

fungicides were not used, excellent control was achieved when fungicides were applied to vines in which shoots were removed at cluster set.

Previous studies have reported that mid-season hedging was responsible for slightly lower disease levels. Our results also showed that hedging offers only minimal disease control when done in midseason and gives no control when done early in the season. If hedging promotes lateral shoot growth, the canopy density may increase and create a microclimate more conducive to *Botrytis* infection. This study further confirmed previous reports that hedging can delay maturity, thus making this type of canopy management questionable from a viticultural standpoint.

Yield loss from botrytis bunch rot in California varies from year to year, influenced primarily by late-summer and fall weather conditions. Wineries generally will accept up to 2% rot. More than that may result in

significant cullage, increased harvesting costs, and lower quality or yield. In these studies, even under conditions conducive to high rot incidence, rot severity was reduced to less than 3%, permitting growers to harvest all fruit produced.

Fungicides are widely used in California to control *B. cinerea* on grapes, but they generally become less effective as the grapevine matures because of heavy canopy growth and bunch closing. Usually, by the third fungicide application at or near veraison, it becomes virtually impossible to penetrate the canopy well enough to protect the cluster targets adequately. Preliminary spray tests have shown that leaf removal does improve spray coverage within the canopy.

Fungicide timing trials also lead us to question the need for a fungicide application at bloom. Our tests show no significant difference in disease control between single fungicide applications made at bloom or at preclose.

Fungicides alone do not provide adequate protection against *B. cinerea* during severe disease pressure. By integrating leaf removal with chemical control, growers might eliminate at least two fungicide applications. One fungicide application at either bloom or preclose appears to afford adequate protection when used in conjunction with leaf removal.

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# Attitudes of California milk producers toward bovine somatotropin

Lydia Zepeda

**A survey in late 1987 revealed that, despite widespread publicity, many California dairy farmers had not yet heard of bovine somatotropin (BST), a milk production stimulator. Of those who had, most said they would either wait to see how well BST worked on other dairies before they tried it, or they wouldn't use it on their herds at all.**

Bovine somatotropin is a naturally occurring hormone produced in the pituitary gland of cattle. Biotechnology has made possible commercial production of the material, which, when injected into dairy cows, stimulates feed intake, increases milk production, and improves the efficiency of feed conversion per unit of milk. Although the Food and Drug Administration has not approved BST for commercial use, and is not likely to before 1990, its possible effects on the dairy industry have aroused controversy.

To evaluate the potential impact of bovine somatotropin in California, a survey queried

dairy farmers on their attitudes and concerns about BST. A sample of 7% of all Grade A dairy farmers in the state was drawn at random. The 153 farmers selected were telephoned between August 10 and October 23, 1987, and asked a total of 43 questions. The first part of the survey focused on attitudes toward BST, and how much milk producers knew about it. The second part concerned characteristics of respondents and their dairies. These characteristics were correlated with potential BST use.

## Characteristics

A total of 131 milk producers representing 146 dairies responded to the survey. Of the original 153 dairy farmers in the sample, seven had sold out or participated in the dairy termination program, ten declined to participate, and five could not be reached or did not respond. The final response rate was 86%.

The survey covered three regions: 78 dairies in northern California, 36 in the southern San Joaquin Valley, and 32 in southern California. These numbers are representative of the distribution of Grade A dairies in the state.

The average respondent was 46 years old, had a high school education, and had managed a dairy for 21 years. Most (90%) were involved in daily operation and decisions on their dairies.

The average milking herd size was 508 cows, including dry cows (table 1). Herds had an average of 6.5% registered cows.

The 1987 rolling herd average, in pounds of milk per year per cow, for survey respondents was 17,885 pounds. For 1986 and 1985, the averages were 17,084 and 16,735 pounds, respectively.

Over half (56%) of the respondents said they planned to increase milk production in

**TABLE 1. Average herd size, total number of cows, and average milk production per herd of survey respondents, 1987**

Region	Herd size	Total cows in survey	Avg. herd prod.
	No. cows		lb/yr/cow
Northern Calif.	381	29,722	17,454
South Valley	590	21,246	17,880
Southern Calif.	725	23,200	18,935
California	508	74,168	17,885

the next few years through improved genetics or breeding, by adding more cows, or through improved feed management.

When asked about technology, respondents were most positive about personal computers. Only 17% used a personal computer for record-keeping, but many expressed a desire to purchase one. Use of isoacids, silage inoculants, and buffers was 3%, 17%, and 43%, respectively.

Respondents found it difficult to estimate their costs to produce a hundredweight of milk—labor, feed, interest payments, overhead, and all other expenses. There were 69 responses, ranging from \$4.83 to \$13.05 per hundredweight. The rest of the respondents could not estimate their costs. (One farmer said he was scared to figure it out.) The southern San Joaquin Valley was the lowest cost region at \$9.42 per hundredweight. Not surprisingly, southern California was the highest at \$10.18 per hundredweight. Northern California respondents estimated an average cost of \$9.59 to produce a hundred pounds of milk.

