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# G91-1041 Feeding the Bovine Somatotropin (BST) Treated Dairy Cow

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# Feeding the Bovine Somatotropin (BST) Treated Dairy Cow

**Proper feeding management of dairy cows treated with bovine somatotropin is emphasized.**

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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 question, and related questions concerning human health and animal safety, have been discussed in*NebGuide G89-942, Can You Afford to Use Bovine Somatotropin (Bovine Growth Hormone)?* This discussion focuses on feeding practices necessary to increase milk production successfully in a dairy herd using BST.

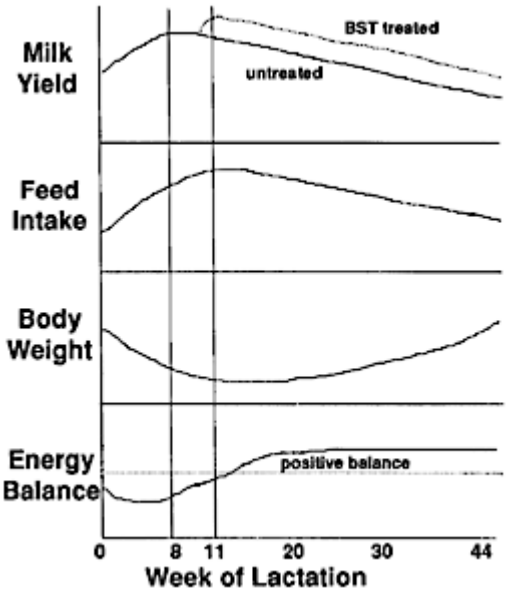


**Figure 1. Milk yield, feed intake, body weight, and energy balance during lactation.**

## BST Increases Feed Intake and Milk Production

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

First, there is usually an immediate increase in milk production, 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 to 20 percent in 3.5 percent fat-corrected milk yield for BST-treated cows, compared to 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 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 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 6 to 8 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.

For information concerning proper techniques of body condition scoring, see NebGuide *G90-997, How to Body Condition Score Dairy Animals*.

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.

Nutritional requirements of high-producing dairy cows are discussed in NebGuide *G90-999, Nutritional Management of the High-Producing Dairy Cow in the 1990s.*

***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. Management practices that stimulate feeding activity by dairy cattle are described in detail in NebGuide *G90-1003, Maximizing Feed Intake for Maximum Milk Production*. **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 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 have 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 include: whole beans (cottonseed, soybeans, sunflowers), animal fat (tallow), and ruminally protected fats (Megalac, Energy Booster as examples). The various sources of added fat and how to successfully feed them are described in NebGuide *G90-961, Supplemental Fat for High Producing Dairy Cows.*

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***

Level of crude protein needed in the ration dry matter ranges from 16 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 to 35 percent, or as much as 40 percent, of the dietary crude protein should be undegradable in the rumen. Levels of crude protein and escape or "bypass" protein needed by high producing dairy cows are detailed in NebGuide *G91-1027, Protein and Carbohydrate Nutrition of High Producing Dairy Cows*.

***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 which 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 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. Levels of NDF and NFC required in the ration dry matter of high producing cows are given in NebGuide *G91-1027, Protein and Carbohydrate Nutrition of High Producing Dairy Cows.*

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

To simplify technical terminology, trade names of products or equipment sometimes are used. No endorsement of product is intended nor is criticism implied of products not mentioned.

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