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## **The Potential For Growth In Wisconsin Milk Production**

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Recent reports about the condition of the Wisconsin dairy industry have not been all that good. According to the National Agricultural Statistics Service (NASS), dairy cow numbers in Wisconsin have been steadily dropping over the last few years while total milk production has, at best, held steady or declined modestly. This stability in total milk production, in the face of falling cow numbers, is due largely to increases in the average milk production of those cows that remain in the herd.

At first glance one might conclude that the recent trends in the Wisconsin dairy industry are an indication that the state's dairy is destined to shrink. Before one concludes this however, one needs to consider some recent changes that have been going on within the industry which may be a sign that Wisconsin dairy industry may be rebounding and beginning to grow again.

Recent reports by NASS show that while overall cow numbers and milk production in Wisconsin have been on the decline, both cow numbers and total milk production have risen substantially for dairy herds with 100 or more cows. These up-trends for what we will refer to here as large herds are encouraging because they suggest that milk production could be up in Wisconsin shortly if larger dairies keep expanding their production at recently observed rates.

This report details some of the production trends that have been exhibited by three groups of dairy farms within the Wisconsin dairy sector. One of these groups is dairy farms with less than 50 cows. A second group is dairy farms with 50-99 cows and the third group is the large herds mentioned earlier with 100 or more cows. These dairy farm groups correspond to the herd size categories specified by NASS in its dairy reports.

The production trends for the three groups of dairy farms being analyzed are expressed in terms of annual growth rates that were observed during the 1993-2001 period in cow numbers and milk production per cow. These annual growth rates and some forecasts based on these growth rate estimates are presented below. In general the forecasts suggest that milk production in Wisconsin could be growing around three percent per year in the coming years if dairy farms with 100 or more cows keep expanding their production at the same rate they have in the last five to seven years.

### **General Trends Across Wisconsin Dairy Farms**

The information in Table 1 details some of the changes that have occurred in Wisconsin's dairy industry over the 1993-2001 period. From this table we see that across the entire state the number of dairy cows dropped substantially while total milk production fell slightly from 22.8 billion pounds of milk in 1993 to 22.2 billion pounds of milk in 2001. Average milk per cow for all Wisconsin dairy farms increased roughly 2500 pounds from approximately 14,800 to almost 17,300 during the same period. In the absence of this productivity gain, milk production in the state would have dropped dramatically over the last few years.

The data in Table 1 reported for the small (less than 50 cows), moderate (50 to 99 cows), and large (100 or more cows) dairies show that the large farms were not on the same path as the small and moderate sized dairy farms. From 1993 to 2001, total milk production of both small and moderate sized dairy farms dropped. The total milk production of small dairy farms fell from roughly 7 billion pounds to almost 3.6 billion pounds while total milk production of moderate sized dairies dropped roughly 2 billion pounds from around 10 billion pounds to 8 billion pounds. Over the same period, total milk production of the larger farms increased almost 4.9 billion pounds from 5.8 billion pounds in 1993 to roughly 10.7 billion pounds in 2001. This rather dramatic growth in the milk production on large farms kept total milk production in the state from sliding downward in recent years.

The milk production data reported in Table 1 show that the reductions in the milk production of small and moderate sized dairy farms in Wisconsin were generally offset by increases in the total milk production of larger dairy farms with 100 or more cows. This uptrend in the milk production of larger dairy farms is noteworthy particularly if one assumes that large dairy farms will continue to boost their production in the coming years at the rate they have increased milk production in recent years. This level of growth in the milk production of large farms could result in an overall increase in total milk production in Wisconsin.

### **Growth Estimates and Forecasts**

In order to see what changes may take place in total milk production in the state in the near future, ordinary least-squares regression techniques were used to estimate the rates of growth in cow numbers and milk per cow for small, moderate, and large dairy farms, respectively, for the 1993 to 2001 period. The data used to estimate these growth rates were obtained from NASS reports. Ideally a longer time period would have been considered to estimate trends in the growth of cow numbers and milk per cows across the three size groups for dairy farms. Unfortunately, NASS data were only available for the small, moderate, and large size dairies for 1993 and subsequent years.

