black Angus or a percentage of Black Angus and Simmental breeding due to calve in mid-March through April were used in the trial. Two of these groups were wintered in Ames, IA (34 cows per group) and one wintered at the McNay research farm at Chariton, IA (98 cows). Each group was split in half by a gate cut with every other cow going to a winter swath grazing protocol while the other half was placed in a feedyard with some degree of shelter starting in early December and maintained in the respective environment until the first week of March. All cows were then supplemented with better quality feed about three weeks prior to calving since the forage quality was inadequate to support both cow and developing calf at that point. Table 1 provides details regarding the composition of these treatment groups.

The trial was initiated with all cows being removed from corn stalk grazing at the beginning of December, weighed, body condition scored, mud scored, and an ultra sound measure of the 12th rib fat cover and ribeye area were taken. These same measures were taken again the first week of March. Ultra sound images were processed at the C.U.P. Lab in Ames IA. Daily weather data was taken from the Iowa State University weather stations at each location. Water intake was measured at the water fountains using the metering systems of the Iowa Rural Water Cooperative that supplied the water to the groups. Forage samples were taken at the start of the trial from the first crop, round baled hay used to feed the confined cattle and of the swaths used for winter grazing. Samples from the swaths were also taken in late January and at the end of the trial. All forage samples were evaluated at Rock River Laboratory, Watertown, WI. Results are provided in Table 2. Calving data, which included birth weight, calving difficulty, calf vigor, death loss and treatments due to sickness, was collected on all animals involved in the trial.

Confined Cow Protocol

Cows in this treatment were fed round bales of hay in round bale feeders. These feeders were filled once or twice weekly allowing the cows ad libitum intake. A mineral / vitamin supplement was fed free-choice in each pen. Bedding in the form of baled corn stalks was provided as needed. These cows had access to a building and dry lot with about 235 square feet per cow for the cows held in Ames. While those at the McNay farm had a wind break from a wooded lot and a grass covered hillside with about 1000 square feet per cow. All pens had an insulated, heated, autofill water fountain. Bale weights were recorded as were both man-hours and machine-hours of labor and operating time.

Grazing Cow Protocol

Cows designated to this treatment were placed on a swathed field of pearl millet. Pearl Millet was seeded the last week of June at the Chariton location and the first week of July in Ames. In both locations the millet was only mowed once and this occurred during the first week of December. These animals were given approximately two to three days of grazing for each move of the break wire

supported by Gallagher tumble wheel posts. Water was supplied by an insulated water fountain at the end of the field. A water meter was installed on each fountain to measure group water consumption. The same mineral and vitamin supplement used for the confined cows was used in this treatment. Forage supply was measured prior to turnout by taking yield estimates across the field using a three-foot length of windrow weight at each of the sampling locations on the sampling grid. Dry matter content of the sampled forage and a dry matter yield per acre were determined prior to grazing as well to assist in calculating the forage allotment when moving the wires. When weather permitted, the leftover forage from these locations was raked up, weighed (with dry matter determined) and used to calculate forage intake by the grazing cattle. Daily time and machine commitment were also recorded. The cows on the grazing treatment had minimal protection from weather other than the rolling terrain of the field being grazed and an occasional patch of trees along the fence line.

Results and Discussion

Primary Data

Table 3 provides a summary of the weather conditions at both locations. Chariton Iowa, which is about 100 miles south-east of centrally located Ames is a few degrees warmer and slightly more humid. Daily variation in temperature, total precipitation, windspeed, days with high temperatures above freezing and days with lows at or below zero degrees Fahrenheit are quite similar.

Referring again to Table 2 the forage quality the cows received while on test was fairly close between treatments and locations initially. The swathed millet did decline substantially over time. There were no strong differences between cows in the two treatments, but there was a slight numerical trend where the confined cows may have fared slightly better. Referring to Table 4, it appears that the quality of the forage probably had more impact on the slight resulting difference than the weather conditions. Cows on the grazing treatment reflect this in that utilization of the available swathed forage. Early when the trial began in December, about 80% of the swath forage was utilized, As the season advanced into late February swath utilization declined to approximately 50%. The resulting changes in the initial cow body measurements are listed in Table 4. Cow weight and visual body condition scores are a bit deceptive in this scenario since it is difficult to control gut fill when cows are provided ad libitum access to round bales and grazed forage with no set fasting time prior to weighing. Visual body condition scores are a quick reference of tissue reserves in the cow, but pregnant cows with a clean hair coat may appear to be in better condition than their counterparts that have soiled hides from being in confinement thus the ultrasound images were used to better evaluate the body composition changes that occurred. The results given in Table 4 indicated no difference between ribeye area or rib fat change from treatment in this trial.

