

RELATIONSHIP BETWEEN BODY WEIGHT CHANGES IN POSTPUBERAL HEIFERS AND CESSATION OF LUTEAL ACTIVITY

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Story in Brief

The relationship between changes in body weight during winter in postpuberal growing heifers and the cessation of luteal activity was evaluated in seventeen Hereford and Angus x Hereford heifers. From April 1992 until December 1992, heifers received .8 lb/day of a 40% crude protein supplement and native grass pasture. Heifers lost 4.3% of their body weight between October and November and 6 of 17 became anestrous. In order to re-initiate luteal activity the diet was increased in December to 7 lb of a 20% crude protein supplement and free choice native grass hay. Within 4.5 weeks after the diet was increased, heifers gained 77 lb and 4 of the 6 nutritional anestrous heifers re-initiated luteal activity.

(Key Words: Heifers, Anestrus, Nutrition.)

Introduction

Nutritional management is a major factor controlling reproduction. Nutritional restriction can delay the onset of puberty and can cause anestrous in cows and heifers. Body energy reserves control reproductive performance in cows (Selk et al., 1988), but the mechanism by which undernutrition causes anestrous in cattle remains unclear. Reduced nutrient intake is associated with loss of body weight which in turn is manifested in changes in body condition score (BCS), decreased luteal activity and cessation of estrous cycles (Richards et al., 1989). However, the effect of relative small changes in body weight on luteal activity in postpuberal growing heifers has not been documented. Therefore, the objective of this study was to evaluate the effect of changes in body weight on reproductive performance of growing beef heifers.

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Materials and Methods

Seventeen Hereford and Angus x Hereford heifers were kept on pasture and fed 6 lb/day of a 20% crude protein (CP) supplement from weaning (October 1991) until 65% of the heifers reached puberty (April 1992). From April 1992 until December 1992, heifers received .8 lb/day of a 40% CP supplement and from December 1992 to February 1993 the diet consisted of 7 lb/day of a 20% CP supplement. During December and January, good quality prairie hay was offered *ad libitum*.

Blood samples were taken weekly between April 1992 and February 1993 and concentrations of progesterone were determined by radioimmunoassay. Onset of puberty was considered to have occurred at the first of two successive weekly samples when concentrations of progesterone were greater than 1 ng/ml. Cessation of ovarian luteal activity (anestrus) was indicated by concentrations of progesterone less than 1 ng/ml for more than one week. Body weight (BW) and BCS (1=emaciated, 9=obese) were determined every 28 days from April 1992 to February 1993.

Results and Discussion

Heifers attained puberty at $14.5 \pm .3$ month of age. At puberty heifers weighed 653 ± 17 lb and had a BCS of $5.1 \pm .1$.

From April 1992 until October 1992 heifers gained an average of $1.1 \pm .1$ lb/day and all heifers exhibited normal luteal activity, or estrous cycles, from August to October (Figure 1). However, from October to December, heifers lost a total of 35 lb and 35% (6 of 17) of the animals became anestrus. Heifers that ceased luteal activity lost significantly more weight ($-.62$ lb/day) than heifers that continued exhibiting normal estrous cycles ($-.22$ lb/day; $P < .03$). Even though heifers that became anestrus lost only 4.3% of their BW between October and December, this loss was sufficient to cause cessation of ovarian function. Previous studies indicate that older heifers fed restricted diets for 24 weeks became anestrus after a 20% to 23% loss of initial BW (Imakawa et al., 1986; Vizcarra et al., 1991).

Heifers were $4.7 \pm .2$ month older at the onset of anestrus than at puberty and weighted 114 lb more ($P < .02$). No significant changes were observed in BCS during the evaluation period.

Within an average of $4.5 \pm .2$ weeks after the dietary intake was increased in December, luteal activity was re-initiated in four of the six nutritionally anestrus heifers. Anestrus heifers had gained 77 ± 8 lb when they re-initiated estrous cycles.

We suggest that minimal losses of body weight in growing heifers may be sufficient to induce anestrus. Thus, nutritional management of heifers during

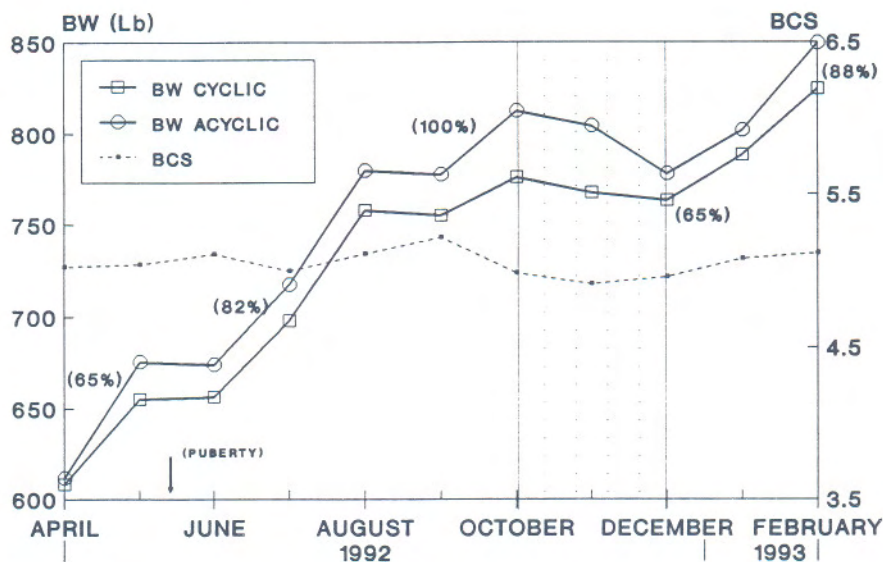


Figure 1. BW, BCS and percentage of heifers with luteal activity (in parentheses) during the evaluation period.

winter may be more critical than that of cows to ensure that cyclic animals maintain normal estrous cycles.

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