



Impact of Managing Cow-calf Pairs on Pasture or Dry Lot during a 10-day Synchronization Period on Reproductive Performance and Weight Change in Cows and Their Calves

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The objective of this study was to evaluate the impacts of managing cow-calf pairs in dry lot as compared with pasture for a 10-day estrous synchronization in an effort to alleviate time and labor which are associated with synchronization protocols. Dry lot management did not affect reproductive performance of cows; however, weaning weights of the suckling calves were impacted negatively.

Summary

Angus-based cow-calf pairs were assigned to one of two treatments: 1) dry lot (DL), pairs were managed in dry lots during a 10-day estrous synchronization period or 2) control (CON), pairs remained on summer pasture for the synchronization. The DL group was provided *ad libitum* grass hay and both treatments had equal access to a vitamin/mineral supplement. All cows were exposed to seven-day CO-Synch + CIDR protocol for synchronization of ovulation. Body weights (BW) of cows were recorded on days -10, 0, and 95 and calves were recorded on -10, 0, 35, and 88, relative to breeding. Whole blood was collected on a subset of cow-calf pairs on days -10 and 0 for serum non-esterified fatty acid (NEFA) concentration. Pregnancy status was determined in cows on days 35 and 95 with ultrasound. Cows and calves in the DL group had reduced ($P \leq 0.04$) weight gain during the 10-day synchronization period compared with cows and calves in the CON group. Calf concentrations of NEFA on day 0 were impacted by a treatment by group interaction. Concentrations of NEFA in DL cows were greater ($P = 0.001$) than CON cows on day 0. No differences ($P \geq 0.36$) were observed between treatments for pregnancy rate at days 35 or 95, or cow BW on day 95. However, calves in the DL treatments were lighter ($P \leq 0.003$) on days 35 and 88 (weaning) compared with calves in the CON group. Managing cow-calf pairs in the dry lot for a 10-day estrus synchronization and AI period did not affect the reproductive performance of cows, but it did have a negative impact on calf weaning weights.

Introduction

Artificial insemination (AI) offers many benefits however, only 8 percent of producers in a 2007 survey indicated that they utilize AI (NAHMS, 2009). Variation in cattle management across herds occurs as producers attempt to reduce the amount time and labor required of an AI protocol,

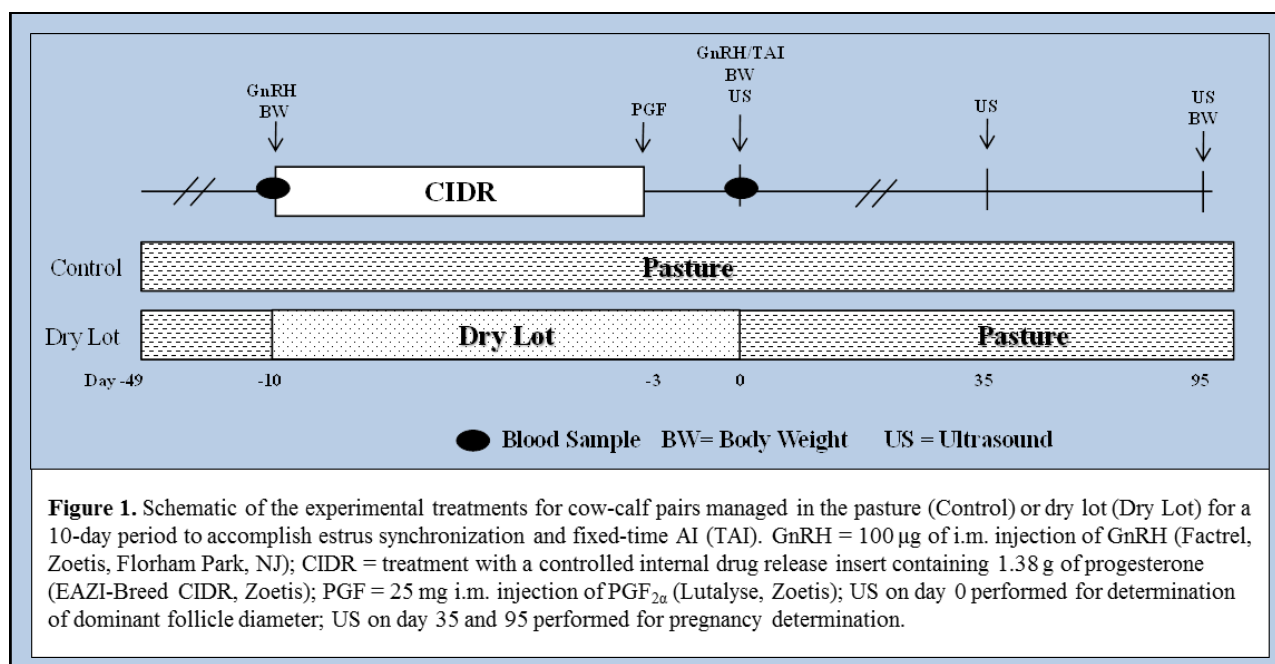
which is the number one concern of producers (NAHMS, 2009). Differences in herd management may be causing differences in pregnancy rates to AI across locations, despite the use of similar protocols (Larson *et al.* 2006). An example of a management strategy is to confine cattle to dry lots close to working facilities during the synchronization period to lessen the burden of gathering cattle multiple times.

