January 2004

A System for Wintering Spring-Calving Bred Heifers Without Feeding Hay

Tim W. Loy
University of Nebraska-Lincoln

Don C. Adams
University of Nebraska-Lincoln, dadams1@unl.edu

Terry J. Klopfenstein
University of Nebraska-Lincoln, tklopfenstein1@unl.edu

Dillon Feuz
University of Nebraska-Lincoln

Jacqueline A. Musgrave
University of Nebraska-Lincoln, jmusgrave1@unl.edu

See next page for additional authors

Authors
Tim W. Loy, Don C. Adams, Terry J. Klopfenstein, Dillon Feuz, Jacqueline A. Musgrave, and Burke Teichert

A System for Wintering Spring-Calving Bred Heifers Without Feeding Hay

Tim W. Loy
Don C. Adams
Terry J. Klopfenstein
Dillon M. Feuz
Jacki A. Musgrave
Burke Teichert[1]

Summary

Two systems for wintering pregnant, March-calving heifers were compared over two years on a commercial Nebraska ranch. The ranch's standard management system (CON) included grazed forage, supplement and hay. The alternative system (TRT) relied on grazed forage and higher levels of supplement, with no hay. Treatment effects on weight and body condition changes differed between years. Calves nursing TRT heifers tended to gain more weight. Two-year-old pregnancy rates did not differ. Partial budget analysis suggests the TRT system reduced expense by $7 per heifer, while maintaining a high level of performance.

Introduction

The costs associated with producing and feeding baled meadow hay (non-fertilized) in the Nebraska Sandhills have been reported to be $46.44 per ton (2002 Nebraska Beef Report, pp. 17-19). Because of the costs associated with providing harvested forages to beef cows in the Northern plains, interest has developed in designing supplementation programs that reduce dependence on harvested forages, and that may result in decreased winter feed costs. Such strategies may be of particular relevance during periods of drought or other conditions resulting in limited forage supplies.

Supplementing to meet the needs of spring-calving females in late gestation grazing dormant winter range is challenging, because diet samples collected in Nebraska during this time are low in both energy and metabolizable protein (1998 Nebraska Beef Report, pp. 7-11). This challenge is exacerbated when managing animals with relatively higher nutrient requirements, such as bred yearling heifers, which have been shown to be deficient in metabolizable protein (MP) when grazing winter range in Nebraska (2000 Nebraska Beef Report, pp. 7-10). In addition, low-quality forage intake by heifers in late gestation declines, perhaps due to physical inability to accommodate large volumes of forages which pass slowly from the rumen (2001 Nebraska Beef Report, pp. 19-22). These combined indicate that supplementation programs for pregnant heifers grazing dormant range must overcome a negative energy balance in addition to meeting MP requirements.

Byproducts of the corn milling industry are becoming increasingly available to Nebraska livestock producers. Dry corn gluten feed (DCGF), a product of the wet milling industry, has potential to be used as a supplement for grazing cattle. The energy and protein content of DCGF, as well as the price, permit its use in a variety of production settings.

The objective of this trial was to design a supplementation program for wintering pregnant heifers using grazed winter range and DCGF supplementation without feeding harvested forages before calving.

Procedure

The two-year study was conducted in cooperation with the Rex Ranch (Abbot Unit) near Ashby, NE. In the fall pregnant yearlings, heifers were weighed, assigned body condition scores (BCS; 1 = emaciated, 9 = obese) by two technicians, and allotted to treatment. Treatments included the ranch's standard heifer management system (CON; 558 heifers) and an alternative system (TRT; 559 heifers).

The CON system included access to native range with heifers being rotated to new pastures regularly and included supplementation of a high undegradable intake protein (UIP) supplement (Table 1), formulated to meet MP requirements (2000 Nebraska Beef Report, pp. 7-10). Hay feeding began in December and gradually was increased as the winter progressed. The amount of hay fed was at the discretion of the ranch manager and ranged from about 7 to 18 lb per heifer per day (average = 7.3). As the amount of hay was increased, the availability of ungrazed forage was decreased.

