



International Agricultural Trade and Policy Center

REDUCING SEASONALITY IN DAIRY PRODUCTION

By

Richard N. Weldon, Andrew A. Muhammed, & Richard L. Kilmer

PBTC 03-10

September 2003

POLICY BRIEF SERIES



**UNIVERSITY OF
FLORIDA**

Institute of Food and Agricultural Sciences

INTERNATIONAL AGRICULTURAL TRADE AND POLICY CENTER

MISSION AND SCOPE: The International Agricultural Trade and Policy Center (IATPC) was established in 1990 in the Food and Resource Economics Department (FRED) of the Institute of Food and Agricultural Sciences (IFAS) at the University of Florida. Its mission is to provide information, education, and research directed to immediate and long-term enhancement and sustainability of international trade and natural resource use. Its scope includes not only trade and related policy issues, but also agricultural, rural, resource, environmental, food, state, national and international policies, regulations, and issues that influence trade and development.

OBJECTIVES:

The Center's objectives are to:

- Serve as a university-wide focal point and resource base for research on international agricultural trade and trade policy issues
- Facilitate dissemination of agricultural trade related research results and publications
- Encourage interaction between researchers, business and industry groups, state and federal agencies, and policymakers in the examination and discussion of agricultural trade policy questions
- Provide support to initiatives that enable a better understanding of trade and policy issues that impact the competitiveness of Florida and southeastern agriculture specialty crops and livestock in the U.S. and international markets

Reducing Seasonality in Dairy Production

By

Richard N. Weldon, Associate Professor, Department of Food and Resource Economics,
University of Florida

Andrew A. Muhammad, Assistant Professor, Department of Economics,
Southern University

Richard L. Kilmer, Professor, Department of Food and Resource Economics,
University of Florida

Since the passage of the Capper-Volstead Act and the Cooperative Marketing Act in the early 19th century, farmers in the U.S. have used cooperatives to purchase inputs and market their products. Individual producers benefit from cooperatives that operate at cost to provide cheaper inputs and services. Marketing cooperatives also provide producers with potentially higher prices and access to markets. The consumer also benefits when the cooperative provides a more efficient market, economies of size, and/or market coordination.

The vast majority of the milk produced in the U.S. moves through dairy cooperatives. These cooperatives, in conjunction with federal marketing orders, have attempted from time to time, by implementing seasonal pricing plans, to minimize the variability of seasonal and yearly milk production and provide consumers with a stable and fresh supply of fluid milk and dairy products. However, in spite of these attempts, U.S. dairy marketing cooperatives in general, and the Florida cooperatives in particular, continue to struggle with seasonal supply and demand disequilibriums. This inefficiency is expensive to both the producer and the consumer.

Florida

Florida milk production varies throughout the year. Moderate temperatures in the spring help to promote monthly production at levels 15 percent above the monthly average while summer heat contributes to production levels 17 percent below the monthly average (Figure 1). At the same time, demand for milk varies seasonally due to school lunch programs and tourism. Consequently, even though annual production and annual consumption may be similar, these seasonal patterns result in monthly supply and demand imbalances. Florida dairy cooperatives must export bulk fluid milk early in the year and then turn around a few months or even weeks later and import milk. Due to the nature of "full supply" contracts with milk processors, Florida dairy cooperatives incur transportation costs for both the importing and exporting of fluid milk.

Given the size and type of market, little, if anything, can be done to bring consumption or demand into synch with production. A more likely course of action would be to bring production in line with consumption by reducing seasonal production. The problem of output coordination with the changes in seasonal demand could be dealt with by using production controls (quotas) or with price incentives. Numerous issues, such as implementation and administration as well as the likelihood of capitalization of benefits into the quotas, preclude the use of production controls. The more likely course of action would be the use of price incentives.

In January 1993 in an attempt to reduce the variability in seasonal production, the two milk-marketing cooperatives in Florida, the Florida Dairy Farmers Association (FDFA), which marketed approximately 75 percent of Florida's milk, and the Tampa Independent Dairy Farmers Association (TIDFA), which marketed about 25 percent, implemented a seasonal pricing plan. The overall objective of the pricing plan was to provide an incentive for dairy farmers to change their patterns of production so as to produce less milk during the surplus months and more during the deficit months. By achieving this objective, the cost associated with importing and exporting milk would be reduced.

