

# Comparison of a Select Synch/CIDR + Timed Artificial Insemination vs a Modified Co-Synch/CIDR Estrous Synchronization Protocol in Suckled *Bos Indicus* X *Bos Taurus* Cows

Regina Esterman<sup>1</sup>  
Brad Austin  
Erin McKinniss  
Joel Yelich

Suckled *Bos indicus* × *Bos taurus* cows achieved similar synchronized pregnancy rates when synchronized with a Select Synch/CIDR + timed artificial insemination (49.4%) vs a modified Co-Synch/CIDR protocol (47.1%) in a large field trial with 5 groups (n=659).

## Summary

Suckled *Bos indicus* × *Bos taurus* cows were used to compare a Select Synch/CIDR + timed artificial insemination (AI) protocol (SSC) vs a modified Co-Synch/CIDR protocol (COS). Five groups of suckled *Bos indicus* × *Bos taurus* cows were evaluated (n=659). Cows received GnRH and a CIDR on d 0. On d 7, SSC cows had their CIDR removed and received prostaglandin F<sub>2α</sub> (PGF<sub>2α</sub>), whereas COS cows had their CIDR removed and received PGF<sub>2α</sub> on d 7.5. Estrus was detected for 3 d following PGF<sub>2α</sub> and SSC cows were AI 8 to 12 h after observed in estrus. Cows on the SSC protocol not exhibiting estrus by 72 h after PGF<sub>2α</sub> were timed-AI between 76 to 80 h and received GnRH. Estrus was detected on COS cows, but all COS cows were timed-AI at 66 h after PGF<sub>2α</sub> and received GnRH, regardless of whether they displayed estrus or not. Similar (P>0.05) synchronized pregnancy rates were achieved with the SSC (49.4%; 164/332) and COS (47.1%; 154/327) protocols. Differences (P<0.05) in estrous response, timed-AI pregnancy, and synchronized pregnancy rates were observed between groups. Days postpartum influenced (P<0.05) timed-AI pregnancy and synchronized pregnancy rates, with longer postpartum cows achieving greater pregnancy rates. Cycling status did not (P>0.05) influence synchronized pregnancy rates. In summary, this field trial suggests that similar pregnancy rates can be achieved using a

straight timed-AI synchronization protocol (COS) compared to a heat detection + cleanup timed-AI protocol (SSC).

## Introduction

Development of an estrous synchronization protocol that achieves acceptable pregnancy rates in cattle of *Bos indicus* breeding is particularly important to producers in subtropical regions, such as Florida. While there are many common synchronization protocols, nearly all of them were developed for *Bos taurus* cattle. A frequently used and effective synchronization protocol in *Bos taurus* cattle is administration of GnRH followed 7 d later with PGF<sub>2α</sub>. However, a common problem with the GnRH + PGF<sub>2α</sub> protocol is expression of estrus several days before PGF<sub>2α</sub>, which can be eliminated with addition of a progestogen concomitant with GnRH and removed at PGF<sub>2α</sub>. Addition of progestogen can also increase the percentage of anestrous cows that exhibit estrus. However, limited research has employed this protocol in *Bos indicus* × *Bos taurus* cattle. The unpredictability of these synchronization protocols in cattle of *Bos indicus* breeding makes it difficult to utilize a timed-AI program. Behavioral differences are also apparent in cattle of *Bos indicus* breeding, including a shorter, less evident estrus and increased occurrence of ‘silent estrus’. Due to the difficulty of detecting

estrus in these cattle, if a timed-AI protocol could be refined to produce acceptable pregnancy rates, the need for estrous detection would be minimized.

The objective of these experiments were to evaluate the effectiveness of a Select Synch/CIDR synchronization protocol followed by either 3 d of estrous detection with a cleanup timed-AI at 75 to 80 h or a straight timed-AI at 66 h in postpartum lactating *Bos indicus* × *Bos taurus* cows.

