# PUBLICATIONS
# 1981

# Effect of Daylength on Reproductive Performance of Brahman Cattle

Research Center
Technical Report, NO. 81-1

EFFECT OF SEASON AND MONENSIN ON THE PREOVULATORY LUTEINIZING HORMONE SURGE IN BRAHMAN COWS

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## SUMMARY

As shown by Florida researchers, the Brahman cow has an increased number of estrous cycles in which she fails to ovulate (shed an egg) during the winter. In this study, we have found a decrease in the number of Brahman cows having a surge of luteinizing hormone (LH) following standing heat. This surge of LH must occur in order to cause ovulation. Increasing the level of energy nutrition aided the Brahman cows to have an LH surge during the winter.

## MATERIALS AND METHODS

Twenty-seven estrous cycling Brahman cows, between 2 and 6 years of age, were allocated randomly to receive a daily concentrate containing either 0 mg monensin (C) or 200 mg monensin (M). Thirteen C and 14 M cows were fed 3 lbs of 75% milo and 25% cottonseed meal/head/day and were maintained in paddocks with access to Coastal bermudagrass hay. Sterile heat check bulls equipped with chin ball markers were kept with each group to aid in detection of estrus. Both groups were observed at least every 4 hr to identify those cows approaching estrus. When a cow stood to be mounted by the marker bull or another cow, she was immediately removed from the herd and bled via tail vessel puncture at hourly intervals for 24 hours. All cows were placed on feed on the same day (January 3, 1980) and blood samples were collected at three different seasons. The first collections (WI) consisted of blood samples taken from five cows from each of the C and M groups, and all were taken before mid-January. A second group of blood samples (SP) were taken from 10 C and 10 M cows in March. The monensin was discontinued after the SP sampling and approximately half of the cows from each group were combined into one control group and tested a final time in late May (SU) to obtain blood samples in the same manner from 10 cows at estrus. The remaining cows were returned to the breeding herd. Single blood samples were also taken on days 10, 11 and 12 after estrus to be analyzed for progesterone content, to confirm that an LH surge did occur and that an ovulation resulted. All blood samples were immediately placed under refrigeration upon collection, processed to yield serum and stored at -20 C until assayed for hormone content.

## RESULTS

Both monensin and season appear to exert an effect on the nature of the LH surge. Chi-square analysis of the timing of onset of the preovulatory LH surge pointed out distinct differences between C and M. Only one of five cows in the WI-C group manifested an LH surge during the sampling period, whereas five of five WI-M cows had a surge ($P<.01$). The number of cows exhibiting a surge was not significantly different between SP-M and SP-C, but further evidence of an altered timing of the LH surge was obtained by combining WI and SP values for analysis. The number of cows where the peak LH value was not the first sample taken was 3 of 10 C as opposed to 10 of 15 M ($P<.10$). Progesterone assay of midcycle blood samples confirmed that all cows tested for LH surge had ovulated with the possible exception of one WI-C cow whose midcycle progesterone values showed considerable variation.

Since analysis of the timing of onset of the LH surge indicated that WI and SP control groups were either exhibiting a delayed behavioral estrus or the LH surge was initiated earlier, it was considered probable that the LH peak had occurred prior to the initial blood sample in a number of cows. As the LH peak could not be verified in these cases, analyses using peak LH as a parameter were disregarded as inaccurate. Comparisons were made using peak LH only where the highest values were preceded by lower values.

Two separate comparisons were made employing the estrus through hr 24 LH profile to further ascertain any monensin induced differences. A WI-C/WI-M analysis of variance denotes differences between groups by treatment ($P<.001$), by period for both C and M ($P<.001$) and a treatment x period interaction ($P<.005$) (figure 1). Comparing SP-C to SP-M yielded similar results. Differences existed between treatments ($P<.005$) and by period ($P<.001$) but there was no treatment x period interaction (figure 2).

After SP-C to SU-C comparison indicated no significant differences, those values where the LH peak was known were combined to permit comparison to the SP-M group where peak values were known (9 of 20 C; 7 of 10 M). A monensin-induced enhancement of the LH surge is most clearly seen by this comparison. Again, treatment and period differences were highly significant (P<.001) (figure 3).