Mud score, or the dirtiness of the hide was significant between these two treatments. At the start of the trial, all cows were taken from corn stalk grazing and the mud scores were "1" (free from any mud or manure) for all animals. Cows that returned to grazing maintained this score of "1" without exception throughout the trial while those in confined quarters became significantly dirtier with those in the tighter quarters at the Ames location being the worse even though copious amount of bedding were provided. Table 6 indicates the quantities of bedding used here and the time commitment required in maintaining the cows in these different environments. The higher mud score does impact not only the aesthetics but also the lower critical temperature (LCT) tolerated by the cow and subsequently the cow's well-being. Based on NASEM calculations, the LCT of the grazed cows was estimated to be -26°F while the confined cows, on average was -14°F.

In regards to the pregnancy and calving data provided in Table 5, there did not appear to be any notable difference in birth weights due to treatment nor were there any differences in mortality, calf health or dystocia between treatments in this trial. There was a breech birth and two calves that received assistance nursing in the confined treatment, but the difference was not significant. Mortality was the same between treatments with two calves lost on the grazing treatment and two calves lost with the confined cows. What may be of consequence concerning both calves lost on the grazing treatment, the cold, wet weather that occurred the day the calves were born may have been the cause where the cause of those lost in the confined groups seemed to be due to an injury possibly due to a cow stepping on the calf.

Secondary Data

Considering the practical element of time and overhead commitment in the successful care of livestock, measures of labor hours, machine hours, forage use, bedding use and water use measures were taken to provide a comparison between treatments. Starting with water usage, Figure 1 provides a summary of water usage per cow at the Chariton Iowa location while grazing swaths during this trial where supplemental water consumption was just under 4 gallons per head per day. At this location snow cover was intermittent and as Canadian winter grazing data would suggest, grazing cows consume little to no supplemental water when natural precipitation as snow or rain occurs. The Ames location confirmed this thought where snow cover persisted for most of the time on trial, less supplemental water was consumed- an average of 1.25 gallons per head per day. There did not seem to be any difference between treatments in overall water consumption. During dry periods in the Chariton location the grazed cows tended to consume more supplemental water than their confined contemporaries.

Considering the time element shown in Table 6, the hours involved in taking care of the animals has meaning,

but the value of time is not static. Man-hours become higher in value when equipment is used and when the time needed for routine animal care competes with other tasks that require immediate attention. The grazing option did have the advantage when time was considered. The initial fence set up, which was essentially a single electric wire was not factored in, but neither was the time required to bale and haul hay or bedding bales. The biggest advantage in the grazing treatment seemed to be in manure and bedding management since bedding and manure handling was not required.

Forage requirements seemed to also be similar between treatments. Hay rings are notorious for allowing waste and this did happen. The consumption of the corn stalk bedding, when fresh probably had a big impact on what apparent hay consumption calculated to be at the end of the trial. The swath grazing treatment has always competed well with mechanically harvested forage in terms of utilization. The utilization rate does decline as winter winds down since the quality of the feed in the swath declines. Grass growing along fence rows and waterways consumed by the cows confounds accuracy, as bedding did in the confined treatment.

Acknowledgements

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Confined cow treatment.

Swath grazed cow treatment.

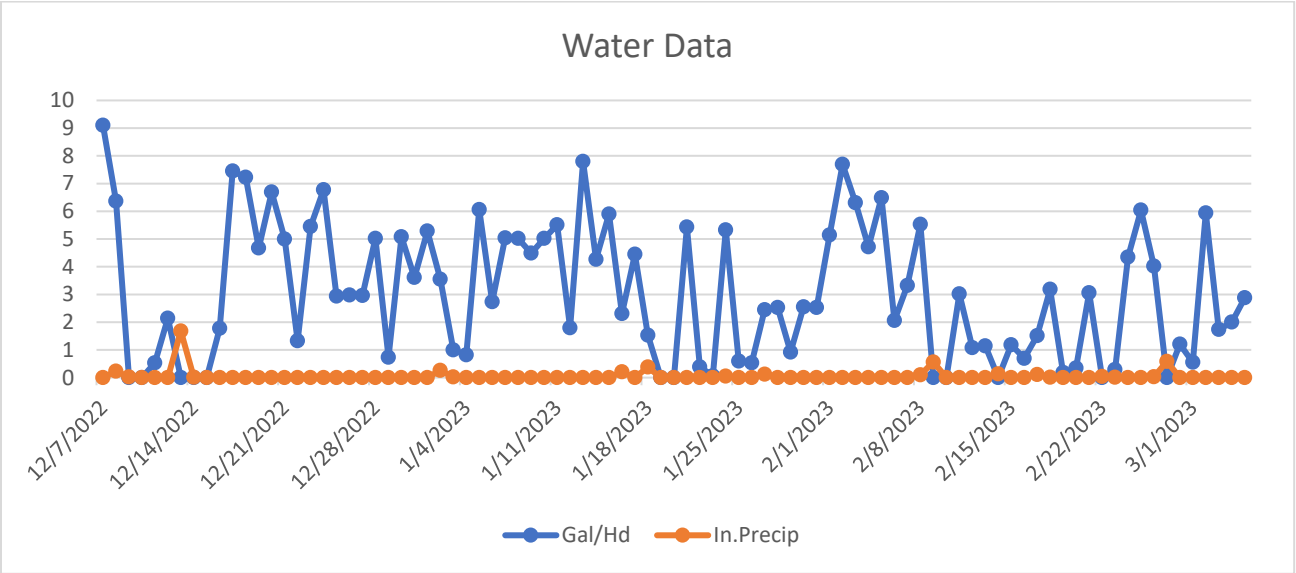

Figure 1. Water consumption per head per day.

