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# Table of Contents

Milk Protein Fractions: Potential Market Utilization ............................................................ 3  
Angela Gloy

Impacts of Pending Budget Constraints on Dairy Policy:  
Implications of Spending Decisions for Innovation ............................................................ 11  
Ronald Knutson, Hal Harris

Dairy Price Support Program and the Milk Income Loss Contracts .................................... 17  
Mark Stephenson

An Introductory Examination of the National Dairy Equity Act ........................................ 21  
Scott Brown

Classification of New Products .............................................................................................. 25  
Charles Nicholson and Andrew Novakovic

Innovations To Address Price Risk Management and Price Volatility ............................ 39  
Bob Cropp

Large Farm Issues: Producer-Handlers .............................................................................. 45  
Joe Outlaw, David Anderson, Ronald Knutson, Robert Schwartz

Large Farm Issues: Payment Limits .................................................................................... 49  
David Anderson, Joe Outlaw

Permitting Large Dairies ..................................................................................................... 53  
Wilson Gray

List of Workshop Participants ............................................................................................... 59
Market development opportunities are always welcome, regardless of product category. One particular marketing challenge in agriculture is the continual growth of mature commodity markets. It is in this light that potential market utilization of (bovine) milk protein fractions are examined as a possible value-added development opportunity. Value-added success implies producers’ ability to match consumers’ wants or needs for a product with more desirable attributes than can be found in similar, existing products. In part, this inquiry is motivated by the possibility that processor and end-user interests may be better served with an even broader scope of specialized milk protein ingredients. Recent research from the food science and medical disciplines suggests there are desirable technical and nutritional/bioactive properties associated with milk proteins.\(^1\) Thus, milk protein fractions may be a means of transitioning milk from commodity-only status to a value-added product tailored to meet specific protein buyers’ needs.

Having demonstrated technical feasibility of fractionating (bovine) milk proteins via membrane technologies (Yang et. al., 1999; Turhan et. al., 2003), the question turns to economic motivation. This paper examines potential market utilization of milk protein fractions in three parts: milk protein fraction properties, possible market applications, and current market characteristics.

Milk Protein Fractions

There are a total of 10 intact proteins found in bovine milk (Table 1). The 4 proteins found in the casein portion include alpha casein (including alpha s\(^1\) and alpha s\(^2\)), beta casein, gamma casein, and kappa casein. In the whey portion, there are six proteins: alpha lactalbumin, beta lactoglobulin, bovine serum albumin, immunoglobulins, lactoferrin, and lactoperoxidase.

Presently, there are more whey, or serum, protein fractions available in commercial markets than there are casein fractions. This is attributed to the economic motivation behind the different protein classes. Historically, casein interests have been associated with cheese making and there was little economic motive to investigate casein protein properties. Only a few inquiries thus far have examined casein fraction properties (Gill et. al., 2000; Shah, 2000).

Of the 6 whey/serum fractions, bovine serum albumin has received the least attention in the academic literature and beta lactoglobulin is recognized primarily for its properties as a foaming/gelling agent in processed foods. The remaining 4 proteins enjoy greater commercial visibility. Lactoferrin in particular, has been identified as having the widest range of bioactive properties (Table 1), and is attractive for use in health supplements, specialty nutrition formulation, health and oral care products, and as an antimicrobial agent used to treat food borne pathogens.

Lactoperoxidase appears to have similar properties to lactoferrin though fewer in total number. Lactoperoxidase applications tend to be centered on its antimicrobial properties, often sought out by processors of health and oral care products. In addition, the literature suggests that there are synergistic properties where lactoferrin and lactoperoxidase are used together. Asian and European manufacturers of infant formula are already using alpha lactalbumin and lactoferrin fractions for their immuno-enhancing properties and amino acid profiles. With respect to immunoglobulin proteins, each of the 5 immunoglobulin sub-classes in some way facilitates antibacterial and antiviral cell behavior, again making them an attractive ingredient in nutritional food products. Immunoglobulins are also used in products to treat illness resulting from food borne pathogens (i.e., Campylobacter jejuni, Salmonella, E. coli, Shigella flexneri, and Bovine rotavirus).

Applications

Milk protein fraction market development is possible on two fronts. First, the technical properties of a refined, individual protein may provide improved functional performance desired by food processors. Current use of dairy protein ingredients span a wide range of processing functions including stabilization, emulsification, gelling, and whipping. Survey results from approximately 50 large food companies will provide information as to current protein ingredient use,
price sensitivity, purchase patterns, and about information flows associated with new protein ingredients. Second, milk protein fractions are of interest to consumers/end-users, an increasingly nutrition-savvy audience who are demanding high quality, health-promoting ingredients. Milk proteins already enjoy a presence in functional food product formulation and their use is expected to grow based on consumer demand patterns, the existing dairy presence in functional foods, and technological advancements that facilitate fraction use.

Whey protein isolates, in particular, have provided a springboard from which food formulators are exploring use of a refined protein product with reduced lactose concentrations.

**Functional Foods Market**

Weststrate et al. (2002) estimate a 10 percent growth rate for functional foods, a rate significant not only in terms of absolute value, but also relative to the more traditional food and beverage market growth estimates (2 percent). Leading factors influencing functional food market growth include (1) heightened nutritional knowledge and growing wealth allowing consumers to further refine their nutritional preferences (Verschuren, 2002), (2) consumer recognition of scientific evidence validating functional food efficacy, and (3) consumer interest in countering perceived unhealthy air, water, and food pollutants through nutrition (Sanders, 1998).

The group further notes that Japanese per capita expenditure on functional food and drink exceeds $160 annually, in comparison to $136 and $92 in the U.S. and Europe, respectively. Asian consumers’ valuation of functional foods and beverages can be viewed in their purchasing behavior following the SARS epidemic of 2003. The New Zealand Co-operative Fonterra reports that sales of colostrum milks (high in immunoglobulin proteins) in their Chinese market experienced significant growth as consumers turned to functional milk beverages as a means of immune system enhancement.

Despite a clearly stated food focus, targeting specific health functions requires knowledge of related disciplines including nutrition and medicine. One of the opportunities associated with functional food development is the merging of industry skill sets. “The scientific research process into functional foods will be empowered by technology and insights available from other disciplines, such as informatics, pharmacology, engineering, proteomics and genomics (Weststrate et al.).”

**Nutritional Supplements Market**

Despite a slowing of the nutritional supplements market, it is still a likely home, in some fashion, for milk protein fractions. The National Center for Environmental Health and Prevention, an arm of the Centers for Disease Control and Prevention, estimates that the market value for the two largest supplement categories, namely single and multivitamin products ranges from $1.3 to $1.7 billion (Balluz

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**Table 1. Milk Protein Fraction Profiles**

<table>
<thead>
<tr>
<th>Protein Fraction</th>
<th>Concentration (g/L)</th>
<th>Processing Functionality</th>
<th>Nutritional/Bioactive Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Protein</td>
<td>35.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Casein</td>
<td>29.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpha s1-casein</td>
<td>11.9</td>
<td>Gelling and whipping</td>
<td></td>
</tr>
<tr>
<td>Alpha s2-casein</td>
<td>3.1</td>
<td>Emulsifier, foaming agent</td>
<td>Matches protein found in breast milk (nutritionally valuable)</td>
</tr>
<tr>
<td>Beta casein</td>
<td>9.8</td>
<td>Emulsifier, foaming agent</td>
<td>Matches protein found in breast milk (nutritionally valuable)</td>
</tr>
<tr>
<td>Gamma casein</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kappa casein</td>
<td>3.5</td>
<td>Stabilizes other casein micelles</td>
<td>Possibly Antitumor, contains high levels of tryptophan, provides all essential and branched chain amino acids</td>
</tr>
<tr>
<td>Total Whey/serum</td>
<td>5.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alpha lactalbumin</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beta lactoglobulin</td>
<td>3.2</td>
<td>Foaming/gelling agent</td>
<td></td>
</tr>
<tr>
<td>Bovine serum albumin</td>
<td>0.4</td>
<td></td>
<td>Provides all essential and branched chain amino acids, aids in fighting infection in immuno-compromised patients. Binds fatty acids and other small molecules and may facilitate health functioning of the liver</td>
</tr>
<tr>
<td>Immunoglobulin</td>
<td>0.8</td>
<td></td>
<td>Immunity-enhancing/disease prevention</td>
</tr>
<tr>
<td>Lactoferrin</td>
<td>0.2</td>
<td></td>
<td>Antimicrobial, antibacterial, antiviral, antitumor, antiparasitic, antifungal, anti-inflammatory, immuno-modulation, iron absorption agent</td>
</tr>
<tr>
<td>Lactoperoxidase</td>
<td>0.03</td>
<td></td>
<td>Antimicrobial, antiviral, antitumor</td>
</tr>
</tbody>
</table>

Milk protein fractions are likely to continue to be well-received in the nutritional supplements market given (1) current fraction supplement availability, (2) an increasing usage trend over the past 10 years, (3) the breadth of the potential consumer base, in terms of gender, age, and global market segment and (4) the medical community’s perceived value, and subsequent encouragement of multi-vitamin use. Assuming that the design of nutritional supplements is to enhance essential nutrient intake, it is also likely that supplement use increases in an effort to counter-balance greater and greater consumption of prepared foods.

On the down side, the myriad products already available to consumers makes selection for the average consumer more difficult in that they must sort through numerous marketing claims. The ease with which nutritional claims can now be made merits greater research attention if new dairy products are to be marketed largely on nutritional properties. From the supplement manufacturer’s perspective, this also suggests increased competition that could have negative price effects. Second, without FDA approval of the properties and efficacy of milk protein fractions, consumer confidence may erode over time. While federal regulatory approval often connotes high front-end costs, in terms of time and dollars, it is a strong signal to consumers of a products efficacy and is expected to improve long-run growth potential. Finally, there is an increasing trend by consumers to turn to functional foods, versus supplements, to enhance health. On balance, it is possible that milk protein fraction use increases in both the functional foods and supplements markets, though to different degrees.

**Infant Formula and Clinical Nutrition Markets**

Both the infant formula and clinical nutrition markets seem a natural market growth opportunity for fractionated milk components. The literature points to on-going research with milk protein fractions, with particular attention in the infant formula market being paid to alpha lactalbumin and lactoferrin.

Increased protein ingredient specialization can be observed in both specialty nutrition markets. Research in infant formula continues to be directed toward alpha lactalbumin and lactoferrin (Hernell and Lonnerdal, 2002). Study results indicate that an alpha lactalbumin-enriched formula yielded an amino acid pattern very similar that of breast milk, and that infant growth and weight gain was not compromised as a result of being fed the protein fraction supplemented formula (Lien, 2000; Kelleher et al., 2000).

Populations typically requiring high protein clinical diets include those whose ability to consume a regular diet has been compromised. In particular, these populations suffer from catabolic and chronic illness, as well as involuntary weight loss, and often include individuals in intensive care units.

Manufacturers of both infant and clinical nutrition formulas are particularly concerned with protein quality, in part explaining the industry’s long-standing use of milk as a protein source. Milk protein fractions are desirable for their essential and branched chain amino acid profiles. The trend towards disease-specific formulas only encourages inquiry into specialized bioactive milk components.

One potential hurdle in expanding fraction use in these markets will be determining the effects of processing and heat treatment on fractions. A second challenge in the U.S. market speaks to regulatory oversight as formula manufacturers push to use new ingredients. Ingredient approval can be time-costly given the scope of research trials involved in determining safety and efficacy. However, the ability of formula manufacturers to patent new formulations provides incentive to investigate new ingredient capabilities.

**Sports Nutrition Market**

The sports nutrition market is yet another large subset that falls under the functional foods category umbrella. Historically, sports nutrition supplements have been marketed to hard-core athletes such as weightlifters, distance runners, or cyclists, though the general trend towards healthier lifestyles has encouraged sports nutrition marketers to target a wider audience (Packaged Facts, 2001).

In general, dairy products have been shown to impact muscle and fat mass, oxidation rates, neurostimulation, and muscle damage associated with physical activity (Scammell et al., 2003; Brouns, 2003). Fewer studies are protein fraction-specific. Studies suggest that bovine colostrum supplements enhance sprint ability, time trial performance, anaerobic exercise performance and recovery, blood buffer capacity, lean body mass, and immunoglobulin production levels. The impact of an alpha lactalbumin-rich whey supplement is less definitive. One study suggests improvement in training efficiency while another suggests it may lower cognitive stress levels. However, Scammell et al. (2003) indicate the specific effect on athletic performance remains unclear.

