

Feeding the Bovine Somatotropin (BST) Treated Dairy Cow

Jeffrey F. Keown, Extension Dairy Specialist
Paul J. Kononoff, Extension Dairy Specialist

This NebGuide discusses proper feeding management of dairy cows treated with bovine somatotropin.

When dairy producers decide to use bovine somatotropin (BST) in their herds, proper nutritional management is critical to its success.

The final decision to use BST is likely an economic one: Will the use of BST in a producer's operation generate a positive cash flow?

This NebGuide focuses on feeding practices necessary to increase milk production successfully in a dairy herd using BST.

BST Increases Feed Intake and Milk Production

Administering BST to dairy cows has two distinct effects on the lactation curve.

First, an immediate increase in milk production usually occurs, causing the lactation curve to shift upward a few days following administration. Second, use of BST increases the persistency of lactation, causing higher levels of milk production to be maintained for a longer period of time (Figure 1).

The average increase in milk production for research trials conducted over a complete lactation, with BST administration beginning on days 30 to 60 postpartum, has been about 10 pounds/cow/day. This increased milk yield equates to an increase of 10 percent to 20 percent or 10 pounds in most herds in 3.5 percent fat-corrected milk yield for BST-treated cows, compared with non-treated.

Within several weeks after using BST, an increase in dry matter intake usually occurs. Research indicates most cows experience an increase in daily dry matter intake of 6 percent to 8 percent. For the normal cow, intake response is a predictable function of increased milk yield: the more milk in the bucket, the more feed needed in the manger.

As a cow's milk production climbs, the producer's ability to keep sufficient amounts of a well-balanced ration available at all times is critical to the success or failure of BST use. Two

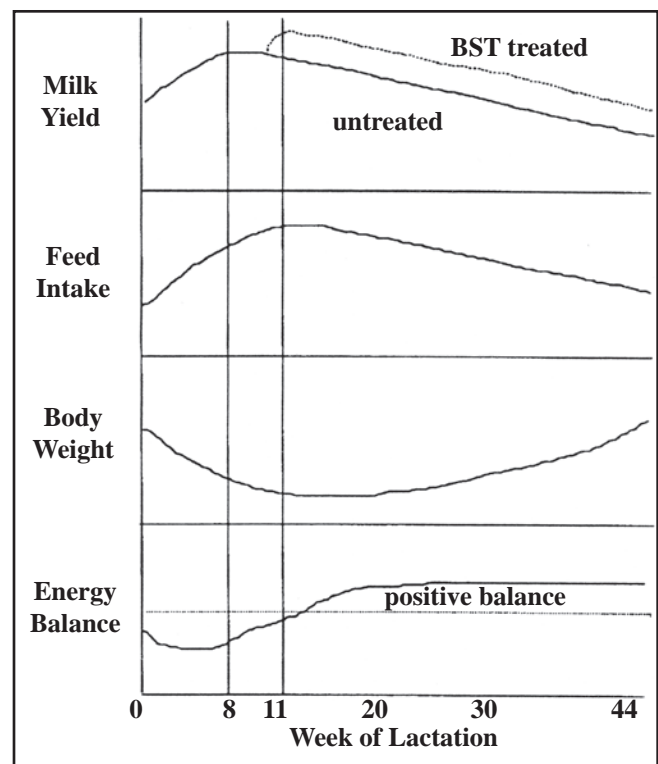


Figure 1. Milk yield, feed intake, body weight and energy balance during lactation.

essential factors to consider before administering BST are the amount of quality feed available to the herd and the feeding strategy used to deliver the feed to the cow.

Importance of Body Condition and Energy Balance

Most herds will use BST only after peak milk production, or about 60 to 100 days postpartum. High-producing, early lactation cows often do not consume enough feed to meet their needs for milk production. Consequently, body reserves (mainly fat) are mobilized and provide extra nutrients to support high levels of milk production.

Cows in early lactation usually lose body weight until feed intake increases sufficiently to meet the nutrient demands of lactation. *Figure 1* depicts the relationships among milk yield, feed intake and body weight.

Milk production generally peaks by six to eight weeks postpartum, while feed intake peaks at 10-12 weeks. This lag in feed intake results in the cow being in negative energy balance, resulting in a loss of body weight. Use of BST in early lactation only worsens this negative energy balance, causing additional stress upon the cow.

Use of BST should be restricted to cows 60 to 100 days postpartum, when the cow is usually no longer in negative energy balance. Cows having good body condition at this time (3- to 2+, minimum) will be the best candidates for use of BST to enhance milk production.

Since negative energy balance also can cause decreased conception rates, producers may wish to restrict the use of BST on high-producing cows until they are safe in calf. Once a cow is safe in calf, administration of BST shifts the lactation curve to a higher level of production, increasing milk yield and profits during the final two-thirds of the lactation.

BST Use Requires Feeding Adjustments

The BST-treated dairy cow needs to be fed like a high-producing, genetically superior animal. Primary nutritional considerations include: maximizing feed intake, increasing energy content, assuring protein sufficiency of the diet and feeding high quality forage. Failure to meet any of these requirements reduces the potential response to BST.

