Comparison of Partially Confined and Traditional Cow-Calf Systems

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Summary with Implications

Production of cow-calf pairs and grow/finish performance of calves from a partially-confined, fall-calving, intensive cow-calf system were compared to a traditional, spring-calving, extensive cow-calf system. Body condition was lower at breeding and weaning for the fall-calving alternative system compared to the traditional, spring-calving system. Conception, calving, and weaning rates were not different among treatments. Weaning weights were lower for the fall-calving alternative system than traditional, spring-calving system. Following weaning, calves were grown for 117 d and then subsequently finished to the same target fatness for both systems. In the grower phase, gain was greater and feed conversion improved for the fall-calving alternative system. In the finishing phase, gain was lower for fall-calving alternative system compared to traditional, spring-born calves. Intakes and carcass weight were not different among treatments during finishing, but calves from the fall-calving alternative system were fed 27 days more. The use of a fall-calving alternative cow-calf system had no impact on reproduction and weaning rates demonstrating potential value if pasture acres are limiting in areas with abundant crop acres, but calves will need to be grown longer to overcome lighter weaning weights.

Introduction

Traditional pasture has been converted to corn and soybean production in the northern plains region which has limited pasture availability for grazing. Limited grazing areas, and overall feed prices have steadily increased pasture rental rates. The reduction in perennial grasslands and increase in land values created a need for use of alternative forages and intensive cow-calf systems. Research has demonstrated that limit-feeding cows in a drylot setting is a comparable alternative to traditional pasture cow-calf systems. Additionally, winter grazing corn residue is an economical alternative to harvested forage or limit-feeding in confinement for non-lactating cows.

The use of double-crop annual forages (DCAF), commonly referred to as cover crops, has increased in popularity. Cover crops provide several advantages, including soil conservation, weed control, and an alternative forage source for livestock producers. Grazing late-summer planted cover crops provides economic incentives for livestock owners by adding weight to cattle, as well as economic incentives for crop producers with grazing rent and no impact on subsequent crop yields.

The objective of this study was to compare a traditional cow-calf system utilizing perennial pasture and corn residue grazing to an alternative cow-calf system utilizing drylot, fall forage oat and corn residue grazing on reproduction and calf growth performance, and subsequent post-weaning calf performance in a growing/finishing system.

Procedure

Multiparous, cross-bred beef cows (n = 160; average age = 6.2 ± 2.8 years-old) were utilized in a general randomized block design with two treatments. In year 1, cows were blocked by cow age, stratified by age and origin source (two sources), and assigned randomly within strata to one of two production systems treatments with four replicates, each consisting of 20 cows. Once allocated, cows remained in assigned treatment for both years of the experiment. Treatments were (1) alternative fall-calving system utilizing confinement, summer-planted oats, and corn residue grazing (ALT) with calves born in the fall (August/September) or (2) traditional extensive spring calving (March/April) system utilizing perennial pasture and corn residue grazing (TRAD). To maintain herd size, cows culled between years were replaced with open, multiparous cows sourced from the same herd of the original cows. An additional replicate was maintained for each system so that replacement cows entered the experiment after being maintained in that system.

Each year, after the conclusion of weaning, calves were maintained in their respective dam's experimental unit to measure animal growth performance in a grower phase, finisher phase, and carcass characteristics. The post-weaning experiments utilized the same generalized randomized block design maintaining the same treatment and replication as the calf's dam.

Cow Breeding and Cow-Calf Health Processing

Cows from both treatments were exposed to the same set of Simmental × Angus bulls that had passed an annual breeding soundness exam 30 days prior to breeding. The bull:cow ratio was 1:10 and the breeding season was 63 d (year 1) and 61 d (year 2). Two bulls were allocated to each replication of cows to prevent reproductive failure due to inadequate bull performance. All cows were given 5 ml of prostaglandin $F_{2\alpha}$ (5 mg/ml dinoprost tromethamine, Lutalyse, Zoetis Animal Health) following five days of bull exposure. Approximately one month before breeding, cows were vaccinated Bovi-Shield Gold FP 5 VL5 (Zoetis). Pregnancy was diagnosed via pregnancy detection blood test 31 d (TRAD; year 1), 29 d (ALT; year 1), 52 d (TRAD; year 2), and 50 d (ALT; year 2) after bulls were removed. Cows were treated annually with 1% doramectin (Dectomax, Zoetis) for control of internal and external parasites. Approximately one month before calving, cows were vaccinated Scourguard 4KC (Zoetis).