The estimated growth rates for the milk per cow and cow numbers of small, moderate, and large sized dairies are presented in Table 2. The growth rates for milk per cow are positive for all three groups of farms. This is not the case, however for the cow number growth rates. Negative rates of growth of -9.58 percent and -3.85 percent are reported for small and moderate sized dairies, respectively, while a positive growth rate of 7.34 percent is shown for large dairies. These cow number growth rates are noteworthy because they suggest that large dairies are expanding their production as small and moderate sized dairies are contracting production.

The values in Table 3 show what cow numbers, milk per cow, and total milk production could be in 2010, if the recently observed growth in these factors continues throughout the remainder of this decade. In general these forecasts show that in 2010, most dairy cows in the state would be in what are referred to here as large farms. As such most of the state's milk production would come from these larger dairies.

Total milk production for all farms is forecast to be almost 33 billion pounds with approximately 75 percent of this milk coming from larger dairy farms. The margin of error of this forecast at a 95 percent level of confidence is roughly 8 billion pounds of milk; so total production of milk could be as low as 23 billion pounds in 2010. The margin for error is high because the forecast is based on so few actual observations (1993-2001) and it is nine years into the future. A more reliable forecast would have been obtained if more years of data had been available for analysis.

### **Prospects For Herd Expansions**

It remains to be seen if Wisconsin dairy producers will choose to expand at the rates being suggested here and boost total milk production to something close to 33 billion pounds. This would be a radical departure from what has been going on for a number of years in Wisconsin. Whether one believes that Wisconsin's dairy industry is set to make a major turnaround hinges on whether one believes that the state's dairy producers are willing to abandon traditional barn-based dairy systems in favor of parlor-based dairy systems which are more labor efficient and less physically taxing to operate.

Up until recent years, moving to a parlor-based dairy system was a costly proposition for most dairy producers. Typically producers had to be prepared to spend \$250,000 or more to construct a new parlor with the capacity to handle 500 or more dairy cows. This high price tag for parlors discouraged many producers and led most of them to conclude that a parlor was not something they could incorporate into their dairy operations. As such the majority of dairy producers decided to stay with traditional barn-based dairy systems.

In the last few years, producers throughout Wisconsin have started thinking outside the box and discovered that it is possible to move to parlor-based dairy systems without spending huge sums of money. These producers have generally remodeled their existing barns and placed parlors in them. These innovative producers have found ways to keep their investment costs relatively low while constructing parlor systems that are nearly as functional and efficient as brand new parlor set-ups. Many of those retro-fit parlor systems are being put in place at a cost of \$50,000 to \$100,000.

Converting a traditional stall barn to a parlor system versus constructing a new parlor facility is less costly primarily because it allows producers to use an existing milk house and it does not require producers to construct a new facility. This latter cost is eliminated because producers are able to make use of existing barns. Parlor costs can also be held down if producers make use of existing pipelines and other used milking equipment.

The primary payoff from investing in parlor systems is labor savings because considerably less labor is needed to milk cows in a parlor than in a traditional stall-barn. Agricultural engineers estimate that in a double eight parlor system, one person can milk 100 cows in roughly 2 hours while the same person would spend almost 5 hours milking the 100 cows in a stall-barn. This labor saving of roughly 3 hours per milking results in over 2000 hours of labor savings through the course of a year.

The economic value of the labor savings producers gain from investing in parlor-based milking systems depends in part on the hourly value of labor. If for example, the hourly wage rate for labor is \$10 per hour, the total value of 2000 hours of labor savings is \$20,000. (2000 hours x \$10 per hour) The value of total labor savings rise to \$30,000 if the hourly wage rate for labor is \$15.00.

The rates of return producers can earn on investments in a parlor system can be substantial. This is shown by the values reported in Table 4; which all pertain to a case where: the annual per cow labor saving from a parlor is 21.04 hours; the hourly cost of labor is \$12.00; and the tax rate on income is 35 percent. These are the only factors that need to be considered when analyzing a parlor investment because variables such as milk production, milk price, feed costs, and other production costs are the same depending on whether cows are milked in a parlor or a stall barn.

