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# The University of Georgia

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**Center for Agribusiness and Economic Development**

**College of Agricultural and Environmental Sciences**

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## **Estimated Cost and Economic Impact of a Dairy Tax Credit in Georgia**

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## **Estimated Cost and Economic Impact of a Dairy Tax Credit in Georgia**

### **Introduction**

Milk production across much of the southeastern United States has been declining for more than two decades. Since the late 1980's, states in the deep south including Georgia, South Carolina, Alabama, Mississippi, and Louisiana have witnessed average annual declines in milk production of about five percent. This decline, coupled with an increasing population in the region, and hence an increasing demand for milk, has sparked considerable interest in examining the causes, effects, and potential remedies for declining milk production.

Several factors are likely contributors to declining production. Growth of comparatively larger dairy farms located outside the region, that are able to achieve lower production costs by spreading fixed costs over higher levels of output, thus achieving economies of scale sufficient to overcome the additional cost of transporting milk into the southeast, are generally viewed as one of the most significant factors. Additional factors include strong growth in the industrial and service sectors of the southeast's economy over the past two decades, which has resulted in a proliferation of competing employment opportunities that make it increasingly difficult to keep successive generations on the farm, higher land prices which make farmland more valuable in non-farm uses, and increased environmental pressures.

Another contributing factor may be certain provisions of Federal Milk Marketing Orders, which calculate and enforce floor prices representing the minimum price that must be paid to dairy cooperatives for their member's milk or to independent dairy farmers for their milk. In recent years, such prices have been averaged across increasingly broader regions and tied to often volatile prices for manufactured dairy products such as cheese, butter, milk powder, and whey.

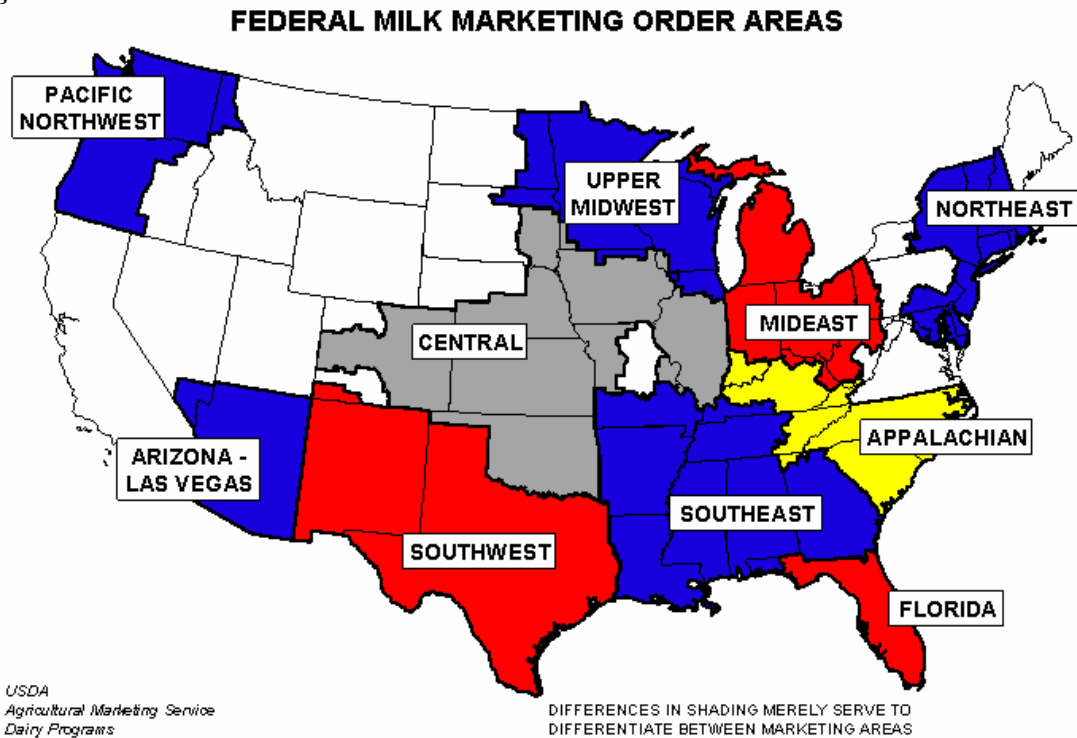
Several southeastern states have launched initiatives aimed at stabilizing or growing their local dairy industries. One such state is South Carolina, which in 2005, enacted the South Carolina Dairy Tax Credit program. This program offers South Carolina's dairy farmers a tax credit (or tax rebate if no state income tax is due) of up to \$10,000 on their first 500,000 pounds of milk produced during the year and up to \$5,000 on each additional 500,000 pound increment. This credit is available when the Appalachian Federal Milk Marketing Order price for milk falls below South Carolina's 3-year average cost of production plus the average cost of transporting milk into the state. In order to assess the potential cost and economic impact of a South Carolina style dairy tax credit program in Georgia, the University of Georgia's Center for Agribusiness and Economic Development was asked to simulate the afore mentioned tax credit calculations based on Georgia's milk production and associated production costs using sample calculations provided by the South Carolina Department of Agriculture.