The combination of a broadening mass market and ease of entry highlights product pricing strategies for sports nutrition supplements. High product margins (35-52%), coupled with an open regulatory environment, invite new supplier entrants. Currently, sports nutrition products fall under the purview of Dietary Supplements Health and Education Act (DSHEA) of 1994 whose oversight marketers credit with enhancing product credibility. Sports nutrition ingredients tend to drive product formulation more so than retail price and particular attention is paid to protein quality (Packaged Facts, 2001).
Other Potential Market Applications

Already there are numerous applications of milk protein fractions in the healthcare product category. Many of these applications are based on fractions’ antibacterial properties (i.e., lactoferrin and lactoperoxidase). In 2003, FDA and USDA approved the use of lactoferrin as meat preservative. DMV Nutritional has partnered with Agri-Mark and Farmland National Beef to supply and use lactoferrin as a natural meat preservative. Activin™, the brand name under which it is marketed, has shown to be effective against approximately 30 types of food-borne pathogens including Salmonella and E. coli (http://www.activinlf.com/activinlf/homepage.htm). Motivating use of natural preservative agents is the public health concern and the associated costs of food borne illnesses. The U.S. Department of Agriculture estimates that food pathogens cause almost 14 million illnesses, 61,000 hospitalizations, and 1,800 deaths annually. The total corresponding cost for household medical expenses and lost labor productivity is estimated at approximately $6.9 billion (USDA, 2001). One of the Activin’s™ most attractive attributes is that it does not affect the taste, texture, or color of meat.

A representative of DMV Nutritional indicates that Activin™ is currently being used to treat beef carcasses though the company hopes to expand application to include poultry, pork, fish, and eventually produce. National Beef began using Activin™ to treat carcasses in August 2003 following FDA approval. Activin™-treated beef can not be recognized by end-users as yet. Because there are only trace amounts left on the carcass, FDA approval came without labelling requirements. The DMV representative indicated that case-ready beef is the next step, which will be marketed under the Nature Check™ brand and will display labeling regarding lactoferrin treatment directly to consumers.

Lactoperoxidase is already present in numerous health-care products. Gums and mouthwashes are among the two most common applications for non-food lactoperoxidase use. The Biotene Company, headquartered in California, has a unique line of oral care products made with lactoperoxidase. While these products are marketed to the general population, products are particularly attractive to cancer patients whose chemotherapy treatments leave them with dry mouth syndrome. Other applications include toothpaste, shampoos, and creams/lotions. Lactoperoxidase, and to a lesser extent lactoferrin, are also appearing in dental floss and toothpaste applications. Separate toothpaste products are available for both human and animal use. Hand creams and shampoos containing lactoperoxidase are more visible in natural or organic markets, though the more successful brands are increasingly mainstream (i.e., Burt’s Bee’s, Inc.). Finally, milk protein fraction use has also found a home in some calf and piglet starter formulas, suggesting animal feed applications.

Milk Protein Market Motivation and Drivers

Several inter-related factors contribute to the motivation behind this inquiry. At the same time that traditional dairy product consumption and milk production patterns appear to be diverging, milk protein markets are experiencing growth (Valeur, 1997). Much of the milk protein growth can be explained by processor preference for improved protein ingredient functionality, as well as consumer interest in the nutritive value of milk proteins. The trend toward higher protein percentages, and the commercial availability of individual milk protein fractions, indicates a market preference by protein ingredient users. User value is reflected in prices paid for the higher protein content products (Table 2). Note that the higher protein fraction unit prices also reflect higher (non-linear) production costs.

Though relatively small, a global market for milk protein fractions already exists. Factors such as production cost, supplier concentration, distribution channel efficiency, and market prices received will shape individual fraction supply curves. On the demand side, consumer willingness to pay must be at least as great as the costs required to provide the fractions to market. However, consumer willingness to pay is likely to be influenced by the application. End-user willingness to pay for enhanced processing functionality, which may not be visibly demonstrable, may be a hurdle for processors. Conversely, where consumers perceive health or nutritional benefits to using milk protein fractions, they might be more inclined to pay higher retail prices. Other factors to consider include the number of consumers (market size) and the extent to which consumers are dependent upon the fraction-enhanced product (price sensitivity). Finally, information flows to consumers of milk protein fractions will be an important consideration.

Table 2. Milk Protein Products and Prices

<table>
<thead>
<tr>
<th>Milk Protein Product</th>
<th>Price (US$/lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-fat dry milk</td>
<td>0.83</td>
</tr>
<tr>
<td>Milk protein concentrate (42% protein)</td>
<td>1.03</td>
</tr>
<tr>
<td>Whey protein concentrate (80%)</td>
<td>1.50</td>
</tr>
<tr>
<td>Milk protein fraction – Lactoferrin</td>
<td>159 - 227</td>
</tr>
</tbody>
</table>

Sources: [http://www.ams.usda.gov/dairy/mncs/annual03.pdf](http://www.ams.usda.gov/dairy/mncs/annual03.pdf), USDEC (2004), industry contacts
Information about milk protein fractions will derive from multiple sources including the scientific and medical research communities, governmental agencies (e.g., U.S. Food and Drug Administration), and from commercial/retail advertising efforts. Educating consumers about milk protein fraction properties is expected to positively influence their receptivity to milk protein fraction use.

User-processor interests speak to input use and expense, with special attention paid to the ease of substitutability and production costs. With respect to raw input availability, scarcity of fluid milk seems unlikely given recent milk production trends observed particularly in the U.S. market. The presence of an existing milk protein fraction market is a strong signal that production costs are not prohibitive, given the current sale price. The expectation is that technological improvements and increased competition will put downward pressure on fraction production costs as the market matures.

Protein fraction prices will be particularly important where user-processors choose milk protein fractions for their technical/processing performance. Processing procedures can and do influence the technical properties of milk protein fractions. Smithers (1996) notes an inverse relationship between milk protein bioavailability and processing relationship; the greater the degree of processing, the greater the risk of compromising a fraction's bioactive properties.

**Competitive Product and Manufacturer Considerations**

The price point at which user-processors are prompted to consider alternative protein sources will be determined by the number and price of protein substitutes, in addition to their functional and nutritional properties. Higher market prices typically accompany products with more unique characteristics. Coupling a strong demand for protein-enhanced goods, with a lack of substitute products, makes demand less sensitive to price changes or more inelastic. Because of the range of applications in which milk protein fractions might be used, demand elasticity will be situation-specific. For example, processors will have less ingredient choice flexibility for products marketed with lactoferrin-specific health benefits relative to those marketed with general health-enhancing claims. This may be particularly true with respect to protein-enhancement of low nutritional value foods such as soda or cookies.

At a very general protein level, soy proteins are quite competitive with milk protein ingredient products. At the fraction level, one of the benefits milk proteins enjoy is their bland taste, making milk proteins more desirable in food and beverage formulation. User-processors typically prefer bland ingredients in that they minimize the additional effort to mask undesirable flavors. Continued competition between the two protein sources is expected, with increased attention being paid to unique nutritional properties.

In the short run, growth in the milk protein fraction market is likely to continue, encouraging new supplier entrants. For some, the high fixed investment cost will appear surmountable in the face of accessible input supplies and expected growth in the health foods sector. The most likely new entrants would be current whey protein isolate manufacturers looking for the next protein market opportunity. One strategy for offsetting the start-up costs and risks associated with nascent markets is to partner with companies possessing complementary skills. Partnerships created by protein manufacturer Proliant, Inc. and cheese processors The Hilmar Cheese Company and Trega Foods capitalize on whey usage. These partnerships re-direct the cheese by-product from input production source to fraction processors. A second example is the multi-stage partnership that DMV Nutritional, Inc., has created with Agri-Mark Cooperative, a whey protein supplier, and National Beef, a beef processor now using lactoferrin as an antibacterial treatment for animal carcasses.

Manufacturers of milk protein fractions have distinguished themselves from those companies supplying milk protein concentrates and isolates. Approximately 12 companies, located predominantly in Europe, the U.S. and Oceania, currently produce milk protein fractions (Table 3).4 The bovine milk protein fraction market remains small enough that serving a domestic market alone is economically not attractive thus making current fraction manufacturers global competitors. The fairly concentrated fraction supplier market also tends to be protein-specific, with much of the current production effort directed toward lactoferrin, lactoperoxidase, and alpha-lactalbumin.

Milk protein fraction manufacturers typically fall into 1 of 2 categories. One type of manufacturer is the large, diversified food company. This type of company manufactures a wide range of food products, including dairy. Functional food products are experiencing strong growth and protein-fortification is one way in which these companies might broaden dairy and non-dairy product appeal. The larger, more diversified companies tend to produce milk protein fractions in their own facilities and incorporate them downstream in product formulation. A second category type describes those companies specializing in dairy product and/or protein ingredients, which are often smaller in size and in their scope of product offerings.

Demand for milk protein fractions is a function of end-users’ willingness to pay for a fraction-enhanced product. Given the higher-cost associated fraction production, relative to alternative protein ingredients, protein fraction manufacturers will need to consider two effects. It will be important for processors to identify both consumer willingness to pay, and the effect that regulatory policies play in price determination. The expectation is that consumers’ incentive to pay higher product costs will vary by fraction
application, essentially segregating protein functionality along processing and nutritional lines. Consumer interest in health foods appears to be moving beyond niche market characterization to larger, mainstream audiences, resulting in an expansion of market size.

**Market Challenges**

For all of the apparent growth potential in the milk protein market, it is not without potential hurdles. One challenge has to do with establishing milk protein preferences relative to alternative protein sources, such as soy. Relatively speaking, milk proteins are more expensive which is particularly unattractive to processors. Where consumers do not demand milk protein-specific characteristics, processors will be tempted to use less costly inputs.

To complicate matters, the soybean industry has done more than the dairy industry to inform consumers about soy’s nutritional properties. Many consumers are still unfamiliar with milk protein’s nutritional properties. Since FDA

<table>
<thead>
<tr>
<th>Table 3. Milk Protein Manufacturer Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Company</strong></td>
</tr>
<tr>
<td>Arla Foods Denmark</td>
</tr>
<tr>
<td>Armor Proteines France</td>
</tr>
<tr>
<td>Borculo-Domo The Netherlands</td>
</tr>
<tr>
<td>Carbery Group Ireland</td>
</tr>
<tr>
<td>DMV International U.S.A.</td>
</tr>
<tr>
<td>Erie Foods U.S.A.</td>
</tr>
<tr>
<td>Davisco U.S.A.</td>
</tr>
<tr>
<td>Glanbia Nutritionals Ireland</td>
</tr>
<tr>
<td>Milei GmbH Germany</td>
</tr>
<tr>
<td>Nutricepts, Inc. U.S.A</td>
</tr>
<tr>
<td>Tatura New Zealand</td>
</tr>
</tbody>
</table>
approved health claims associated with soybeans in 1999, the industry has made great efforts to educate consumers. The risk is that consumers are either never exposed to the bioactive properties of milk proteins through industry education efforts or that they establish soy protein as a first choice/preference, having established a knowledge base around soy’s healthy attributes. The latter may also be considered a “first mover” benefit of sorts. Together, processor and end-user interests will determine the degree of competition amongst protein sources. A second hurdle is the regulatory component. From a labeling perspective, FDA approval typically signals some additional level of credibility. In the case of milk protein fractions, this would speak to bioactive property efficacy, and at the same time build consumer confidence.

Summary

In conclusion, continued growth of the milk protein fraction market looks likely given current trends toward protein ingredient specificity from both a food processor and end-user perspective. The different markets’ long-standing preference for milk protein quality works to the dairy industry’s advantage. A key component in future market development will be disseminating information about fraction properties. In the long run, science-based research (1) provides consumer education and product promotion and (2) encourages product innovation as interest grows in specific milk protein capabilities.

As the fraction market matures, there will likely be greater (production) price transparency. On the demand side, consumer willingness to pay must be at least as great as the costs required to provide the fractions to market, and this willingness to pay is likely to be a function of fraction application. It appears that current milk protein fraction market prices are being determined outside of the regulated environment. However, continued expansion in the fraction market will require larger supplies of raw milk, and the regulatory policies associated with this input may increasingly influence protein fraction prices. At what volume threshold this effect occurs may be worth further investigation. In sum, it is difficult to assign a dollar value to potential market utilization of milk protein fractions because of the breadth of possible applications. For the dairy industry, this would seem to be a good problem to have.