A profound seasonal effect was elucidated by comparing WI-C to SP-C. Evidence of an LH sruge was seen in nine of 10 SP cows but in only one of five WI cows (P<.005). This difference did not appear between the SP-C and SU-C groups; all of the SU-C cows had an LH surge. While not statistically significant, more of the WI and SP control cows tended to surge earlier than SU animals. This seasonal difference is further clarified by examining the estrus to hr 24 LH profile. No differences were found between SP-C and SU-C groups, but both exhibited elevated values when compared to WI-C (P<.001) (figure 4). Although not statistically significant, basal LH levels as measured at hr 24 tended to increase from winter to summer. Additional indication of a postestrus seasonal effect is seen by the estrus to hr 24 LH profile between WI-M and SP-M. Differences were found between treatment groups (P<.05) and by period for both groups (P<.005) (figure 5).

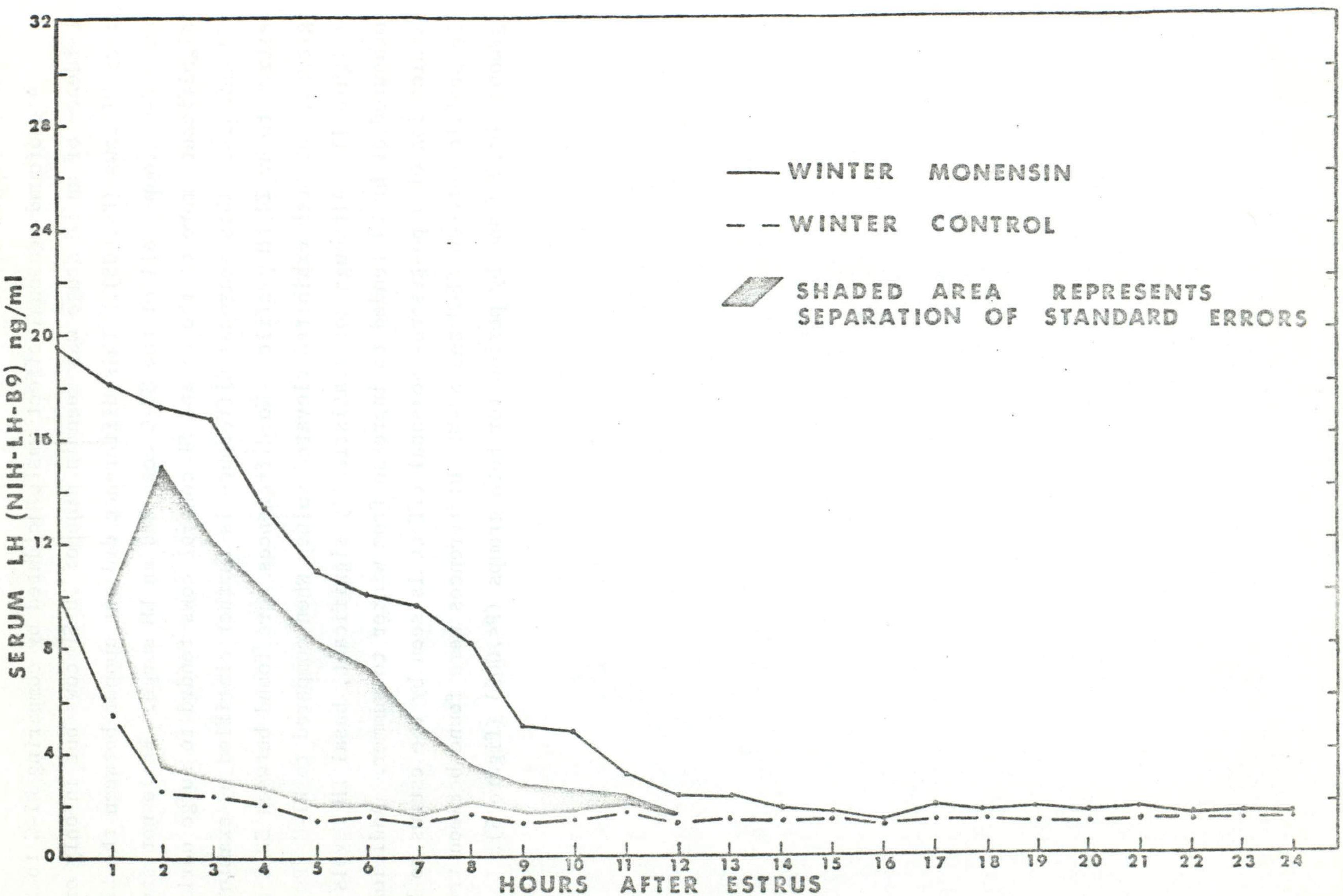


Figure 1. Effect of dietary monensin on the LH surge in Brahman cows in the winter.

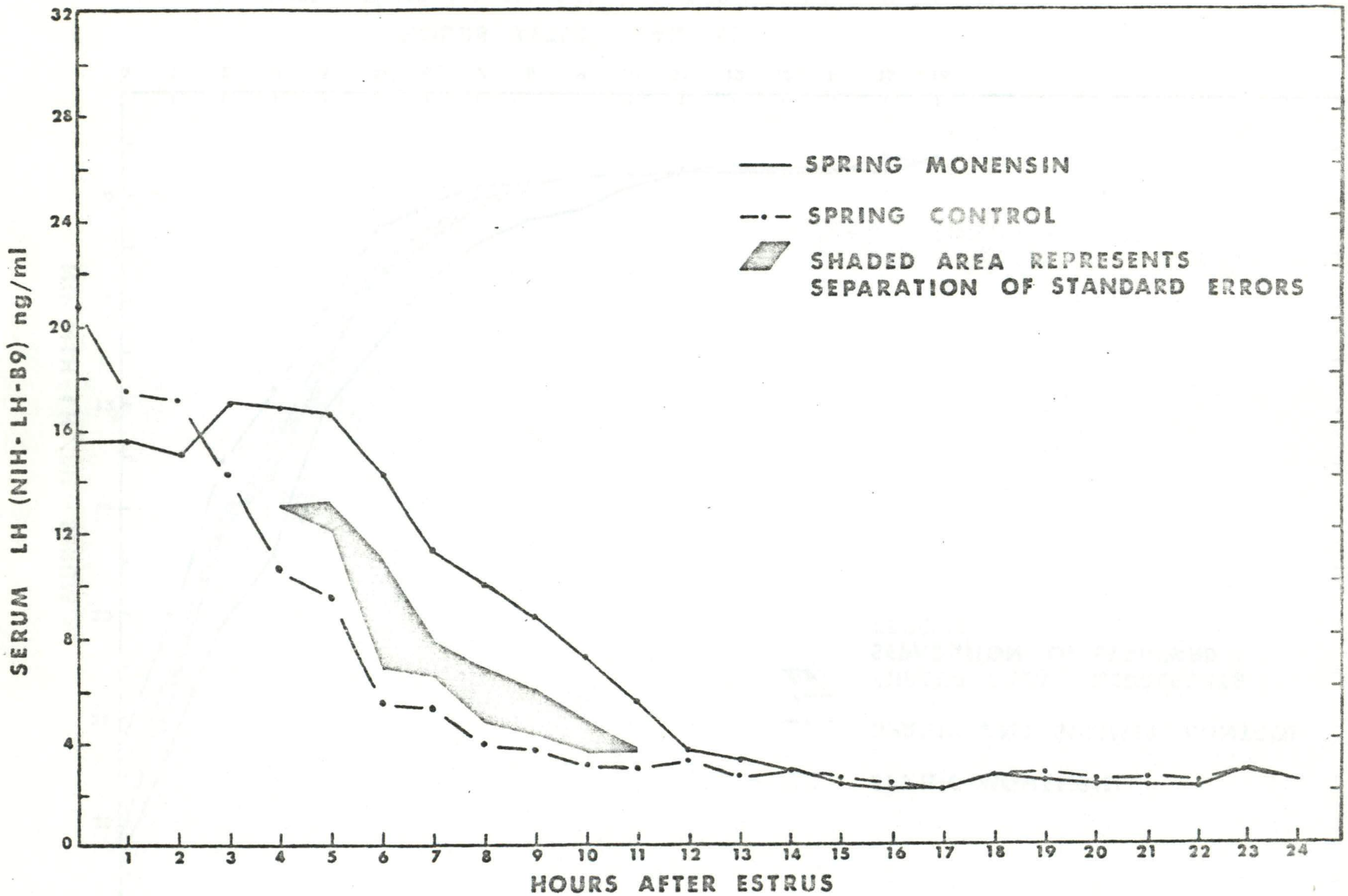


Figure 2. Effect of dietary monensin on the LH surge in Brahman cows in the spring.