## Data and Calculations

The calculations begin with 2005 milk production data for each dairy farm in Georgia. The United States Department of Agriculture's Southeast Federal Milk Market Administrator's Office reports a total of 344 Georgia farms participating in the milk marketing order program in 2005. It is assumed that this represents all commercial dairy farms in the state. This analysis includes milk pooled on the Appalachian, Southeast, and Florida Federal Milk Marketing Orders. Of these 344 farms, 307 would qualify for a hypothetical Georgia tax credit program based on South Carolina's model requiring a minimum annual production level of 500,000 pounds (the production from approximately 22 cows). Collectively, these 307 qualifying farms produced a total of 1,362,784,556 pounds of milk during 2005, or 99.3% of the state's total production.

South Carolina is a part of the Appalachian Federal Milk Marketing Order. The South Carolina tax plan identifies five additional federal milk marketing orders as supply areas for the state; the Northeast Order, Mideast Order, Upper Midwest Order, Central Order, and Southwest Order (Figure 1.).

**Figure 1.**



Although located in close proximity to South Carolina, the Southeast and Florida orders were not considered as potential supply areas, presumably because they represent milk deficit areas that are unlikely to supply any substantial quantities of milk to South Carolina. This reasoning is

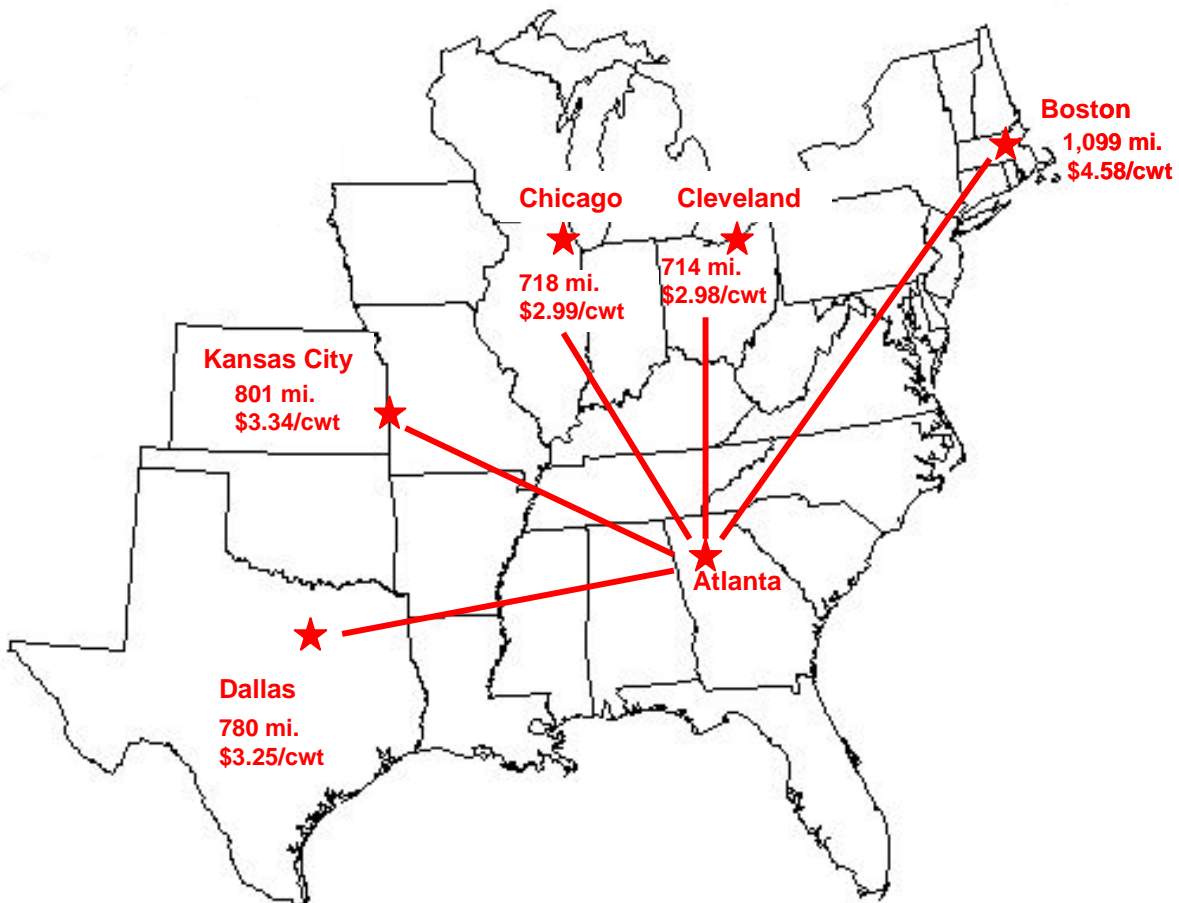
extended to assume that neither the Appalachian, nor Florida orders is a likely candidate to supply milk to Georgia, and that those areas that are most likely to supply South Carolina would be most likely to supply Georgia also.