Endnotes

1 Bioactive is considered here to be an ability to influence a living organism.

2 Surveys to be sent out in Spring 2004

3 The definition proposed by the International Food Information Council identifies a functional food as “any food or food ingredient that may provide a health benefit beyond the traditional nutrients that it contains (IFIC Foundation, 1995).

4 Only companies whose production of milk protein fractions can be verified are included.

5 A third type of company is the chemical company that produces smaller quantities of protein fractions available for laboratory research use. This type of protein fraction supplier though is not addressed in this study because, while recognized as a critical link in facilitating market development, these companies could not supply sufficient quantities demanded where novel uses are identified.

References

Balluz, Lina S., Stephanie M. Kieszak, Rosanne M. Philen, and Joseph Mulinare. “Vitamin and Mineral Supplement Use in the United States: Results from the third national health and nutrition examination survey.”


Fonterra http://www.fonterra.com/fonterra/content/news/ fonterranews/displayarticle.jsp?elementId=k%3A%5Cfont erraprod%5Cinetpub%5Cwwwroot%5Cfonterramediarele ase%5C20031001_Colostrum.xml


How government taxes and spends taxpayer dollars has substantial impacts on innovation. The most obvious example is the level of expenditures on agricultural research and extension, which has been declining over the last three decades. Likewise, if recent court decisions regarding the collection of check-off funds are upheld and applied across agriculture, further reductions in dairy product innovation could be anticipated. Often overlooked is that the nature of government subsidies also affects the nature and rate of innovations. For example, it is generally recognized that the dairy price support program has reduced U.S. innovations in the production and use of milk proteins. State milk control laws have been found to lower the rate of innovation in fluid milk markets.

Expectations are that following the 2004 election there will be a vigorous effort to reduce the Federal budget deficit. This can be accomplished by substantially increased economic growth which raises revenues, increased tax rates, or reduced government spending. While increased economic growth is already a reality, it is unlikely that this will be sufficient to solve the budget deficit problem because excessive rates of economic growth result in inflation. This result likely would be viewed by the Federal Reserve Bank and the stock market as being worse than the budget deficit, thus resulting in higher interest rates and reduced growth. The feasibility of Federal tax increases will be tested in the 2004 election but would appear to be unlikely if the Republicans retain control of the Congress. Therefore, the most likely prospect is for tightened spending, particularly spending that is not related to defense or homeland security. Farm program spending, including dairy programs, is a likely target for reducing the federal deficit.

A second factor that could result in reduced farm program spending is the outcome of the current round of World Trade Organization (WTO) trade negotiations. A new WTO agreement could reduce spending either by placing limits on the amount of farm support subsidies, by reducing export subsidies, or by opening U.S. markets to increased imports. The latter would require adjustments in U.S. dairy policy, presumably in the direction of reduced spending and government involvement. It would not affect the level of expenditures on innovation-inducing research and extension since these are green box (nontrade distorting) subsidies.

The means and impacts of reducing dairy program spending resulting from a new WTO agreement and efforts to curb the Federal deficit require knowledge of the Federal budget process. The purpose of this article is to explain:

- The contribution of farm program spending (including dairy programs) to the Federal deficit,
- the mechanisms that could be utilized by the Congress and the Administration to constrain Federal spending,
- the potential implications for dairy policy and innovation within the dairy industry, and
- the impacts on dairy farmers and related dairy industry interests.

**Farm Program Spending and the Federal Deficit**

Farm program spending is a small portion of the Federal budget and of the deficit. Dairy program spending is a small portion of farm programs. Yet many programs, not related to either defense or homeland security, will likely be impacted by efforts to reduce the Federal deficit. Moreover, farm subsidies have become a target of criticism by nonfarm interest groups and by members of Congress with primarily urban constituencies.

Table 1 indicates the size of the Federal deficit relative to farm and dairy program spending. It indicates that under the 2002 Farm Bill, CCC farm program expenditures have not exceeded 5 percent of the Federal deficit. Dairy programs have been less than 1 percent of the Federal deficit. In other words, eliminating farm subsidies would reduce the federal deficit by less than 5 percent, and eliminating dairy subsidies would reduce the deficit by less than 1 percent. Despite these small contributions to deficit reduction, it can be anticipated that farm programs will bear at least a proportional share of deficit reduction, and perhaps more.
Mechanisms for Reducing Federal Spending

Both the Administration and the Congress are part of the budget process. The process begins with the President's annual budget proposal, which is sent to the Congress in January following the President's State of the Union address and the February release of the Economic Report of the President. The President's budget is developed by the Office of Management and Budget (OMB) under the supervision of its Director, who is appointed by the President as a powerful staff member of the Executive Office of the President. The Director of the OMB receives proposals that are prepared according to guidelines developed and approved by the President from each cabinet department and regulatory agency of the government. The OMB makes decisions on the budget proposals by the Departments, subject to the approval of the President. While members of the Cabinet appeal OMB decisions to the President, the fact is that the Director of OMB has a huge influence on the President's budget. Once developed, the executive departments of government are obligated to support and advocate the budget before the Congress.

President Bush has submitted his FY 2005 budget to the Congress. Table 2 shows the President's 2005 budget for the Department of Agriculture compared to actual 2003 expenses and estimates for 2004.

Note that while the President's budget proposal calls for a $1 billion cut in discretionary expenditures, the actual total proposed spending for 2005 increases by over $4 billion. This is because the bulk of the Department's spending is mandatory. The two largest items mandated are food assistance programs and commodity programs, including dairy provisions of the 2002 Farm Bill. Congress must reduce spending, revisit the Farm Bill before it expires, or adopt some other measures as discussed later.

The President's budget can be looked upon as a starting point for the congressional budget process. However, it needs to be clearly understood that the President's budget proposal is not binding on Congress. The only congressional constraint presented by the President's budget is determined by the degree of influence that the President has over members of his party and his power to veto appropriation bills.

### Table 2. President's 2005 Budget for the USDA Compared with 2003 Actual Expenditures and 2004 Estimated Expenditures

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<tr>
<th></th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
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<tbody>
<tr>
<td>Discretionary</td>
<td>21,114</td>
<td>20,239</td>
<td>19,056</td>
</tr>
<tr>
<td>Mandatory</td>
<td>51,866</td>
<td>56,236</td>
<td>60,997</td>
</tr>
<tr>
<td>Total</td>
<td>72,185</td>
<td>77,612</td>
<td>81,776</td>
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In the Congress there are three committees in both the House and the Senate that are crucial to the budget process:

- The Budget Committees, established by the 1974 Congressional Budget Act, set the overall process for constraining the level of spending, referred to as budget resolution and reconciliation. Both the appropriation and authorizing committees must operate within the spending constraints, referred to as the budget resolution, established by the Budget Committees and approved by the Congress. Assisting the Budget Committees in doing their jobs are their staff and the Congressional Budget Office (CBO), which officially projects the cost of, or “scores,” all congressional proposals relative to the CBO baseline of projected expenditures. The baseline, which assumes no change in government programs, is issued each January. Table 3 indicates the CBO dairy baseline for 2005 through 2014. The dairy baseline indicates a sharp $909 million decline in projected expenditures in 2006 due largely to the elimination of the National Dairy Market Loss Program (MILC). The scoring process assists the Congress in assuring that spending will stay within the budget resolution. The CBO budget does not mean that the dairy budget it fixed at the indicated level. Rather, it means that if dairy is to exceed the indicated level, it must make the case in the Congress to get authorization for a higher level of spending. In times of tight budget, this may mean a reduction in spending for other agricultural programs, potentially resulting in considerable conflict among agricultural interest groups.

- The Appropriation Committees make the initial decision on how much money is to be available for spending on each program within the overall constraints established by the budget resolution. These Committees are organized into subcommittees, which are powerful in determining the level of spending, particularly for the party that is in the majority. The subcommittees hold hearings involving each agency of each Department. These hearings provide an opportunity for the members of the subcommittees to question programs that they oppose and even restrict funding if the chair, who is always from the party in the majority, agrees. Of course, it also provides an opportunity to liberally fund programs that benefit their constituency. The most controversial decisions made by the Appropriation Committees involve decisions not to fund particular programs that have been enacted into law and to establish and fund programs that have not gone through the authorization process. Decisions of the appropriation committees must be approved by the House and Senate, reconciled in conference committee, and signed by the President to become law.

- The Authorizing Committees frame the laws that go to the House and Senate floors for debate and vote by each body. With a favorable vote, enactment into law takes place after conference committee reconciliation of differences between the House and Senate versions and signature by the President. The House and Senate Agriculture Committees develop the crucial farm bill legislation that contains, among other things, the authorization for most farm subsidies, including dairy programs. If enacted, laws substantially exceed the spending constraint established by the budget process; or if trade negotiations lead to a requirement to reduce spending, the Authorizing Committees may be required to modify the laws to lead to spending that is within the budget constraint. The combined actions of the Authorizing and Appropriation Committees are referred to as the budget reconciliation process, which is performed annually with each budget.

There are times when extraordinary steps have been taken to constrain spending that is judged to be out of control. A state level example would be a requirement that the state legislature balance its budget, which exists in almost every state. The requirement for a balanced budget at the Federal level has from time to time been advocated, but it has been rejected because of the pervasive effect that such a requirement could have on the overall health of the domestic and world economy. In fact, conventional economics suggests that during economic slowdowns, deficits should be used to stimulate the economy.

The most extraordinary example of congressional action to constrain overall spending was the Gramm-Rudman-Hollings Act, which became effective in 1987 and remained in effect through 1992. It required that the Congress balance the Federal budget by 1991 from a deficit level of $212 billion in 1985 and $221 billion in 1986. This was to be accomplished by a series of annual deficit reduction targets. If the targets were missed, the law implemented automatic cuts in spending through a process called sequestration, meaning that appropriated monies were not available for spending. From 1987 through 1989, the deficit was reduced by $70 billion.

In 1990 it became apparent that a 30 percent reduction in spending would be required; thus Gramm-Rudman-Hollings was abandoned in favor of the 1990 Omnibus Budget Reconciliation Act. This replacement budget reconciliation law placed pay-as-you-go limits on discretionary spending. In addition to the budget resolution and reconciliation process described previously, this restraining feature requires that if an increase in discretionary spending is authorized in one area (such as dairy price supports), it must be reduced by an equivalent amount in another area (such as marketing loan payments) to come within the prescribed budget. Obviously, such trade-offs are politically sensitive and difficult to accomplish.
Implication for Dairy Policy and Innovation

The dairy price support program (DPSP) is the most important dairy program impacted by budget constraints. This is because most of the costs of the dairy program are incurred in the purchase of dairy products offered to the Commodity Credit Corporation (CCC) at the support price and their disposal at less than the purchase price. Therefore, a higher purchase or support price above market clearing levels, results in greater government costs. One of the effects of the DPSP is to stifle innovation in the U.S. dairy industry. This happens by raising the price of manufactured products above the world price and, therefore, discouraging innovation in the use of U.S. produced, manufactured products. For example, there is little doubt that the DPSP has hindered the development of a milk protein concentrate (MPC) sub-industry by making sales of nonfat dry milk (NFDM) to CCC a more profitable alternative. A separate paper in this workshop discusses, in greater detail, the nature of these cause and effect relationships.

The National Dairy Market Loss Program (MILC) is a direct payment cost to the Federal government until it expires in 2005. As a result of its expiration, its costs are not included in the projected CBO baseline (Table 3). Direct payments if unimpeded by other factors, encourage innovation by lowering the price of milk and, therefore, make new milk products more profitable and competitive. The MILC program has negated these benefits by operating in the presence of the price support program, which has prevented the milk price from falling to competitive levels. In addition, payment limits discourage innovations by producers as they approach and exceed the payment limit. It can be argued that the MILC program rewards smaller, higher cost farms and penalizes the more progressive and efficient producers.

The Dairy Export Incentive Program (DEIP), which subsidizes exports of manufactured dairy products, is also a source of dairy program expenditures. However, since pressures for DEIP expenditures increase when surplus stocks of commodities increase, DEIP expenditures tend to be directly related to price support levels and costs. In addition, DEIP export subsidies are constrained by WTO and U.S. trade policy.