### Materials and Methods

This experiment was conducted from January to May, 2008 at the Bar L Ranch, Marianna, FL and the University of Florida Beef Research Unit, Gainesville, FL. Five groups of primiparous and multiparous postpartum lactating *Bos indicus* × *Bos taurus* cows (n=659) were used. Groups were pre-selected by the location and initiated the synchronization protocol once they reached > 45 days postpartum. Mean (± SD) cow age was 5.3 ± 2.4 yr, DPP was 69.2 ± 15.0 d, body weight (BW) was 1181 ± 154 lb, and body condition score was 5.3 ± 0.6 (Table 1; BCS: 1 = emaciated, 9 = obese). Cycling status, BCS, and DPP for each group is described in Table 1. The degree of *Bos indicus* breeding ranged from approximately 10 to 75% with the remainder being *Bos taurus* breeding. Three groups of cows were started on the experiment protocol in three consecutive wk at Bar L Ranch and two groups were started on the experimental protocol three wk apart at the Beef Research Unit. On d 0, BW and BCS were evaluated and on d 0 and 10 blood samples were collected for determination of cycling status. At the start of the synchronization (d 10), cows were equally distributed by cow age, DPP, and BCS to one of two treatments, which included Select Synch/CIDR + timed-AI (SSC) and a modified Co-Synch/CIDR (COS) protocol. All cows received GnRH (100 µg i.m.; Cystorelin<sup>®</sup>, Merial) at CIDR (1.38 g progesterone; Eazi-Breed<sup>™</sup> CIDR<sup>®</sup>, Pfizer Animal Health) insertion. On d 7, SSC cows' CIDR were removed and cows received PGF<sub>2α</sub> (25 mg i.m.; Lutalyse<sup>®</sup>, Pfizer Animal Health). On d 7.5, COS cows' CIDR were removed and cows

received PGF<sub>2α</sub>. All cows received an estrous detection patch (Estroject<sup>™</sup>, Rockway, Inc.) at CIDR removal to aid in estrous detection.

Estrus was visually detected in both treatments two times daily at 0700 and 1700 h for 3 d following PGF<sub>2α</sub>. Estrus was defined as a cow standing to be mounted by another cow and/or a half to fully rubbed Estroject<sup>™</sup> patch. Cows in the SSC treatment were AI 8 to 12 h after observed in estrus through 72 h post-PGF<sub>2α</sub>. Cows in the SSC that had not displayed estrus by 0800 h, 73 h after PGF<sub>2α</sub>, were timed-AI and administered GnRH between 76 and 80 h after PGF<sub>2α</sub>. Cows in the COS treatment were all timed-AI at 66 h after PGF<sub>2α</sub> and administered GnRH.

Frozen-thawed semen from multiple AI sires was used and cows were inseminated by four AI technicians. In four of the five groups, 7 d after the last cow was inseminated, clean-up bulls were placed with cows. In the remaining group, estrous detection continued for 30 d and cows displaying estrus were inseminated a second time. Pregnancy was diagnosed approximately 55 d after AI using a real-time B-mode ultrasonography machine (Aloka 500V, Corometrics Medical Systems) with a 5.0 MHz transducer. Due to the 7 d period in which no cows were inseminated or bred by the clean-up bull, differences in fetal size were used to determine whether a pregnancy resulted from the synchronized breeding or clean-up bull.

The GENMOD procedure of SAS (SAS Inst. Inc.) was used for the statistical analysis of this experiment. The effects of treatment, group, and their interaction, were evaluated for estrous response, conception, timed-AI pregnancy, synchronized pregnancy, and thirty-day pregnancy rates. Cow age, DPP, BCS, and interval from PGF<sub>2α</sub> to the onset of estrus were included as covariates. When covariates were significant (P < 0.05) they were treated as independent variables.

### Results

Estrous response over 3 d following PGF<sub>2α</sub> for the SSC cows was 50.6% (168/332) and estrous response for the 2.5 d following PGF<sub>2α</sub> for the

