Situation and Outlook for the U.S. Dairy Industry

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2012, a Record Breaker

For the U.S. dairy industry, 2012 was a year for the record books. As with most other agricultural sectors, extreme climatic conditions played a huge role. The year 2012 was the warmest year on record for the contiguous United States. Comprehensive records have been kept since 1895. The average temperature for the year was 55.3 degrees Fahrenheit, 3.2 degrees above the 20th century average. The high temperatures played a huge role for the dairy industry in the first part of 2012. The warmest March on record occurred in 2012, with a temperature of 50.4 degrees Fahrenheit. Early spring-like conditions brought about a long flush season, resulting in a surge in milk production.

According to the USDA Economic Research Service, in 2012 the U.S. experienced the worst drought in at least 25 years. According to the U.S. Drought Monitor, the area of the country experiencing at least a severe drought reached a peak of 46 percent in early August; the area of the contiguous U.S. experiencing at least a moderate drought reached a peak of 65 percent in late September. Drought conditions were the main factor in bringing about record farm prices for feed ingredients for the 2012 calendar year (corn: $6.67 per bushel, soybeans $13.96 per bushel, alfalfa hay: $205.4 per short ton).

The average 2012 all-milk price of $18.50 per cwt. was down from the record $20.10 per cwt. in 2011. With the record-high feed prices and the lower all-milk price, the milk-feed ratio reached a record low of 1.52 for 2012, using current calculation methods.[1]

In 2012, milk production per day was 1.8 percent above the 2011 level. Milk production for the year surpassed the 200 billion pound mark, reaching 200.3 billion pounds. Cow numbers grew by 0.4 percent, averaging 9.231 million head, and daily milk per cow grew by 1.4 percent, with the average cow producing 21.7 thousand pounds during the year. Domestic commercial disappearance continued to grow, reaching a 2012 total of 193.6 billion pounds on a milk-equivalent fat basis and 171.5 billion pounds on a milk-equivalent skim solids basis. (Hereafter, for brevity, the terms “fat basis” and “skim solids basis” are used with the understanding that these refer to “milk equivalent” terms.)

[1] USDA National Agricultural Service maintains records of the milk-feed ratio, using current calculations, back to 1984. For the years 1961 through 1983, the reported milk-feed ratio is calculated using a different method. However, the milk-feed ratio can be calculated back to 1939 (the first year that alfalfa hay prices were reported) using the current method.

In 2012, dairy cow slaughter under Federal inspection totaled 3.1 million head, the highest since 3.6 million head were slaughtered in 1986, a Dairy Termination Program year.[2] Since cow numbers grew in 2012, it appears that much of the slaughter was in effort to freshen the herd.

In the past two years, milk-fat percentages reached the highest levels using data since 1980. The average milk-fat content grew substantially from 3.66 percent in 2010 to 3.71 percent in 2011, and it remained at that level in 2012.[3] In December, milk-fat tests are typically high. In December 2012, the milk-fat level reached 3.86 percent, the highest level for any month using data since 1980. At least part of the rise in milk-fat levels is due a shift in the breed make-up of the U.S. dairy herd. While Holsteins are the dominant breed and usually provide the highest level of milk production, Jerseys and certain mixed breeds generally provide milk with greater component tests. In recent years, there has been a significant trend in breeding Holstein females with colored-breed sires. Changes in breed proportions of cows enrolled in dairy herd improvement (DHI) programs provide a general indication of trends in the breed composition of the U.S. dairy herd. From January 1, 2009, to January 1, 2012, DHI-enrolled Holsteins fell from 89.1 percent to 84.7 percent. Over the same period, DHI-enrolled Jerseys grew from 5.1 to 6.2 percent. Remarkably, DHI-enrolled mixed-breed cows grew from 5.1 to 8.6 percent.

