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A novel estrus-synchronization program for anestrous and cycling, suckled, beef cows (1997)

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A NOVEL ESTRUS-SYNCHRONIZATION PROGRAM FOR ANESTROUS AND CYCLING, SUCKLED, BEEF COWS [1]

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Summary

We used four herds at three Kansas ranches to evaluate the potential of two new estrus synchronization strategies to increase estrus expression and fertility of 911 crossbred suckled beef cows. The treatments included: 1) 100 µg of GnRH and a 6-mg norgestomet ear implant on day -7 and 25 mg of $PGF_{2\alpha}$ and implant removal on day 0 (GnRH+NORG+$PGF_{2\alpha}$); 2) 100 µg of GnRH on day -7 and 25 mg of $PGF_{2\alpha}$ on day 0 (GnRH+$PGF_{2\alpha}$); and 3) (control) 25-mg injections of $PGF_{2\alpha}$ on days -14 and 0; (2×$PGF_{2\alpha}$ control). The GnRH+NORG+ $PGF_{2\alpha}$ and GnRH+$PGF_{2\alpha}$ treatments increased ($P<.01$) the overall percentages of cows detected in estrus by 49% and 27% and pregnancy rates by 46% and 37%, respectively, over the control group, without altering conception rate. Both treatments increased the estrus, conception, and pregnancy rates of noncycling cows, compared to controls.

(Key Words: Estrus Synchronization, AI, GnRH, $PGF_{2\alpha}$, Norgestomet.)

Introduction

Estrus-synchronization programs are popular and profitable tools for improving the reproductive performance of cow herds. Synchronization combined with artificial insemination (AI) improves overall reproductive efficiency by reducing the duration of the breeding and calving seasons and allowing increased use of AI sires with superior genetic potential. Current synchronization programs are designed to synchronize estrus in cows that are already cycling at the beginning of the breeding season. They are not intended to induce estrus in noncycling cows. Therefore, our objective was to test the effect of two new treatments to induce estrus and increase conception and pregnancy rates in anestrous suckled beef cows, as well as to synchronize estrus in cycling cows.

Experimental Procedures

Four herds of predominantly crossbred cows (n= 911) at three locations were allotted randomly to two treatments and one control (Figure 1): 1) 100 µg of GnRH and a 6-mg norgestomet ear implant on day -7 and 25 mg of $PGF_{2\alpha}$ and implant removal on day 0 (GnRH+NORG + $PGF_{2\alpha}$); 2) 100 µg of GnRH on day -7 and 25 mg of $PGF_{2\alpha}$ on day 0 (GnRH+$PGF_{2\alpha}$); and 3) 25-mg injections of

[1]We acknowledge partial financial support by Select Sires Inc., Plain City, OH; Pharmacia & Upjohn, Kalamazoo, MI, for $PGF_{2\alpha}$ (Lutalyse®); Fort Dodge Laboratories Inc., Fort Dodge, IA, for GnRH (Factrel®); Rhone-Merieux, Inc., Athens, GA, for GnRH (Cystorelin®) and SyncroMateB® implants (norgestomet); and the assistance of Jon Ferguson, Joe Thielen, and Dean Perkins, cattle producers who most willing cooperated in this study. Special thanks go to all who assisted in this project: Chris Riedel, Brice Guttery, Mike Marshall, Dustin Covey, Jon Siefkes, Linc Lunsway, Becky Hansen, Abby Janssen, Juliana Coalson, Brian Miller, Betty Hensley, and Cody Wright.

