Bovine Somatotropin and Heat Stress

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Bovine somatotropin (BST) has proven to be an effective agent for increasing milk yield. Extensive research shows that this holds true even when cattle are managed under heat stress conditions. A summary of results from studies on the use of BST in heat-stressed cows are shown in Table 1. Across all studies, the increase in milk yield caused by BST averaged 18%.

Table 1. Effect of recombinant bovine somatotropin on milk yield in dairy cattle exposed to heat stress.

	Milk yield (lb/d)		
Location	Control	BST	Reference
Florida	37.6 ± 2.2	42.9 ± 2.0	Staples et al., 1988
Florida[a]	50.1 ± .9	54.7 ± .9	Zoa-Mboe et al., 1989
Georgia	46.1 ± 1.5	54.9 ± 1.5	West et al., 1990
Missouri	63.5 ± 1.1	77.0 ± 1.5	Johnson et al., 1991
Environmental chambers	46.3 ± .9	62.4 ± .9	Johnson et al., 1991
Florida	41.5	47.0	Elvinger et al., 1992
Arizona[b]	57.3	68.8	Sullivan et al., 1992
Israel	67.9 ± .2	77.6 ± .2	Lotan et al., 1993

[a] Fat-corrected milk yield; effects on milk yield were not significant (53.8 vs 56.2 kg/d).
[b] Fat-corrected milk yield

The use of BST in hot environments must be coupled with good environmental management because BST can make cows more susceptible to heat stress. Although BST has no effect on body temperature of cows in cool environments, there are reports that lactating cows that receive BST during periods of heat stress experience higher body temperatures than control cows. The magnitude of these effects are shown in Table 2. The effect of BST on sensitivity to heat stress is not simply a reflection of increased milk yields because higher body temperatures in BST-treated cows were observed when BST-treated cows had similar milk yields to control cows (Elvinger et al., 1992) and when cows were not lactating (Cole and Hansen, 1993).

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Table 2. Effect of recombinant bovine somatotropin on rectal temperatures of cows exposed to heat stress.

	Body temperature (°F)[a]		
Experimental conditions	Control	BST	Reference
Florida summer; shade and no shade groups	103.7 ± .1	104.0 ± .1	Zoa-Mboe et al., 1989
Georgia summer; shade only[b]	103.5 ± .2	104.4 ± .2	West et al., 1991
Florida summer; partial access to shade cloth	104.9 ± .2	106.0 ± .2	Elvinger et al., 1992
Florida summer; partial access to shade cloth	105.4 ± .2	106.0 ± .2	Elvinger et al., 1992
Arizona summer; extensive cooling from evaporative coolers and shade[c]	101.8 ± .1	102.3 ± .1	Sullivan et al., 1992
Florida summer, exposure to sun; lactating cows; peak daily temperature	106.0 ± .3	106.9 ± .3	Cole and Hansen, 1993
Florida summer, exposure to sun; nonlactating cows; peak daily temperature	105.8 ± .3	106.3 ± .3	Cole and Hansen, 1993

[a] Unless otherwise stated, data are rectal temperatures.
[b] Milk temperatures collected at afternoon milking.
[c] Shown is the average of rectal temperatures from July and August. There was no effect of BST in June or after September 9.

Increased sensitivity of BST-treated cows to heat stress has not been observed in all studies (Mohamed and Johnson, 1985; Staples et al., 1988; Johnson et al., 1991; Manalu et al., 1991). Nonetheless, the fact that BST often does exacerbate effects of heat stress on body temperature means that dairy producers should give careful attention to limiting exposure of BST-treated cows to heat stress. Information on structures and facilities for cooling cows during the summer can be obtained from past proceedings of Dairy Production Conferences or from UF extension faculty.

References

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