Health Programs for Productivity Using Bovine Somatotropin (BST)

L.D. Weaver, V.M.D. *Diplomate, ACT*
Veterinary Medicine Teaching and Research Center
University of California, Davis
Tulare, California 93274

Production medicine programs for Bovine Somatotropin (BST)-treated herds will be similar to programs in high producing herds. Veterinary activities will include reproductive health, nutrition, udder health and production monitoring services. Available research data indicate little effect on cow health or fertility in animals receiving BST at efficacious levels. Primary concerns are maintaining/restoring body condition, reproduction management options and consumer/marketing issues. This presentation will briefly discuss disease effects other than those associated with nutrition, reproduction and udder health, outline possible treatment strategies, describe dry cow and fresh cow management for BST treated herds and present a rationale for on-line production monitoring.

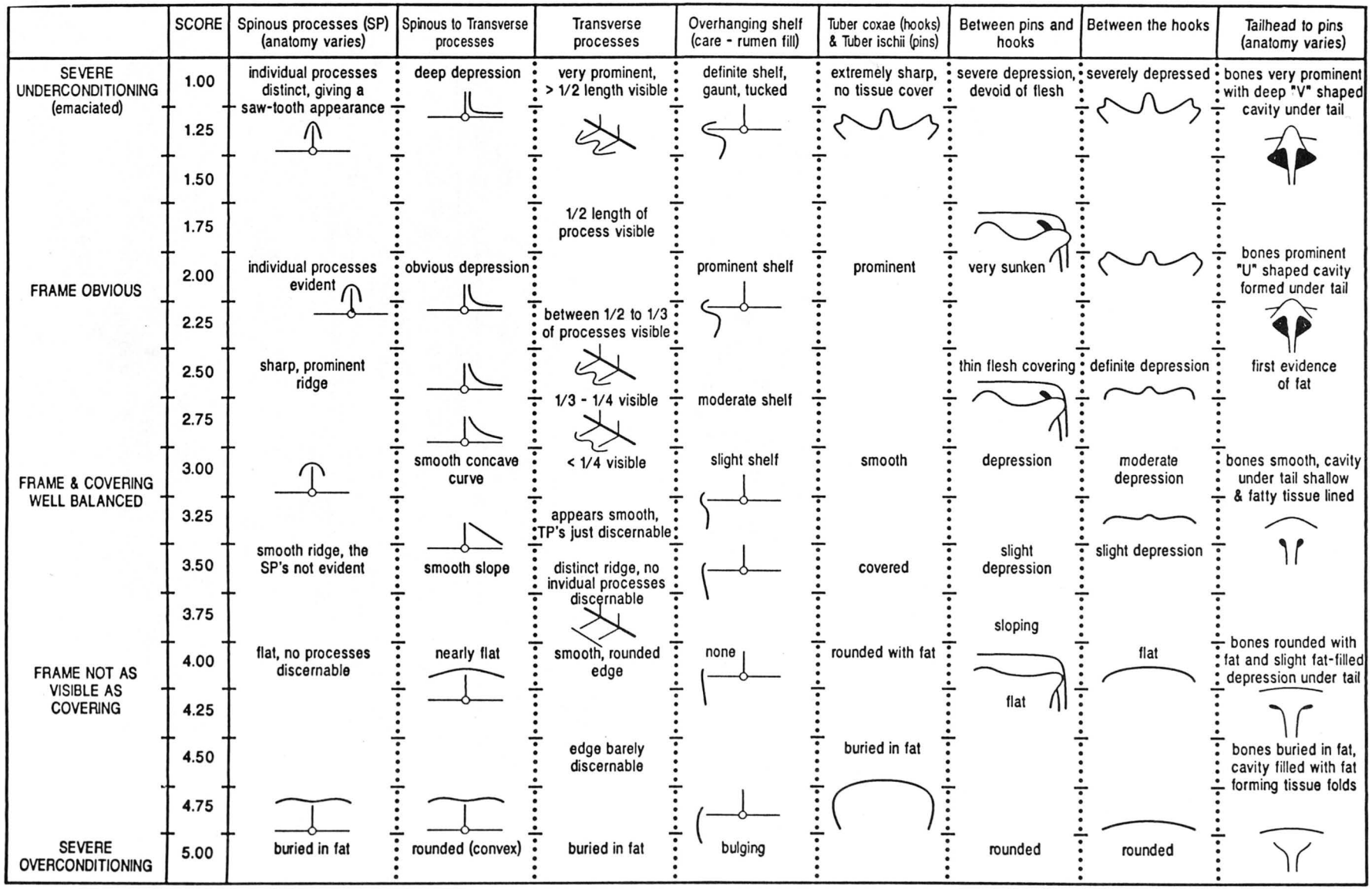
Few if any BST research studies have been designed to demonstrate moderate or small differences in health of BST treated cows. Detection of significant differences in incidence rates of diseases occurring only sporadically (eg displaced abomasum, bloat, pneumonia) in mature cows would require prohibitively large sample sizes. However, inspection of available data from many studies, sites and protocols suggest that treatment during lactation has no effect on incidence of periparturient disease, fetal or calf growth, digestive disturbances or ketosis[1]. The lack of association between BST treatment and clinical ketosis is interesting because of the expected and observed negative effect on energy balance during the first days on treatment. Indeed, it has been suggested that BST may be antiketogenic[2]. Nevertheless, it is generally recommended that treatment be delayed until after the usual period of postpartum energy deficits. An increase in lameness might be anticipated in BST treated cows if previously observed associations between lameness and increased yield in untreated cows are predictive of associations between treatment-induced yields and lameness.[3,4]

