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Pregnancy rates in virgin heifers and suckled beef cows after synchronized ovulation using PGF2a, norgestomet, and GnRH

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**PREGNANCY RATES IN VIRGIN HEIFERS AND SUCKLED
BEEF COWS AFTER SYNCHRONIZED OVULATION USING
PGF_{2α}, NORGESTOMET, AND GnRH**

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Summary

One disadvantage of most estrous synchronization programs is their inability to induce cycling in prepubertal heifers and anestrus suckled beef cows. Suckled cows and virgin heifers were treated with PGF_{2α}, norgestomet, and GnRH to induce ovarian cyclicity in prepubertal heifers and anestrus suckled cows as well as to synchronize estrus in cycling females. The treatment consisted of two injections of PGF_{2α} (day -14 and 0) plus 100 µg of GnRH and a 6 mg norgestomet implant on day -7. The implants were removed 24 h after the second injection of PGF_{2α} (day 0). An injection of 100 µg of GnRH was given 30 hours after implant removal. The treatment group was inseminated at estrus or 18 hours after the second injection of GnRH. Pregnancy rate in the treated females was higher than in the controls that had received PGF_{2α} injections 14 days apart and were bred at estrus (65.1 vs 48.1%). The treatment also successfully induced a fertile ovulation in previously prepubertal heifers and anestrus cows (treatment vs. control; 67.7 vs 20.0%). We conclude that treating beef cattle with PGF_{2α}, norgestomet, and GnRH induced ovarian cyclicity and increased pregnancy rates in prepubertal heifers, anestrus cows, and cycling females.

(Key Words: Prepubertal Status, Anestrus, Heifer, Cow, Estrus Synchronization.)

Introduction

Estrus synchronization improves reproductive efficiency by reducing the length of the breeding and calving season and increasing calf weaning weights, because cows calve earlier. However, most estrus synchronization programs do not induce cycling in prepubertal heifers and anestrus suckled beef cows. Treatments that involve single or multiple injections

of gonadotropin-releasing hormone (GnRH) given at 10- to 12-day intervals and/or implants of norgestomet have been used to "jump-start" these acyclic females. The effect of GnRH is to induce LH and FSH release and ovulation of follicles that are of preovulatory size and function. The effect of the norgestomet is to prime the hypothalamic-pituitary axis for the release of endogenous GnRH, LH, and FSH necessary for follicular growth. In both prepubertal heifers and anestrus suckled cows, the norgestomet implant prevents the short luteal phase that follows the first pubertal or postpartum ovulation. That short luteal phase prevents the continuation of pregnancy, even if fertilization occurs.

Therefore, our objective was to determine the effect of a treatment consisting of PGF_{2α}, norgestomet, and GnRH on inducing ovarian cyclicity in prepubertal heifers and suckled cows, as well as to synchronize estrus in cycling females before one fixed-time insemination.

Experimental Procedures

Purebred Angus, Hereford, and Simmental heifers and suckled cows were assigned to two treatments: 1) two injections of PGF_{2α} 14 days apart (control); or 2) two injections of PGF_{2α} (days 0 and 14) plus 100 µg of GnRH and a 6 mg norgestomet implanted on day -7 (Figure 1). The implants were removed 24 h after the second injection of PGF_{2α} (day 0). A second injection of 100 µg of GnRH was given 30 h after implant removal. Three blood samples were collected (-21, -14, and -7 days) before the second PGF_{2α} injection to determine cycling status. Control females were inseminated 12 to 16 h (AM-PM rule) after first detected estrus until 80 h after the second PGF_{2α} injection, when all remaining females were inseminated. The females in the treatment group were inseminated either at estrus or at 18 h after the

second injection of GnRH (48 h after implant removal or 72 h after the second PGF_{2α} injection). Pregnancy status was determined at day 34 to 35 postservice by intrarectal ultrasonography.

Results and Discussion

Pregnancy rate was greater ($P<.05$) in the treated females than in the controls (65.1 vs 48.1%). No differences in pregnancy rates were detected among breeds or parity

groups (heifers, primiparous, and multiparous cows). An interaction ($P<.01$) occurred between treatment and insemination type. Control and treated females inseminated at estrus had similar pregnancy rates (61.5 vs 62.8%), whereas control and treated females inseminated at a fixed time were markedly different (7.7 vs 66.7%, respectively). An interaction also occurred between treatment and cycling status ($P<.05$). The treatment successfully induced a fertile ovulation in previously prepubertal heifers and anestrous cows (Table 1). Furthermore, the treatment numerically increased pregnancy rates in all cycling females in each of the parity groups. We conclude that treating beef cattle with PGF_{2α}, norgestomet, and GnRH induced ovarian cyclicity and increased pregnancy rates in prepubertal heifers, anestrous cows, and cycling females.

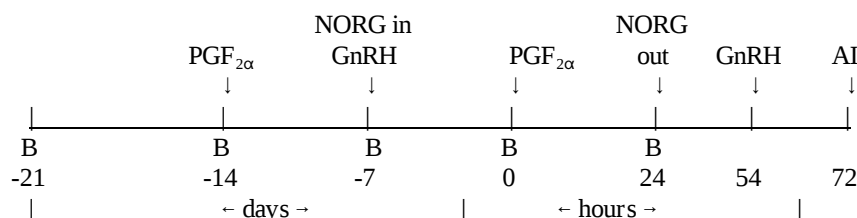


Figure 1. Treatment Protocol and Blood Sampling (B)

Table 1. Pregnancy Rate: Interactions of Treatment and Cycling Status

Cycling status ²	Treatments ¹			
	Control-PGF _{2α}		PGF _{2α} /GnRH/NORG/GnRH	
	No.	% Pregnant ³	No.	% Pregnant ³
Noncycling	25	20.0	31	67.7
Heifers	4	0.0	5	100.0
Primiparous	4	0.0	8	37.5
Multiparous	17	29.4	18	72.2
Cycling	79	57.0	75	64.0
Heifers	32	56.2	32	59.4
Primiparous	17	58.8	14	64.3
Multiparous	30	56.7	29	69.0

¹Cows in the control-PGF_{2α} treatment received two injections of PGF_{2α} 14 d apart. Cows in the PGF_{2α}/GnRH/NORG/GnRH treatment received two PGF_{2α} injections as controls plus 100 µg of GnRH 7 d before the second injection of PGF_{2α} when 6 mg of norgestomet was implanted. Implants were removed 24 h after the second injection of PGF_{2α}. An injection of 100 µg of GnRH was administered 30 h after implant removal. ²When concentration of progesterone in serum on days -21, -14, and/or -7 (second injection of PGF_{2α}) exceeded 1 ng/mL, estrous cycles were assumed to have been established; otherwise, heifers were defined to be prepubertal and cows to be anestrous. ³Based on ultrasonically determined presence of uterine fluid and embryo on day 34 or 35 postservice.