Exports were an important feature of 2012. On a skim solids basis, exports reached a record 33.3 billion pounds, representing 16.7 percent of milk production. On a fat basis, exports were down from 2011, totaling 8.8 billion pounds, representing 4.4 percent of milk production. The U.S. was a net exporter on both a skim solids and fat basis in 2012. Imports were 5.7 billion pounds on a skim solids basis and 4.1 billion pounds on a fat basis. It is notable that in recent years, the U.S. has consistently been a net exporter on a skim solids basis; but as recently as 2009, the U.S. was a net importer on a fat basis.

The relationships between exports and domestic product prices appear to be changing in recent years. Cheese exports provide an example. Prior to 2005, U.S. domestic Cheddar cheese prices were substantially lower than Oceania Cheddar export prices. In 2005 and 2006, the annual average U.S. price started to converge toward the Oceania price; and the U.S. price has exceeded the Oceania price since 2007. From the period from 2005 through 2010, cheese exports followed a pattern of increasing in years when the Oceania price increased relative to the U.S. price and decreasing in years when the Oceania price decreased relative to the U.S. price. In 2011 and 2012, as the Oceania price decreased relative to the U.S. price, exports actually increased. Other dairy products show similar patterns.

[2] Under the Dairy Termination Program, the Federal government paid dairy farmers to slaughter or export their entire herds.

[3] The average milk-fat test for 2012 should be considered preliminary. The USDA National Agricultural Statistics Service has not yet published an annual number for the 2012 average milk-fat test. However, monthly milk-fat test numbers have been published. The 3.71 percent milk-fat test number was computed as average of monthly milk-fat tests published, weighted by monthly milk production.

A Closer Look at 2010 through 2012

To provide some understanding of dairy industry changes in 2012, it is helpful to look back to 2010 and 2011. Although 2010 had the lowest milk prices of the 3 years (with a low of $14.60 per cwt. in April 2010), it had the highest milk-feed ratios. The highest quarterly average milk-feed ratio during the three-year period from 2010 through 2012 was 2.34 in the 3rd quarter of 2010. In comparison to past years, this was not a high ratio. However, in the context of the last 3 years, a milk-feed ratio of 2.34 is relatively high. Milk production usually responds to price signals with a lag of one or more quarters. It grew by 1.9 percent in 2010 and 1.8 percent in 2011. While milk prices grew in 2011 to reach a record level of $22.10 per cwt. in August, feed prices grew at a faster rate, driving down the milk-feed ratio.

Typically, with a low milk-feed ratio, milk production would be expected to fall, or at least slow in its growth rate, in the following quarters. However, in 2012, with the unseasonable warm temperatures in the first half of the year, milk production surged. The all-milk price fell, reaching a low of $16.20 per cwt. in May and June of 2012. As feed prices rose, the milk-feed ratio dipped to a record low of 1.38 in the 2nd quarter. Drought conditions worsened through the year, reaching a peak in the 3rd quarter. Milk production in the 3rd quarter fell from its 2nd quarter level, reaching a level that was only 0.1 percent higher than the 3rd quarter of 2011. The all-milk price rose in the 3rd quarter, and feed prices peaked along with the drought. The all-milk price continued to rise in the 4th quarter, peaking at $22.00 per cwt. in November. Surprisingly, milk production increased in the 4th quarter, reaching a level that was 1.1 percent higher than the 4th quarter of 2011.

While the milk-feed ratio in 2012 reached a record low, most dairy farmers probably fared worse in 2009. Using Milk Cost-of-Production Estimates provided by USDA Economic Research Service (ERS), the average estimated margin between the all-milk price and associated feed costs in 2009 was $1.90. For 2012, the estimate is $4.30. (In the documentation provided by ERS, it is suggested that the 2012 data, calculated from monthly data, could be less reliable than the data calculated based on annual estimates.) [4]

It is remarkable that commercial exports on a skim solids basis have been running about 3 times higher than commercial exports on a fat basis. Both reached a peak in the 2nd quarter of 2012 (9.0 billion pounds on a skim solids basis and 2.8 billion pounds on a fat basis). Imports generally grew over the period on a skim solids basis, from a total of 4.8 billion pounds in 2010 to 5.7 billion pounds in 2012. On a fat basis, imports totaled 4.1 billion pounds in 2010, dipped to 3.5 billion pounds in 2011, and then grew to 4.1 billion pounds in 2012.