The first step in calculating transportation cost estimates is to obtain a measure of distance between each of the five orders or supply areas enumerated above and Georgia. The base point in each of the five orders is taken to be the city used in the sample calculations provided and the base point in Georgia is taken to be Atlanta, due to the high concentration of the state's milk bottling operations located in its metropolitan area. Distances were based on the driving distance between each city and Atlanta using Rand McNally Maps and Directions at [www.randmcnally.com](http://www.randmcnally.com). A transportation cost figure of \$2.00/mile was taken from the South Carolina sample calculations and converted to a cost per 100 pounds of milk (cwt) using the following formula:

$$\text{transportation cost/cwt} = \text{miles} \times \$2.00/\text{mi.}/48,000\text{lbs.} \times 100,$$

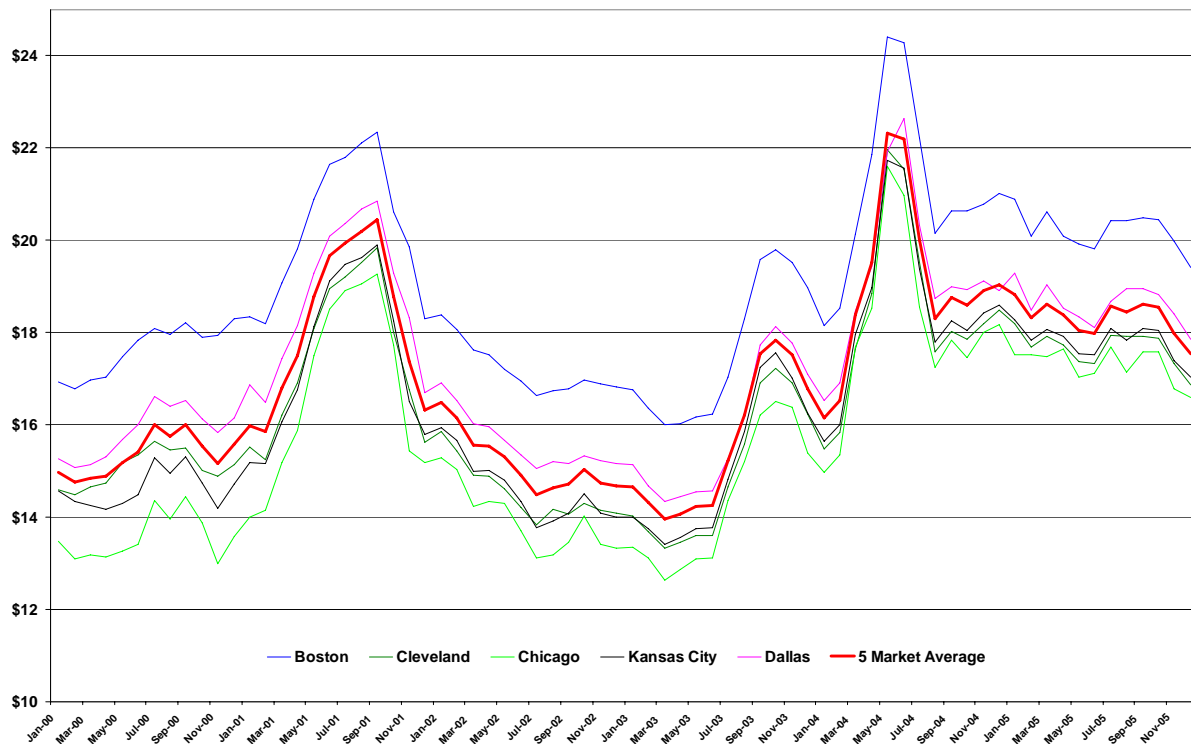
to yield the distances and transportation cost figures shown in figure 2. The formula assumes that milk is shipped in 48,000 pound capacity tankers and that no ultrafiltered milk is used.

