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Story in Brief

An indication that heifers are reproductively active or post puberal is the presence of progesterone in plasma produced by corpora lutea that form after ovulation. Concentrations of progesterone in plasma of 222 Angus x Hereford heifers were quantified at weaning to estimate luteal activity. Blood samples were collected at 7 and 14 d after heifers were weaned in each of three years. Seven heifers (3.2%) had at least one plasma sample with ≥ 1 ng/mL of progesterone. However, only 1.4% of the heifers had ≥ 3 ng/mL of progesterone. Age and weight at weaning did not affect the incidence of luteal activity in heifers. Heifers averaged 206 ± 1.4 days of age and weighed 471 ± 4 lb at weaning. Concentrations of progesterone in plasma of heifers during a normal 21 day estrous cycle are > 3 ng/mL on at least half the days. Since concentrations of progesterone in at least one of two samples were greater than 3 ng/mL in 1.4% of the heifers, this indicates that less than 2% of the heifers studied had luteal activity at weaning.

(Key Words: Heifers, Weaning, Progesterone, Puberty.)

Introduction

Puberty in heifers has been defined as the first standing heat followed by development of a functional corpus luteum (Kinder et al., 1987). Age at which a heifer achieves puberty is of major importance in determining lifetime production (Lesmeister et al., 1973). Although early puberty is advantageous, precocious puberty may be detrimental to animal health. Presence of a bull before weaning did not influence the incidence of precocious puberty which averaged 25% in one year and 8% in a second year (Wehrman et al., 1996). The objective of this study was to determine the incidence of luteal activity in beef heifers at weaning.

Materials and Methods

A total of 222 Angus x Hereford heifers were evaluated during three years. Birth date, weaning date and weaning weight were recorded. Blood samples were collected 7 and 14 d after weaning and progesterone concentrations were determined. Heifers were considered to have luteal activity if progesterone concentrations were ≥ 3 ng/mL. Stress of handling was minimized at the time of sampling. The effects of year, age at weaning, and weaning weight on luteal activity were analyzed by analyses of variance.

Results and Discussion

Seven heifers (3.2%) had at least one plasma sample with ≥ 1 ng/mL of progesterone. Three heifers (1.4%) had concentrations of progesterone ≥ 3 ng/mL (Table 1). An extraovarian source may contribute to concentrations of progesterone in plasma (Gwazdauskas et al., 1972). Concentrations of progesterone < 3 ng/mL could be the result of stress of handling at blood sampling. We previously found 6% (48/809) of heifers of four breed types in four states had ≥ 3 ng/mL at weaning (Looper et al., 1998). Concentrations of progesterone ≥ 3 ng/mL are more indicative of luteal activity than 1 ng/mL since extraovarian sources are usually not sufficient to increase progesterone in cattle to 3 ng/mL. Heifers have ≥ 3 ng/mL on 52% (11 of 21 d) of the days of the estrous cycle (Figure 1), thus two samples at 7 d intervals should detect 75% of heifers with luteal activity.

Age at weaning averaged 206 ± 1.4 d for heifers and did not influence the incidence of luteal activity. Luteal activity was not affected by weaning weight which averaged 471 ± 4 lb. Wehrman et al. (1996) found 25 and 8% of heifers exhibited precocious puberty at 206 and 158 days of age, respectively, in a two year study and duration of luteal function averaged 69 and 55 d for year 1 and 2, respectively. In the current study, blood samples were collected from one heifer (563 lb; 225 d of age) with luteal activity at weaning. Luteal activity persisted for 10 weeks after weaning as indicated in Figure 2.

In conclusion, less than 2% of heifers had luteal activity at weaning based on plasma concentrations of $^3 3$ ng/mL of progesterone. The incidence of puberty or ovulation before weaning is very infrequent in the Angus x Hereford heifers studied in this experiment.

Literature Cited

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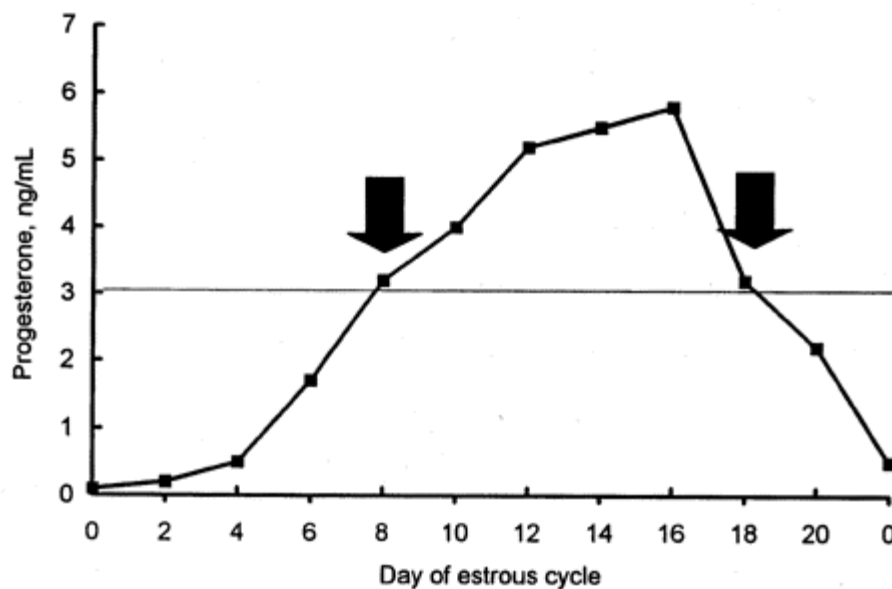


Figure 1. Typical concentrations of progesterone in plasma during bovine estrous cycle.

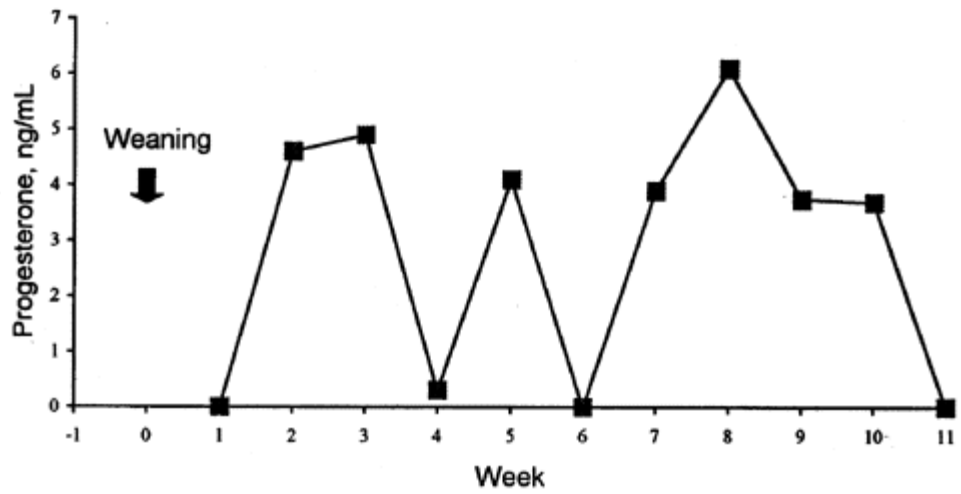


Figure 2. Progesterone profile of heifer with luteal activity at weaning.

| Concentration of progesterone (ng/mL) | n | % of heifers |
|---------------------------------------|-----|--------------|
| < 1 | 215 | 97 |
| ³ 1 | 7 | 3 |
| > 2 | 3 | 1.4 |
| > 3 | 3 | 1.4 |