EFFECT OF BOVINE SOMATOTROPIN ON BODY CONDITION SCORES

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Introduction

Recombinant bovine somatotropin (BST) has become available within the last 14 months and is used as a dairy management tool to increase milk production. Production responses of up to +36% have been reported in some studies (Soderholm et al., 1986; Jenny, et al., 1992). Herd responses can be variable depending on nutritional and environmental factors (Crooker and Otterby, 1991; Coppock, 1987).

One important ramification of increased milk yield is an adverse effect on body condition score throughout the lactation period. Jenny et al. (1992) reported significantly lower body condition score at 42 wk postpartum in BST treated cows when compared to controls (BST started at 14 wk postpartum). Similarly, in a 2 lactation study with BST treatment commencing at 28 to 35 d, Hansen et al. (1994) showed that BST treated multiparous cows completed the first lactation at BCS 3.10 to 3.15 compared to BCS 3.50 for control cows. Body condition scores of primiparous cows at dry-off were similar between treatment groups. At the end of the second lactation period, both age groups treated with BST at the commercially available dose had significantly lower BCS than control cows. Lower BCS at dry-off was not related to any health disorders in the following lactation. However, response to BST was diminished during the second lactation period. The authors suggested that this may be due to lack of replenishment of body reserves. Management of BST use as it relates to body condition score at start of treatment and at end of lactation is an important consideration.

To investigate possible relationships between BST use and dry-off body condition score (D-BCS), a clinical study was undertaken using BCS data from three farms with detailed, computerized BCS information[1]. Because these farms use the product on all available cows, contemporary controls were not available, necessitating the use of historical controls from pre-February 1994 (prior to BST approval). These herds use very similar feeding practices and feed components. Rations are corn silage and alfalfa hay based. One ration designed to support approximately 90 lb milk/d is fed throughout lactation. All cows are milked three times per day. Rolling herd average milk production and calving interval ranged from 18,600 to 22,700 lb and 12.8 to 14.7 mo, respectively.

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[1] Visi-Cow™, Haas Chemical Co, Mobile, AL

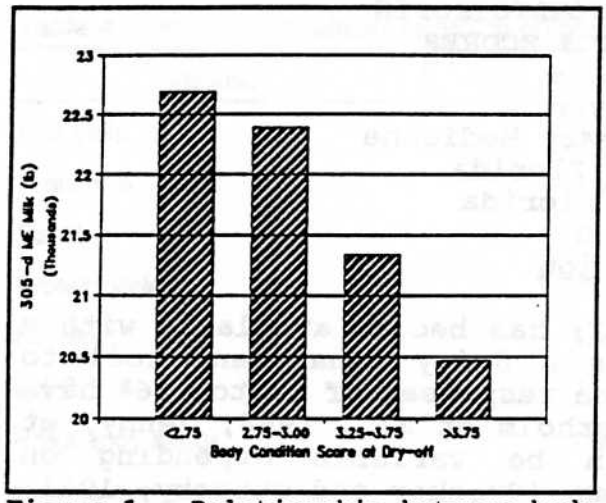

Figure 1 - Relationship between body condition score at end of lactation and lactational milk yield (mature equivalent milk).

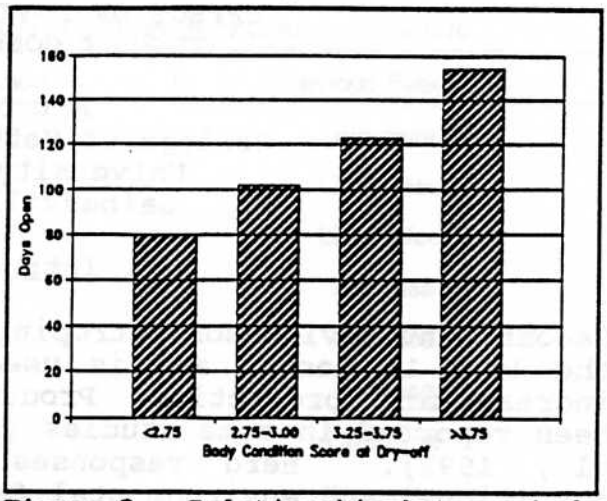

Figure 2 - Relationship between body condition score at end of lactation and average days open.

A total of 3878 lactation records were used for this study. The 'Before BST' group were those cows that were dried off in August 1993 and January 1994. The 'After BST' were those body condition scored in August 1994 and January 1995.

Initial analysis performed on BCS data collected before BST approval shows that three management factors have the greatest influence on D-BCS in these herds - calving to conception interval (days open), lactational milk yield and season in which the cow is dried off. Cows that were dried off in the summer and early fall had an average BCS that was 0.25 lower than cows dried off at other times of the year. Figure 1 shows the relationship between D-BCS and mature equivalent milk production. Cows that had a low D-BCS had higher lactational milk yield than those with higher BCS. This indicates that cows with high milk production potential have difficulty regaining lost condition and the subsequent lactation may be negatively impacted.