[4] ERS Milk Cost-of-Production (COP) Estimates are based upon the Agricultural Resource Management Survey (ARMS). For the dairy industry, surveys were conducted for the years 2005 and 2010. Indices are used to make annual COP estimates in the intervening years. Therefore, the base for the years 2005 to 2009 estimates is 2005, and the base for 2010 and 2011 estimates is 2010. For 2012, at the time of this writing, annual estimates were not yet available, so the average of Monthly Milk COP Estimates was used for this presentation. According to ERS, "Users of the monthly milk COP estimates need to be aware that these estimates are not as reliable as the annual estimates published by ERS." For more information, see http://www.ers.usda.gov/data-products/milk-cost-of-production-estimates/methods.aspx.

Transition from 2012 to 2013

Data available for the end of 2012 and limited data available for the beginning of 2013 provide some clues concerning the direction of supply, use, and prices in 2013. Drought is still a factor, with about 38 percent of the contiguous U.S. in a severe or worse drought, but it is down from 65 percent in early August.

Feed prices are likely to remain high through the summer of 2013, but later in the year feed prices are expected to decline sharply as the 2013/14 corn and soybean crops are harvested. In the first 3 quarters, producers will be facing corn prices that will reflect a forecast crop year average of $6.75-$7.65 per bushel, compared with $6.22 in 2011/2012. However, with expectations of a relatively large planted area and trend yield growth, prices in the last quarter are expected to average below the $4.80-per-bushel price forecast for the 2013/14 crop year. Soybean meal prices for 2012/13 are forecast to average $430-460 per ton, up from $394 the previous year, but like corn, prices will decline with the harvest of next year's the soybean crop. Soybean meal prices are forecast to average $300 per ton in 2013/14 with prices averaging lower in the early part of the marketing year.

As previously stated, the level of increase in milk production for the 4th quarter of 2012 was surprising. It is not expected that cow numbers will continue to rise. Available data seem to point toward lower cow numbers in 2013. The January 1 inventory of replacement heifers that are expected to calve in 2013 (2.9 million head) was down from January 1, 2012 (3.1 million head). Dairy cow slaughter was high throughout 2012. In December 2012, dairy cow slaughter fell to 258.8 thousand head, below the December 2011 level. However, on a per-business-day basis, December 2012 slaughter (13.6 thousand head) was higher than in December 2011 (13.1 thousand head).

Inventory levels at the beginning of 2013 seem to indicate that supplies of dairy products are plentiful. Total cheese ending stocks rose significantly from November to December 2012 (to 987.9 mil. pounds). The 2012 ending stocks for butter (152.9 mil. pounds) were above 2011 levels, and 2012 manufacturers' stocks for nonfat dry milk and dry whey for human use, rose substantially from November to December (to 180.4 mil. pounds and 52.9 mil. pounds respectively). Altogether, 2013 began with relatively high stocks of dairy products.

From November to December 2012, prices fell for Cheddar cheese and butter (from $2.01 per pound to $1.79 and from $1.84 to $1.60). Prices rose from $1.51 per pound to $1.54 for nonfat dry milk. Dry whey prices rose only slightly, from $0.65 to $0.66. For each product, it is likely that price movements will continue in the same directions through the first months of 2013.

A Look Forward to 2013

With forecasts of high feed prices, expected supply response to low milk-feed ratios in 2012, lower numbers of replacement heifers, and high slaughter levels in recent months, cow numbers are projected to fall by 0.7 percent in 2013. Daily output per cow is projected to grow at a

modest rate of 1.3 percent, a slower rate than it has grown over the last 2 years. Together, these changes are expected to result in a small increase in daily milk production of 0.6 percent.