**Figure 2.**



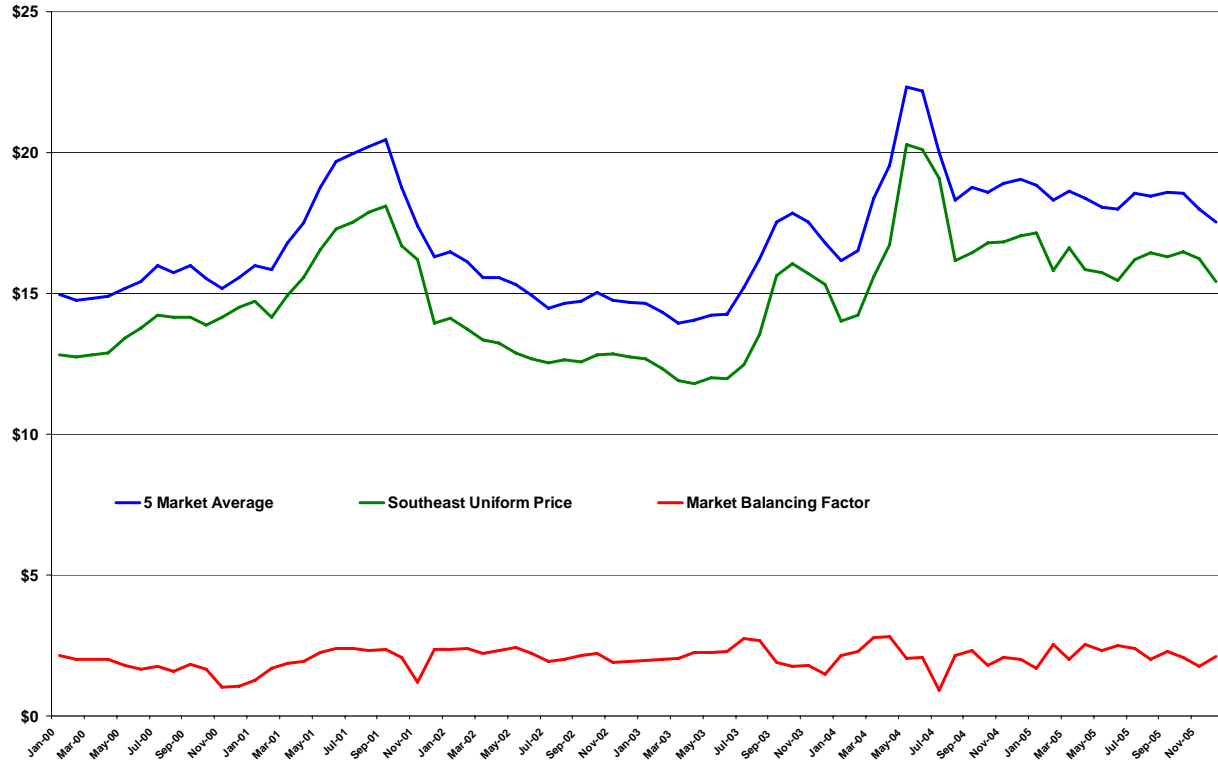
Transportation cost is then added to the monthly Federal Milk Marketing Order price for each area to arrive at an approximation of the total cost of procuring and transporting milk to Georgia. A simple monthly five-market average is then calculated for these five-areas for the 2000 – 2005 time period (Figure 3.).

**Figure 3.**



The five-market average price plus transportation cost ranges from a minimum of \$13.95/cwt in March 2003 to a maximum of \$22.23/cwt in May 2004. The average for the 2000 - 2005 time period is \$16.93 and the average for 2005 is \$18.33. Just as the Appalachian Federal Order price was used as a South Carolina benchmark in the sample calculations, the Southeast Federal Order price is taken to be representative of a Georgia price. Using the Southeast Federal Order price as a proxy for Georgia does not take into account the fact that approximately half of all milk produced in Georgia is pooled and priced on the Florida Federal Order. The difference in the Southeast price and the five-market average shown in Figure 4 is defined as the “market balancing factor”.