COS cows was 52.6% (172/327; Table 2). Estrous response was different ( $P<0.05$ ) for groups (data not shown). Estrous response was influenced ( $P<0.05$ ) by cycling status at the start of synchronization (Table 2), with a greater percent of noncycling cows displaying estrus (58.2%; 170/292) compared to cycling cows (46.3%; 170/367). Days postpartum effected ( $P<0.05$ ) estrous response (Table 3). Cows that were  $\leq 55$  DPP had a lower ( $P<0.05$ ) estrous response compared to cows that were  $\geq 56$  DPP. Cows that were 56 to 65 DPP had a lower ( $P<0.05$ ) estrous response compared to cows that were 66 to 75 DPP, but were similar ( $P>0.05$ ) to cows  $\geq 76$  DPP. Cows 66 to 75 DPP and  $\geq 76$  DPP had a similar ( $P>0.05$ ) estrous response. Body condition score influenced ( $P<0.05$ ) estrous response (Table 4). Cows with a BCS  $\leq 4.5$  had a lower ( $P<0.05$ ) estrous response compared to cows with 5 to 5.5 BCS or  $\geq 6$  BCS. Cows with a BCS of 5 to 5.5 or  $\geq 6$  had a similar ( $P>0.05$ ) estrous response. There were no ( $P>0.05$ ) effects of age on estrous response. In SSC cows that displayed estrus, the interval from PGF<sub>2 $\alpha$</sub>  to the onset of estrus was  $59.1 \pm 0.7$  h. In COS cows that displayed estrus, the interval from PGF<sub>2 $\alpha$</sub>  to the onset of estrus was  $51.0 \pm 0.7$  h.

The conception rate for SSC cows was 66.1% (111/168; Table 2). Conception rate was not ( $P>0.05$ ) effected by group. Cycling status, age, and DPP did not ( $P>0.05$ ) effect conception rate in SSC cows.

In SSC cows that did not display estrous and were timed-AI, timed-AI pregnancy rate averaged 32.3% (53/164) across all groups (Table 2). In COS cows, all cows were timed-AI and the timed-AI pregnancy rate averaged 47.1% (154/327) across all groups. Timed-AI pregnancy rates differed ( $P<0.05$ ) between groups (data not shown). Days postpartum influenced ( $P<0.05$ ) timed-AI pregnancy rate (Table 3). Cows that were  $\leq 55$  DPP had lower ( $P<0.05$ ) timed-AI pregnancy rates compared to

cows that were 56 to 65 DPP and 66 to 75 DPP, but were similar to cows  $\geq 76$  DPP. Cows 56 to 65 DPP and 66 to 75 DPP had similar ( $P>0.05$ ) timed-AI pregnancy rates, but were both greater ( $P<0.05$ ) than cows that were  $\geq 76$  DPP. Timed-AI pregnancy rate was not ( $P>0.05$ ) effected by cycling status, age, or BCS.

Synchronized pregnancy rates were similar ( $P>0.05$ ) for SSC (49.4%; 164/332) and COS (47.1%; 154/327) treatments (Table 2). Groups differed ( $P<0.05$ ) in synchronized pregnancy rates (data not shown). Cycling status did not ( $P>0.05$ ) influence overall synchronized pregnancy rates. Days postpartum influenced ( $P<0.05$ ) synchronized pregnancy rates (Table 3). Cows that were  $\leq 55$  DPP had lower ( $P<0.05$ ) synchronized pregnancy rates compared to cows that were 56 to 65 DPP and 66 to 75 DPP, but were similar ( $P>0.05$ ) to cows that were  $\geq 76$  DPP. Cows 56 to 65 DPP and 66 to 75 DPP had similar ( $P>0.05$ ) synchronized pregnancy rates, as did cows that were 65 to 75 DPP and  $\geq 76$  DPP. Cows that were 66 to 75 DPP and  $\geq 76$  DPP had similar ( $P>0.05$ ) synchronized pregnancy rates. Body condition score influenced ( $P<0.05$ ) synchronized pregnancy rates (Table 4). Cows with a BCS  $\leq 4.5$  (39.0%; 46/118) had lower ( $P<0.05$ ) synchronized pregnancy rates compared to cows with 5 to 5.5 BCS (48.8%; 183/375) or  $\geq 6$  BCS (53.6%; 89/166). Cows with a BCS of 5 to 5.5 or  $\geq 6$  had similar ( $P>0.05$ ) synchronized pregnancy rates. Synchronized pregnancy rate was not ( $P>0.05$ ) influenced by cow age.

In summary, similar synchronized pregnancy rates were achieved using the SSC and COS synchronization protocols. Differences in estrous response, timed-AI pregnancy, and synchronized pregnancy rates were observed between groups. Cycling status did not influence pregnancy rates, however DPP did effect pregnancy rates.