With slower milk production growth, dairy product prices are expected to be generally higher in 2013 than in 2012. However, high beginning stock levels may keep prices from rising to a level much higher than 2012 levels. Prices in 2013 are expected to be higher than 2012 levels for cheese, nonfat dry milk, and dry whey. Butter is the exception, with the 2012 price being within the range of the expected average price for 2013. Class III and Class IV milk prices are both expected to rise, and the all-milk price is expected to rise from $18.50 per cwt. in 2012 to an average ranging from $18.90 to $19.60 in 2013.

With higher prices in 2013, commercial disappearance is expected to grow at a slower rate than in previous years (fat basis: by 1.1 percent in 2013 compared to 2.3 percent in 2012; skim solids basis: by 0.3 percent in 2013 compared to 1.9 percent in 2012). Relatively small increases in commercial exports are expected (from 8.8 to 9.0 billion pounds on a fat basis, and from 33.3 to 33.7 billion pounds on a skim solids basis). Import levels on a fat basis are expected to decline slightly from 4.1 to 4.0 billion pounds from 2012 to 2013; on a skim solids basis, import levels are expected to fall from 5.7 to 5.4 billion pounds.

Higher prices during a year are generally associated with lower ending stocks (although there are certainly factors that may cause a contrary result). Manufacturers are more likely to sell when prevailing prices are relatively high rather than hold stocks in anticipation of higher prices in the future. Given the expectation of higher prices, along with our expectation of combined growth in consumption and exports exceeding growth in milk production, year-over-year ending stocks are expected to fall in 2013 (by 6.5 percent on a fat basis and by 3.2 percent on a skim solids basis).

In 2013, higher feed prices, in comparison to 2012, are expected to more than offset higher milk prices with respect to cash flow. Average net cash income per dairy operation is projected to fall from $98.1 thousand to $83.9 thousand, a decrease of 14.5 percent.

A Few Words Concerning Long-Term Projections

In February, USDA publishes its long-term projections (baseline projections). For its current-year estimates in *USDA Agricultural Projections to 2022*, USDA used the *World Agricultural Supply and Demand Estimates* (WASDE) report published in November 2012. USDA's current outlook numbers for 2013, as presented in the February 2013 WASDE report and discussed above, are a little different than shown in *USDA Agricultural Projections to 2022*, but they are in the same general ballpark.

In this discussion, the Compound Annual Growth Rate (CAGR) is used to describe percentage changes over the long term. For 2013, baseline projections, rather than latest projections, are used for percentage change calculations.

Following increases in 2005-08 and again in 2011 and 2012, milk cow numbers are projected to resume a more typical long-term path of year-to-year declines. However, the average projected rate of decline for the years following 2013 (-0.3 percent) is not nearly as great as it was in the years

leading up to 2000 (-0.8 percent). After 2013, output per cow increases at an annual rate of 1.9 percent, a rate slightly higher than the trend-line average of 1.8 percent since the 1990. With these average changes, for the years following 2013, milk production increases at an average rate of 1.6 percent.

Commercial exports are projected to grow substantially over the projection period. On a fat basis, they are projected to grow from 9.7 billion pounds in 2014 (4.8 percent of milk production) to 15.1 billion pounds in 2022 (6.6 percent of milk production). On a skim solids basis, commercial exports are expected to grow from 34.4 billion pounds in 2014 (17.0 percent of milk production) to 47.2 billion pounds in 2022 (20.5 percent of milk production).

In the years following 2013, the projected all-milk price grows at an average rate of 0.7 percent per year, reaching a level of $20.80 per cwt. in 2022. In line with the long-term trend of most agricultural commodities, farm-level milk prices in real terms are projected to decline over time. In contrast to the 0.7 percent increase in nominal milk prices, inflation-adjusted all-milk prices are projected to decline at an average rate of 1.6 percent per year in the years following 2013.