Maximize Feed Intake

To meet the nutrient demands of high milk production levels, feed intake must be maximized. With high feed intake, cows attain positive energy balance sooner and maintain better body condition. Any factor that decreases dry matter intake also can reduce the milk response to BST.

Factors known to decrease intake include heat stress, inadequate water availability, improper frequency, timing or sequence of feeding, excessively high or low ration moisture content and negative social interactions. **Maximum** intake of a **balanced** ration is essential to support high levels of milk production, whether from a genetically superior cow or from a BST-treated cow.

Increase Ration Energy Density

As milk yield increases, higher energy feeds become necessary to meet the cow's increased nutritional requirements. High quality forages with high net energy content are the most economical and nutritionally safe way to balance high production rations. However, at levels of milk production over 20,000 pounds/cow/year, and especially if quality forage is limited, supplemental energy sources become necessary.

Typically, dietary energy density is increased using higher levels of grain. However, feeding above 50 percent

to 55 percent grain in the ration dry matter can lead to acidosis, chronic off-feed problems, lameness and altered milk composition.

Two major methods of avoiding the negative effects of high grain feeding are use of buffers or use of supplemental fat sources in place of some dietary grain. Use of buffers has shown beneficial responses when cows were fed high grain diets and treated with BST.

It is generally advisable to avoid high grain diets and emphasize high quality forages and, if necessary, use supplemental fat. The three primary sources of added fat are whole beans (cottonseed, soybeans, sunflowers), animal fat (tallow), and ruminally protected fats (Megalac, Energy Booster as examples).

Generally, high-producing cows that will be treated with BST will respond with more milk production when supplemental fat sources are included in the diet to increase the energy density of the diet consumed.

Assure Dietary Protein Sufficiency

The level of crude protein needed in the ration dry matter ranges from 16 percent to 18 percent for high levels of milk production. For cows receiving BST, as with all high production cows, it becomes increasingly important to consider not only crude protein level, but protein degradability, as well.

Some research indicates the amount of escape or "bypass" protein in the ration is especially important for cows receiving BST and performing at high production levels. It is recommended that 33 percent to 35 percent, or as much as 40 percent, of the dietary crude protein should be undegradable in the rumen.

Emphasize Forage Quality

Use of BST greatly increases the need for high quality forages. Approximately 1.5 to 2 pounds/head/day more forage is needed for cows treated with BST, reflecting the increased milk yield and feed intake level. This forage intake must be high quality so the ration meets the cow's energy and protein requirements.

Producers need to target forages such as alfalfa with Relative Feed Value (RFV) equal to 150 or, in some cases, even higher. Relative Feed Value of 150 equates to alfalfa hay that is 20 percent crude protein, 30 percent acid detergent fiber (ADF), and 40 percent neutral detergent fiber (NDF). Forage inventories need to be adjusted accordingly to increase forage supply by about 3 percent to 4 percent.

Dietary Carbohydrate Status

Cows expected to produce like genetically superior, high-producing cows must be fed as such. Dietary carbohydrate status involves fiber level and particle length, and non-fiber carbohydrate (NFC) level.

Generally, for high-producing cows, ration NDF should not fall below 26 percent to 28 percent (dry basis), and NFC should be between 35 percent to 40 percent (dry basis).

Dairy Herd Management with BST

BST probably will be used only on cows past peak milk production (60 to 100 days postpartum). Cows in poor body condition (less than 2+ or 3-) or with health problems will not be candidates for BST treatment.

If used properly, cows given BST should complete their lactation with a body condition score of approximately 3+. Movement of cows to rations with lower nutrient density should be on the basis of **body condition** and **milk yield**, so body reserves are replenished prior to drying off.

Successful use of BST requires a high level of herd management. BST probably has greater value for higher-producing herds with better overall herd management, but herd size should not affect the value of BST.

Conclusions

Successful use of BST requires considerable herd management skills. Although complex, the producer needs to consider several critical aspects of nutritional management to maximize intake of a properly formulated ration. When the required amount of nutrients are present in an amount of feed the cow can eat, high levels of milk production can

be sustained. Current feeding recommendations for high-producing dairy cows apply equally to BST-treated cows.

Additional dairy feeding information can be found at <http://nebraskadairy.unl.edu>.

Acknowledgment

The authors would like to acknowledge the work of Rick Grant, former Extension Dairy Specialist, who was a contributor of the previous edition of this publication.

Reference to commercial products or trade names is made with the understanding that no discrimination is intended of those not mentioned and no endorsement by University of Nebraska–Lincoln Extension is implied for those mentioned.

UNL Extension publications are available online at <http://extension.unl.edu/publications>.

**Index: Dairy
Feeding and Nutrition**

Issued March 2007

Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska–Lincoln cooperating with the Counties and the United States Department of Agriculture.

University of Nebraska–Lincoln Extension educational programs abide with the nondiscrimination policies of the University of Nebraska–Lincoln and the United States Department of Agriculture.