From Table 4 it is seen that the rates of return on parlor investments vary depending on the cost of the parlor, the useful life of the parlor, and the number of cows milked. The rates of return are inversely related to the cost of the parlor such that lower parlor cost results in higher rates of return. Similarly the rates of return are higher when the useful life for the parlor is longer. The rates of return are also higher when the parlor is used to milk more cows.

The values in Table 4 clearly show that a producer milking 125 or more cows can gain sizable rates of return from a parlor that is expected to last 5 to 10 years. The returns on a \$50,000 parlor investment range from roughly 35 percent to almost 70 percent and the returns gained from a \$100,000 parlor system are somewhere between 11 percent and 35 percent. These rates of return far exceed the returns dairy producers could earn on stocks, bonds, land or other investments.

Investing in parlor systems is no longer the costly undertaking that it once was for dairy producers. Now it is possible for producers to invest as little as \$50,000 and gain access to the benefits that come from milking cows in parlors versus stall barns. In general dairy producers can earn substantial returns from parlors without increasing cow numbers by large amounts. The data above suggest that relatively high rates of return can be earned when parlors are used to milk as few as 125 cows. This herd size is roughly twice the average herd size that is currently observed in Wisconsin but it is probably a manageable size for most producers. Thus it seems reasonable to assume that many Wisconsin dairy producers could easily make parlors work in their operations.

Now that producers are understanding that parlor technology can be affordable, more and more of them are converting their barn-based dairy systems to parlor-based systems. This conversion has been going on for five or so years and producers who have adopted parlors are now starting to tell other producers how they have benefitted from moving to parlor-based systems. This producer enthusiasm for parlors-based systems is spreading across the state and encouraging other producers to follow suit. If this continues to play out as it has in the last few years, it is reasonable to assume that total milk production in the state will start to grow and perhaps reach 30 billion pounds as being forecasted here.

The forecasted upturn in milk production, which can be attributed almost entirely to expansions of larger herds, is good news for dairy plants and processors that have been struggling to get the milk supplies they need to manufacture cheese and other dairy products. If milk supplies start increasing as forecasted, processors will be able to satisfy their needs for milk and begin to feel that they can justify making some investments in processing equipment and the like. This investment on the part of processors will benefit dairy producers because it will

preserve, if not expand, the infrastructure in the state that is needed to create value added products from the raw milk produced by dairy operators throughout Wisconsin. The net result of this investment in dairy processing equipment and plants should be a continued demand for milk which should keep milk prices paid to farmers from falling as they would if processors scaled back activities or, at the extreme, shut down their Wisconsin plants.

**Table 1**  
**Wisconsin Dairy Industry Production Factors**  
**For 1993 and 2001**

*(Source: National Agricultural Statistics Service - USDA)*

|  | 1993    |                | 2001    |                |
|--|---------|----------------|---------|----------------|
|  |         | <i>% Total</i> |         | <i>% Total</i> |
| <b>Herds of less than 50 cows</b>        |         |                |         |                |
| Number of Cows                           | 526163  | <i>34.10</i>   | 228684  | <i>17.70</i>   |
| Total Milk Production ( Billion Pounds ) | 7.035   | <i>30.80</i>   | 3.552   | <i>16.00</i>   |
| Milk per cow                             | 13372   | <i>N/A</i>     | 15531   | <i>N/A</i>     |
| <b>Herds of 50 to 99 cows</b>            |         |                |         |                |
| Number of Cows                           | 678920  | <i>44.00</i>   | 490960  | <i>38.00</i>   |
| Total Milk Production ( Billion Pounds ) | 10.051  | <i>44.00</i>   | 7.992   | <i>36.00</i>   |
| Milk per cow                             | 14804   | <i>N/A</i>     | 16278   | <i>N/A</i>     |
| <b>Herds of 100 cows or more</b>         |         |                |         |                |
| Number of Cows                           | 337917  | <i>21.90</i>   | 572356  | <i>44.30</i>   |
| Total Milk Production ( Billion Pounds ) | 5.757   | <i>25.20</i>   | 10.656  | <i>48.00</i>   |
| Milk per cow                             | 17036   | <i>N/A</i>     | 18617   | <i>N/A</i>     |
| <b>All Herds</b>                         |         |                |         |                |
| Number of Cows                           | 1543000 | <i>100.00</i>  | 1292056 | <i>100.00</i>  |
| Total Milk Production ( Billion Pounds ) | 22.843  | <i>100.00</i>  | 22.199  | <i>100.00</i>  |
| Milk per cow                             | 14804   | <i>N/A</i>     | 17305   | <i>N/A</i>     |