Federal Milk Marketing Order (FMMO) prices also may contribute to excess production and, thus, to dairy price support expenditures. For example, when the 1996 Farm Bill set the FMMO price for milk used for fluid purposes (Class I) at the higher of the Class III and Class IV prices, the effect was to raise producer returns and, thereby, stimulate milk production. If either the Class III or IV price is resting on the support price, the effect is to increase government costs. Potential remedies for reducing dairy price support program costs that are considered to be excessive and/or hit and imposed budget constraint include:

- The price support level can be lowered. This is the most obvious action that can be taken in that a lower price means reduced costs in purchasing commodities, reduced losses on any commodities sold by the CCC, reduced incentives for milk production, and increased incentives for innovation. Industry resistance to lowering the price support level results from losses in the value of commodities in private sector inventories, increased price volatility that results from a lower price support, adverse impacts on the income and financial position of dairy farmers, and political problems encountered in raising the price support once it is lowered.

- Milk production incentives provided by the FMMO program could be reduced. This can be accomplished by reducing the milk class price differentials, eliminating the practice of pricing Class I milk at the higher of the Class III and Class IV price (which effectively reduces the Class I price differential), or reducing the number of milk classes (which may also reduce the class price differentials).

- Milk production controls could be imposed. To be effective, government imposed controls would be essential, meaning new legislation. Even then, past experiences, such as the milk diversion and dairy termination program in the 1980s, had only short-run effects on milk production. Milk production controls inherently stifle innovation by raising milk prices and by making milk products less available.

Table 3. CBO Dairy Outlay Baseline, 2005-2014 Compared with Actual 2003 and Estimated 2004, Mil. $.

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<tbody>
<tr>
<td>Purchases</td>
<td>595</td>
<td>369</td>
<td>340</td>
<td>305</td>
<td>262</td>
<td>218</td>
<td>212</td>
<td>208</td>
<td>163</td>
<td>146</td>
<td>133</td>
<td>122</td>
</tr>
<tr>
<td>DEIP</td>
<td>49</td>
<td>44</td>
<td>52</td>
<td>63</td>
<td>70</td>
<td>72</td>
<td>75</td>
<td>76</td>
<td>77</td>
<td>77</td>
<td>77</td>
<td>77</td>
</tr>
<tr>
<td>National Dairy Market Loss Program</td>
<td>1,796</td>
<td>935</td>
<td>963</td>
<td>77</td>
<td>---</td>
<td>---</td>
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<td>---</td>
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<tr>
<td>Market Loss Assistance Payments</td>
<td>---</td>
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<tr>
<td>Other Outlays</td>
<td>94</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Total Outlays</td>
<td>2,533</td>
<td>1,348</td>
<td>1,354</td>
<td>445</td>
<td>331</td>
<td>290</td>
<td>287</td>
<td>284</td>
<td>240</td>
<td>223</td>
<td>211</td>
<td>199</td>
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</table>

• A producer assessment/tax could be imposed to offset that portion of the cost of the milk price support program that exceeds the budget constraint or to constrain production. From 1983 to 1995, assessments totaled nearly $3 billion. For example, the 1982 Omnibus Budget Reconciliation Act placed an assessment of $0.50 per cwt on milk production and an additional $0.50 per cwt that was refundable to producers who did not increase production. These actions were taken as an alternative to reducing the milk price support and to offset the cost of the milk price support program, which at the time exceeded $2.5 billion. In all seven pieces of legislation have levied assessments to either reduce spending or to fund production control programs, such as milk diversion or dairy termination.

An alternative policy strategy that would foster innovation while providing income protection to dairy farmers involves making the previously indicated modifications of the FMMO program while replacing the price support program with direct payments, uninhibited by payment limits. The level of government spending would be determined by the target price and related rules for determining the level of direct payment, which are discussed in another workshop paper.

Summary and Consequences for the Dairy Industry

While reducing dairy program spending will do little to reduce the Federal deficit, the size of the deficit clearly indicates that, unless dairy program spending falls substantially during 2004, pressures to utilize one of the four potential remedies for reducing dairy program costs will accelerate in the post-election 2006 budget year. Three of the four remedies, all except a reduction in the number of FMMO classes, would require legislation. A reduction in the number of FMMO classes would require approval by affected dairy farmers and the Secretary of Agriculture.

An alternative direct payment strategy could provide dairy farmer income protection benefits while enhancing incentives for innovation.
The Dairy Price Support Program (DPSP) and the Milk Income Loss Contracts (MILC) represent one of our oldest and one of our newest dairy policies respectively. Both programs were instituted to help dampen the effects of milk price volatility and both programs can be operated to enhance dairy farm income. However, the mechanisms used in the two programs are quite different. This paper will briefly examine the histories of the two programs, current operation of the programs, possible modifications to each and, finally, the impact on dairy product innovation.

The Dairy Price Support Program

Early in the 20th century seasonal milk price volatility was a major problem for dairy producers. Price swings of 150 percent from spring to fall were not uncommon. Land O’ Lakes Creameries, Inc. had learned how to process a very clean butter that could be stored for many months without significant product degradation. The cooperative had the idea that seasonal price swings could be muted by taking some of their butter off of the market in the flush months and holding it for sale in the short season. Unfortunately, they were unable to afford the purchase and holding of inventories for this long a period of time.

In 1930, the Dairy Advisory Committee of the Federal Farm Board recommended a loan to Land O’ Lakes to withhold some of their own butter and to purchase any additional butter off of the market that would be necessary to stabilize prices. That year, Land O’ Lakes accumulated some 5 million pounds of butter which it later sold back at a profit and repaid the loan. This first successful experiment in price stabilization was formalized in the Agricultural Adjustment Acts of 1933 and 1935. Between 1934 and 1938, the federal government spent $22 million to purchase butter, cheese, evaporated and condensed milk and nonfat dry milk to stabilize farm milk prices.

The concept of the dairy price support is that a milk price goal can be achieved by government purchasing storable dairy products at wholesale prices, consistent with the milk price goal. Conceptually, you can make about 10 pounds of cheese from 100 pounds of milk. If it costs a processor about $1 to convert a 100 pounds of milk into cheese and your milk price goal was $12 per hundredweight, then a simple formula would show that ($12 + $1) / 10 = $1.30 per pound should be the announced support price for cheese. If the government is willing to buy as much cheese as anyone wants to sell them at $1.30 per pound, then the market place should approximately yield a $12.00 milk price.

When President Carter entered office in 1977, he came with a promise of higher milk prices. In his first year, he used his authority to set the support price at a level in excess of 80 percent of parity. Congress used the Food and Agriculture Act of 1977 as the legislative vehicle for maintaining higher prices for dairy farmers. The 1977 Act set the price at 80 percent of parity and also required that it be adjusted semi-annually to reflect changes in prices paid by farmers. From 1977 to 1981, the support price for grade A milk rose from $8.26 to $13.10 per hundredweight and annual net government expenditures on dairy supports increased from a few hundred million dollars to over $2 billion. Ultimately, the purchase price was reduced to the $9.90 level that we have today.

With the much lower support price, price volatility has returned. However, in contrast to the volatility of a century ago, today’s price spikes and troughs don’t necessarily correspond to seasonal production and demand for dairy products.

The Milk Income Loss Contracts

From the point of view of the dairy industry, the MILC program was the most interesting and the most controversial portion of the Farm Security and Rural Investment Act of 2002. The MILC program was a compromise program between the Northeastern states and the Upper Midwest. The program is a direct payment to producers that is more of an income support than a price support. It is triggered by a price and the amount paid is calculated from the difference between a market price and the trigger price.

Many of the provisions of the program look like the former Northeast Dairy Compact. The MILC program provides...
support to dairy producers when the price of class I milk in Boston falls below $16.94. That is the same trigger that was used by the Compact when it was in place. The payment that is made is equal to 45 percent of the difference between $16.94 and the class I Federal Order price. Forty-five percent is approximately the class I utilization in the Northeast Federal Milk Marketing Order, so the MILC payments to dairy farmers were designed to approximate the revenue from the Compact in the Northeast, while extending benefits outside of the Northeast. The program was instituted retroactive to December 1, 2001 and runs through September 30, 2005 (note: This is not the full life of the farm bill).

Producers in all regions of the country have access to identical payments under this program. However, there is a production cap for payments equal to 2.4 million pounds of milk per farm during a federal fiscal year (October 1 through September 30). Unlike the Compact, the payments come from taxpayers and not consumers.

Current Programs and Possible Modifications

Don Kullmann of Prairie Farms Dairy Cooperative used to talk about his “3M,” “5M” and “7M” theories of milk production: “money makes milk,” “more money makes more milk” and “much more money makes much more milk.” We found in the 1980s that there is a practical limit to the price that can be paid to dairy farmers. With a practical support price at more than $13.00 per hundredweight, we sold more dairy products to the CCC than was produced in all of Canada. The current $9.90 support price is a minimal safety net and is well below the full cost of production for most milk producers and below the cash costs for many. However, even economists who were proponents of a direct payment program, did not imagine that MILC would supplant the DPSP. Most thought that a direct payments program would replace the venerable market intervention program.

The high milk prices of 2001 yielded a 5M response from dairy producers, to use Kullmann’s theory. That “more milk” production in turn yielded low milk prices the following year—the same year that MILC was implemented. Several problems were made apparent in the two programs during those years.

The first problem that surfaced was that the USDA had a difficult time achieving its $9.90 target. In a consecutive 12 month run from July 2002 through June 2003, the class III milk price was below the target level in 9 months. This angered dairy producers and their cooperatives who demanded to know why the USDA did not more aggressively pursue the support price. It has also led to some prescriptions for a fix, including: 1) reflecting the added costs of selling product to the government in the product price formulas; 2) let the CCC be a participant on the CME to actively purchase product at established support prices; or, 3) using the support price as a floor under federal order pricing.

A second problem witnessed in the past few years is that of the proper “tilt.” While the CCC may have failed to achieve support price in some months, there have also been many months when the government has been actively buying dairy products even though the market price is well above support levels. This can happen if the support price for a particular commodity is well above market clearing levels even when other market prices are strong.

In the 1990s the CCC was purchasing large quantities of butter but was not purchasing nonfat dry milk or cheese. Three adjustments to the tilt were made (April '90, May ‘92 and July ‘93) to lower the purchase price of butter and raise the price of nonfat dry milk. This had the effect of encouraging less butter production and stimulated new uses of butterfat.

The current problem is that the CCC has been purchasing large quantities of nonfat dry milk and no butter or cheese. Two tilt changes have been made (June '01 and November '02) but nonfat dry milk prices remain at support levels and CCC purchases continue.

The Secretary of Agriculture does have authority to adjust the tilt two times a year to minimize government expenditures on dairy products. The authority granted in the farm bill is permissive but does not require the Secretary to adjust the tilt. The Secretary has felt considerable pressure from farm groups to not adjust the tilt. A possible solution to this problem would be to change the language in the farm bill from “the Secretary may adjust” to “the Secretary shall adjust”. If the CCC purchased a market basket of dairy products to support the price, any one commodity would not be produced in quantities above the market mix—in other words, less market distortion.

A third problem is one of market adjustment time and expense. Over the past decade, dairy producers have demonstrated a remarkable ability to alter milk production in a relatively short period of time. Rapid reductions in milk production have always been possible, but better management, new technologies (such as rBST) and better access to genetics and animals from out of the country, have made rapid increases in milk production also possible. As previously stated, high milk prices in 2001 encouraged expansion of milk production and low milk prices in the subsequent years. The new twist was that the MILC program was in place to help shore up farm revenues when prices are low.

Having MILC in place surely postponed farm retirements that would have been expected during two years of low milk prices. The milk production that took some time to adjust further fed back into price support program and nonfat dry milk purchases by the CCC. CCC stocks of powder are now more than a billion pounds. Milk prices are just now rebounding but the adjustment time was quite a bit longer.
than most industry observers expected.

It may be a philosophical question as to whether it hurts less to pull the Band-Aid off quickly or more slowly. What isn’t in question is how much it costs to leave the Band-Aid on for prolonged periods of time. Initially, the Congressional Budget Office estimated that the MILC program would cost about $1.3 billion over its life. Half way through the program we have already spent about $1.9 billion and more recent estimates show the cost could exceed $4 billion by the time we get to September 30, 2005…this, in addition to the higher costs of CCC purchases.

