

Comparison of CIDR-based protocols to synchronize estrus prior to fixed-time AI in beef heifers



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Introduction

Despite the recent development of estrus synchronization protocols that facilitate fixed-time AI in beef cows, the same degree of success in beef heifers has not been realized.



Observations with MGA-based protocols in yearling beef heifers...

- Increasing number of reports that pregnancy rates resulting from MGA-based estrus synchronization protocols are declining in yearling age heifers...
- Higher rates of estrous cyclicity
- Heavier weight and conditioned heifers

Utter and Corah, 1994



Response to GnRH in estrous cycling beef heifers based on day of the estrous cycle GnRH was administered

Day of treatment	1 st GnRH (no. & % responding)		2 nd GnRH (no. & % responding)	
Day 2	0/14	0%	13/14	93%
Day 5	12/13	92%	12/13	92%
Day 10	4/13	31%	11/14	79%
Day 15	8/13	62%	2/13	15%
Day 18	2/10	20%	2/10	20%

Atkins et al., 2005



MGA Select



14-day CIDR



14-day CIDR vs MGA Select

- No difference in estrous response during the synchronized period
- Improved synchrony of estrus
- Improved conception & pregnancy rates during the synchronized period
- No difference in final pregnancy rate at the end of the breeding period

Kojima et al., 2004



Response to GnRH in beef heifers synchronized with the 14-day CIDR based on day of the estrous cycle GnRH was administered

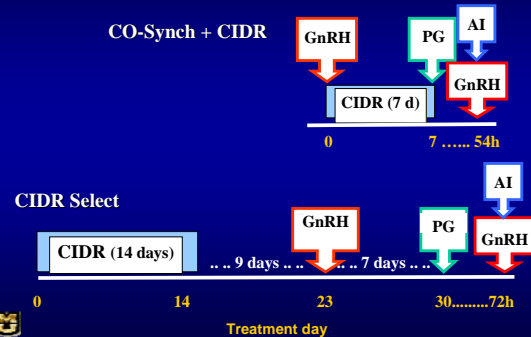
Day of the cycle GnRH was administered	No. & % responding
Day 3	1/2 50%
Day 4	0/1 0%
Day 5	5/5 100%
Day 6	7/7 100%
Day 7	23/27 85%
Day 8	24/27 89%
Unknown	8/10 80%

Schafer et al. 2006

Until recently, there have been no comprehensive studies in estrous cycling and pre/peripubertal beef heifers comparing the long-term CIDR protocol (CIDR Select) and short-term CIDR-based protocols.

Improvement in the degree of synchrony of estrus and ovulation following treatment with the CIDR Select protocol suggests that fixed-time AI may result in more predictable outcomes following administration of this protocol in comparison to currently recommended short-term CIDR-based treatments (Leitman et al., 2007).

CO-Synch + CIDR w/ TAI at 54h vs CIDR Select w/ TAI at 72h



Experimental procedures

- Animals: Beef heifers (n = 217) at three locations were assigned to treatment within RTS groups by age and weight.
- Blood samples were collected 10 d and 1 d prior to initiation of treatment to determine pre-treatment estrous cyclicity status (progesterone conc. \geq 0.5 ng/mL)

Experimental procedures

- Estrus detection was performed using HeatWatch® Estrus Detection System at Location 1
 - Transmitters were fitted on the day of PG to characterize estrus distribution.

Experimental procedures

Two different AI sires were used

- Location 1 = 1
- Location 2 = 1
- Location 3 = 1
- The sire that was used at location 2 was the same sire used at Location 1.