<sup>1</sup>Regina Esterman; Graduate Student; Brad Austin, Graduate Student; Erin McKinniss; Graduate Student; Joel Yelich Associate Professor, UF-IFAS Animal Sciences, Gainesville, FL

**Table 1** General description of *Bos indicus* × *Bos taurus* cows synchronized with either a Select Synch/CIDR + TAI or modified Co-Synch/CIDR synchronization protocol by group.<sup>a</sup>

Group	n	Cycling Status (%)	Approx. % Brahman breeding (%)	Body condition score, 1-9, (range)	Days postpartum, (range)
1	173	59.0 (173)	10 - 38	5.4 ± 0.05 (3.5 - 7.0)	74.0 ± 1.1 (48 - 128)
2	152	38.2 (152)	10 - 38	5.2 ± 0.05 (4.0 - 7.0)	75.4 ± 1.2 (47 - 102)
3	193	59.6 (193)	10 - 38	5.5 ± 0.05 (4.0 - 7.0)	62.8 ± 1.0 (54 - 99)
4	94	64.9 (94)	25 - 75	5.1 ± 0.1 (3.5 - 6.5)	71.3 ± 1.4 (50 - 99)
5	47	66.0 (47)	25 - 75	5.1 ± 0.1 (3.5 - 6.5)	53.8 ± 2.0 (41 - 69)

<sup>a</sup> All cows received GnRH at initiation of the 7 d CIDR treatment, with PGF<sub>2α</sub> administered at the time of CIDR removal. For Select Synch/CIDR + TAI cows, estrus was detected for 3 d, and cows that exhibited estrus were AI approximately 8 to 12 h later. Cows which had not displayed estrus were timed-AI at 76 to 80 h and given GnRH. All modified Co-Synch/CIDR cows were fixed TAI at 66 h after PGF<sub>2α</sub>.

**Table 2** Effect of synchronization protocol (Select Synch/CIDR + timed-AI (SSC) or modified Co-Synch/CIDR (COS)) and cycling status on estrous response, conception, timed-AI pregnancy, and synchronized pregnancy rates following PGF<sub>2α</sub> in *Bos indicus* × *Bos taurus* cows.<sup>a</sup>

Treatment	n	Estrous response, % <sup>b</sup>	Conception rate, % <sup>c</sup>	Timed-AI pregnancy rate, % <sup>d</sup>	Synchronized pregnancy rate, % <sup>e</sup>
SSC	332	50.6 (332)	66.1 (168)	32.3 (164)	49.4 (332)
Cycling	185	48.8 (185)	66.7 (81)	40.4 (104)	51.9 (185)
Non-cycling	147	59.2 (147)	65.5 (87)	18.3 (60)	46.3 (147)
COS	327	52.6 (327)	.	47.1 (327)	47.1 (327)
Cycling	182	48.9 (182)	.	45.1 (182)	45.1 (182)
Non-cycling	145	57.2 (145)	.	49.7 (145)	49.7 (145)
P Values					
Treatment		P > 0.05	.	.	P > 0.05
Cycling Status		P < 0.05	P > 0.05	P > 0.05	P > 0.05
Treatment × Cycling		P > 0.05	.	.	P > 0.05

<sup>a</sup> All cows received GnRH at initiation of the 7 d CIDR treatment, with PGF<sub>2α</sub> administered at the time of CIDR removal. For Select Synch/CIDR + TAI cows, estrus was detected for 3 d, and cows that exhibited estrus were AI approximately 8 to 12 h later. Cows which had not displayed estrus were timed-AI at 76 to 80 h and given GnRH. All modified Co-Synch/CIDR cows were fixed TAI at 66 h after PGF<sub>2α</sub>.

<sup>b</sup> Percentage of cows displaying estrus 3 d after PGF<sub>2α</sub> of total treated.

<sup>c</sup> Percentage of cows pregnant to AI of the total that exhibited estrus and were AI.

<sup>d</sup> Percentage of cows pregnant to timed-AI of the total that were timed-AI.

<sup>e</sup> Percentage of cows pregnant during the synchronized breeding of the total treated.

