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**K** FACTORS AFFECTING ESTRUS AND FERTILITY OF HOLSTEIN  
**S** HEIFERS AFTER PROSTAGLANDIN F<sub>2α</sub><sup>1</sup>

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Summary

Stage of the estrous cycle, time of insemination, and season of the year were examined for their influence on estrus and fertility of 223 Holstein heifers after prostaglandin F<sub>2α</sub> (PGF). Heifers given PGF early in the estrous cycle (days 5 to 8 where estrus = day 0) had shorter intervals (by 11 hr) to heat than heifers given PGF later in the cycle (days 14 to 16). Heats also were more closely synchronized for heifers treated early in the cycle. Season of the year had no effects on the interval to estrus or on proportion of heifers observed in heat. Conception rates were highest when heifers were bred after estrous detection. Inseminations by appointment at 80 hr after PGF reduced conception for heifers treated early in their estrous cycles. Variability of intervals to estrus can reduce fertility, if heifers are only bred at 80 hr after PGF without regard to when estrus occurred.

Introduction

Numerous factors have been identified or suggested to influence the success of inseminating heifers after synchronization of estrus with prostaglandin F<sub>2α</sub> (PGF). Many studies demonstrated that age and breed of cattle, season, stage of the estrous cycle when treated, and timing of inseminations influenced the occurrence of estrus and fertility after PGF. This study was designed to evaluate the importance of three of these known variables in the same experiment, so recommendations could be made for using PGF to maximize fertility after synchronized estrus.

Procedures

Holstein heifers (n=223) no less than 13 mo of age and weighing no less than 750 lb were used from January 1981 to March 1983. Heifers were given 25 mg PGF (Lutalyse®) early (days 5 to 8) or late (days 14 to 16) in their estrous cycles. These treatments would cause regression of a developing corpus luteum for the early group and regression of a mature corpus luteum for the late group. This would allow comparisons of when estrus occurred and the fertility of those heat periods after PGF. Treatments were conducted in 12 different groups of heifers in all seasons of the year except summer (June, July and August) to test for seasonal effects. During the first year (1981) heifers were inseminated according to estrous detection and during the second year (1982) heifers were inseminated at 80 hr after PGF without regard to estrus. For each of the 12 groups, inseminations were performed by one technician using semen from the same sire for each group.

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### Results and Discussion

Occurrence of estrus was affected by when PGF was given during the estrous cycle but not by season of treatment. Table 1 illustrates intervals to estrus after PGF. Interval to estrus was 11 hr shorter when PGF was given early in the estrous cycle compared with later. Percentage of heifers detected in heat was not affected by time of PGF treatment during the cycle nor by season of the year. Overall, only 16% of the heifers were not observed in heat after PGF.

Table 1. Seasonal and stage of the estrous cycle effects on PGF-induced estrus and fertility for heifers

Item	Early			Late		
	Fall	Winter	Spring	Fall	Winter	Spring
Interval to estrus <sup>a</sup> hr	48.5	49.3	51.1	64.6	59.1	60.3
Detected in estrus <sup>b</sup>						
Number	14/18	28/31	39/47	19/20	26/32	38/48
Percent	77.8	90.3	83.0	95.0	81.2	79.2

<sup>a</sup>Interval to estrus for early vs late groups (49.5 vs 60.6 hr) was shorter for early cycle treatment ( $P < .01$ ).

<sup>b</sup>Overall percentage for early vs late groups (84.4 vs 83.0%) was similar.

Fertility results are summarized in Table 2. Conception for early cycle heifers was less ( $P < .05$ ) after timed inseminations at 80 hr (53.4%) than for inseminations according to heat detection (73.7%). Comparing early with late cycle treatments, AI at 80 hr showed lower ( $P < .05$ ) conception in the early group. But when inseminations were made after heat detection, conception rates were similar between early and late treatments. Similar effects occurred for services per conception.

Table 2. Fertility of heifers after PGF-induced estrus at an early and late stage of the estrous cycle

Item	Early		Late	
	(n)	(%)	(n)	(%)
First service conception				
AI at estrus	28/38	73.7	29/43	67.4 <sup>b</sup>
AI at 80 hr	31/58	53.4 <sup>a</sup>	44/57	77.2 <sup>b</sup>
Services per conception	(Average)		(Average)	
AI at estrus	1.37		1.53 <sup>b</sup>	
AI at 80 hr	1.72 <sup>a</sup>		1.28 <sup>b</sup>	

<sup>a</sup>Different from early heifers inseminated at estrus ( $P < .05$ ).

<sup>b</sup>Different from early heifers inseminated at 80 hr ( $P < .05$ ).

### Recommendations

Because of the effects of the stage of estrous cycle at the time PGF is given, it is better to observe heifers for estrus and inseminate according to estrus. Early cycle heifers come into heat sooner, so an 80-hr timed AI is too late for maximal fertility. Therefore, if heifers fail to show heat before 72 hr after PGF, AI those heifers at 72 hr in the absence of estrus. Otherwise, breed heifers when observed in heat. Season did not influence estrous response or fertility after PGF. However, summer inseminations (June, July and August) were not tested and may result in lower fertility.