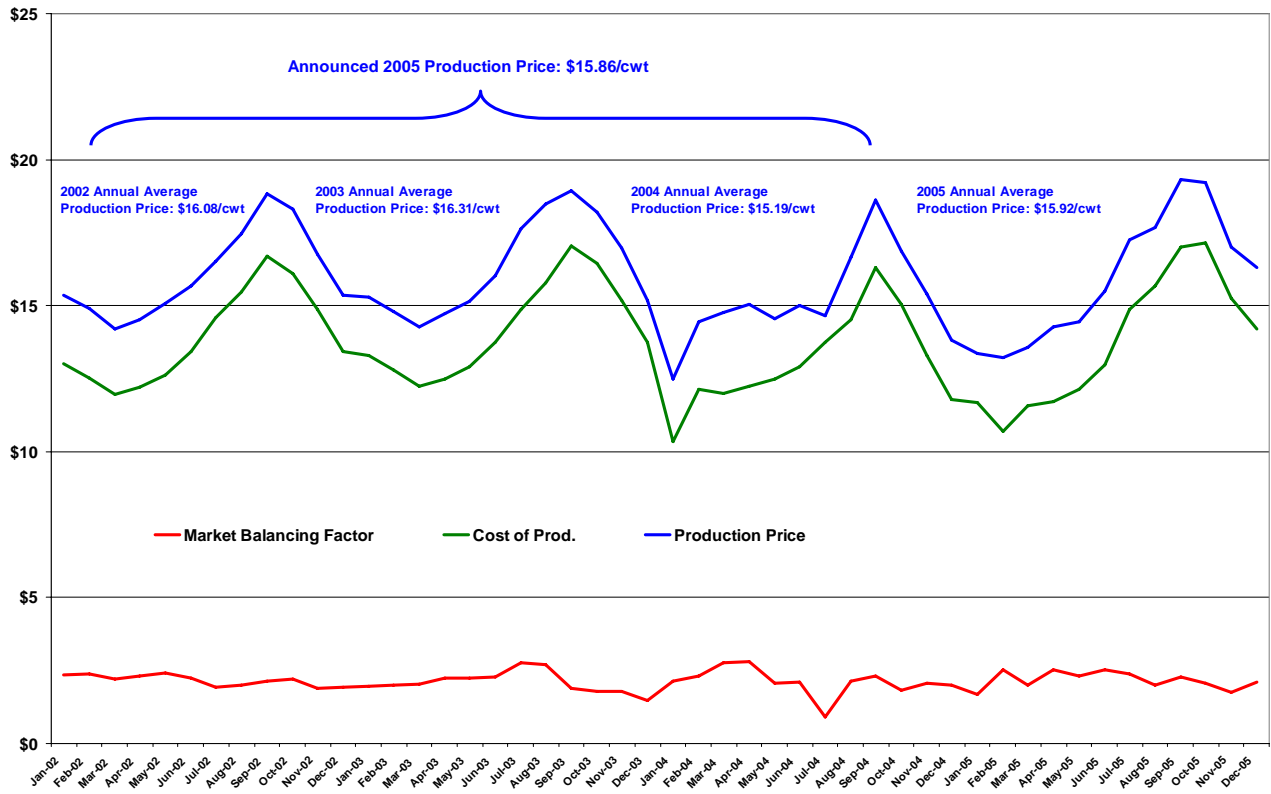
**Figure 4.**



### **Milk Production Cost**

In the absence of published milk production cost estimates for South Carolina, the program uses a simple average of Georgia and Virginia costs of milk production, published by the United States Department of Agriculture, Economic Research Service, as a proxy for South Carolina. Since specific estimates of Georgia’s milk production costs are published by USDA/ERS, these estimates are directly available for use. In accordance with the South Carolina example, cost of production for Georgia is defined to be total operating cost plus the cost of hired labor. Monthly cost of production estimates plus the previously calculated market balancing factor is defined as the “production price”. Monthly production prices are then averaged to obtain annual production prices and finally, the “announced production price” is calculated as a rolling three year average, so that the 2005 announced production price of \$15.86 is an average of 2002-2004 annual production prices (Figure 5).