**Table 3** Effect of days postpartum (DPP) on estrous response, conception, timed-AI pregnancy, and synchronized pregnancy rates following PGF<sub>2α</sub> in *Bos indicus* × *Bos taurus* cows synchronized with either a Select Synch/CIDR + timed-AI (SCC) or modified Co-Synch/CIDR (COS) synchronization protocol.<sup>a</sup>

DPP	n	Estrous response, % <sup>b</sup>	Conception rate, % <sup>c</sup>	Timed-AI pregnancy rate, % <sup>d</sup>	Synchronized pregnancy rate, % <sup>e</sup>
≤ 55 d	96	35.4 (96) <sup>f</sup>	70.6 (17)	31.6 (79) <sup>f,h</sup>	38.5 (96) <sup>f</sup>
56 - 65	228	50.4 (228) <sup>g</sup>	70.4 (54)	47.7 (174) <sup>g</sup>	53.1 (228) <sup>g</sup>
66 - 75	148	60.1 (148) <sup>h</sup>	56.5 (46)	50.0 (102) <sup>g</sup>	52.0 (148) <sup>g,h</sup>
≥ 76 d	136	54.6 (187) <sup>g,h</sup>	68.6 (51)	35.3 (136) <sup>h</sup>	44.4 (187) <sup>f,h</sup>
P Values		P < 0.05	P > 0.05	P < 0.05	P < 0.05

<sup>a</sup> All cows received GnRH at initiation of the 7 d CIDR treatment, with PGF<sub>2α</sub> administered at the time of CIDR removal. For Select Synch/CIDR + TAI cows, estrus was detected for 3 d, and cows that exhibited estrus were AI approximately 8 to 12 h later. Cows which had not displayed estrus were timed-AI at 76 to 80 h and given GnRH. All modified Co-Synch/CIDR cows were fixed TAI at 66 h after PGF<sub>2α</sub>.

<sup>b</sup> Percentage of cows displaying estrus 3 d after PGF<sub>2α</sub> of total treated.

<sup>c</sup> Percentage of cows pregnant to AI of the total that exhibited estrus and were AI.

<sup>d</sup> Percentage of cows pregnant to timed-AI of the total that were timed-AI.

<sup>e</sup> Percentage of cows pregnant during the synchronized breeding of the total treated.

<sup>f,g,h</sup> Means without a common superscript within a column differ (P<0.05).

**Table 4** Effect of body condition score (BCS) on estrous response, conception, timed-AI pregnancy, and synchronized pregnancy rates following PGF<sub>2α</sub> in *Bos indicus* × *Bos taurus* cows synchronized with either a Select Synch/CIDR + timed-AI (SCC) or modified Co-Synch/CIDR (COS) synchronization protocol.<sup>a</sup>

BCS	n	Estrous response, % <sup>b</sup>	Conception rate, % <sup>c</sup>	Timed-AI pregnancy rate, % <sup>d</sup>	Synchronized pregnancy rate, % <sup>e</sup>
≤ 4.5	118	41.5 (118) <sup>f</sup>	54.6 (22)	35.4 (96)	39.0 (118) <sup>f</sup>
5 - 5.5	375	53.6 (375) <sup>g</sup>	63.7 (102)	43.2 (273)	48.8 (375) <sup>g</sup>
≥ 6	166	54.2 (166) <sup>g</sup>	77.3 (44)	45.1 (122)	53.6 (166) <sup>g</sup>
P Values		P = 0.05	P > 0.05	P > 0.05	P < 0.05

<sup>a</sup> All cows received GnRH at initiation of the 7 d CIDR treatment, with PGF<sub>2α</sub> administered at the time of CIDR removal. For Select Synch/CIDR + TAI cows, estrus was detected for 3 d, and cows that exhibited estrus were AI approximately 8 to 12 h later. Cows which had not displayed estrus were timed-AI at 76 to 80 h and given GnRH. All modified Co-Synch/CIDR cows were fixed TAI at 66 h after PGF<sub>2α</sub>.

<sup>b</sup> Percentage of cows displaying estrus 3 d after PGF<sub>2α</sub> of total treated.

<sup>c</sup> Percentage of cows pregnant to AI of the total that exhibited estrus and were AI.

<sup>d</sup> Percentage of cows pregnant to timed-AI of the total that were timed-AI.

<sup>e</sup> Percentage of cows pregnant during the synchronized breeding of the total treated.

<sup>f,g</sup> Means without a common superscript within a column differ (P<0.05).