$PGF_{2\alpha}$ on days -14 and 0; (2×$PGF_{2\alpha}$) (control). Three blood samples were collected (days -14, -7, and 0) before the last $PGF_{2\alpha}$ injection to determine estrus-cycling status. If any one of the three samples contained ≥1 ng/ml serum progesterone, then the cows were assumed to be cycling. Cows were observed for estrus twice daily (4 hours each) for 144 hours after $PGF_{2\alpha}$. All cows were inseminated 12 to 14 hours after first detected standing estrus. Body condition score was assessed at the time of $PGF_{2\alpha}$ injection, and pregnancy was diagnosed by transrectal ultrasonography between 32 and 51 days after AI. Conception rate was defined as the proportion of cows detected in estrus and inseminated during 144 hours after $PGF_{2\alpha}$ that became pregnant. Pregnancy rate was defined as the proportion of treated cows that became pregnant.

Results and Discussion

Body condition scores ranged from 1 (thinnest) to 6.5, with an average of 4.5 on a 1 to 9 scale. In addition, days postpartum at the onset of the breeding season ranged from 21 to 108, with an overall average of 72 across all herds. The combination of somewhat lower body condition scores, fewer days postpartum, and the lack of spring pasture may have reduced estrus, conception, and pregnancy rates in herds 3 and 4.

The percentages of cows that exhibited standing estrus were greater ($P<.05$) in the two treatments than in controls. The GnRH +NORG+$PGF_{2\alpha}$ treatment had 51% and the GnRH+$PGF_{2\alpha}$ treatment had 27% more cows showing heat than the control. Although the treatments had no statistically significant effect on conception rate (Table 1), pregnancy rates were greater ($P<.05$) in the two treatments than in the control.

Based on the three blood samples, 54.8% of the females were cycling at the time of the $PGF_{2\alpha}$ injection. Within the cycling cows, conception and pregnancy rates were not different between treatments and control (Table 2). The major advantage of the treatments was the positive reproductive response in the anestrous cows. Both GnRH+NORG +$PGF_{2\alpha}$ and GnRH+$PGF_{2\alpha}$ treatments resulted in a greater proportion of cows detected in estrus with higher fertility, resulting in greater pregnancy rates compared to controls (Table 2). The GnRH+NORG+$PGF_{2\alpha}$ treatment induced both the earliest and tightest synchrony of estrus (Figure 2). In that treatment, 50.5% of the cows showed detectable estrus between 24 and 48 hours after the $PGF_{2\alpha}$ injection, compared to 32.4% in the GnRH+ $PGF_{2\alpha}$ and 16.1% in the 2×$PGF_{2\alpha}$ (control) group.

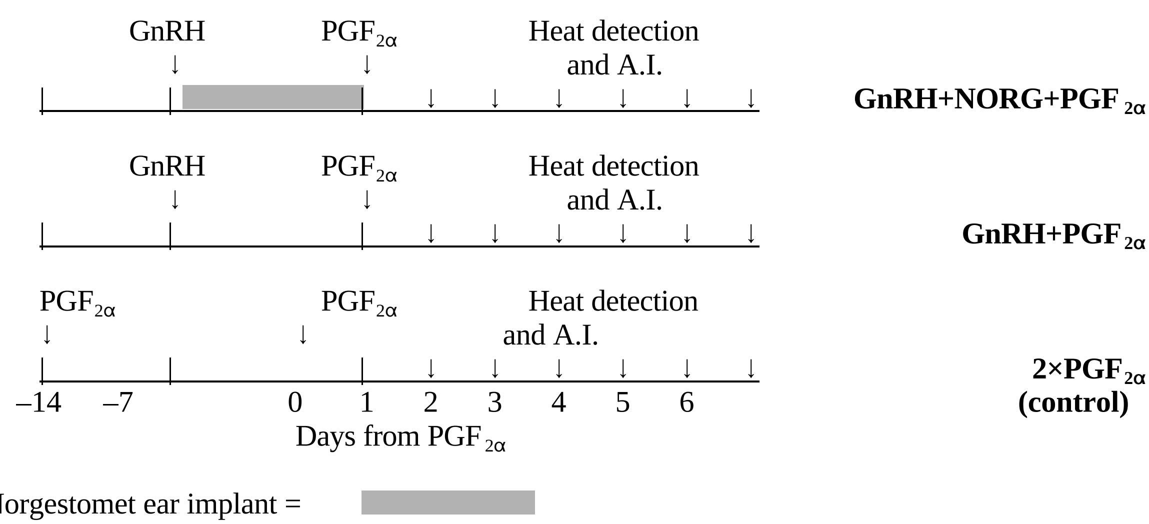

Figure 1. Experimental Protocol for Two New Estrus-Synchronization Treatments.