Abrupt diet changes have been reported to have negative impacts on reproductive performance (Perry *et al.* 2009; Bridges *et al.* 2012), energy balance (Zhang *et al.* 2013), milk production and calf performance (Chelikani *et al.* 2004). The consequences of moving cow-calf pairs from grazing pastures to dry lot feeding for a short period on cow reproductive performance and calf growth are unknown. Therefore, the objectives of this study were to evaluate the effects of moving cow-calf pairs from summer grazing to dry lot feeding for a 10-day period of estrous synchronization on cow reproductive performance, BW, and concentration of NEFA, and calf BW and concentrations of NEFA.

Procedures

Angus crossbred cow-calf pairs at the Central Grasslands Research Extension Center near Streeter, ND, were used in this study. Cow-calf pairs were managed in two groups based on cow age: young (2 to 4 years old, $n = 209$) and old (≥ 5 years old, $n = 213$). Within management group, cows were designated to one of two treatments (Figure 1): 1) control (CON), pairs remained on summer pasture for the 10-day synchronization and breeding period, and were gathered each of the three times required to facilitate estrous synchronization and AI, or 2) dry lot (DL), pairs were removed from summer pastures and managed in dry lots during the 10-day synchronization period. The DL treatment group received *ad libitum* grass hay for the 10-day period and both groups had equal access to mineral supplement. Crude protein content of the hay fed to DL was 10.7 percent and that the pasture forage available to CON cows was 10.5 percent.

Ovulation was synchronized in all cows by exposure to the seven-day CO-Synch + CIDR protocol (Larson *et al.* 2006). Body weights of cows were recorded on days -10, 0, and 95, whereas BW of calves were recorded on days -10, 0, 35, and 88 (weaning). Immediately following AI, all pairs were



returned to summer pastures and cleanup bulls were placed in pastures from days 10 to 49 after AI.

A subset of cow-calf pairs ($n = 72$ pairs) were selected for blood collection. Whole blood samples were collected from cows and calves on days -10 and 0 into 10-mL Vacutainer tubes (BD Worldwide, Franklin Lakes, N.J.) without additives. Serum was harvested and concentrations of NEFA were determined (NEFA-C Wako Chemicals USA, Richmond, Va.).

Cows were ultrasounded on days 35 and 95 to determine pregnancy status. Examination on day 35 revealed the proportion of cows pregnant to AI, whereas examination on day 95 revealed the proportion of cows pregnant at the end of the breeding season.