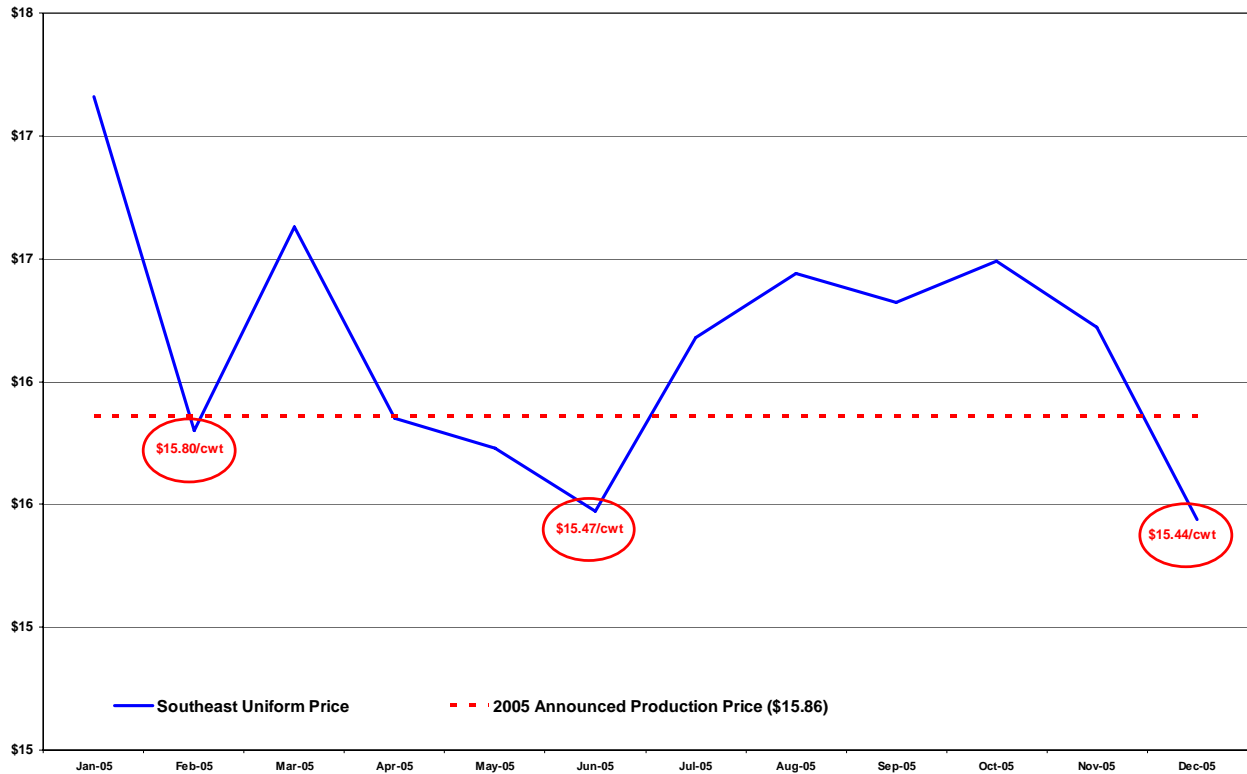
**Figure 5.**



Any quarter in which a monthly federal order uniform price falls below the announced production price is considered to be a “qualifying quarter” for tax credit purposes. Thus, for 2005, qualifying quarters would be quarters 1, 2, and 4 (Figure 6).



**Figure 6.**



The tax credit for an individual producer is calculated based on the following formula where  $P$  is annual production rounded down to the next lowest 500,000 lb. unit,

$$[(P - 500,000\text{lbs.})/500,000\text{lbs.} \times \$5,000 + \$10,000] \times (\text{qualifying quarters as \% of year}) = \text{tax credit}$$

For example, a producer with 2,200,000 pounds of production in 2005 would receive,

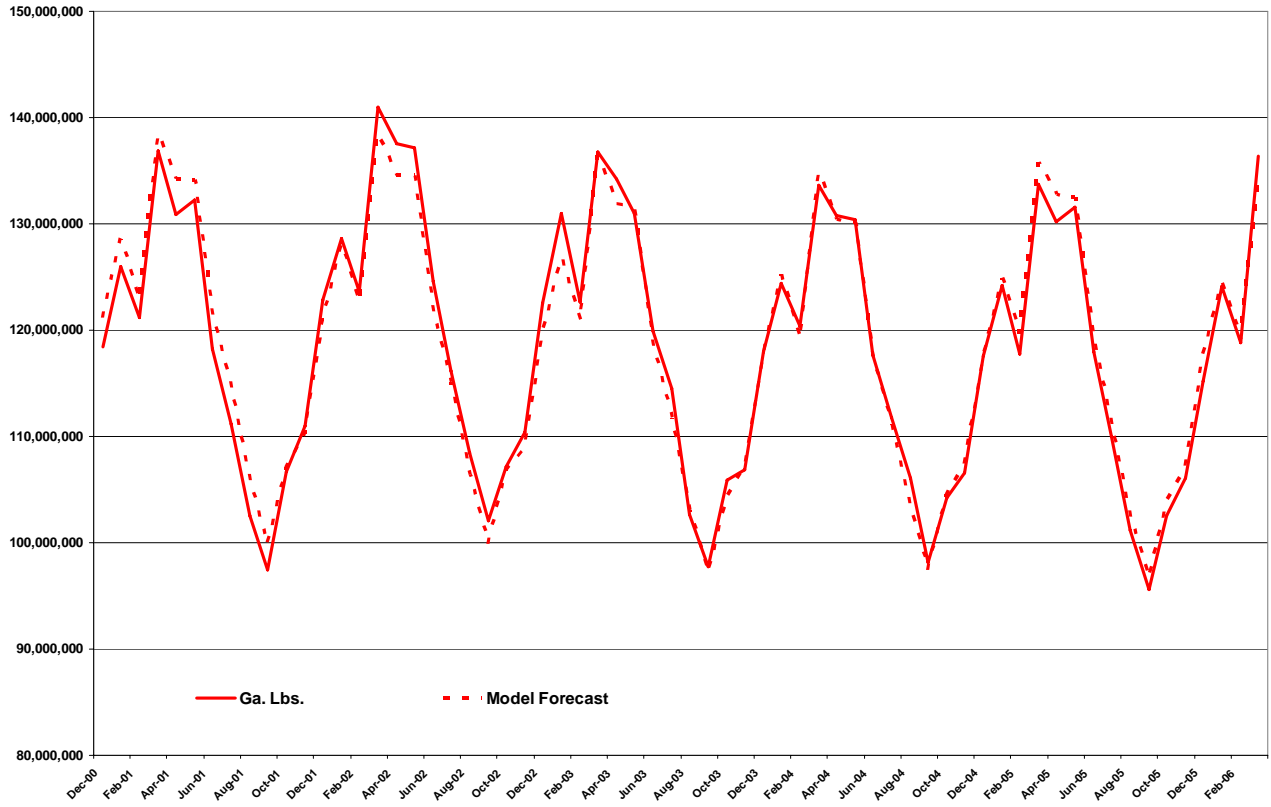
$$[(2,000,000\text{lbs.} - 500,000\text{lbs.})/500,000\text{lbs.} \times \$5,000 + \$10,000] \times .75 = \$18,750$$

Calculation of a hypothetical tax credit for each qualifying dairy farm in Georgia for 2005 yields a total of \$10, 811,250 in total tax credits on 1,362,784,556 pounds of milk, or about 79.3 cents per cwt.