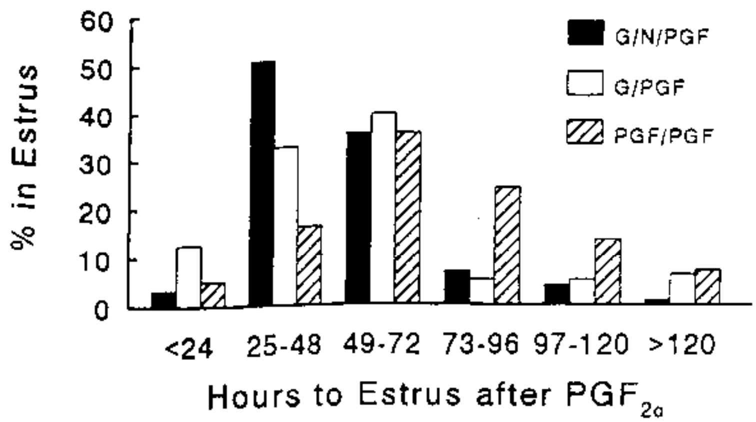

Figure 2. Distribution of Estrus in Cows that Were Detected in Estrus after $PGF_{2\alpha}$.

Table 1. Expression of Estrus, Conception, and Pregnancy Rates[a]

		Estrus, %			Conception, %			Pregnancy, %				
Herd	No.	A	B	C	A	B	C	A	B	C	BCS[b]	Days[b]
1	206	92.1	76.5	60.9	67.2	75.5	52.4	61.9	57.8	31.9	4.7	81
2	266	89.5	79.8	71.6	57.1	69.0	68.2	51.2	55.1	48.9	4.6	73
3	329	54.6	44.4	25.7	53.4	55.3	57.1	28.7	24.1	14.7	4.5	68
4	110	38.9	23.5	25.0	57.1	37.5	55.6	22.2	8.8	13.9	3.8	64
All	911	71.0[x]	59.7[y]	47.0[z]	58.9	65.7	60.6	41.6[x]	39.0[x]	28.5[y]	4.5	72

[a]A = GnRH+NORG+$PGF_{2\alpha}$; B = GnRH+$PGF_{2\alpha}$; and C = 2x$PGF_{2\alpha}$.
[b]BCS = body condition score and days postpartum at beginning of the breeding season (time of $PGF_{2\alpha}$ injection).
[x,y,z]($P < .05$).

Table 2. Reproductive Traits of All Cows Based on Concentrations of Progesterone

	Treatment		
Cycling Status [a]	GnRH+NORG+$PGF_{2\alpha}$	GnRH+$PGF_{2\alpha}$	2x$PGF_{2\alpha}$ (control)
Anestrus, %	51.2	38.3	45.6
No. of cows	153	116	140
Estrus, %	51.0	30.2	15.7
Conception rate, %	58.4	68.6	27.3
Pregnancy rate, %	29.4	20.7	4.2
Cycling, %	48.8[b]	61.7[c]	54.4[b,c]
No. of cows	146	187	166
Estrus, %	91.8	79.1	74.1
Conception rate, %	59.0	64.6	66.7
Pregnancy rate, %	54.1	50.8	49.4

[a]If any one of three blood serum samples contained high <(1 ng/ml) progesterone, then the cows were assumed to be estrus-cycling before $PGF_{2\alpha}$ injection.
[b,c]($P < .01$).