Experimental procedures

- Heifers were maintained on the HeatWatch system (loc 1) or visually observed (loc 2 & 3) for estrus, and AI was performed for approximately 24 days following fixed-time AI
- Heifers were exposed to fertile bulls following the AI period until the end of the 60 d breeding season



Experimental procedures

- Pregnancy rate to fixed-time AI was determined with ultrasound 44 d (loc 1) and 58 d (loc 2 & 3) after insemination
- Final pregnancy diagnosis was determined 80 to 95 d after the end of the 60 d breeding season

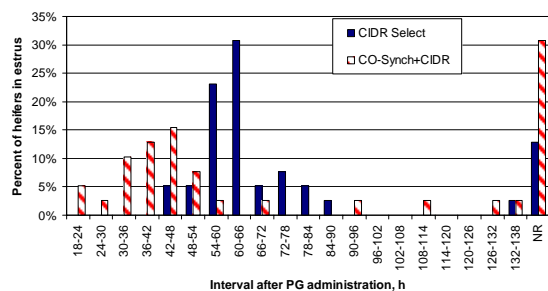


Number of heifers, age, weight, RTS and cyclicity status prior to initiation of synchronization treatments

- | <u>CIDR Select</u> | <u>CO-Synch + CIDR</u> |
|--------------------|------------------------|
| • No. = 108 | • No. = 109 |
| • Age = 399 days | • Age = 399 |
| • Weight = 843 lbs | • Weight = 843 lbs |
| • RTS = 4 | • RTS = 4 |
| • % Cycling = 81% | • % Cycling = 79% |



Distribution of estrus after PG administration at Location 1



Estrous response

	Estrous response (Location 1)	Mean interval to estrus (mean ± SE)	Synchrony of estrus (mean ± SD)
CIDR Select	34/39 (87%)	65.1 ± 4.0 h	65.1 ± 15.6 h
CO-Synch + CIDR	27/39 (69%)	52.1 ± 4.5 h	52.1 ± 30.1 h
Diff.	+ 18 P = 0.06	P = 0.03	F-test P < 0.01



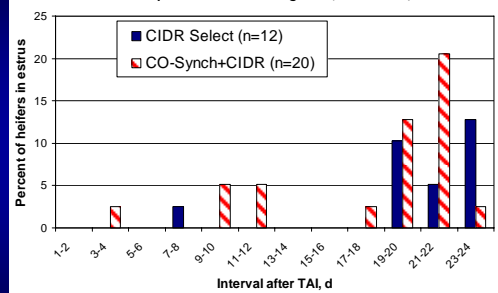
AI pregnancy

Fixed-time AI pregnancy rate

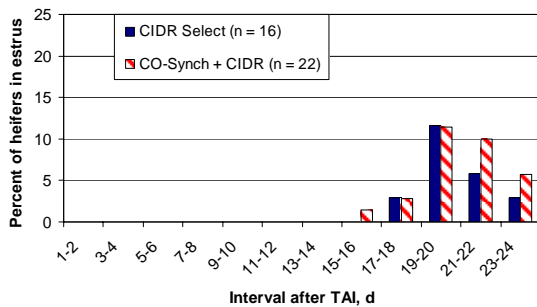
	Pre/peri-pubertal	Estrous cycling	Combined
CIDR Select	13/21 (62%)	54/87 (62%)*	67/108 (62%)*
CO-Synch + CIDR	11/23 (48%)	40/86 (47%)*	51/109 (47%)*
Total	24/44 (55%)	94/173 (54%)	118/217 (54%)
Diff.	+ 14 %	+ 15 % *y P= 0.03	+ 15 % *y P= 0.02



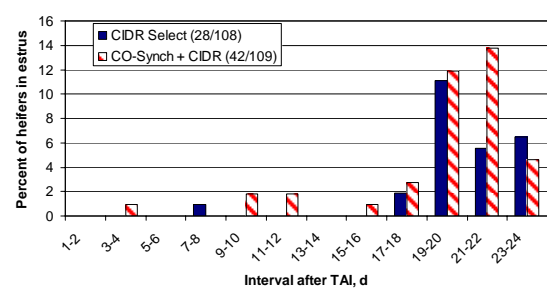
Distribution of repeat estrus following TAI (HeatWatch) at Location 1