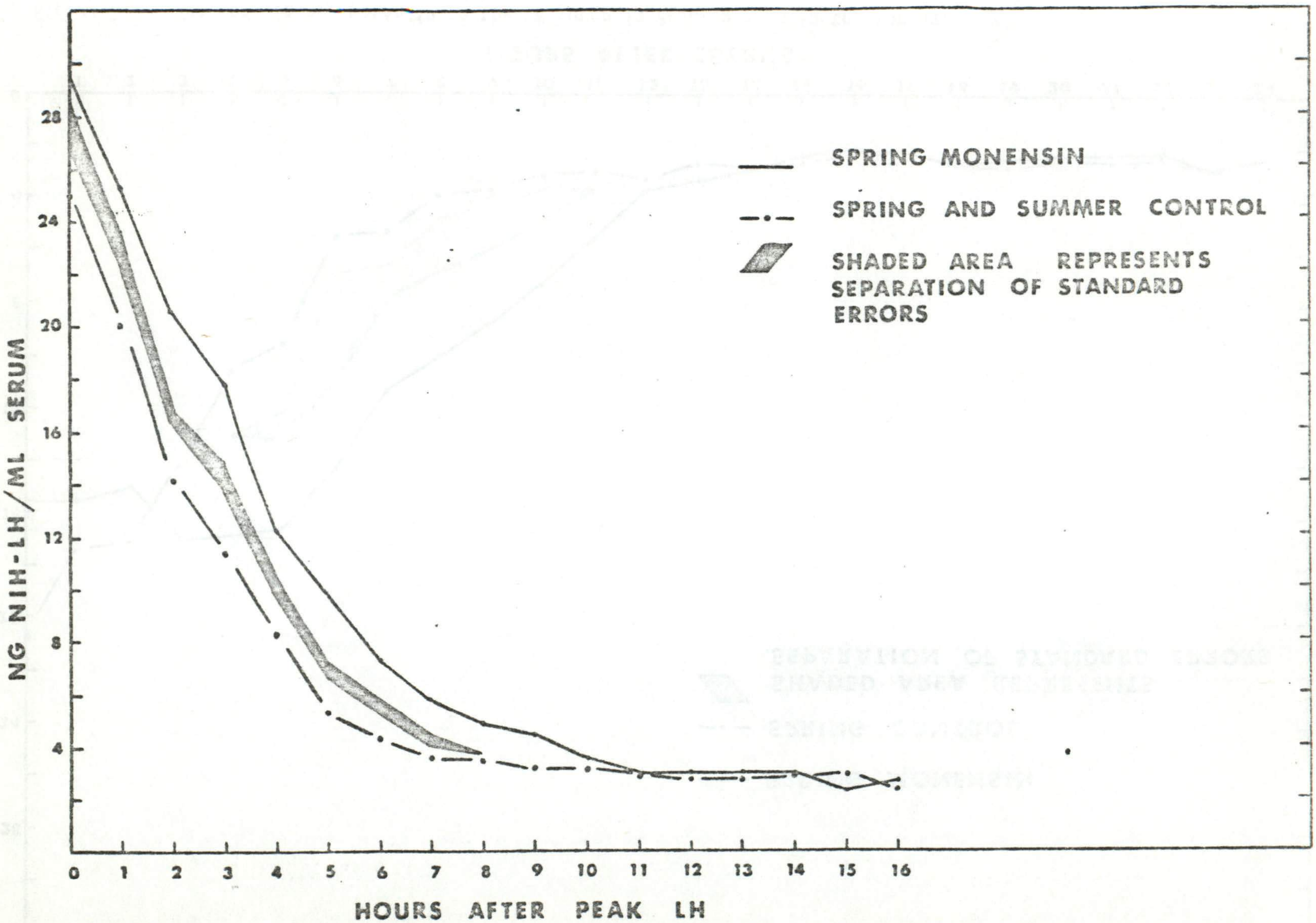


Figure 3. Effect of dietary monensin on the LH peak in Brahman cows in the spring.