A fourth problem is who is helped and who is hurt. It is perfectly legitimate to pursue social goals with policy, but unforeseen changes can hurt those who had made investment decisions under a previous set of rules. Clearly, farms who produced less than the MILC cap of 2.4 million pounds of milk received the maximum benefit of the program. On a per hundredweight basis, very large farms received very little benefit but many of those operations have achieved such substantial returns to scale that they were able to weather the low milk prices. The farms most hurt by this new program were the intermediate-sized operations (400-800 cows). Many of these farms have been in the process of growing to achieve the scale economies of the larger operations...they aren’t quite there yet, but they have accumulated substantial debt along the way. As a category, these farms were most hurt by the sustained low market prices and the relatively small MILC payments.

Alterations in the MILC program might include raising the production cap and lowering the trigger. Creating more uniform access to MILC dollars would help the farms in that vulnerable growth size mentioned above. Access to capital will be sharply reduced if lenders are wary that farms cannot cash flow for two-year stretches. This will have the impact of creating a bimodal farm structure—fairly small and very large farms with no ability for smaller farms to aspire to long-term growth in the industry. Raising the cap to say 15 millions pounds of milk or eliminating the cap altogether would certainly alleviate this problem, but it would greatly increase the cost of the program. Program costs could be contained by lowering the trigger from its current $16.94 to something more modest.

Finally, as previously mentioned, most economists did not imagine the coexistence of a target price/deficiency payment program and a price support program. While either program can achieve the goals of volatility reduction and price enhancement, the feedback between the two programs creates even greater problems of long-term growth in the industry and program expense.

A simplification of these two programs might be to discontinue the price support program (the 1995 farm bill had a sunset provision for the DPSP in 2000) and keep a simplified target price/deficiency program as a safety net. The trigger on target prices might be $10.00 to $11.00 on manufacturing use milk and not the more complicated class I price and utilization.

Potential advantages of this type of target price deficiency program include:

1. Milk would be allocated by milk processors based on market clearing prices and not government support prices. Thus, milk allocation would be based on the highest and best value in the market place.

2. Eliminates administration difficulties and controversy over USDA establishing appropriate CCC purchase prices for butter, nonfat dry milk and cheese.

3. With nonfat dry milk prices allowed to seek a market clearing level, there may be more incentive on the part of processors to explore the domestic production of milk proteins.

4. Government stocks of surplus dairy products would be eliminated.

5. The dairy program would be more similar to the grains and oilseeds program.

Possible disadvantages of such a program include:

1. Increase market risk for dairy product processors (no infinite buyer of last resort)

2. Increase risk for dairy cooperatives that perform market balancing function via making and storing nonfat dry milk and other dairy products.

3. Federal government exposure, if the target price is established too high.

Possible Impacts of the DPSP and MILC on Dairy Product Innovation

Twenty years ago, whey was a waste product of cheese making. We used to dispose of it in municipal sewer systems or land spread it. With mounting environmental concerns and the recognition that there were valuable products in the whey, new markets for whey-containing products were sought. Today, there are more than a dozen dairy products derived from raw whey and many cheese makers will tell you that they break even on their cheese and that profit results from the whey stream. Some folks are even referring to whey as a co-product and not a by-product of cheese making. Given the incentive, markets will innovate to maximize profits.

Seeking markets for milk produced in New Zealand, Fonterra manufactures and markets more than two-dozen milk powders (not including whey). The U.S. dairy industry is more than five times the size of New Zealand’s dairy sector and it has unfettered access to the largest economy in the world—our own. Yet, we produce perhaps four to five milk...
powders and one can’t help but wonder “why?”

Part of the answer may be found in our history of plant ownership and dairy policy. Dairy cooperatives have evolved to provide the bulk of weekly and seasonal balancing services in this country. As evidence, more than 80 percent of the nonfat dry milk produced in this country is by cooperatively owned butter-powder plants. These are very expensive plants to own and operate. Capital in these plants may run from $50-80 million. These plants also cannot be fired up for a short run of product. Just starting and stopping an evaporator takes several hours. Studies have shown that there are such tremendous efficiencies of scale in these plants that it pays to build much more capacity than is needed to balance the region and only operate the plant for a few days per week. However, once built, the plant is a sunk cost, and operating at full capacity will further reduce the long-term cost of plant ownership. There is an incentive to fully utilize large butter-powder plants.

Although there is an incentive to operate these plants, there wouldn’t be if there wasn’t a reasonable market for the products they produce. For many years, the dairy price support program has provided a reasonable, and perhaps even good, price floor under these products. Without this price floor, it is likely that cooperatives would have sought other markets for milk solids. Recently, a new joint venture with U.S. dairy cooperatives and Fonterra has brought a plant online which is producing milk protein concentrates in New Mexico. There is some exploration of new products.

Milk protein concentrates became an issue in 2000-2001 as increased imports came into the country. Part of the reason for these imports was the relatively high price of domestically sourced solids-not-fat and part of the reason was the functionality of the new product. Many processors liked the lactose-reduced protein source and the price was attractive when compared to domestically sourced nonfat dry milk.

Conclusion

The venerable Dairy Price Support Program has done a credible job of moderating milk price volatility, and it can be properly used as a tool to enhance overall milk prices (just raise the price support goal). However, in an increasingly complex dairy industry the program can be improperly used to enhance farm incomes while decreasing industry efficiency by pushing one product price well above market clearing levels. New product innovation would be left to the normal forces of economics if the program were terminated.

Perhaps a better safety net for the dairy industry is a target price deficiency payment approach. Like the Milk Income Loss Contracts, direct payments would be made to dairy producers during low price cycles. This tactic would put a more transparent and direct floor under producer incomes and would allow individual dairy product prices to move to market clearing levels. Indeed, if the program were operated as a substantial income enhancement to dairy producers, we would expect that market prices could fall to quite low levels which could spur product innovation and exploration of new domestic or export options.

Endnotes

1 This is only an example—the exact cheese formula differs somewhat and includes a value for whey. Butter and nonfat dry milk (NDM) are the other products purchased by the Commodity Credit Corporation (CCC). The basic concept is that if manufacturers are paid the right price for their product, they can cover their costs and have sufficient money left to pay farmers a price comparable to the support price goal. Because butter and NDM are joint products, the income from both combined covers the manufacturing costs and the cost of 100 pounds of milk. Therefore, there is some flexibility in how much of the value of milk is assigned to butter and how much to NDM. The higher the butter price, for a given value of milk, the lower the NDM price can be. This inverse relationship between butter and NDM prices is called the “tilt”.

References


Many in the dairy industry are beginning to talk about policy alternatives to the Milk Income Loss Contract (MILC) program since its expiration is currently set for September 30, 2005. One possible dairy alternative that has been discussed in many dairy circles is the National Dairy Equity Act (NDEA).

The NDEA contains features similar to the Northeast dairy compact. Fluid milk processors would make payments based on an over-order fluid price set by regional boards. The NDEA would allow all states the opportunity to join the program. There are several additional features currently being discussed as a part of the NDEA.

This paper will examine the current version of the NDEA. As refinements of the NDEA occur this analysis will need to be updated to reflect the changes that could be made in how the program will operate. As a result, further analysis may yield very different results depending on how the program is modified.

Main Features of the NDEA

The NDEA program defines five regional marketing areas (figure 1) that would operate under the program. Each marketing area will be governed by a board made up of three members from each participating state. One member from each state must be a consumer representative and one member must be an eligible producer.

The current language allows all states in the Northeast, Southern and Upper Midwest regions to be defined as participating states upon enactment of the legislation. States in the Intermountain and Pacific regions would need to have their Governor provide written notice to the Secretary of Agriculture of their desire to participate in the program.
This notification process would need to be in accordance with State laws in the notifying state.

Once a state is a participating state under the NDEA program, they are no longer eligible for MILC payments. If an original participating state, a state in the Northeast, Southern or Upper Midwest region, withdraws from the program during the first 90 days, that state will become eligible for MILC payments. That withdrawal process will require written notification to the Secretary of Agriculture from the Governor of the State with the approval of the state’s legislature. However, withdrawals that occur after the first 90 days will not become eligible for MILC payments. This language does extend the MILC program through September 30, 2007.

Each region’s board would be responsible for setting an over-order price under the legislation. The boards are given guidance to consider several factors in determining an over-order price. They include: the balance between production and consumption of milk and milk products, the price of feed, the cost of labor, machinery expenses, interest expenses any other cash expenses such as veterinary services, hauling and marketing, the price of milk outside the regulated area, the purchasing power of the public and the milk price necessary to yield a reasonable return to an eligible producer.

This section of the language also instructs the board to “the maximum extent practicable, ensure that the over-order price does not cause or compensate eligible producers in a manner that results in local production of milk in excess of the quantities of milk necessary to ensure consumers an adequate supply for fluid purposes.”

A board may operate more than one pool with the purpose of equalizing returns across all eligible producers in the marketing area. Unregulated milk will be valued in relation to the nearest class price subject to any other board adjustment. All processors handling class I milk with the exception of producer-handlers that sell less than 150,000 pounds per month will be required to pay the over-order price set by the board. Processors that bring class I milk into a marketing area will be required to make an equalization payment to equalize the cost of milk relative to handlers subject to the over-order price.

The NDEA establishes a fund in the U.S. Treasury to carry out the program. Processor over-order payments are one source of money for the fund while the Commodity Credit Corporation (CCC) will also allocate money into the fund in an amount necessary to carry out the program.

The program authorizes the Secretary of Agriculture to compensate for: 1) administrative costs incurred by the Secretary or the boards in carrying out the program, 2) the increased cost of federal nutrition programs and 3) the increased cost participating states will face in carrying out the Child Nutrition Act of 1996.

Participating marketing areas whose milk production grows faster than the national average will reimburse the CCC for the additional cost of the price support program with a limit that reimbursement would not exceed payments made available to producers in the region under the program. That is, producers would not have to pay money into the fund if funds collected from processors are not sufficient to cover the additional CCC cost.

The remaining funds will then be allocated to each regional board. Each regional board will receive the greater of the payments made by processors in each area into the Treasury fund or the over-order payment in the area multiplied times 45 percent of all milk produced in the area. Using this formula to calculate monies to each board is equivalent in dollar terms to each region having a minimum class I utilization of 45 percent. The federal government will be required to allocate the funds necessary to bring regions with less than 45 percent class I use up to that equivalent level. Boards will then use these funds to make payments to eligible producers.

**Issues Surrounding Quantitative Analysis of the NDEA**

There are many assumptions that must be made to provide an analysis of the effects of the NDEA. This section will discuss these assumptions to provide a base from which to judge the quantitative results. A different set of assumptions will yield very different results than shown here.

The first most important assumption is what states will participate under the NDEA. The NDEA establishes all states in the Northeast, Southern and Upper Midwest areas as participating states. In these areas, the question arises as to whether any of these states might opt out of the program. Consumers of dairy products as well as dairy producers could lobby state governments in these states to opt out of the program. In some states with high levels of milk eligible for MILC payments, producers could decide they would rather remain in the MILC program.

Another question regarding participation arises concerning states in the Intermountain and Pacific regions. Will they become participating states? Each of these states will have to weigh the pros and cons of joining the program and then pass necessary legislation to officially notify the Secretary of Agriculture if they wish to participate. The participation decision each state makes will be dependent on many factors that will not be known with certainty when the decision is debated. For example, what class I over-order prices will be set in each region?

Each regional board can set the level of the over-order price for their area. There is not explicit coordination between the different regions. Without coordination between the boards, there could be a broad range of over-order prices across the country. If producer-interests dominate the boards, an upward spiral of over-order prices could oc-
cur as each board attempts to maximize revenue to their producers.

Although the language contains a clause concerning local overproduction of milk, it is not clear that it is binding without board action. It is difficult to reason why one board would impose any supply control if the other regions did not include any supply control measures. In fact, taking the language at face value, all regions currently produce more milk than needed for fluid use for a majority of the year which would suggest that the clause is binding today without any over-order price.

Paying for the additional costs associated with nutrition and price-support programs is one feature that may keep milk production expansion in check in those regions of the country that grow faster than the national average.