Distribution of repeat estrus following TAI (visual observation) at Location 2 & 3



Distribution of repeat estrus following TAI at all locations



Return to estrus after TAI

	Observed in estrus	Mean interval to estrus (mean ± SE)	Synchrony of estrus (mean ± SD)
CIDR Select	28/108 (26%)	20.2 ± 0.7 d	20.2 ± 3.0 d
CO-Synch + CIDR	42/109 (39%)	19.2 ± 0.6 d	19.2 ± 4.3 d
Diff.	+ 13 % P= 0.05	P = 0.26	F-test P < 0.05



Return to estrus after TAI

	Observed in estrus	Mean interval to estrus (mean ± SE)	Synchrony of estrus (mean ± SD)
CIDR Select	28/108 (26%)	20.2 ± 0.7 d	20.2 ± 3.0 d
CO-Synch + CIDR	42/109 (39%)	19.2 ± 0.6 d	19.2 ± 4.3 d
Diff.	+ 13 % P= 0.05	P = 0.26	F-test P < 0.05



AI & Final Pregnancy Rate

- | | |
|--|---|
| <p><u>CIDR Select</u></p> <ul style="list-style-type: none"> AI Preg = 62%* Range = 59 to 64% Final Preg = 90% Range = 87 to 97% | <p><u>CO-Synch + CIDR</u></p> <ul style="list-style-type: none"> AI Preg = 47% Range = 41 to 51% Final Preg = 91% Range = 85 to 97% |
|--|---|



Conclusion

Synchronizing replacement beef heifers with the CIDR Select protocol resulted in:

- Higher estrous response ($P = 0.06$)
- Reduced variance associated with the interval from PG to estrus ($P < 0.01$)



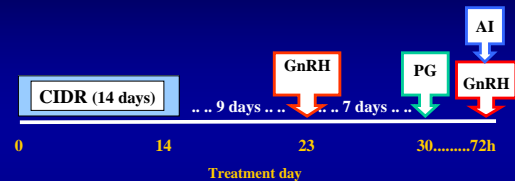
Conclusion

Synchronizing replacement beef heifers with the CIDR Select protocol resulted in:

- Significantly higher TAI pregnancy rates ($P = 0.02$)
- Reduced variance associated with the interval from TAI to subsequent return to estrus ($P < 0.05$)



CIDR® Select



Recommended by the Beef Reproduction Task Force for Fixed-time AI in Beef Heifers



14d CIDR with heat detection results

Herd	No. Pregnant	Total No.	Percentage
1 (F02)	50	79	63%
2 (S03)	27	42	64%
3 (S03)	35	56	63%
4 (S04)	26	48	54%

14 day CIDR with Heat Detection

830 Total Females at 18 Locations

Average % Synchronized Pregnancy = 60%

Range – 45% to 76%

13 (S05)	10	16	63%
14 (S05)	8	10	80%
15 (S05)	41	81	51%
16 (F05)	25	33	76%
17 (F05)	12	18	67%
18 (F05)	23	51	45%
Totals	499	830	60%



14d CIDR with TAI at 72 hrs results

Herd	No. Pregnant	Total No.	Percentage
1 (F04)	71	117	61%
2 (S05)	44	67	66%

14 day CIDR with Timed AI @ 72 hrs.

853 Total Females at 13 Locations

Average % Synchronized Pregnancy = 61%

Range – 26% to 78%

9 (F05)	50	81	62%
10 (S06)	23	39	59%
11 (S06)	44	69	64%
12 (S06)	32	50	64%
13 (S06)	24	32	75%
Totals	518	853	61%



Acknowledgements

Financial and Product Support



Faculty, Students and Staff

- Dan Busch
- Nicole Leitman
- Dallas Wilson
- Daniel Schafer
- Jon Bader

- MU Thompson Farm
- MFA Research Farm

- Dr. Mark Ellersieck

- Dr. Mike Smith
- Dr. Kent Haden