Calves were vaccinated at birth with Inforce 3 (Zoetis), given a clostridial vaccine (Ultrabac 7; Zoetis), navels treated with iodine, and received a panel tag in the right ear with individual identification number, and birth weight recorded. If a cow gave birth to twins, one calf was selected randomly and removed from the experiment.

Table 1. Ingredient composition of limit-fed diet for an alternative cow-calf system[1]

Ingredient[2], %	Year 1		Year 2	
MDGS[3]	55.00		54.45	
Low Quality Forage[4]	40.00		40.55	
Supplement[5]	5.00		5.00	
	Gestation[6]	Lactation[7]	Gestation[8]	Lactation[9]
Fine ground corn	2.47	2.44	2.49	2.45
Beef trace mineral and salt premix[10]	—	—	1.79	1.79
Limestone	1.98	1.98	0.57	0.57
Salt	0.30	0.30	—	—
Tallow	0.125	0.125	0.125	0.125
Beef trace minerals[11]	0.10	0.10	—	—
Insect growth regulator[12]	—	0.0275	—	0.0275
Vitamin A-D-E[13]	0.015	0.02	0.015	0.02
Monensin[14]	0.0138	0.0138	0.0158	0.0158
Nutrient composition, % DM				
Organic matter	90.76		90.79	
Crude protein	19.79		20.93	
Neutral detergent fiber	53.81		48.84	
Acid detergent fiber	35.07		32.37	
Ether extract	5.22		4.86	

[1]Treatment = alternative cow-calf system (ALT) calving in July/August and utilizing drylot, fall forage oat grazing, and corn residue grazing.

[2]All values represented on a DM basis.

[3]Modified wet distillers grains plus solubles.

[4]Low quality forage for year one was wheat straw, year two was wheat straw for 73 d, oat hay for 137 d, and ground corn residue for 14 d.

[5]Included at 4.79% (Year 1) and 3.58% (Year 2) total diet DM.

[6]Included in diet from March 16th, 2018 to July 18th, 2018.

[7]Included in diet from July 19th, 2018 to October 22rd, 2018.

[8]Included in diet from March 14th, 2019 to July 17th, 2019.

[9]Included in diet from July 18th, 2019 to October 22nd, 2019.

[10]Premix contained 21.5% salt, 30.5% Ca, 0.22% Zn, 0.22% Mn, 0.11% Cu, 0.0005% I, 0.0002% Co, 0.0001% Se.

[11]Premix contained 10% Mg, 6% Zn, 4.5% Fe, 2% Mn, 0.5% Cu, 0.3% I, and 0.05% Co.

[12]JustiFLY feedthrough, Champion Farmoquimico LTDA, Anapolis, Goias, Brazil. Formulated to provide 5g/kg.

[13]Premix contained 1,500 IU of vitamin A, 3,000 IU of vitamin D, and 3.7 IU of vitamin E per g.

[14]Rumensin 90, Elanco Animal Health, Indianapolis, IN. Formulated to provide 27.5 mg/kg

Alternative Cow-Calf System Breeding

Each year of the experiment began at breeding, which occurred from October 11th to December 12th of 2017 (63 d; year 1) and October 18th to December 17th of 2018 (61 d; year 2). In year 1, cows were non-lactating at the time of breeding. Part of the ALT treatment design was to use fall forage oats to meet the nutrient requirements of the cows during lactation and breeding. Fall oat grazing began for the ALT treatment on October 11th and 23rd (years 1 and 2, respectively). Stocking rates for the fall oat fields were approximately 2.5 to 3.0 acres/pair. Each replicate of cow-calf pairs had full access to their assigned oat field.