Available data concerning health effects of BST treatment and other BST trial data describing yield, body condition, nutrition and fertility measures suggest that successful veterinary programs in BST treated herds will expand or intensify efforts in several areas. Known negative relationships between increased yield and fertility in untreated cows can be expected to persist or be magnified as production levels increase above 20,000 lbs annually, whether that increase is induced by genetics, management or BST. Data are needed to define optimum reproduction management schemes/options for very high-yielding cows. Production medicine consultants will be actively involved in devising strategies, conducting field trials and developing observational data that can be used by quantitative research scientists to definitively answer such questions. Energy deficits must be controlled postpartum to optimize fertility.[5] Production management to control energy deficits will utilize dry cow and fresh cow management schemes that include ration analysis, feed intake estimation, body condition scoring and monitoring of periparturient diseases. Current knowledge about relationships between early lactation measures of peak yield, diseases, total yield and fertility suggest that cows with problems in

Table 1: Potential criteria useful to select individual cows for BST treatment.

	TREATMENT INITIATION (DIM)			
	<60	60-80	81-100	PREG
COWS WITH HIGH YIELD POTENTIAL:				
Observed High Peak Milk				
Disease Absent				
Optimum BCS		X		
Suboptimum BCS				X
Disease Present				
Optimum BCS			X	
Suboptimum BCS				X
Observed Low Peak Milk				
Disease Absent				
Optimum BCS		X		
Suboptimum BCS				X
Disease Present				
Optimum BCS			X	
Suboptimum BCS				X
COWS WITH LOW YIELD POTENTIAL:				
Disease Absent				
Optimum BCS	X			
Suboptimum BCS		X		
Disease Present				
Optimum BCS	X			
Suboptimum BCS				

Figure 1. Body Condition Scoring Chart.



early lactation will perform poorly over the course of the entire lactation. On-line production monitoring systems may therefore be used to optimize health and maximize yield and returns.

Herd consultants may need to assist producers in determining whether BST should be used in a particular herd. These decisions may be difficult and imprecise. Factors to consider include owner bias, management capability, herd genetics, production history, feedstuffs available (especially forages) and herd records.

Producers and consultants may select all-inclusive or selective treatment programs using BST. All inclusive programs would select all cows for BST administration after some standard initiation time (eg 60-84 DIM). Such schemes could also vary time to initiation of treatment for cow groups considering parity, genetics or reproductive potential. Alternatively, owners might choose selective treatment on an individual cow basis, omitting some cows and delaying treatment in others based upon similar criteria. For example, highest producers may be omitted until 100 DIM or confirmed pregnant. A possible treatment selection scheme is presented in Table 1.

Dry cow management programs should emphasize calcium, phosphorus vitamin E, selenium and cation-anion balance as well as energy needs in late lactation and dry periods. Postpartum energy deficits can be controlled by prevention of milk fever, retained fetal membranes and overconditioned cows during the dry period. Yields will be maximized by ensuring body condition reserves are replenished before calving. Late lactation and dry cow programs may require dividing cows into energy supplemented and energy adequate groups. Alleviation of heat stress, providing adequate bunk space and use of total mixed rations are important components of proper dry cow management.