Dairymen already know that problem breeders have extended lactations and tend to become overconditioned. This relationship between days open and D-BCS is presented in Figure 2. In these herds, cows with dry-off body condition score of less than 3.0 had average days open of 80. Those with D-BCS greater than 3.75 had average days open over 150.

Because there is a known relationship between the three factors affecting D-BCS (milk yield, reproductive performance and season), a statistical model was developed to explain the effect of milk production alone on D-BCS (Figure 3). Here we see that for every +2,000 lb change in 305-d ME, there is an anticipated -0.1 change in dry-off body condition score. Since BST has the net effect of transforming a mediocre producing cow into a good producing cow, and a good into an excellent producing cow, we would expect to see some reduction in body condition over the course of the lactation.

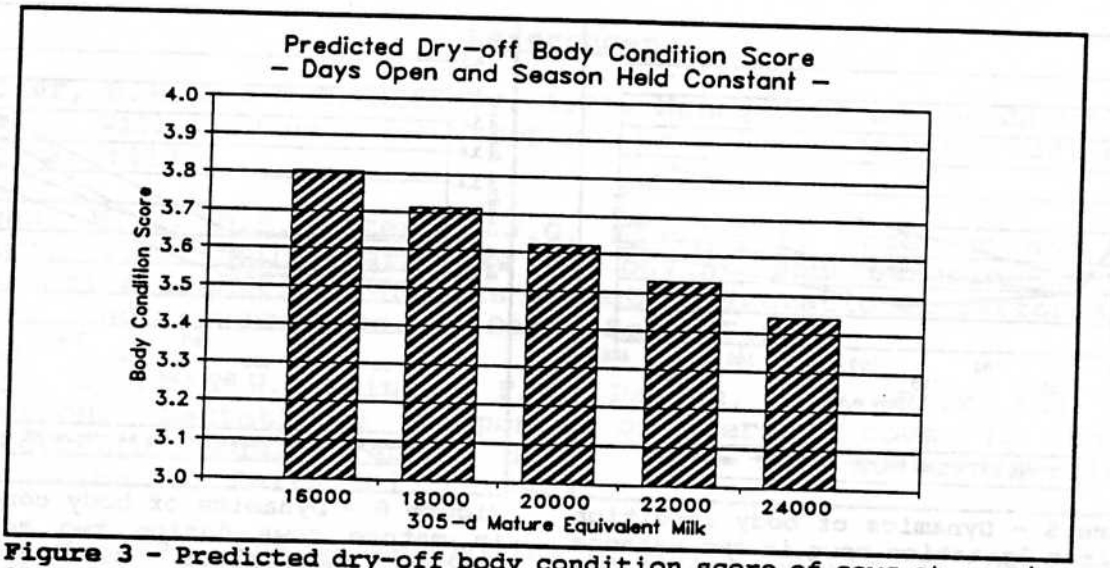

Figure 3 - Predicted dry-off body condition score of cows at varying 305-d mature equivalent milk production and standardized days open (120 days) and season (winter).

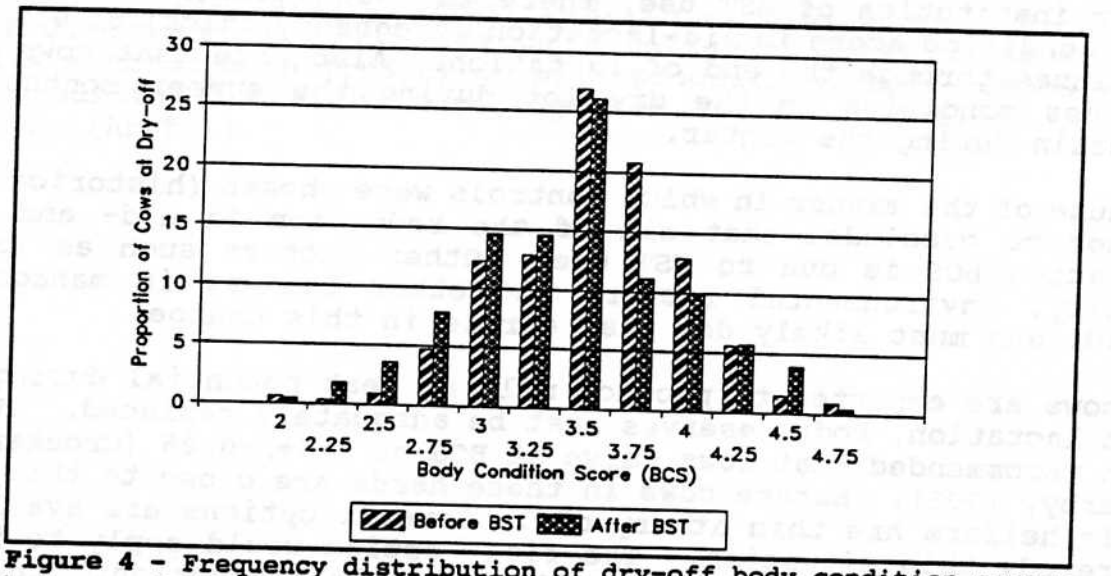

Figure 4 - Frequency distribution of dry-off body condition scores before and after BST approval.