On March 14th and 16th (years 1 and 2, respectively) cows in the ALT treatment were housed in open feedlot pens with approximately 30 in. of bunk space and 850 ft^2 of pen space per cow. Cows were limit-fed to meet requirements based on physiological stage during both gestation and lactation periods (NASEM, 2016; Table 1). Breeding body condition scores for the ALT treatment indicate that energy intakes were adequate for maintenance and lactation during the confinement period, which occurred directly prior to breeding. Cows were fed once daily between 0900 to 1200 h with ad libitum access to fresh water. The limit-fed diet, for year 1, consisted of 55.0% modified distillers grains plus solubles (MDGS), 40.0% wheat straw, and 5.0% supplement (DM basis). In year 2, the limit-fed diet consisted of 54.5% MDGS, 40.5% wheat straw, and 5.0% supplement (DM basis). In both years, the limit-fed diet was formulated to provide 200 mg/cow daily of monensin (Rumensin 90; Elanco Animal Health, Greenfield, IN). Diets were mixed and delivered using a truck-mounted feed mixer and delivery unit with scale measurements to the nearest 1.0 lb (Roto-Mix model 420, Roto-Mix, Dodge City, KS). All scales used for the study were calibrated twice annually. Cows in the ALT treatment were managed as a fall calving herd with calving occurring in feedlot pens from July 16th to September 12th of 2018 and July 20th to September 28th of 2019 (years 1 and 2, respectively). Cow-calf pairs remained in the feedlot until October 23rd (years 1 and 2) for a total of 222 and 224 d (years 1 and 2, respectively). At which time, cows would be moved to oat fields, as previously discussed.

Alternative Cow-Calf System Weaning

Cow-calf pairs grazed fall oats from October 23rd to January 13th of 2019 and October 23rd to approximately January 8th of 2020 (years 1 and 2, respectively). Grazing days were variable between years, with 82 d (year 1) and an average of 77 d (58 to 92 d; year 2). Cow-calf pairs were moved off oat fields when it was visually estimated that forage height was 5.1 cm. In the event this occurred prior to weaning, cows-calf pairs returned to the feedlot and were provided the same limit-fed diet at the same intake amount they received prior to oat grazing. After weaning, cows were moved to corn residue fields on January 10th, 2019 of and 29th, 2020 (years 1 and 2, respectively). Stocking rates were approximately 3 acres/cow and grazing days were 64 and 52 d (year 1 and 2, respectively) for corn residue fields.

Traditional Cow-Calf System Breeding

Cows were exposed to bulls from July 12th to September 12th of 2017 (63 d; year 1) and July 6th to September 4th of 2018 (61 d; year 2). In year one, TRAD cows were lactating and had the previous, non-experimental calf, with them.

Traditional Cow-Calf System Calving

On approximately March 17th, 2018 and March 12th, 2019 (years 1 and 2, respectively), cows from the TRAD treatment were comingled prior to calving and fed ground grass hay provided at 30 lb for 31 d (year 1) and 20 lb for approximately 81 d (year 2) on dormant smooth bromegrass pastures. Calving began on April 10th to June 16th of 2018 and April 5th to June 6th of 2019 (year 1 and 2, respectively). On May 7th, 2018 and May 2nd, 2019 (year 1 and 2, respectively), cows in the TRAD treatment were moved to smooth bromegrass pastures. Stocking rate was 1.2 ha/cow (years 1 and 2) and grazing days were 186 and 197 d (years 1 and 2, respectively).

Traditional Cow-Calf System Weaning

Calves from the TRAD treatment were weaned on October 16th, 2018 and October 11th, 2019 (year 1 and 2, respectively). After weaning, on November 15th, 2018 and 8th, 2019 (years 1 and 2, respectively), cows in the TRAD treatment grazed corn residue fields. Corn residue fields were stocked at 1.69 and 1.43 ha/cow (years 1 and 2, respectively) and grazing days were 119 and 123 d (years 1 and 2, respectively).

Grower Phase

Calves were weaned using a fence-line weaning strategy. All calves from the four replicates within treatment were comingled in a pen. Calves were fence-line weaned for three d and limit-fed grass hay at 2.0 % of BW before transport to the feedlot at ENREC (2 miles). Calves, steers and heifers, were sorted into their previous cow group on d—6. Steers and heifers from each experimental unit were fed together in one pen. Weaning BW measurements were collected on two consecutive days and averaged following 5 d limit-fed period. The weaning BW measurement also served as the growing initial BW. Calves were implanted with 36 mg zeranol (Ralgro; Merck Animal Health, Madison, NJ) on d 1. Calves were vaccinated with Bovi-Shield Gold One Shot (Zoetis) and for Clostridial and *Histophilus somnus* (Ultrabac 7/Somubac; Zoetis). Calves received parasite control as well (Dectomax; Zoetis Animal Health). Calves were maintained in their original replicate for the grower and finisher phases. All calves received a common grower diet consisting of 35.0% grass hay, 30.0% modified distillers grains plus solubles (MDGS), 30.0% dry-rolled corn, and 5.0% supplement. The grower diet was formulated to provide 200 mg/calf daily of monensin (Rumensin 90; Elanco Animal Health). The ALT grower phase occurred from January 29th to May 22nd and February 5th to June 4th (years 1 and 2, respectively. The TRAD grower phase was from October 26th to February 16th and October 22nd to February 18th (years 1 and 2, respectively). The grower phase was 113 d and 120 d (years 1 and 2, respectively).