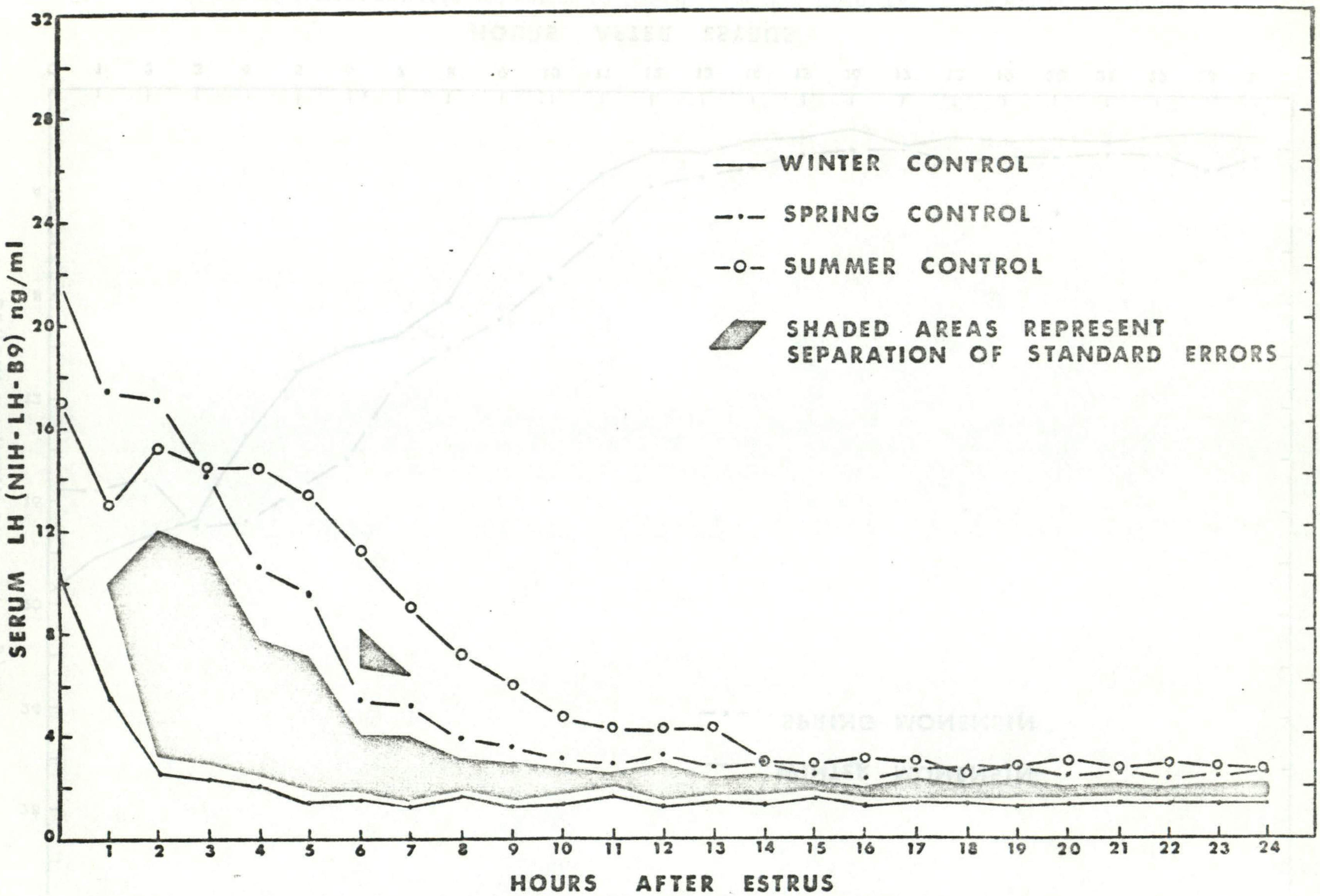


Figure 4. Effect of season on the LH surge in Brahman cows in the winter, spring and summer.