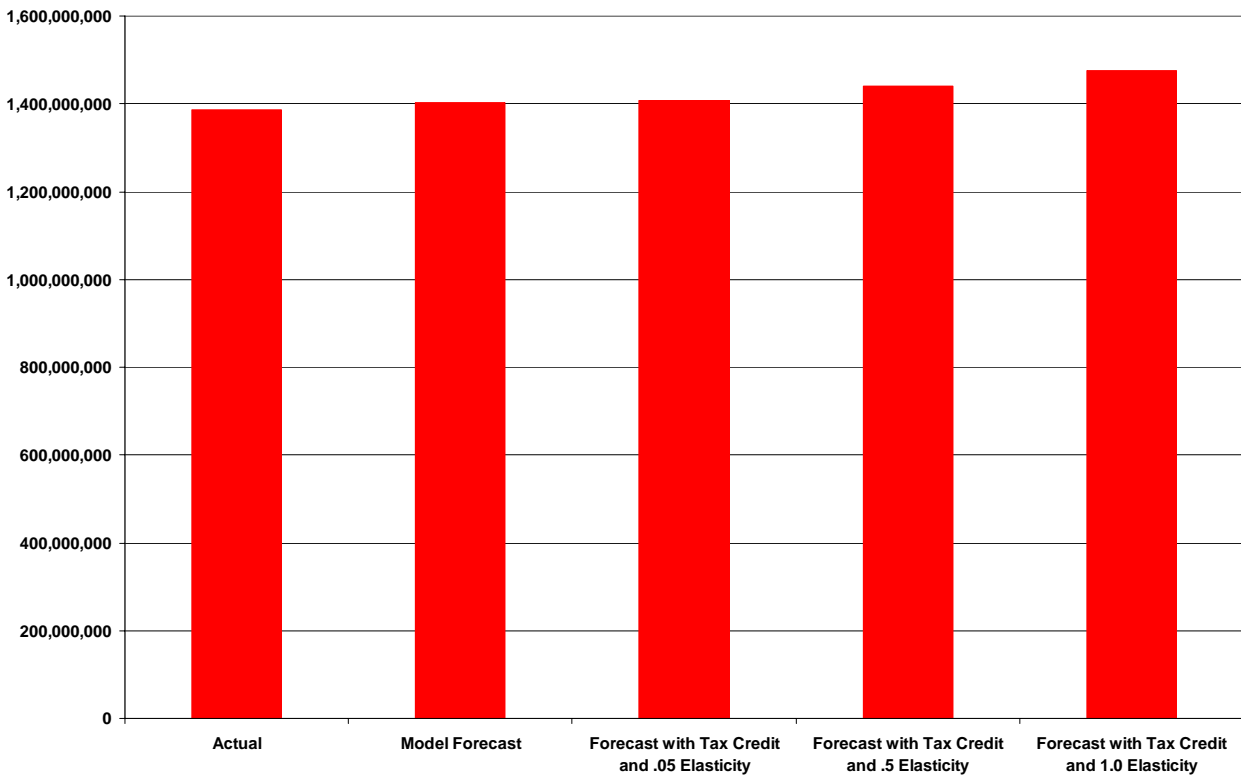
## Supply Response

To assess the impact of a hypothetical tax credit on sustaining or increasing milk production in Georgia, it would be beneficial to understand how changes in farm level milk prices impact production. In addition to the price of milk, numerous other factors may influence production including feed prices, land values, replacement heifer prices, and government programs, to name a few. Extensive research has been conducted in this area at a national level, yielding estimated price elasticities of supply ranging from .07 to more than 1.0, with a typical value of about .5. Little work has been done in the area of estimating supply response functions for the southeast and even less specifically related to Georgia. The number of alternative farm enterprises available to Georgia farmers compared to U.S. dairy farmers as a whole would be expected to have an impact on their supply response. A simplistic estimate of production in the state was estimated as a function of its existing milk production capacity, seasonal variability, the current downward trend in production, and the monthly Southeast Federal Order uniform price for 2000 – 2006. It was necessary to lag the price variable by eleven months in order to allow for the time required by producers to respond to increased prices by increasing production capacity. The estimates closely approximate actual production, as shown in figure 7. A price elasticity of supply was calculated to be approximately .05, indicating that a 1% increase in the farm level price of milk, as measured by the Southeast Federal Order price, would be expected to induce a .05% increase in the quantity of milk produced. Based on this estimate, a 79.3 cent/cwt increase in the price of milk would be expected to result in only an additional 3.8 million pounds of milk produced in Georgia. Based on information provided by the Georgia Department of Agriculture, the average dairy cow in Georgia produces about 22,265 pounds of milk per year. This would suggest that an additional 79.3 cents/cwt effectively added to the milk price by the hypothetical tax credit would lead to a production increase (or offset expected future declines) by the equivalent of about 171 cows. If the more generally accepted supply elasticity measure of .5 cited in much of the literature for the United States as a whole were used, Georgia production would increase by 36.4 million pounds, or the equivalent of 1,637 cows, and if an elasticity estimate of 1.0 were used, production would increase by 72.9 million pounds, or 3,274 cows (Figure 8).