Analysis of a High Over-Order Price under the NDEA

This scenario examines the impact of the NDEA under high over-order prices. The over-order price was set at the highest monthly price each region had seen over the 1990 to 2003 period. This assumption results in an average over-order payment for each of the regions of roughly $3.25 to $3.75 per cwt. This compares to the highest annual average Northeast dairy compact over-order obligation of $2.14 in 2000. Under this high over-order price scenario, it is assumed that all states would enter the NDEA. If states were to choose not to enter, producers in that state would be at a large disadvantage relative to participating states since manufacturing prices are pushed lower under the scenario.

There is no supply management component assumed in the analysis beyond the effect of reimbursement of the CCC and nutrition programs by regions with production growing faster than the national average.

This scenario is run against the FAPRI stochastic dairy baseline so that when market prices for milk and milk products are high the amount of the order-order premium is reduced. The stochastic approach used for this scenario provides for more robust results than one would get when the comparison is made to a single-point or deterministic baseline.

Results of the scenario are shown in table one. With high over-order premiums picked for this scenario, significant expansion in milk supplies is expected to occur. On average over the period, an additional 7.5 billion pounds of milk is produced.

The additional milk supplies generated under the scenario results in lower class III and class IV prices. These lower manufacturing prices results in a lower all milk price on average of $1.17 per cwt. The lower all milk price is offset

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<td>Change</td>
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Table 1. Results of a High Over-Order Premium under the NDEA
on a national basis by the over-order collection to increase net revenue on average by $1.10 per cwt. A portion of the additional revenue is generated by additional government outlays. On average, an additional $1.7 billion is needed annually to make up the shortfall in those regions where class I utilization is less than 45 percent.

The cost of the CCC price support program and related activities is increased by nearly $1 billion annually. The Pacific region would bear most of this additional cost. Even with subtracting the additional cost of the price support program, the Pacific region sees slightly higher producer revenue.

This analysis is one of several ways the NDEA could work. If regional boards set lower over-order prices, the supply response would be much less than shown here. That might encourage some states not to participate and could work to lower government outlays for the program.

**Summary**

Many assumptions are necessary to quantify the impact of the NDEA. Most of these assumptions will depend on how the regional boards will implement the program. Other assumptions will depend on how states view the program and whether they choose to participate.

The analysis of the program shown here is likely an extreme of how the program might operate. The other end of the spectrum would be a program that set very low levels of over-order prices and had a very small impact on the industry. Both ends of the spectrum are possible outcomes for the program. If the program becomes law, the effect of the program will likely fall somewhere in the middle of the two ends of the spectrum. That middle point is nearly impossible to identify with the language in hand today.

This program does attempt to capture more revenue for producers out of fluid markets. The higher revenue for producers means that new fluid products classified as class I would face this additional over-order obligation. There would likely be increased pressure for new fluid products to be classified in categories other than class I as these products attempt to elude the additional obligation and be better positioned to compete with other beverage products.
Recently-introduced beverage products such as Swerve from the Coca-Cola Company and LeCarb from Southwest Foods in Texas have raised the issue: to which class should these products be assigned under Federal Milk Marketing Orders? Given the current Federal Order definition, fluid products with milk solids greater than 6.5% are Class I. These new products have been formulated with slightly lower solids to that they would be assigned to Class II. Some have argued that the language of the enabling legislation, the Agricultural Marketing Agreement Act of 1937, dictates that physical form (fluid) and product use (beverage) require these products be priced in Class I. It has also been argued that the assignment of these products to Class I will increase producer revenues compared to when they are assigned to Class II, particularly if these new beverage products displace sales of regular milk. In late 2003, a hearing was requested to examine the classification of these new products, and this request is still pending. The objective of this paper is to explore the potential short-run and long-run impacts on producer revenues of classifying new products such as LeCarb and Swerve as Class I. We use a systems modeling approach to develop a simplified description of dairy markets that allows us to explore the basic principle of classification and price impacts (although it falls short of an explicit projection of market impacts). We begin with a brief discussion of the motivation and history of classified pricing to clarify the rationale and characteristics of classified pricing that can lead to producer price benefits.

Why Classified Pricing?

The use of classified pricing for milk pre-dates the establishment of Federal Milk Marketing Orders by at least four decades. In 1896 dairy cooperatives introduced use-based pricing in Boston. Over the next 40 years, cooperatives introduced and tried to maintain classified pricing in almost 70 markets around the U.S. Our interpretation of the history is that producers and their organizations realized that fluid markets were able to sustain higher prices and generate higher returns to producers. Classified pricing was implemented to take advantage of this opportunity, recognizing that other product markets would receive a lower price to ensure that markets cleared. Sharing the proceeds of higher markets with producers who didn’t sell to fluid processors but who conceivably could have (i.e., pooling) was necessary to avoid what has been called “destructive competition”. The benefit of this approach was particularly compelling in an era that:

1) required significant farm production costs to produce milk eligible for fluid use (grade A) versus the common and acceptable standards for manufactured and farm sold products,
2) necessitated costly transportation relative to the value of the product, and
3) was characterized by large differences between the seasonal fluctuations of production and fluid sales.

Classified pricing and pooling were viewed as mechanisms to enhance producer revenues, share those revenues more equitably among dairy producers, and minimize the negative impacts of competition for high valued sales outlets among sellers of a highly perishable product. Whether the early cooperatives knew it as such or not, they were employing a technique that economists call “price discrimination” (Stephenson, 2003). Price discrimination simply means that sellers have an incentive and are able to set different prices for different buyers, thereby exploiting differences in buyers’ willingness to pay or demand.

It is important to take note of two things in the price discrimination model. First, although producers have the ability to charge different prices to different buyers, they do not have the ability to charge whatever they please to everyone. The basic market law that supply must equal demand remains in effect: over time, a combination of prices must be found under which total production equals total consumption. Second, in order for price discrimination to result in higher net prices to producers, one set of buyers or consumers must be less price sensitive than the other set of buyers. Economists refer to this price sensitivity as the (own price) elasticity of demand.

The Law of Demand says that normally (with rare exception) buyers will buy more of something if the price declines...
and less if the price goes up. The question that elasticity answers is “which changes more, price or quantity?” If price goes up, say, will quantity demanded change proportionately or disproportionately? Will it change by a greater relative amount or a lesser relative amount? If demand for milk by a particular buyer is “inelastic”, then a given change in price will result in a smaller percentage change in quantity purchased. As long as their demand remains inelastic, then sellers will increase their revenue by charging that buyer a higher price. On the other hand, if demand by a different buyer is “elastic”, then sellers will actually increase revenue by charging a lower price, because the gain in quantity sold is large relative to the reduction in price. Of course, the latter begs the question of whether or not the lower price is sufficiently high to cover the unit marginal cost of producing the product needed to meet the increased sales. The price discrimination model only guarantees that total revenues will increase.

In the price discrimination model, sellers are able to gain by charging a higher price to one set of buyers and letting the total market clear at a lower price to another set of buyers. If sellers face one set of buyers whose demand is inelastic and another set of buyers whose demand is elastic, then they win in both directions. Total revenues increase by raising price in the inelastic market and lowering price in the elastic market. This situation does not really imply an opportunity for dairy farmers. Although there are a wide range of empirical estimates of demand elasticities for fluid milk and dairy products (see Nicholson and Alexander, 2001) there is general agreement that the demand for fluid milk is the “most inelastic” but other dairy products also have inelastic demands. Thus, charging a higher price for beverage milk will increase producer revenues from sales to fluid processors, but there are offsetting consequences in the rest of the market (manufactured product markets).

In the short run, the higher price charged for the portion of the milk supply sold to fluid processors will result in higher returns, even though sales of fluid milk will decline somewhat. The combination of reduced sales to fluid markets and the stimulus to increased milk production from higher returns means that there will be more milk that has to clear the market through sales to manufacturers. Manufacturers, even if they have the capacity readily available, will not purchase additional milk unless they can do so at a lower price. This lower price will be necessary for them to subsequently re-price their outputs (cheese, etc) so that consumers will buy more finished dairy products.

Thus, the price discrimination model requires that the higher price in one market be partially offset by a lower price in the other market, compared to what would be the price if all buyers paid the same. Because the demand for manufactured products is also inelastic, lowering the price means lower producer revenues from sales of milk to manufacturers. In this case, price discrimination results in an increase in revenues from fluid milk sales and a decrease in revenues from manufacturing milk sales. In basic theory, producers will always come out ahead, and the magnitude of the positive net effect is determined in large part by the spread between the elasticities in the two markets.

Two questions are posed in the remainder of this paper. First, how much gain is there for producers because of classified pricing, given modern conditions? Does the answer offered by conventional theory change when one takes into account more explicitly the dynamic effects of adjustment in supply and interactions with a more complicated but also more accurate understanding of milk composition?

**Classified Pricing and Producer Revenues Then and Now**

To what extent does the current classified pricing structure increase dairy producer revenues? Decreases over time in the size of the Class I differential (in absolute terms and relative to the all-milk price) and the percentage of Class I utilization (at least on a national basis) imply that the additional revenues generated from beverage milk sales are markedly smaller than they used to be. That is, the proportion of producer dollars generated by Class I differentials is much lower now than in the past. There is also some evidence that dairy product demand elasticities are changing over time (Nicholson and Alexander, 2001), that is, becoming more price sensitive – still inelastic but less so. This may be due in part to changes in the products viewed as competing with fluid milk, which now include such diverse categories as soft drinks, sports drinks, soy milk and even water. If fluid milk demand is becoming more elastic, the ability to generate additional revenues from Class I sales will be reduced. (Note, however, that if manufactured product demand becomes more elastic, the offsetting effects of higher beverage milk prices would also be less.)

**A Dynamic Model of New Product Classification**

The concept of price discrimination provides a starting point to determine the logical assignment of products to classes, when the objective is to maximize producer revenues. However, in the case of a new product it is helpful to consider additional elements relevant to understanding both short-run and long-run outcomes. How the introduction of the new product relates to demand and supply changes over time can be important, so a conceptual model that explicitly includes dynamic effects can provide additional insights. Moreover, the basic price-discrimination model does not include a number of characteristics relevant to assessing the impacts of a new product on US dairy markets. These include the use a product-pricing formula based on the market prices of manufactured dairy products to determine the base milk price for classified pricing, the potential for new products to cannibalize existing (fluid milk) products, cross-price effects between new and existing products, and potential market impacts from by-products resulting from production of the new product.

The dynamics of dairy markets can be modeled in a num-
number of ways. We have chosen to use a modeling technique that was developed explicitly to look at how elements in complex systems interact and evolve over time. This technique is called System Dynamics (or SD for short). A system dynamics model (Sterman, 2000; Nicholson and Fiddaman, 2003) of milk supply and dairy product markets is developed which simplifies dairy markets to two basic classes, I and II. Class I initially applies to beverage milk and Class II initially applies to a single (aggregated) manufactured product. As for Federal Orders, the base price is determined by the manufactured product price under a product-pricing formula, and Class I includes a fixed differential (set at $2.50/cwt) over the base price. The model is similar to the three-product model described in detail in Nicholson et al. (2004), but it allows for both short-term and long-term adjustments to milk supply.

We assume that a new milk-based product is introduced that can be assigned to either Class I or Class II. Demand for the new product is assumed to follow an S-shaped growth curve, as typically observed for new product introductions. The milk required to meet the market potential for the new product (NP) is 5% of the total assumed initial milk supply. The initial demand elasticity for the perishable (fluid) product is -0.2, for the manufactured product -0.5 and for the new product, -0.9. A model diagram (Figure 1) allows us to highlight a dynamic “offsetting” effect that is analogous to the effect of price discrimination on manufactured milk revenues.

Assigning the new product to Class I has the immediate effect of increasing Class I utilization and increasing the blend price (follow the series of thick gray arrows starting with NP Production). An increase in the blend price has a short-run impact on milk per cow and a long-run impact on farm capital (including cow numbers); both of these effects increase the milk supply. An increase in the milk supplied increases the amount of milk that available for use in the production of the manufactured products. Until the price in this market adjusts, the increased milk available results in increased inventories and puts downward pressure on manufactured product prices (follow the series of thick black arrows starting with the manufactured product inventory). As the manufacturing product price falls, so does the base price, the class I price, and ultimately, the blend price. Thus, in the very short run we should expect a considerable increase in the blend price, but before long there will be an offsetting effect on the blend price as additional milk supplies cause price to decline in manufactured product markets.