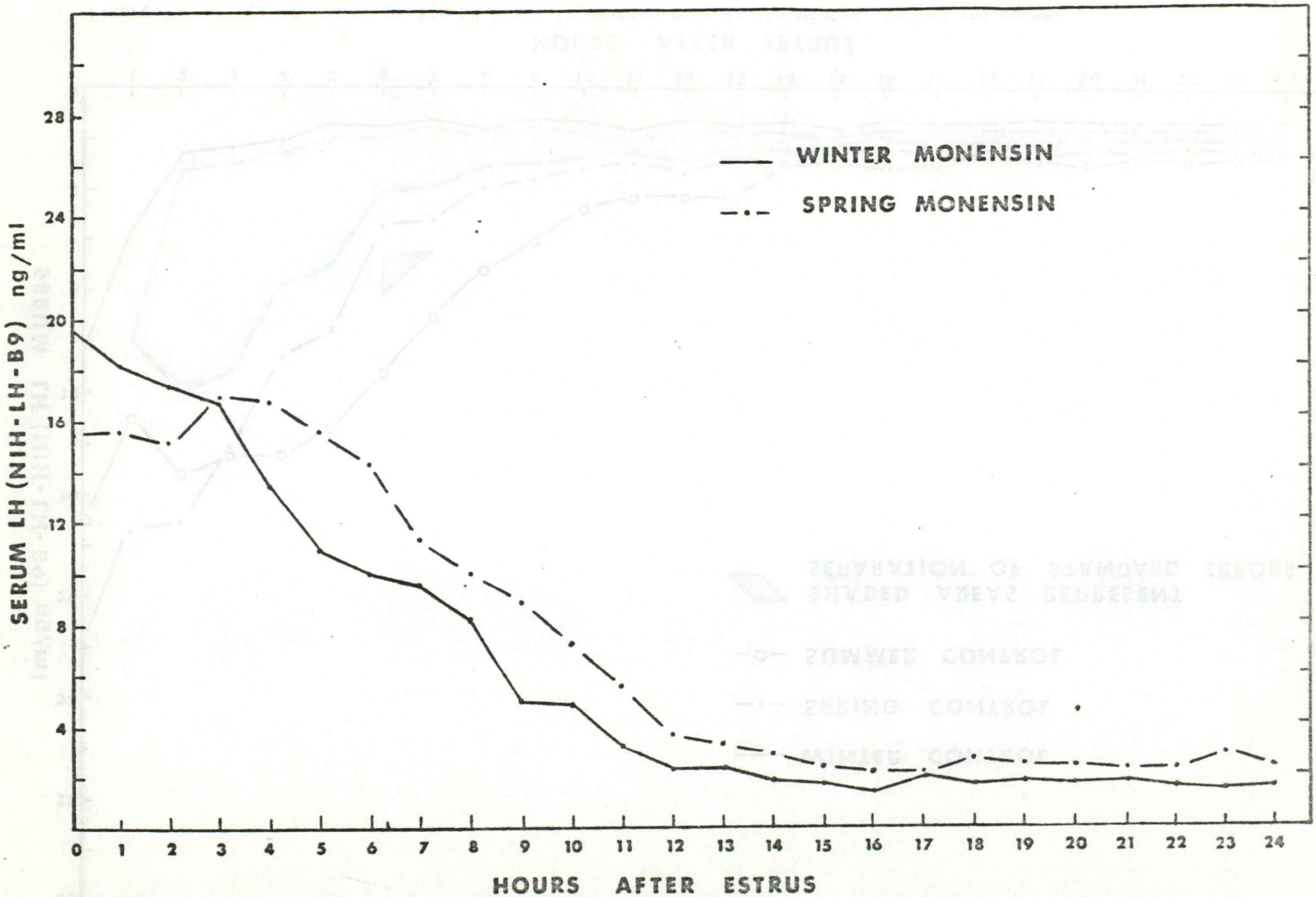


Figure 5. Effect of dietary monensin and season on the LH surge in Brahman cows in the winter and spring.