Table 1. Initial cow data.

Management Group	Initial Cow Wt Pounds	Visual Body Condition Score	Initial 12th Rib Fat Inches	Initial Ribeye Area Inches^2	Initial Mud Score[1]
Field	1342	4.5	0.23	11.0	1
Yard	1295	4.4	0.20	10.7	1
Prob. (T<=t) Between yard & field	0.21	0.78	0.53	0.37	1.0

[1]Mud score = 1 if clean hide, Mud score = 5 if entire hide is dirty and matted

Table 2. Forage quality.

Forage	RFQ	NEm Mcal/pound	Available Cr.Pro. %	aNDFom %	TTNDFd % of NDF	NFC %	Ash %
Chariton Hay[1]	75	0.40	7.5	62.2	37.6	18.3	8.6
Ames Hay	91	0.49	9.8	63.3	46.6	16.8	8.4
Swath Grazed Millet[2]							
Dec. 7	84	0.43	6.8	69.3	47.7	14.7	6.9
Jan 24	58	0.21	6.1	65.0	41.3	14.0	10.9
March 6	43	0	5.7	67.0	31.0	12.2	11.9

[1] Both hay sources were first crop, fescue hay.
[2] Pearl millet samples from both locations are averaged together for table.

Table 3. Weather data.

Time Period Winter 2022-2023		High °F	Low °F	[1] Wind Speed Knots	Humidity %	[2] Days with Precipitation & Period Total	Days with highs above 32 °F & lows below 0°F
Ames, IA							
December	Average	23.4	7.1	10.9	74.7	9	4 / 8
12/16-12/31	*St. Dev.*	*13.5*	*14.1*	*5.7*	*7.0*	*0.32 inches*	
January	Average	32.1	16.1	8.2	81.2	15	16 / 3
1/1-1/31	*St. Dev.*	*10.2*	*12.0*	*3.6*	*7.0*	*2.47 inches*	
February	Average	39.2	16.8	8.7	73.8	9	21 / 3
2/1-3/2	*St. Dev.*	*10.3*	*10.8*	*3.3*	*7.1*	*2.69 inches*	
Chariton, IA							
December	Average	32.3	16.4	10.7	83.8	4	13 / 6
12/7-12/31	*St. Dev.*	*13.7*	*15.3*	*4.8*	*11.1*	*1.94 inches*	
January	Average	34.0	20.1	8.8	88.6	6	15 / 2
1/1-1/31	*St. Dev.*	*10.5*	*10.0*	*3.5*	*10.2*	*1.04 inches*	
February	Average	43.6	21.9	9.6	77.8	9	28 / 1
2/1-3/5	*St. Dev.*	*10.0*	*10.1*	*2.8*	*11.9*	*1.57 inches*	

[1] 1 knot = 1.15078 miles per hour

[2] Total precipitation includes snow and rain and expressed in rainfall equivalents.

Table 4. Change in cow measurements over time of trial.

Management Group	Cow Wt Pounds	Visual Body Condition Score	12th Rib Fat Inches	Ribeye Area Inches^2	Mud Score[1]
Field	-39	0.0	-0.02	-1.2	1.0
Yard	144	0.3	0.01	-0.9	2.7
Prob. (T<=t) Between yard & field	0.05	0.21	0.13	0.11	0.04

Table 5. Calf data.

	Calf Birth Wt (lbs)	Calf Vigor Score	% Mortality	% Cows Assisted
Field average	78.9	1	2.7	0
Yard average	81.7	1.1	2.7	2.0
Prob. (T<=t) Between yard & field	0.26	0.42	1.0	0.42

Table 6. Management commitment.

	Daily Forage DM [1] Pounds per Cow per Day	**Total Bedding**[2] Pounds per Cow	**Daily Labor Commitment**[3] Total Man-Hours per Cow	**Daily Labor Commitment** Total Tractor-Hours per Cow	**Clean-up**[4] **Manure+Fencing** Total Man-Hours per Cow
Field	28.0	0	0.27	0	0.13
Yard	26.7	686	0.60	0.57	0.18
Prob. (T<=t) Between yard & field	0.32		0.12		

[1] This value only includes forage in swaths or round bales. It does not include bedding or grass in lanes.
[2] Corn stalks were used as bedding.
[3] Daily labor commitment includes, checking water fountains, moving the swath wire 3 times per week, filling round bale feeders and bedding. Those hours that required the use of a tractor are given in the next column.
[4] Manure handling occurred at the end of the trial and only involved the cattle maintained in the yard. Cows on swaths had fence clean up time which involved *taking down the fence and leveling off ground in lanes.*