Fresh cow management programs should focus on parturient cow care, sanitation and disease monitoring. Increased surveillance for disease should minimize disease effects on yield, energy deficits, and fertility, and should improve response to BST. Routine monitoring of rectal temperatures, vaginal discharges and milk yield during the first days and weeks postpartum can be utilized for this purpose. Field data from one of our herds suggests that milk yield during the first 21 days postpartum is highly correlated to peak and total yield.[6] Further, our data supports findings of other investigators that diseases during this period have substantial impact on yield, energy deficits and fertility. In addition, milk yield monitoring to detect diseases has been effectively demonstrated in our laboratory and by other investigators.[7] These findings suggest that increased emphasis on monitoring for such diseases is indicated, especially in large herds. Benefits of increased monitoring of milk yield could include improved estrus detection, early detection of disease and improved therapeutic effectiveness. Early detection and successful treatment could make available more cows that would respond effectively to BST therapy.

Nutrition management to control postpartum energy deficits is critical, but beyond the scope of this presentation. Monitoring for energy deficits can be accomplished by routine (daily, if possible) measurement of dry matter intakes in early lactation cows and cow groups. Intake data are necessary to estimate energy deficits. Unless existence and magnitude of energy deficits are known, early intervention will have limited efficacy. Body condition scoring systems can be used to collect data for charting changes in nutritional status (Figure 1).[8] If condition score data are available at drying, calving, 21-42 days postpartum and 80-100 days postpartum, a thorough evaluation can be made. Condition scoring at these times can often be incorporated into routine genital tract palpation activities. Attention should also be given to size and condition of pregnant heifers. It is possible that the increased variability in response to BST (and 3X milking) in first lactation heifers may be a result of increased variability in size and condition in heifers. Heifers should calve at 1250 - 1300 lbs with condition scores of 3.75 or greater.

Reproductive management programs for BST treated herds may benefit from using varied voluntary waiting periods based upon peak yield, body condition and health status. Controlled breeding management schemes incorporating progresterone testing and synchronization schemes may also be used to improve heat detection and conception rates. Palpation visits should be scheduled to obtain an accurate measure of prevalence of true anestrus and ovarian cysts. Certainly, as herd yield increases, reproductive programs must increase in sophistication to maintaining acceptable reproductive performance.

Health programs for BST treated herds will require more comprehensive, coordinated emphasis to ensure success because of the close interactions among cow health, milk yield, fertility and nutrition. It is likely that introduction of BST will advance the viability of production medicine concepts and return more income to both the producer and the practitioner. Practitioner involvement will be especially critical in ensuring that expected responses to treatment are observed and in identifying and discriminating among successful BST management strategies. Proactive, informed practitioners can position themselves for expanded, more sophisticated services and further develop their image as production consultants.

References

1. Hutchison CF, Tomlinson JE and WG McGee, 1986. The effects of exogenous recombinant or pituitary extracted bovine growth hormone on performance of dairy cows. J. Dairy Sci. 69 (Suppl 1) : 152 (Abstract). 2. Collier RJ. Personal commumication 1989. 3. Dohoo IR and SW Martin, 1984. Disease, Production and Culling in-Friesian Cows. IV. Effects of Disease on Production. Prev. Vet. Med. 2: 755-770.4. Weaver AD, 1971. Solar Penetration in Cattle: Its Complication and Economic Loss in One Herd. Vet. Rec. 89:288-296. 5. Butler WR and RD Smith,

1989. Interrelationships between energy balance and postpartum reproductive function in dairy cattle. J. Dairy Sci. p. 767-783. 6. Deluyker HA, 1989. Characterization of dairy milk production and interrelationships among milk yield characteristics in high yielding dairy cows. PhD thesis. University of California, Davis. 7. Lucey S et al, 1986. Short term associations between disease and milk of dairy cows. J. Dairy Res. 53:7. 8. Edmond AJ, Lean IJ, Weaver LD, et al. 1989. A Body Condition Scoring Chart for Holstein Dairy Cows. J. Dairy Sci 72:68-78.