The seasonal pricing plan was in place from January 1993 through December 1995. Due to the apparent ineffectiveness of the plan, Florida cooperatives voted to do away with the seasonal pricing plan after three years. However, upon closer examination, it is apparent it was not the plan that was unsuccessful, but rather the lack of full participation in the plan on the part of the cooperatives' membership that was at fault.

Cost of Importing and Exporting

In 1992, the last year before the implementation of the pricing plan, significant amounts of fluid milk were imported into and exported out of Florida. Because of transportation costs, imported milk costs cooperatives more, on average, than milk produced in Florida while exported milk, on average, results in a price returned to producers below the price received in Florida. For the five-month period in 1992, July through November, Florida cooperatives imported 110.5 million pounds of milk at a total cost of \$20.2 million (Table 1) for an average price paid of \$18.25 per hundredweight. For the remaining seven months, January through June and December, Florida cooperatives exported a total of 122.1 million pounds of milk at a total return of only \$11.7 million for an average price received by producers of \$9.58 per hundredweight which had transportation cost subtracted (Lawson, Kilmer, and Nubern).

The Pricing Plan and Participation

The seasonal pricing plan was implemented in an attempt to entice individual farmers to change their production patterns to reduce the seasonality of production and aid in cutting the costs associated with imports and exports. Each farm's production in the three highest producing months (March, April, and May) was summed and divided by 92 (the total number of days in these three months) to give a per day base production amount for each farm. The premium per hundredweight was paid in the lowest production and highest importing months (August, September, and October) when the average daily production in any of these months was greater than 75 percent of the daily base production in March,

April and May. Farmers meeting this criterion were paid a premium of at least \$3.00 per hundredweight, which was added to the market price for all milk produced in excess of 75 percent of their daily production base.

Production data from January 1992 through October 1995 was collected for 68 of a possible 307 dairy farmers that belonged to FDFA and TIDFA dairy cooperatives. All farmers included in the data set were farmers that produced each year from 1992 through 1995 and were Dairy Herd Improvement Associate members. In 1993, 1994, and 1995, of the 68 farms 37, 40, and 47 percent participated in the pricing plan (Washington, Lawson and Kilmer). Accordingly, there were 25 participants (43 non-participants) in 1993, 28 (40) in 1994, and 32 (36) in 1995.

The Plan That Failed?

Figure 2 depicts the average daily production in 1992, the year before the plan, for each month for all farms in the two milk-marketing cooperatives. Also, shown is the monthly average for all the months that the plan was in place (January 1993 through December 1995) for the 68 farms in the data set. The plan was not effective in reducing the seasonality of production for the 68 farms. However, upon closer inspection, it is apparent that the *voluntary* nature of the pricing plan caused the plan to fail.

Although the seasonal pricing plan may have appeared unsuccessful overall in reducing seasonality, assessing the effects of the pricing plan on farms that participated in the plan separately from those that did not shows a different outcome. Results (for details see Washington, Lawson and Kilmer) indicate that of the 68 farms used in this study, those farmers *that participated* in the seasonal pricing plan were able to reduce output seasonality in each year (1993-1995) by as much as 20 percent (Figure 3)! For those farms that did not participate, seasonality actually increased in each year by as much as 32 percent! These results were supported in an examination of the actual production practices used by the farms where it was found that the participating farms altered their practices to change seasonal production (Washington, Kilmer, and Weldon).

One of the ways for a dairy farmer to change the amount of milk being produced in response to a change in the price of milk is to change the milk production per cow by altering feeds and feeding practices. A second way to change the amount of milk being produced is to change the number of cows being milked. The number of cows being milked can be changed by altering various practices including the proportion of cows milking, the total number of first lactation animals entering the herd, the culling and breeding rates and others.

Participating and non-participating farmers showed no difference in the seasonal use of production practices in 1992, before the seasonal pricing plan was put into effect. However, a different story emerges after implementation of the seasonal pricing plan in January of 1993. Numerous practices differed for non-participating farms compared to participating farms. Proportion of cows milking, milk production per cow, calving rates and other production practices differed in some or all three years. In each case, the seasonal use of the production practices was less seasonal (i.e., smaller) for participating farms compared to non-participating farms. This reduced the degree of seasonality in milk production for participating farms compared to non-participating farms.

Consequently, the seasonality of those that participated in the pricing plan decreased compared to 1992, while the seasonality of those non-participating producers clearly worsened (Figure 4). Given that seasonality increased for those firms that did not participate, this dampened or overshadowed the pricing plan's effectiveness. Table 1 gives insights into the potential benefits that could have been realized if the cooperatives had full participation in the plan and also the cost associated with not having the plan.