A frequency distribution of D-BCS before and after BST approval is shown in Figure 4. After BST treatment was instituted, a smaller proportion of cows were in high BCS groups and more were in lower BCS groups. The last BCS data summarized are the changes in body condition scores over the entire lactation. Figures 5 and 6 depict BCS dynamics in first lactation and mature cows, respectively. Within the two time periods, before and after BST, two seasons are shown. The five points at which BCS was measured are calving, postpartum reproductive exam, pregnancy check, dry-off and entry to the springer (or close-up dry) lot. The corresponding days in milk for these points are 0, 30, 170, 350 and 400, respectively.

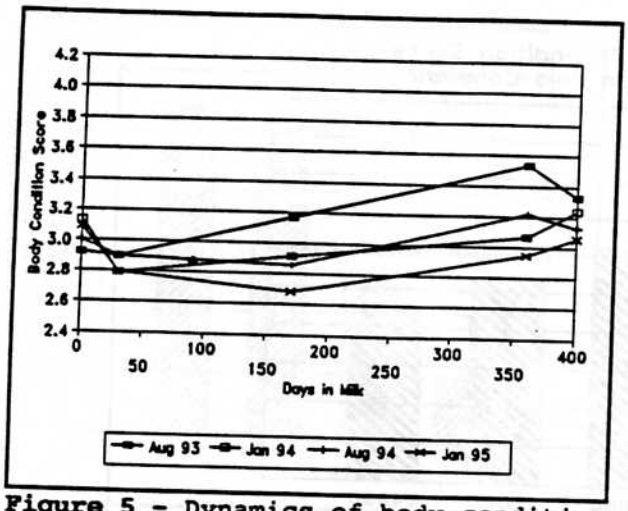

Figure 5 - Dynamics of body condition in first lactation cows in two seasons before and after BST approval in February, 1994.

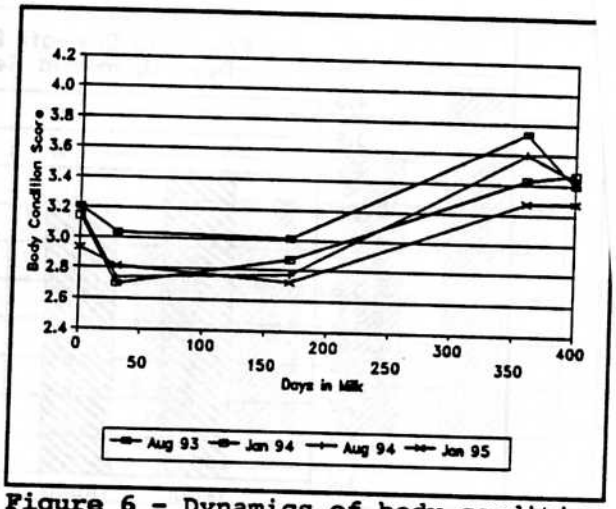

Figure 6 - Dynamics of body condition in mature cows during two seasons, before and after BST approval (February, 1994).

After institution of BST use, there is a consistent reduction in body condition score in mid-lactation (pregnancy check) of 0.2 that continues through the end of lactation. Also note that cows tend to lose condition in the dry lot during the summer months and maintain during the winter.

Because of the manner in which controls were chosen (historical) it cannot be concluded that all of the reduction in mid- and late lactation BCS is due to BST use. Other factors such as forage quality, environmental factors and other changes in management could, and must likely do, play a role in this change.

If cows are expected to produce milk at peak potential during the next lactation, body reserves must be adequately replaced. It has been recommended that cows calve at BCS of 3.5+/-0.25 (Crooker and Otterby, 1991). Mature cows in these herds are close to this goal while heifers are thin at dry off. Several options are available to remedy this situation. The first option would apply to herds that group and feed cows according to milk production. Cows in mid- to late lactation should not be move to lower energy density rations based on milk production alone. Thin cows should be held back in higher production groups until such time that body reserves are replenished. Another option is to terminate BST treatment well before dry-off and put condition on the cow during late lactation when tissue synthesis is more efficient (Moe et al., 1981). In this case the decision must be weighed against lost potential milk income. The last option would be to get cows to gain weight during the dry period. This is not ideal because of reduced efficiency of gain and the risk of creating 'fat cow' syndrome (Morrow, 1976). In the study herds, cows are fed to appetite the high production ration throughout lactation and still do not regain lost condition. This may be their only alternative. The economic decision driving the latter two options needs to be carefully calculated.

References

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