Heifers in the TRT system also were given access to standing

(Continued on next page)

range. However, the system was designed under the assumption that heifers would not be limited in the availability of grazed forage at any point. The TRT supplement (Table 1) was based on dry corn gluten feed (DCGF). Sunflower meal, fat and starch were added to improve pellet quality. The supplementation schedule was designed so predicted forage intake and DCGF supplement delivered approximately the same amount of energy as hay, control supplement and grazed forage intake in the CON system. Predicted MP requirements were met at all times for both systems.

The feeding schedule for each treatment was designed to begin Oct. 1 and continue through March 1 (estimated beginning of calving). Actual starting date was at the discretion of the ranch foreman and was dictated largely by amount and quality of available forage. The 1996 NRC Nutrient Requirements for Beef Cattle model was used to predict nutrient requirements. Predicted forage intake and diet quality were obtained from previous research conducted at the University of Nebraska (1997 Nebraska Beef Report, pp. 3-6; 2000 Nebraska Beef Report, pp. 7-10). Monthly changes in the feeding schedule were made to account for changes in forage quality and advancing gestation. The amount of supplemental feed was changed at the beginning of the month from October through January (0.7 to 1.1 and 0.7 to 4.0 lb for CON and TRT, respectively). Two-week changes were made during February to account for rapid increases in requirements during this time (1.2 to 1.8 and 5.7 to 7.5 lb for CON and TRT, respectively).

At the beginning of March, heifers again were weighed and independently assigned BCS by two evaluators. To alleviate differences in gut fill that resulted from the treatments, heifers were commingled and fed a common diet one day before processing. September to March (pre-calving) weight and BCS change were calculated. Heifers were managed as a single group during calving and the subsequent grazing season.

In the fall as 2-year-olds, heifers again were weighed, assigned BCS and rectally palpated to determine pregnancy. Weight and BCS change from calving through this time (post-calving) were calculated. Calf birth weight, weaning weight and ADG were recorded.

A partial budget analysis was used to compare the costs associated with implementing the two systems. Costs of the supplements were obtained through personal communication and amounts fed from ranch records. Intake predictions were used to calculate grazing costs, with a value of $12 per AUM used for standing winter range. This value is 50% the value of a growing season AUM in the Sandhills as reported in the 2001 Nebraska Livestock Budgets. The amount of hay fed was obtained from ranch records and valued at $0.025 per pound DM, or about $45 per ton as-fed.

Table 1. Composition of supplements fed to bred heifers.

	Composition, %DM	
Ingredient	CON	TRT
Dry corn gluten feed	—	72.0
Feather meal	40.0	—
Sunflower meal	30.0	22.4
Wheat middlings	26.3	—
Molasses	2.5	2.5
Bentonite	—	2.5
Salt	1.0	—
Starch	—	0.3
Fat	—	0.3
Vitamin pre-mix	0.3	0.1
Mineral pre-mix	—	0.1

Table 2. Weight, body condition, and conception rates of heifers in two systems.

Item	CON	TRT
Year One		
Pre-calving BW change, lb	100.0	98.3
Pre-calving BCS change	-0.16[a]	-0.08[b]
Post-calving BW change, lb	-100.1	-98.3
Post-calving BCS change	0.16	0.28
Year Two		
Pre-calving BW change, lb	-5.1[a]	12.3[b]
Pre-calving BCS change	-0.75[a]	-0.48[b]
Post-calving BW change, lb	2.82	0.04
Post-calving BCS change	-0.30[a]	-0.57[b]
Pooled Years		
Calf birth weight, lb	82.3	81.8
Calf weaning weight, lb	310.2	314.6
Calf ADG, lb	1.48[c]	1.52[d]
Pregnancy rate, %[e]	96.1	96.4

[a,b]Unlike superscripts within a row differ, $P < 0.05$.
[c,d]Unlike superscripts within a row differ, $P < 0.10$.
[e]Percentage pregnant with second calf. *P*-value reflects chi square analysis.