**Figure 7.**



**Figure 8.**



### **Economic Impact on Georgia**

A recent University of Georgia Center for Agribusiness and Economic Development report by Dr.'s Archie Flanders and John McKissick estimated the impact of a 1,000 cow dairy on various sectors of the state's economy. Although the effects of a dairy tax credit would be spread across all qualifying farms in the state, their results may be used to evaluate the impact of a hypothetical dairy tax credit by calculating the impact from a single farm that is equivalent in size to the estimated supply responses derived above.

Increased dairy farm production in Georgia has the potential to increase economic activity throughout the state. In addition to creating general business activity in support of dairy operations, feed input requirements create demand for agricultural products. Analysis shows that with \$3.598 million in total sales, a model 1,000 cow dairy produces an additional \$4.266

million in indirect economic activity for a total state output impact of \$7.864 million. The total expected impact on the state's economy resulting from a hypothetical South Carolina style dairy tax credit program is highly dependent upon assumptions regarding the response of dairy farmers to the equivalent of an additional 79.3 cents/cwt added to their milk price. If the estimated price elasticity of supply is truly .05 the supply response is equivalent to about 171 cows and the resulting impact on the state economy is only \$1.3 million relative to the estimated \$10.8 million cost of the program. Increased milk production under this scenario would lead to additional state and local tax revenues of about \$39,000. It should be noted, however, that .05 is significantly lower than most generally accepted estimates of farm level supply elasticities. Using a more generally accepted estimate of .5, the tax credit would be approximated by a 1,637 cow dairy with a total impact of \$12.9 million on the state economy and \$373,000 in additional state and local tax revenues. Using a more ambitious elasticity estimate of 1.0 would lead to a production increase equivalent to a 3,274 cow dairy with a total impact of \$25.7 million on the state economy and an additional \$745,000 in tax revenue.

The estimated dairy tax credit for 2005 discussed above is based on Georgia milk production data for 2005, Southeast Federal Order milk prices for 2002-2005, USDA/ERS milk production cost estimates for 2002-2004 and transportation cost estimates provided by the South Carolina Department of Agriculture. Estimated tax credits for subsequent years could be influenced by several additional factors which should be considered in any further analysis. The assumption that producers respond to the tax credit by increasing production suggests that more milk would qualify for the program during its second and subsequent years. It is also highly likely that those producers who failed to qualify due to producing less than the 500,000 pound minimum would have a strong incentive to expand to reach that threshold in order to receive the tax credit in future years. The tax credit would also be greater in years when all four quarters were "qualifying quarters" instead of the three that qualified during 2005. Further analysis should also include a more comprehensive estimation of Georgia's price elasticity of supply and consideration of the fact that a substantial portion of the state's milk is pooled and priced on the Florida Order.

## **Summary**

Milk production across much of the southeastern United States has been declining for more than two decades. This decline, coupled with an increasing population in the region, and hence an increasing demand for milk, has sparked considerable interest in examining the causes, effects, and potential remedies for declining milk production. Several southeastern states have launched initiatives aimed at stabilizing or growing their local dairy industries. One such state is South Carolina, which in 2005, enacted the South Carolina Dairy Tax Credit program. Calculating a hypothetical tax credit for each qualifying dairy farm in Georgia for 2005, based on South Carolina's dairy tax credit rules, yields a total of \$10,811,250 in total tax credits on 1,362,784,556 pounds of milk, or the equivalent of about 79.3 cents per cwt. A tax credit of this magnitude has the potential to increase milk production in Georgia and create additional economic impacts in the form of general business activity related to the support of dairy operations.

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# **The Center for Agribusiness & Economic Development**



The Center for Agribusiness and Economic Development is a unit of the College of Agricultural and Environmental Sciences of the University of Georgia, combining the missions of research and extension. The Center has among its objectives:

To provide feasibility and other short term studies for current or potential Georgia agribusiness firms and/or emerging food and fiber industries.

To provide agricultural, natural resource, and demographic data for private and public decision makers.

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**J. Scott Angle, Dean and Director**