The ending BW for the grower phase was used to measure the initial BW for the finisher phase. The difference between the ending BW for the grower and initial BW for the finisher is the animal BW gain assumed for the limit-fed period (1 lb/d). Steers were implanted on d 1 with Revalor-IS and heifers implanted with Revalor-IH (Merck Animal Health). Cattle were re-implanted on d 84 with Revalor-200 (Merck Animal Health). The ALT finisher phase was from May 29th to October 29th (first shipping date; year 1) and December 10th (second shipping date; year 1) and June 10th to November 10th (first shipping date; year 2) and January 5th (second shipping date; year 2). The TRAD finisher phase was from February 22nd to July 16th (first shipping date; year 1) and August 13th (second shipping date; year 1) and February 25th to June 23rd (first shipping date; year 2) and July 28th (second shipping date; year 2). In year 1, the finishing diet consisted of 33.5% DRC, 33.5% HMC, 20.0% MDGS, 8.0% grass hay, and 5.0% supplement (DM basis). In year 2, due to feed seasonal limitations, the finishing diet consisted of 51.0% HMC, 30.0% Sweet Bran, 15.0% corn silage, and 4.0% supplement (DM basis). Shipping dates were calculated to target 0.6 in. of back fat between the 12th and 13th rib using ultrasound. Due to fat variation within pen, calves within pen were allotted to one of two shipping dates. In year 1, the ALT cattle were on feed for 154 and 196 d while the TRAD cattle were on feed for 145 and 173 d. In year 2, ALT cattle were on feed for 154 and 210 d and TRAD cattle were on feed for 120 and 155 d. Hot carcass weight (HCW) was collected on day of harvest. Following a 48 h chill, longissimus muscle (LM) area, 12th rib fat thickness, and USDA marbling score were collected. Carcass-adjusted final BW was calculated from HCW using a common dressing percent of 63% to calculate ADG and F:G.

Statistical Analysis

Cow performance, pre-weaning calf growth, post-weaning growth, and finishing performance data were analyzed using the GLIMMIX procedures of SAS where original cow replicate was considered the experimental unit (n = eight replicates/treatment). Cows were blocked by cow age and stratified by original herd (two sources). The model included treatment and block as a fixed effect and year as a random effect. Proportion of heifers and twins were tested as covariates but were not significant ($P > 0.11$) and subsequently removed from the model.

Reproduction, body condition scoring, and morbidity data were analyzed using the GLIMMIX procedure of SAS with a binomial or multinomial models with replicate as the experimental unit and fixed effects of treatment and block. Year was included as a random effect.

Results

Cow and Preweaning Performance

There were no differences ($P \geq 0.27$) in conception rates, calving rates, and weaning rates for ALT vs. TRAD (Table 2). However,

Table 2. Effects of cow-calf system on reproductive performance

	Treatment[1]			
	ALT	TRAD	SEM	*P*-Value
Groups, n	8	8	—	—
Age, year	6.3	6.0	0.49	0.06
Conception rate, %	94.6	94.1	2.3	0.88
Calving rate, %	89.7	91.2	2.92	0.71
Twin rate[2], %	9.4	2.9	2.36	0.04
Wean rate, %	82.3	87.2	3.29	0.27
Cow morbidity[3], %	18.9	17.6	3.24	0.78
Cow mortality, %	0.62	0.62	—	—
Replacement rate[4], %	9.60	9.93	2.89	0.93

[1]Treatments = alternative cow-calf system (ALT) calving in July/August and utilizing drylot, fall forage oat grazing, and corn residue grazing; traditional cow-calf system (TRAD) calving in April/May and utilizing perennial pasture and corn residue grazing.

[2]One calf from each set of twins was selected randomly and removed from experiment.

[3]Number of cows treated for morbidity at least once.

[4]Percentage of cows removed from the herd due to failure to breed or maintain pregnancy.