Respondents grew 3% of their feed grains and a third of their roughage. Southern San Joaquin Valley respondents grew the highest percentages—6% of their concentrates and 42% of their roughage. Southern California respondents grew the least—no concentrate and only 13% of their roughage.

Of the dairy farmers surveyed, 88% milked twice a day, 9% three times a day, and 3% both three and two times per day. Of those milking twice a day, none planned to switch to three times a day. Most of the survey dairies belonged to some sort of monthly milk testing program, primarily the Dairy Herd Improvement Association (DHIA) or Dairy Herd Improvement Registry (DHIR) (64%). Of the remainder, 10% had a private monthly milk test, and 21% had no test of any sort. Others self-tested or had a milk-o-meter to record production automatically.

## Survey results

Considering the controversy surrounding BST approval for commercial use, it is surprising that 21% of the dairy farmers had not heard of it (table 2). Those who had were asked if they would use BST right away, wait, or not use it at all. A third said they would wait to see how BST worked on other dairies. They said they were cautious about trying new products in general. Nearly as many of the respondents (29%) said they

would not use BST at all. The remaining respondents who had heard of BST were divided between immediate adoption and undecided.

Of those who said they would not use BST, 39% were concerned about consumer reaction, 29% were worried about the effects BST would have on cow health, and 24% would not use BST because their cooperative or creamery would not accept milk from cows treated with it.

Of the potential users with concerns (82%), 38% felt BST would adversely affect prices by increasing production, 28% were concerned about the effect on milk sales, and 23% thought BST milk might not be safe. Most rejected the idea of giving daily BST injections.

Potential users said they would try it for an average of 8.5 months on about half of their herd before trying it on their whole herd. Only 22% said they would try BST on confirmed pregnant cows or cows that had been fresh for at least 90 to 110 days. Researchers have identified these cows as the most responsive to BST treatment.

Comments in general indicated most dairy farmers were very concerned about their industry and the surplus of milk. They were sensitive to possible consumer reaction and side-effects of BST on cows. Many felt that BST is not a natural method of production but its use may be necessary to stay competitive. There were many skeptical comments about the companies that manufacture BST, the researchers who test it, and the government agencies that regulate its use. Respondents expressed a belief that dairy farmers would bear most of the risk of BST use, and they wanted to be absolutely assured that BST is safe and economic, and that consumers would accept it, before they used it themselves.

## Potential BST users

Studies of technology adoption predict that age, education, and the use of other technologies are correlated with the adoption of a new technology. This study attempted to correlate receptiveness to BST with each category of response.

Respondents who said they would not use BST tended to be better educated (12.2 years) and older (48.7 years) than the average. They had the smallest herd size (436 cows) among the different categories of respondents. Their production per cow (17,982 pounds per year) was a little better than average. All producers who opposed BST milked their herds twice a day. They tended to use computers, silage inoculants, and feed buffers less than the average respondent. There were no regional differences.

Milk producers who would use BST right away were better educated (12.9 years) and younger (36.7 years) than the average. Their herd size (818 cows) and production per

cow (18,067 pounds per year) were higher than average. They owned multiple dairies more frequently than the other producers, and were more heavily represented in southern California. These producers had a higher proportion of private and DHIA testing than average and were the category most likely to milk twice and three times a day. They were also more likely than the other respondents to use a computer (for record-keeping), silage inoculants, and feed buffers.

Dairy farmers with a "wait and see" attitude were of the average age (46.2 years), but better educated (12.7 years). Their herd size (497 cows) was slightly lower than the average, but they had the highest production per cow (18,906 pounds per year). Regionally, they were distributed proportionally. They were most likely to have DHIA or DHIR testing, and most likely to milk three times a day. This group also had a higher than average use of computers, silage inoculants, and buffers.

Respondents in the "haven't heard" and "don't know" categories were less educated (9.2 and 11.5 years) than the average, had smaller (466 and 449 cows), less productive herds (16,171 and 17,821 pounds per year) than average, were more likely to have no test or self-test programs, and were less likely to own a computer. The "haven't heard" were older (50.4 years) and the "don't know" were younger (38.1 years) than the average dairy farmer surveyed.

## Summary and conclusion

Despite widespread publicity, a fifth of California dairy farmers surveyed in October 1987 had not heard of bovine somatotropin. Those who had heard of it often did not have much information about it. Only 22% of potential users could identify the appropriate cows for BST use. Survey results indicate that milk producers are cautious about BST.

Characteristics associated with potential users indicate that BST's impact on California's milk production would be noticeable if the product is approved. The dairy farmers who would adopt BST first are those who have the largest herds with the most productive cows, and who often own multiple dairies.

To the extent that BST is profitable and immediate adopters do not cut their herd size, the share of production by large, multiple-site milk producers will increase with BST. This will intensify the trend toward larger dairies, even though the technology itself does not favor any particular size dairy farm.

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TABLE 2. Survey response to BST use

Response	Percent
Had not heard of BST	21
Had heard of BST and:	
Would wait	34
Would not use BST	29
Would use BST as soon as available	8
Didn't know	8