Results

Across years, heifers were 865 lb and had an average BCS of 5.5 at initiation of the trial, and neither differed ($P > 0.42$) by system.

The second year of the study (2001 - 2002) was marked by extensive drought. A number of year by treatment interactions were detected for weight and BCS change. Simple effects are presented for weight and BCS data (Table 2). In year one, pre-calving weight change was approximately 100 lb and was not affected by system. In year two, CON heifers lost a small amount of weight, while TRT heifers gained slightly. Average calf birth weight in this study was about 81 lb. If gestational weight gain (fetus, fluids, uterus, and placenta) is approximated by 1.7 times calf birth weight, heifers should have gained 138 lb with non-gestational tissues at maintenance. This suggests heifers in year one lost a small amount of weight, while heifers in year two may have lost more than 100 lb of body tissue.

Differences in pre-calving BCS change reflect the weight-changes observed. Heifers lost an average of 0.12 BCS units in year one, while in year two they lost 0.62 units. In both years, TRT heifers lost less ($P < 0.01$) condition than CON.

A year by system interaction was not observed for post-calving weight change; however, marked differences existed between years. In year one, heifers lost nearly 100 lb, while in year two their fall weight was similar to that recorded at calving. These changes, coupled with pre-calving changes, resulted in fall 2-year-old weights being similar to fall yearling weights in year one, with slight gains during year 2. This difference may be due to heifers having heavier initial weights in year 1. As drought conditions persisted, however, conditions may not have supported weight gain of the heavier heifers.

In year one, post-calving BCS change was slightly positive for both systems. In year two, heifers in both systems lost condition, with TRT heifers losing more. In year two, TRT heifers lost less condition pre-calving, but appeared to be more greatly affected by drought conditions, with a more rapid loss of condition during the summer.

Calf birth weights and weaning weights did not differ by system, although numerical trends in each lead to a tendency ($P = 0.10$) for calves nursing TRT cows to have higher ADG. While milk production was not measured in this study, perhaps TRT heifers had higher milk production. This could be supported by pre-calving BCS, rapid post-calving BCS loss in year 2, and the trend for calves to have higher ADG. Drought conditions in year two prompted early weaning, thus weaning weights were significantly lower in year two.

Second-calf pregnancy rate was 96% and was unaffected by treatment. Pregnancy rates tended to be lower in year two. Year one and year two conception rates were similar for CON heifers. Heifers in the TRT system, however, were three percentage units lower in year two compared to year one. This may be attributable to a greater loss of condition in year two among TRT heifers.

A partial budget analysis of the two systems results in an advantage of about $7 per heifer. An analysis of year one indicated a $6.01 advantage of the TRT system over the CON system, compared to $7.82 in year two. The differences result from changes in the amount of hay used, and different starting dates between years. Constant supplement and hay prices, labor costs, as well as winter range AUM values, were assumed. Equal cow and calf performance were assumed, with only cost differences used in the analysis. The cost of the CON system was most sensitive to changes in hay prices, whereas winter grazing costs and supplement costs were the largest determinants of TRT system costs. Labor comprised about 12% of CON system costs, compared to 6% for the TRT system.

In conclusion, a system of managing spring-calving bred heifers over the winter with supplementation and grazing winter range produced performance that was at least equal to a system including hay feeding, and did so with less total expense.

---

[1]Tim Loy, research technician; Don Adams, professor, Animal Science, North Platte; Terry Klopfenstein, professor, Animal Science, Lincoln; Dillon Feuz, professor, Agricultural Economics, Scottsbluff; Jacki Musgrave, research technician; Burke Teichert, Rex Ranch, Ashby NE; The authors would like to express their appreciation to Harry and Jean Younkin and the rest of the Rex Ranch crew.