As noted previously, in 1992 the cooperatives imported 110.5 million pounds of milk from July through November at a cost of \$20.2 million and during the other months of the year exported 122.1 million pounds and received about \$11.7 million. These actual levels of imports and exports, given in Table 1, are the result of monthly production levels as depicted by the actual 1992 production seasonality index in Figure 4. However, using the actual production and consumption data for 1992, but imposing the pricing plan and non-pricing plan participating indexes from Figure 4, generates the comparison in Table 1. For example, if in 1992 all the cooperative producers had experienced the average seasonality index in Figure 4 of the farms that had participated in the pricing plan for the three-year period, and assuming prices and consumption unchanged, imported milk needs would have been only 85.6 million pounds, some 24.9 million pounds less, and cost \$15.6 million or \$4.5 million less. In a similar manner, the quantity of milk exported during the January through June and December months would have been reduced. Pounds of milk exported would have decreased from 122.1 to 95.4 million as production became less seasonal.

Table 1 also presents the export and import values if the average seasonal production realized for the non-participating farms for the three-year period of the plan as given in Figure 4 were replicated for the entire cooperative membership in 1992. Imported milk would have been 130.8 million pounds, some 20.3 million pounds higher, and cost \$23.9 million or \$3.7 million more! In a similar manner the quantity of milk exported during

the January through June and December months would have increased from 122.1 to 141.3 million as production became much more seasonal.

Thus, an effective seasonal pricing plan for the Florida cooperatives would require either mandatory participation of all members or a penalty for excess seasonal variability. This policy would do away with the incentive for non-participants to over produce to make up for the decrease in production by those who participate.

For More Information:

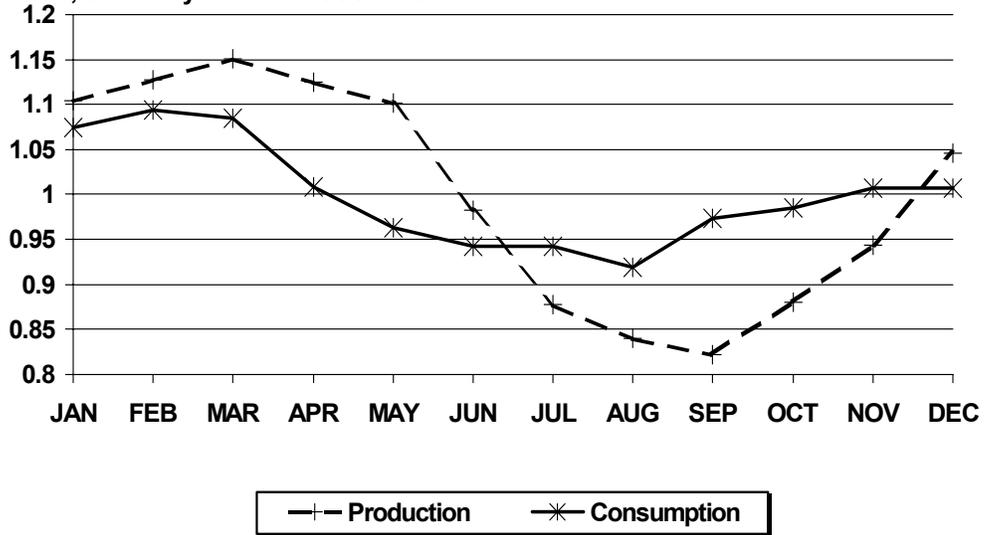
Lawson, Robert W. Jr., Richard L. Kilmer, and Chris Nubern. "Potential for a Supply and Demand Balance in the Florida Milk Market, 1992". *Food and Resource Economics Department Staff Paper #93-14*, University of Florida, October 1994: 1-26.

Washington, Andrew, Robert W. Lawson, and Richard L. Kilmer. "An Evaluation of the Effectiveness of the Florida Cooperative Seasonal Pricing Plan on Seasonal Production Variability." *Journal of Agricultural and Applied Economics*. (April 2000) 113-121.

Washington, Andrew A., Richard L. Kilmer, and Richard N. Weldon. "Practices Used by Dairy Farmers to Reduce Seasonal Production Variability." *Agricultural and Resource Economics Review* 31(1)(April 2002): 127-137.