Results and Discussion

Pregnancy rate to AI and season-ending rates were similar ($P \geq 0.50$) between the two treatments (49 vs. 52.5 percent and 91 vs. 89.6 percent for CON and DL on days 35 and 95, respectively) and no differences ($P = 0.16$) in pregnancy loss were observed (data not shown).

During the 10-day synchronization period, cows in the DL had reduced ($P = 0.02$) weight gain compared with CON, but similar ($P = 0.35$) BW at day 95 (Table 1). Concentrations of NEFA on day 0 tended to be impacted by a treatment \times management group interaction ($P = 0.06$; Table 2). Old cows in the DL treatment had greater ($P < 0.001$) concentrations of NEFA than old CON cows, and both treatments in the young cows were intermediate. The greater concentrations of NEFA on day 0 in DL cows indicates they were in a greater negative energy balance than CON cows (Radostits *et al.* 2007). In the

young cow group, there was no effect ($P = 0.3$) of treatment on day 0 concentrations of NEFA. Perhaps the lack of difference observed in young cows was due, in part, to 2-year-old cows having elevated concentration of NEFA at the onset of treatments (day -10) compared to the 3- and 4-year-olds which make up the young group (data not shown).

Calves in DL had reduced ($P \leq 0.04$) weight gain on days 10 and 35, and remained lighter ($P = 0.002$) at weaning, compared with CON calves (Table 1). Calf concentrations of NEFA on day 0 were impacted by a management group \times treatment interaction ($P = 0.002$). Calves in the young group from both treatments and DL calves in the old group had

Table 1. Impact of moving cow-calf pairs into a dry lot for a 10-day estrus synchronization protocol on body weight of cows and calves.

Item	Treatment	
	Pasture	Dry lot
Cow Body Weight, lbs.		
Day -10	1302.4 \pm 12.8	1299.1 \pm 12.8
Day 0	1302.2 ^x \pm 11.88	1264.3 ^y \pm 11.88
Day 95	1353.4 \pm 12.5	1336.5 \pm 12.5
Calf Body Weight, lbs.		
Day -10	210.0 \pm 2.9	209.7 \pm 2.9
Day 0	229.5 ^x \pm 3.1	220.4 ^y \pm 3.1
Day 35	313.9 ^x \pm 3.5	300.7 ^y \pm 3.5
Day 88	459.8 ^x \pm 4.4	440.0 ^y \pm 4.4
^{xy} Means within row differ ($P \leq 0.04$)		

Table 2. Impact of moving cow-calf pairs into a dry lot for a 10-day estrus synchronization protocol on serum NEFA concentrations of cows and calves.

Item	Treatment				SEM	P-value		
	Old DL	Old CON	Young DL	Young CON		Trt	Group	Trt × Group
Cows								
Day -10	338.4 ^x	295.8 ^x	722.4 ^y	689.1 ^y	62.7	0.55	<0.001	0.9
Day 0	788.3 ^x	507.9 ^y	635.2 ^{xy}	556 ^{xy}	57.5	0.002	0.44	0.07
Calves								
Day -10	448.2	326.5	415.9	413.0	37.1	0.10	0.47	0.12
Day 0	528.7 ^x	346.1 ^y	459.3 ^x	502.8 ^x	40.0	0.09	0.27	0.006
^{xy} Means with row differ (<i>P</i> ≤ 0.05)								

^{xy} Means with row differ ($P \leq 0.05$)

greater ($P \leq 0.05$) concentrations of NEFA compared with CON calves in the old group. Results of the current study indicate that the DL treatment had more of an effect on calves in the old group than the young.

Moving cow-calf pairs from summer grazing into a dry lot setting for the 10-day period for estrus synchronization and AI did not impact reproductive performance; however, the

dry lot treatment had a negative impact on calf weights that still was present at weaning. Producers must consider the reduction in weaning weights of calves alongside the reduced labor and time demands associated with implementation of estrus synchronization to determine whether managing cow-calf pairs in a dry lot during the breeding period warrants consideration on their operation.

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Photo by Bryan Neville