**Table 2**

**Estimated Annual Growth Rates For Number of Cows and Milk  
per Cow For Various Sized Wisconsin Dairies**

|                                   | Estimated<br>Annual Growth Rates |
|-----------------------------------|----------------------------------|
| <b>Herds of less than 50 cows</b> |                                  |
| Number of Cows                    | -9.58 %                          |
| Milk per cow                      | 2.15%                            |
| <b>Herds of 50 to 99 cows</b>     |                                  |
| Number of Cows                    | -3.85 %                          |
| Milk per cow                      | 1.33 %                           |
| <b>Herds of 100 cows or more</b>  |                                  |
| Number of Cows                    | 7.34 %                           |
| Milk per cow                      | 1.54 %                           |

**Table 3**

**Forecasts of Cow Numbers, Milk per Cow, and Total Milk Production,  
in 2010, For Small ( Less than 50 cows ), Moderate ( 50 to 99 cows ), and  
Large ( More than 100 cows ) Sized Wisconsin Dairy Herds**

| <u>Factors</u>  | <u>Forecast</u> | Range of Forecasts For 95% Level of Confidence: |             |
|---|-----------------|---|-------------|
|   |                 | <u>Low</u>                                      | <u>High</u> |
| <b>Herds of less than 50 cows</b>   |                 |   |             |
| Cows  | 110462          | 72763   | 148161      |
| Milk per cow (lbs)  | 19116           | 17060   | 20420       |
| Total pounds milk production (Billions) based on estimated cow numbers and milk per cow | 2.11            | 1.24  | 3.14        |
| <b>Herds of 50 to 99 cows</b>   |                 |   |             |
| Cows  | 356930          | 321140  | 392720      |
| Milk per cow (lbs)  | 18815           | 17211   | 20420       |
| Total pounds milk production (Billions) based on estimated cow numbers and milk per cow | 6.72            | 5.53  | 8.02        |
| <b>Herds of 100 cows or more</b>  |                 |   |             |
| Cows  | 1077194         | 817107  | 1337280     |
| Milk per cow (lbs)  | 21111           | 19830   | 24392       |
| Total pounds milk production (Billions) based on estimated cow numbers and milk per cow | 23.82           | 16.20   | 32.62       |
| <b>All Herds</b>  |                 |   |             |
| Cows  | 1544586         | 1211010   | 1878161     |
| Milk per cow (lbs)  | 21135           | 18969   | 23307       |
| Total pounds milk production (Billions) based on estimated cow numbers and milk per cow | 32.65           | 22.97   | 43.78       |

**Table 4**

**Rates of Return On Parlor Investments of \$50,000 or \$100,000,  
Over 5 or 10 Years, For Various Size Dairy Herds**

| Cows in<br>Herd | Investment of \$50, 000<br>With Useful Life of: |          | Investment of \$100, 000<br>With Useful Life of: |          |
|-----------------|---|----------|--|----------|
|                 | 5 Years   | 10 Years | 5 Years  | 10 Years |
| 50              | 5.49%   | 14.98%   | -8.49%   | 2.97%    |
| 75              | 17.50%  | 25.13%   | -1.16%   | 9.33%    |
| 100             | 28.42%  | 34.44%   | 5.49%  | 14.98%   |
| 125             | 38.65%  | 43.31%   | 11.67%   | 20.20%   |
| 150             | 48.42%  | 51.92%   | 17.50%   | 25.13%   |
| 175             | 57.86%  | 60.39%   | 23.06%   | 29.85%   |
| 200             | 67.06%  | 68.77%   | 28.42%   | 34.44%   |