Which effect dominates (the increase in Class I revenue or the decrease in the base price) in the long run depends on a variety of factors, including demand elasticities for the products, the substitutability of the new products with fluid products, and the degree to which there are by-products (like cream) from the process of manufacturing the new product. The model is used to illustrate the conditions under which assignment of a new product to Class I will likely enhance producer gross revenues. Although the emphasis here is on long-run outcomes, the dynamic pattern of prices and revenues can also be of varying importance to different segments of the dairy industry (e.g., dairy producer groups may be willing to risk somewhat lower prices in the long-run in exchange for more certain increases in revenues in the near term).

To assess the impact of changing the class to which the new product is assigned, we assume that the NP is initially assigned to Class II (i.e., manufacturers pay the base price for the input) and simulate the dynamic model for 100 months. This provides a base scenario for which we can examine the growth in sales of the NP, prices of the manufactured product, the base price, the blend price, and producer revenues. The outcomes observed depend on both the short and long-run milk supply response. For comparison, we simulate these outcomes when milk used to make the NP is switched from Class II to Class I at time t=10 (that is, after 10 months, NP manufacturers pay the base price plus the Class I differential), which is early in the process of growth in NP sales. The difference between these two scenarios suggests something about which class assignment is preferable if the goal is maximizing producer revenues.

**Impacts of Assigning a New Product to Class I**

Under the base scenario in which the NP is assigned to the lower price class, sales of the new product grow over time, to 200 units per month (Figure 2). Given the assumption that it requires 1 unit of milk to make 2 units of NP, the demand for milk to be used in manufacturing the NP also increases over time (Figure 3). The growth in demand for milk to make the NP results in an increased overall demand for milk. Because it takes time for the milk supply to respond, milk markets tighten and the amount of milk available for manufacturing initially declines with growth in demand of the NP (Figure 4). Less milk available for manufacturing means that production and inventories of manufactured products initially decrease, and product price initially increases (Figure 5). The increase in the manufactured product price increases the base price (Figure 6) and the Class I price, resulting in an increase of nearly $0.40/cwt. in the blend price by month 36. Thus, as expected, producer prices initially increase in response to the increased demand for milk for the new product.

Over time, however, an increase in the milk supplied results in an increase in milk used for manufactured products (after about month 30, Figure 4), and the manufacturing product price, the base price, and the blend price begin to decrease (Figures 5, 6 and 7) to clear the market. After a longer period of time, about 70 months or almost six years, the blend price falls below its initial level of $11.25/cwt (Figure 7). A primary reason for this result is our assumption that investment decisions on farms are made asymmetrically to price. In other words, farmers make expansion decisions quickly when prices are above average but contract...
more slowly when prices are below average. This means that producers can “overreact” to the price increase resulting from increased milk demand for the NP, and increase milk production capacity more than would be required to maintain the initial blend price. Given more time, however, farm capital declines and the blend price will return to its initial $11.25/cwt value.

Now suppose we price the new product in Class I. Under the scenario in which the NP is switched to Class I at t=10, the basic patterns of price behavior are similar to when the NP is assigned to the lower price class (dashed lines; Figures 2 through 7). However, there are quantitative differences in the prices, quantities demanded, and the quantity of the input supplied. Assignment of the NP to Class I reduces growth in demand for the NP because we assume the higher input costs lead to higher NP prices (Figure 2)6. Sales are reduced roughly 10% after market growth is complete compared to the base case. The reduction in sales reduces the demand for milk to make the NP (Figure 3), and an increase in the blend price increases milk supplies. These effects together increase the availability of milk for manufactured products compared to when the NP is assigned to Class II (Figure 4). Production of manufactured products increases and lowers the manufactured product price compared to the base case (Figure 5). The base milk price is lower when the NP is assigned to Class I (Figure 6). The blend price received by dairy producers is at first increased by the switch of the NP to Class I (Figure 7), because additional revenues from the Class I differential contribute to the blend price. After a few months, however, the reduction in the base price comes to dominate (Figure 7), given the assumed demand elasticity values.

The blend price is initially increased by about $0.02/cwt when the milk for NP is assigned to Class I (Figure 8; it displays the difference between blend prices in Figure 7). By about 16 months, however, assigning NP milk to Class I results in a $0.02/cwt lower blend price because of increased milk supplies, lower manufactured product price, and lower base milk price. This lower blend price is maintained until about 70 months7, and price differences are minimal thereafter. Cumulative producer revenues are about 0.25% lower at the end of the simulation when milk for the NP is assigned to Class I rather than Class II (Figure 9). That is, in the long run, assigning NP to Class I reduces producer revenues, given the values and assumptions of the model. The essential logic is that increasing the price for a small share of the milk (i.e., milk for NP) results in a decrease in the price for a large share (for both manufactured and perishable products). This result arises because of the product-pricing formula that links the base price to the manufactured product price, and because manufacturing is a residual claimant on the input supply.

Needless to say, one could debate any of the assumptions that underlie this model, including such important elements as the asymmetric investment response or the magnitude of elasticities or market share. We would simply respond in two regards. First, we think the assumptions we made are not capricious. While we can’t prove they are precisely accurate relative to actual dairy markets, we would argue that they are well within the realm of reason. Second, our purpose is in part to illustrate that milk prices may not behave as some assume they would. A reasonable set of assumptions in a model that is simple but contains most of the relevant detail demonstrates that.

The magnitude and direction of the effect on cumulative producer revenues of the class to which NP milk is assigned depends on demand elasticities. For some combinations of elasticities for the three products, assigning the NP to Class I increases cumulative revenues. The impacts on cumulative producer revenues of choosing Class I rather than Class II under different assumed elasticity values can be summarized graphically using information from a large number of simulations. In particular, the combination of NP and manufactured product price elasticities influences whether assignment of the NP to Class I increases cumulative producer revenues.

To assess how the values of these elasticities influence the difference in cumulative producer revenues for assignment of NP to the Class I, 1000 simulations were run using values of the manufactured product elasticity between -0.3 and -1.5 and NP elasticities between -0.1 and -1.5. The percentage difference in cumulative producer revenues for assignment of the NP to Class I versus Class II then can be plotted relative to the elasticity values (Figure 10; initial assumed values for the elasticities are shown by the “**”). Numbers within the figure indicate the percentage difference in cumulative producer revenues when the new product is assigned to Class I versus Class II. Negative numbers (to the upper left) indicate that assignment of the NP to Class I reduces cumulative producer revenues. Positive numbers (to the lower right) indicate that assignment of the NP to Class I increases producer revenues. The zero line indicates where cumulative producer revenues are equal for the two class assignment choices. The perishable product demand elasticity was fixed at -0.2 for these simulations, but the results are qualitatively similar when it is -0.5.

The figure indicates that whenever the NP elasticity is less than about -0.8 (i.e., -0.8 to -1.5), placing the NP in Class I will result in lower cumulative producer revenues regardless of the manufactured product elasticity. In contrast, if the NP demand elasticity is quite inelastic (e.g., -0.2), pricing milk used in NP production in Class I will increase cumulative producer revenues. The shape of the zero line indicates that as manufactured product demand becomes more elastic, the NP demand can also be more elastic and still result in an increase in cumulative producer revenues if the NP is priced in Class I. This occurs because the more elastic is manufactured product demand, the less the manufactured product price needs to fall to bring markets back to equilibrium for a given increase in production. When manufactured product demand is elastic, there can be a larger reduction in NP demand (and therefore an increase in manufactured product production and lower manufac-
tured product price) without fully offsetting the increase in revenues gained from assigning NP to Class I. The figure underscores the point that the relative elasticities of manufactured product and the NP demand are important determinants of the class assignment outcome, but also that the differences in cumulative producer revenues are small (less than 0.5%) when the NP is assigned to Class I or Class II for a wide range of elasticity values.

Conclusions and Implications

The dynamic conceptual model employed in this paper predicts some outcomes that are consistent with the predictions from basic price discrimination theory, namely that charging a higher price in the market with the most inelastic demand can increase the average producer price and revenues when the demand elasticities of the other products are more elastic. However, it also points out the danger of taking this basic concept as a given under all circumstances or over a long period of time. Given the other parameters of the model, unless demand for the new product is very inelastic—or NP demand is inelastic and manufactured product demand is very elastic—assignment of that product to Class I can easily result in a lower blend price and producer revenues over a decade long time horizon.

Although not explored here, cannibalization of fluid milk sales by NP sales, effects of the price of the NP on sales of fluid products, and the extent and nature of by-products can also influence which class results in higher cumulative producer revenues (Nicholson et al., 2004). We have assumed that any increase in milk costs does not have a large enough effect on sales to influence the ultimate success of the product in the eyes of the NP manufacturer. That seems a reasonable assumption for LeCarb and Swerve, but it is conceivable that it may not be for future milk-based products.

Although we have not addressed it directly in the foregoing analysis, Class I differentials may also reduce incentives on the part of fluid milk processors and other companies to develop new fluid milk-based products. The empirical evidence is limited in this regard, but to the extent that higher input costs under classified pricing reduce new product introductions, opportunities to enhance producer prices (in the short run) and revenues (in the long run) will be foregone. Growth in milk demand as an input for new products is likely to result in more sustained increases in prices and revenues than changes in differentials or changing product class assignments (Figure 11).

However, the dynamic conceptual model has a broader policy implication. It illustrates that the existence of “offsetting effects” is often a powerful determinant of the dynamic outcomes of policies. More specifically, it suggests that policies to increase Class I utilization (or increase Class I differentials, as in Compacts) have a limited ability to increase producer prices in the long run, especially if there are no constraints on long-run milk supply response (that is, if there are no supply controls). In the long run, Class I differentials have the effect of increasing the cost of milk for fluid buyers but decreasing the cost of milk for dairy product manufacturers. Under the conditions we have now, with a relatively small differential and low class I utilization, the long-run blend price received by producers is likely to be similar with and without Class I differentials (Figure 12). Producer revenues will be larger under classified pricing to the extent that more milk is produced, but not due to significant average price enhancement (Figure 13).

In the short run, increases in Class I differentials can increase blend prices, but these effects cannot be sustained in the long-run unless the increase in the differential applies only to a geographical area that can control the amount of milk receiving the higher blend price. This brings to the forefront the contentious issue of pool qualification and pooling standards. The fact that current dairy policy includes both Federal Milk Marketing Orders and the Dairy Price Support Program (which became part of permanent law over 10 years after Federal Orders were first authorized) suggests that there was awareness that FMMOs have a limited ability to enhance producer prices and revenues. However, the extent to which classified pricing can enhance prices for farmers does not negate the other positive benefits of Federal Orders, which include decreasing price uncertainty for buyers and sellers, reducing, if not eliminating, incentives for destructive competition, and providing a framework to encourage rational and orderly marketing behaviors and outcomes.

Endnotes

1. In the case of products made with ultra-filtered (UF) milk, the 6.5% milk solids standard is applied on a solids-not-fat equivalent basis. That is, if the milk protein content of the beverage made with UF milk is 2.5%, then the SNF equivalent milk solids content is 2.5 / ( % protein in farm milk/ % SNF in farm milk). A farm milk composition of 3.1% protein and 8.7% SNF implies that a beverage product made from UF milk with 2.5% protein would have an SNF equivalent content of 2.5 / (3.1 / 8.7) = 7.0% and would therefore be in Class I. Note also that the application of SNF-equivalent classification is not specifically included in order language.

2. Recall that the demand elasticity is the percentage change in quantity purchased by a buyer divided by the percentage change in price. Thus, if a 10% increase in the price of milk results in a 5% decrease in milk purchased by a buyer, that buyer’s demand elasticity is -5% divided by +10%, or -0.5. In general, dairy and other basic food products have inelastic demands—the percentage change in sales will be smaller than the percentage change in price. Economists refer to demand elasticities greater than -1.0 (e.g., closer to zero, say -0.5) as “inelastic” and those less than -1.0 (for example, more negative, say -1.5) as “elastic.”

3. Typical demand elasticity estimates for fluid milk are around -0.2, whereas elasticities for other products are
-0.5 to -1.0. Note that this refers to the demand for the final product rather than the milk used to make it, but there is a close relationship between these product elasticity values, and the elasticities of demand for milk as an input.