Table 3. Effects of cow-calf system on calf performance

	Treatment[1]			
	ALT	TRAD	SEM	*P*-Value
Groups, n	8	8	—	—
Birth BW, lb	85.9	88.1	1.5	0.18
Age at wean, d	168	168	1.1	0.76
Wean BW, lb	405	504	12.1	< 0.01
lb weaned/cow exposed[2]	330	438	15.9	< 0.01
Calf morbidity[2], %	58.0	16.7	4.2	< 0.01
Calf mortality, %	7.75	4.08	—	—

[1]Treatments = alternative cow-calf system (ALT) calving in July/August and utilizing drylot, fall forage oat grazing, and corn residue grazing; traditional cow-calf system (TRAD) calving in April/May and utilizing perennial pasture and corn residue grazing.

[2]lb of calf weaned divided by number of cows exposed to bull.

[3]Number of calves treated for morbidity at least once.

there was an increase ($P = 0.04$) in the rate of twin offspring (9.42 vs. 2.90 ± 3.29 %, respectively) for ALT vs. TRAD, respectively. This response was unexpected. In the current study, during the first five days of breeding, cows remained on the limit-fed diet, then placed on fall forage oats which may contribute to twinning. Cow morbidity and replacement rates did not differ ($P \geq 0.78$). Breeding BCS distributions did differ ($P < 0.01$) with a larger proportion of score 5.0 and fewer scores of 6.5 to 7.0 for ALT compared to TRAD cows (data not shown). Likewise, weaning BCS distributions were different ($P < 0.01$) with a larger proportion of scores 4.0 to 5.0 for ALT compared to TRAD cows (data not shown). In general, the ALT cows maintained a lower BCS closer to 5.0 throughout the production system. Differences in body condition among production systems are likely due to controlling energy intake of ALT cows during the confined, limit-feeding period compared to TRAD cows on pasture. Even though ALT cows had a shift towards lower BCS from breeding to weaning compared to TRAD cows, conception rates were not different ($P = 0.88$) among treatments.

As designed, calf age at weaning was not different ($P = 0.76$) at 168 d for both treatments (Table 3). Calf birthweight, not including the removed twin calf, did not differ ($P = 0.35$) among TRAD and ALT treatments. Calf wean BW was 99 lb lighter ($P < 0.01$) for ALT calves compared to TRAD calves. As a result of lower weaning weights, lb of calf weaned per cow exposed was 108 lb less ($P < 0.01$) for ALT cows compared to TRAD cows. In the current experiment, preweaning calf morbidity was greater ($P < 0.01$) for ALT calves compared to TRAD calves. Over half of the calves 58.04 %from the ALT treatment were treated at least once for morbidity compared to 16.70 % of TRAD calves. This difference may be attributed to wet pen conditions in the first year of the study.

Post-Weaning Performance

Due to differences in weaning BW in the cow-calf phase, initial BW for the grower phase was 96 lb lighter (P <0.01) for ALT calves compared to TRAD calves. Ending BW was 53 lb lighter (P <0.01) for ALT calves compared to TRAD calves, illustrating that ALT calves compensated with greater ADG (P <0.01) compared to TRAD calves. There was no difference ($P = 0.17$) for DMI among treatments. Thus, ALT calves had improved ($P < 0.01$) F:G compared to TRAD calves. Morbidity treatments (i.e. coccidiosis, diphtheria, ear infection, foot rot, lameness, pinkeye, prolapse, were greater (P <0.01) for TRAD compared to ALT calves.

Due to differences in ending BW in the grower phase, initial BW for the finisher phase was lower (P <0.01) for ALT calves compared to TRAD calves. Days on feed were 168 and 141 for ALT and TRAD treatments, respectively, in order to harvest cattle at a targeted 12th rib back fat thickness of 0.6 in. Carcass-adjusted final BW did not differ ($P = 0.15$) among treatments. Dry matter intake did not differ ($P = 0.33$) between production system, although ADG was lower ($P = 0.02$) for ALT calves compared to TRAD calves. Lower ADG and no difference in DMI lead to dramatically poorer ($P = 0.01$) F:G for ALT calves compared to TRAD calves.