	Actual	Assuming Seasonality of Pricing Plan Participating Farms 1,000 Pounds	Assuming Seasonality of Non-Pricing Plan Participating Farms
Milk Imports	110,518	85,593	130,803
Milk Exports	122,095	95,392	141,319
		Dollars	
Cost of import	20,166,809	15,658,664	23,866,044
Value of exports	11,711,289	9,173,476	13,585,448

Figure 1. Florida Milk Production and Consumption Seasonality Index, January 1992 - December 1992.



Source: Florida Dairy Cooperatives

Figure 2. 1992 Milk Production and 3-Year Average (1993, 1994, and 1995) Florida Seasonal Daily Production (Thousands).

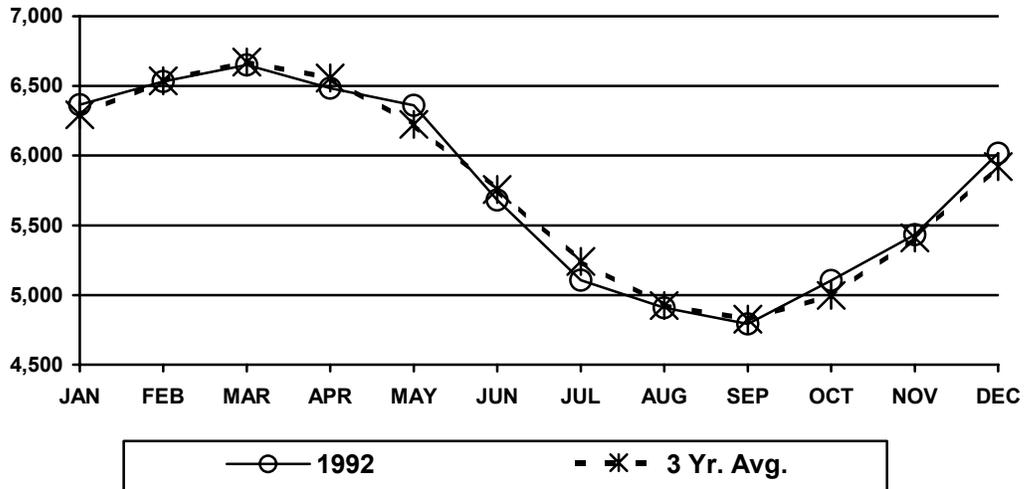


Figure 3: Percentage Changes in Seasonality when Compared to 1992 for Production in 1993, 1994 and 1995.

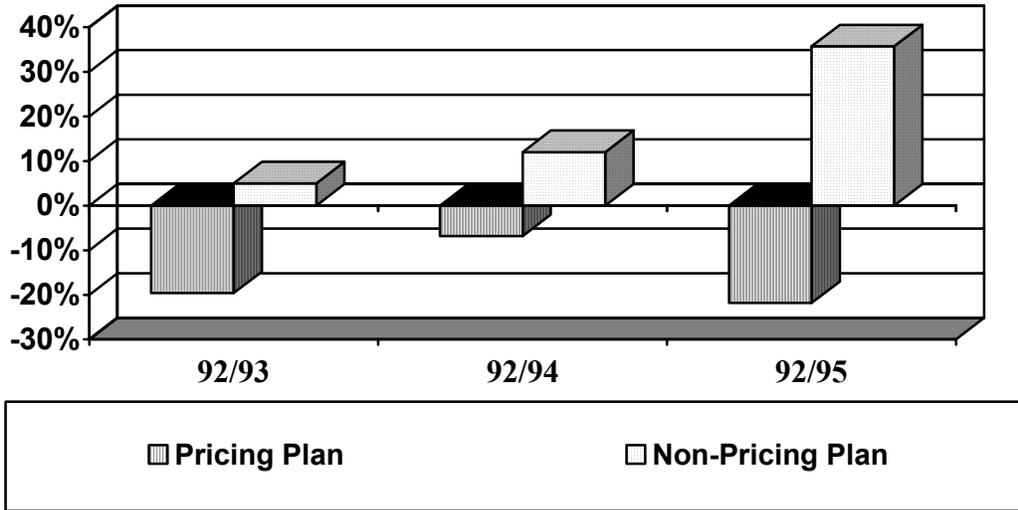


Figure 4. Seasonality of Actual Production in 1992 and Average Seasonality of Pricing and Non-Pricing Plan Participants for 1993-95.

