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NUTRITIONAL INFLUENCES ON REPRODUCTIVE EFFICIENCY IN BEEF COWS

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GENERAL INTRODUCTION

In a previous report "Nutritional Influences on Reproductive Development of Replacement Heifers" the enhancement of endocrine function and onset of puberty in heifers by use of dietary alterations has been shown. Research regarding the relationships between nutrition and reproduction in the beef cow herd began at Overton in 1975. This research has spanned a period of 7 years and the resulting publications are therefore spread over a relatively wide time span. The purpose of this document is to place all of the data concerning the beef cow in a single location. This, hopefully, will enhance the value of these data to both the livestock production and research segments of the beef industry.

GENERAL CONCLUSIONS

These data, in conjunction with data from the literature, clearly indicate that nutritional parameters alter reproductive efficiency in the beef cow. Nutritional parameters, other than caloric intake, are shown to alter the return to estrus after calving and to affect the function of the ovary, pituitary and hypothalamus.

Beef cows fed monensin from 256 days of pregnancy through the 12th week of lactation had a 12.4% increase in feed efficiency of hay consumed. Rumen fluid volatile fatty acid concentrations were altered with monensin increasing propionic acid concentrations without altering total volatile fatty acids, acetic acid or butyric acid. Blood levels of growth hormone were increased in monensin fed cows as compared to control cows. The increased levels of propionate production may be responsible for increased serum growth hormone in the monensin-fed cows. Addition of monensin to the diet of mature cows increased feed efficiency without decreasing any productive trait measured by cow or calf performance. Decreased butterfat percent seemed to be masked by increased milk production when monensin was in the diet (Chapter 1).

The same cows (Chapter 1) were bled during late pregnancy to determine the effect of monensin and sex of calf on serum profiles of progesterone and estrogen. Monensin-fed cows were lower in serum progesterone during the first 22 days of the feeding trial. In contrast, concentrations of serum estrogens did not differ until days 2 to 0 prepartum when concentrations of serum estrone and estradiol-17β were higher in control cows. Cows carrying female calves had higher serum progesterone and lower serum estrogen concentrations prepartum than cows carrying male calves (Chapter 2).

Alterations in endocrine response in beef cows and mature heifers after consumption of monensin or exposure to changes in season were observed in two experiments. Monensin fed heifers receiving a porcine FSH challenge on days 16 to 21 postestrus had a greater number of corpora lutea on day 11 after the FSH challenged estrus than did control-fed heifers. Brahman cows fed monensin and given an identical FSH challenge had similar increases in number of corpora lutea. Serum progesterone was higher after the FSH challenged estrus in heifers receiving monensin, indicating functionality of the greater number of corpora lutea. The ability of the ovary to respond to FSH was increased by monensin feeding in both mature beef heifers and Brahman cows. Brahman cows had fewer and smaller preovulatory LH surges in the winter than in the spring.

Monensin feeding increased the occurrence and magnitude of the preovulatory LH surge in Brahman cows during the winter. Brahman cows fed monensin had serum progesterone levels which were higher than controls during February. Seasonal effects upon reproduction appear to be partially modulated by nutritional factors (Chapter 3).

Monensin fed Brangus cows had shorter intervals from calving to first estrus in 2 experiments (Chapters 4 and 5). Brangus cows fed monensin consumed 10.7% less hay than did control cows (Chapter 5). Serum luteinizing hormone was higher in control fed cows than in monensin fed cows following GnRH injection on day 21 postcalving. This may be due to lower release and subsequent pituitary buildup of LH in the control cows (Chapter 5).

An experiment was conducted to test the effects of 10% increments in dietary energy intake in Brangus cows. Cows fed 110% NRC had the shortest postpartum interval (34.7 days) followed by the 100% NRC group (40.3 days) and longest in the 90% NRC group (57.5 days). Cows that maintained body condition after calving had a shorter postpartum interval (31.7 days) compared to cows which lost body condition (60.0 days). Cows maintaining body condition had higher serum LH levels and were capable of a greater release of LH following a GnRH challenge. Cows maintaining body condition after calving, regardless of calculated nutrient requirements, have enhanced pituitary function and reproductive potential (Chapter 6).

Changes in ruminal fermentation affect return to estrus after calving, increase feed efficiency and alter the hypothalamic-pituitary axis and ovarian function in mature heifers and beef cows. Judicious use of nutritional parameters can be a management tool to increase reproductive efficiency in the beef cow.