Hot-carcass weight did not differ (P =0.20) between ALT and TRAD treatments. In the current experiment, cattle were harvested based on predicted 12th rib fat thickness, not age. *Longissimus* muscle area was greater ($P = 0.04$) for ALT compared to TRAD calves. The ALT treatment had less ($P = 0.05$) 12th rib back fat compared to the TRAD calves but were 0.59 vs. 0.65 in., respectively. Due to the large numerical improvement in growth performance for

TRAD calves in year 2, predicted 12^{th} rib back fat thickness was underestimated. Marbling score did not differ ($P = 0.73$) among treatments. Performance differences shifted from growing to finishing, with ALT calves having greater ADG and better F:G than TRAD in the 117-d growing program, but lower ADG and poorer F:G in the finishing phase. It is worth noting that cattle were not fed at the same time of year, with weather stresses during finishing more challenging for ALT cattle.

Table 4. Effects of cow-calf system on post-wean calf growth performance on a grower diet

	Treatments			
	ALT[1]	TRAD[2]	SEM	*P*-Value
Groups, n	8	8	—	—
Days on feed	117	117	—	—
Mortality, %	1.52	0.00	—	—
Removed[2], %	0.76	0.00	—	—
Morbidity[3], %	5.3	37.7	11.0	<0.01
Initial BW, lb	408	504	10.8	<0.01
Ending BW, lb	764	817	6.4	<0.01
DMI, lb/d	19.1	19.6	0.24	0.17
ADG, lb	3.06	2.69	0.044	<0.01
F:G	6.37	7.30	-	<0.01

[1]Treatments = alternative cow-calf system (ALT) calving in July/August and utilizing drylot, fall forage oat grazing, and corn residue grazing; traditional cow-calf system (TRAD) calving in April/May and utilizing perennial pasture and corn residue grazing.

[2]Percentage of calves removed due to health or injury.

[3]Percentage of calves treated for morbidity at least once.

Table 5. Effects of cow-calf system on post-wean calf growth performance on a finishing diet

	Treatment[1]			
	ALT	TRAD	SEM	*P*-Value
Groups, n	8	8	—	—
DOF[2]	168	141	—	—
Mortality, %	1.55	0.72	—	—
Removed[3], %	0.96	0.91	—	—
Morbidity, %	20.88	40.36	12.210	0.23
Initial BW, lb	771	824	6.4	< 0.01
Final BW[4], lb	1355	1333	13.7	0.15
DMI, lb/d	23.8	23.1	0.62	0.33
ADG, kg	3.35	3.99	0.48	0.02
F:G	7.09	5.85	-	0.01
Carcass Characteristics				
HCW, lb	855	839	8.4	0.14
lb HCW/cow exposed[6]	667	707	28.0	0.33
LMA, in^2	14.4	13.9	0.26	0.04
Back fat, in	0.59	0.65	0.017	0.05
Marbling Score[7]	532	539	14.3	0.73
Calculated YG[8]	3.1	3.4	0.07	0.03

[1]Treatments = alternative cow-calf system (ALT) calving in July/August and utilizing drylot, fall forage oat grazing, and corn residue grazing; traditional cow-calf system (TRAD) calving in April/May and utilizing perennial pasture and corn residue grazing.

[2]Treatments were fed to predict 1.52 cm of 12^{th} rib fat thickness.

[3]Percent of calves removed due to health or injury.

[4]HCW divided by dressing percent (0.63).

[5]Adjusted final BW calculated as ((1.316 × HCW) +32) + [(28 – EBF) × 14.26])/0.891 from Guiroy et al., 2001.

[6]Pound of HCW divided by number of cows exposed to bull.

[7]Marbling score: 400=$small^{00}$, 500=$Modest^{00}$.

[8]Calculated as 2.5 + (6.35 x 12^{th}-rib fat thickness, cm)—(2.06 x LM area, cm^2) + (0.2 x 2.5 KPH fat, %) + (0.0017 x HCW, kg) where KPH fat was assumed to be 2.5 % (Boggs and Merkel, 1993).

[9]Calculated as 17.76207 + (4.68142 x 12th rib fat) + (0.01945 x HCW) + (0.81855 x QG)—(0.06754 x LM area) from Guiroy et al., 2001.

Conclusions

This experiment evaluated performance of a cow-calf production system utilizing confinement, cover crop, and corn residue compared to a traditional, pasture-based cow-calf production system. It provides evidence that reproduction is not impacted negatively in a partially-confined cow-calf system. However, the increased probability of twin offspring for the alternative cow-calf system is interesting. It is unclear what is causing the reduction in weaning weight for the partially-confined system but may be related to calving season.

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