4. The previous model did not allow for long-run supply response.

5. Thus, if everything else stayed the same, overall milk demand would increase 5% when demand for the NP reached its full potential. As we will see, however, not everything else stays the same.

6. Although a decreasing effect on NP demand is assumed, it may be the case that the cost increases are small enough that they are not passed on to consumers by the NP manufacturer. However, the subsequent effects on milk supply and manufactured products do not depend on a reduction in NP demand.

7. The gap between the blend price when NP is assigned to Class I and Class II decreases over time because additional milk supply capacity arises when NP is assigned to Class II (due to the higher blend price).

8. Changes in relative producer revenues depend on the size of the increase in the differential and the growth in demand for the new product. However, the pattern of observed revenues over time should be similar to that observed in this figure, namely, long run higher revenues for new product growth compared to increases in the differential. The patterns for the blend price are comparable, although the blend price can be lower in the long-run under new product growth if long-run supply response is asymmetric.

References


Figure 1. Simplified Structure of the Conceptual Dynamic Model with new product in Class I or Class II
Figure 2. Simulated New Product Sales with new product in Class I or Class II

Figure 3. Simulated Demand for Milk Used in New Product with new product in Class I or Class II
Figure 4. Simulated Milk Used in Dairy Product Manufacturing with new product in Class I or Class II

Figure 5. Simulated Manufactured Product Price with new product in Class I or Class II
Figure 6. Simulated Base Milk Price with new product in Class I or Class II

Figure 7. Simulated Blend Price with new product in Class I or Class II
Figure 8. Simulated Difference in Blend Price (Blend Price with New Product in Class I Less Blend Price with New Product in Class II)

Figure 9. Percentage Difference in Cumulative Producer Revenues Difference (Cumulative Revenues with New Product in Class I Less Cumulative Revenues with New Product in Class II as a Percentage of Cumulative Revenues with New Product in Class II)
Figure 10. Impact of New Product and Manufactured Product Demand Elasticities on the Percentage Difference in Cumulative Producer Revenues

Figure 11. Simulated Producer Revenues With New Product Growth or Increased Class I Differentials
Figure 12. Simulated Difference in Blend Price for $1.00/cwt Increase in Class I Differential at t=10 (Blend Price with Increased Differential Less Blend Price with Constant Differential)

Figure 13. Simulated Cumulative Difference in Cumulative Producer Revenues (Cumulative Producer Revenues with $1.00/cwt Increase in Class I Differential Less Blend Cumulative Producer Revenues Price with Constant Differential)
Milk price volatility has been a topic of discussion since the early 1990s. Prior to that farm level milk prices were relatively stable. The following chart shows the base milk price and the average all milk price for the period of January 1975 through December 2003. During the 1975 through 1982 period, the base milk price was increasing and near the federal support price most of the time and remained near support until 1989. Since then the base milk price has been above the support level most of the time, but very volatile. The major cause of this change is a major shift in the federal dairy price support program. Prior to 1981, the support price on manufacturing milk was based on a parity formula. The support price at average butterfat test was $7.24 per hundredweight January 1975, but increased $5.86 to $13.10 per hundredweight by October 1980. This rapidly increasing and relatively high support price coupled with 2 percent annual increases in milk per cow, due to genetics and improved management, resulted in a major milk surplus situation. CCC purchases of surplus dairy products on a milk-fat equivalent basis reached 12.9 billion pounds, or 10.5 percent of farm milk marketings in 1981 at a cost of $2 billion. This surplus increased to 16.8 billion pounds, or 16.8 percent of farm milk marketings in 1983 at a cost of $2.6 billion.

Under the parity formula the increasing support prices and resulting large milk surpluses kept milk prices not only trending upward but fairly stable. CCC purchases of dairy products prevented milk prices from falling very far and CCC sales back into the market when dairy product prices rose to 110 percent of CCC purchase prices placed a damper on any milk price increases. Thus, the federal

MW/BFP/Class III and Average All Milk Price versus Support Price, 1975-2003

Minneapolis/Wisconsin Price Series (MW) 1975 through April 1995; Basic Formula Price (BFP) May 1995 through December 1999; Class III price January 2000 to present.
dairy price support program provided considerable price stability and reduced the risk of changing dairy product and farm level milk prices.

In response to growing milk surpluses and associated government costs, the U.S. Congress made a major shift in the federal milk price support program. Beginning in 1981, the support level would no longer be based on a parity formula, but rather was based on the level of milk surpluses and associated government costs. This decision led to periodic reductions in the support price, reaching $10.10 per hundredweight January 1990. Since 1999, the support has been established at $9.90 per hundredweight.

With a support price of only $9.90 per hundredweight, market forces and not the federal dairy price support program generally determines dairy product and farm level milk prices most of the time. Other than rather large surpluses of nonfat dry milk for the past three years, CCC purchases of surplus dairy products and associated government costs have been minimal. With both the demand and supply for milk and dairy products being highly inelastic in the short run, relatively small changes in milk production or commercial disappearance results in relatively large changes in dairy product prices and in turn farm level milk prices, as shown in the chart above.

There is also evidence that structural change in dairy farms may also contribute to milk price volatility. While dairy herds of 1,000 or more cows constitute only 1.3 percent of the dairy herds, they account for about a third of the nation’s milk production. Large modern dairy facilities allow dairy producers to expand more quickly in response to higher milk prices. Further, once the decision is made to expand by constructing new dairy facilities, the response to low milk prices may be slowed as the construction process is finalized and these facilities are filled with milk cows. Further, these large farms are in the dairy business for the long run and do not exit when prices are low as do smaller dairies.

Dairy product processors and wholesalers also attempt to address the risk of dairy product price volatility through improved production and inventory management. Increased dairy product price volatility has created reluctance on the part of processors and wholesalers to carry the risk of value changes from relatively high stock levels. This action pushes changing milk production and commercial sales conditions back towards the dairy processor. As a result, this change in production and inventory management may well contribute to increased price volatility.

Greater dairy product and farm level price volatility challenges dairy farm operators, cooperatives and milk processing companies. Farm business planning, debt repayment, and even solvency are impacted by this price volatility. Cooperatives that provide member services, and often substantial product inventories are challenged by price volatility. Dairy product volatility challenges dairy processors in managing inventory values, can impact cash flow and even result in their customers formulating their use of dairy ingredients. There exists a need for price risk management tools for dairy producers, cooperatives, dairy processors, wholesalers and end users of dairy products.

Dairy Price Risk Management Tools

This increased business risk from volatile dairy product and farm level milk prices spurred interest upon the dairy industry to consider price risk management tools. In 1993, the New York Coffee, Sugar and Cocoa Exchange (CSCE, now part of the New York Board of Trade) developed cheddar cheese futures and options contracts. At this time the Minnesota-Wisconsin Price (M-W) was primarily driven by cheddar cheese prices and the M-W was the base price and mover of Class I prices in federal milk marketing orders. Thus, cheese futures and options could be used to reduce the price risk for both dairy producers and dairy processors. Despite limited trading of the cheese contracts, in 1995 the CSCE introduced a deliverable Class III fluid milk contract. That same year, the Chicago Mercantile Exchange (CME) started its own Class III deliverable milk contract. Both exchanges terminated their deliverable fluid milk contracts in 1996 and began trading cash-settled BFP contracts. During the same year, the CME added a deliverable contract for butter and later, cash-settled contracts for cheddar cheese (1997), nonfat dry milk (1998) and dry whey (1998). In 2000, the BFP contracts were converted to Class III milk contracts to conform to federal milk marketing order pricing changes instituted on January 1. Later in 2000, the CME introduced futures contracts for Class IV milk. The dry whey contract is no longer listed. All of these contracts have associated options contracts. Due to limited trading the CSCE ceased dairy futures trading in July 2000.

Use of the butter, cheese, nonfat dry milk and Class IV contracts by the dairy industry as risk management tools has been minimal. With a relatively high support price on nonfat dry milk, prices have been stable and near support. Since Class III is cheese milk, it can be used by both dairy producers and cheese manufacturers to protect both raw milk prices and cheese prices. While butter prices are very volatile, the concentration of butter amongst a relatively few players appears to limit the use of butter futures. The Class IV contract is milk used for butter and nonfat dry milk. Since nonfat dry milk has been at support only changes in butter prices move the Class IV price. Thus, Class IV could be used by Grade B butter makers and butter wholesalers as a risk management tool. Also, the Class I price in federal milk marketing orders uses the higher of an advanced Class III or Class IV price as its mover. But, both the Class III and Class IV futures contracts are cash-settled against the announced final and not the advanced prices, thereby creating more basis risk for producers in relatively high Class I markets. Therefore, the Class IV contract has had limited use. The only active dairy futures contract is the Class III futures. As of March 23, 2004, open interest for Class III contracts and options were at an all-time high (32,299 for Class III futures contracts and 11,117 for Class
Federal Government’s Role in Dairy Price Risk Management

Dairy Options Pilot Program

The 1996 Farm Bill authorized USDA Risk Management Agency (RMA) to develop and implement pilot risk management programs. A Dairy Options Pilot Program (DOPP) was introduced in 1999 and ran through 2001. The objective was to train dairy producers in the use of dairy PUT options to protect future milk prices. Interested producers in 39 selected states were required to attend about a four hour educational program and to complete an application form before being eligible for DOPP. USDA subsidized 80 percent of option premiums for the dairy producer and paid $30 of broker fees. A producer could use PUTs to establish floor prices on up to 600,000 pounds of milk, but no more than 200,000 pounds for any single month. A total of 6,359 producers went through training. Of these 1,354 producers bought 6,512 PUTs. However, 10 of the 39 states had no producers buying PUTs. USDA’s costs were $4.9 million in premiums and $195,000 in broker fees.

There were a number of reasons for a relatively small number of producers actively participating in DOPP. During a four hour time period, not only was the requirements and procedures for participating in DOPP explained, but also all of the terminology and mechanics of dairy futures and options. Since for most dairy producers, this was their first real exposure to dairy price risk management tools, they were over-whelmed by all of this information. States that had follow-up sessions for producers held by the extension service and/or others, such as brokers, had better participation. A number of producers did not know how to contract a broker or were skeptical of brokers for DOPP participation. And many producers felt that the futures prices being offered did not meet what they considered acceptable price levels.

Dairy Forward Pricing Pilot Program

In 1999, the U.S. Congress amended the Agricultural Marketing Agreement Act of 1937. The amendment mandated the USDA Agricultural Marketing Service to implement a pilot program which exempts milk handlers regulated under the federal milk order program from paying producers and cooperative associations the minimum federal order prices(s) for that portion of their milk that is under forward contract. Producers and handlers could use forward contracts on all milk except Class I milk. September 2000 was the first forward contracts under the pilot program. The pilot program was introduced in 1999 and ran through 2001. The objective was to train dairy producers in the use of dairy forward contracts as a price risk management tool.

Most dairy cooperatives offer producers forward contracts. Federal orders require all handlers, cooperatives and non-cooperatives to pay the regulated minimum Class prices into the federal order pool. But, while non-cooperative handlers must also pay producers at least the regulated minimum price for the respective month, cooperatives are not required to do so. With a fixed price contract, if the federal order minimum milk price is higher than the contract price, the non-cooperative handler does not have the funds to pay producers this higher price because of the loss experienced on the respective futures contract used to protect the contract price. In contrast, a cooperative also pays the higher regulated minimum prices into the federal order pool, but is not required to pay the higher price to producers. It only pays the contract price. The pilot program exempts all handlers from paying producers the minimum federal order price. Since all handlers are required to pay into the pool minimum regulated Class prices, the argument that forward contracting undermines federal orders is weak. If the forward contracting is not made permanent, cooperatives could well have an advantage over non-cooperatives in procuring milk from those producers interested in forward contracts as a price risk management tool.

USDA, Agricultural Marketing Service, Dairy Programs Division, was required to submit a report to the Senate Committee on Agriculture, Nutrition, and Forestry and the House Committee on Agriculture on the effect of the pilot contracting program on prices paid to producers for milk. The report covered the period of September 2000 through June 2003, a time period where producers experienced both relatively high prices and low prices not experienced since the late 1970s. During this period, a total of 1,555 producers located in 16 different states entered into forward contracts under the pilot program. The four top states as percent of this total producer number participating were: Wisconsin 46.6%, Minnesota 30.5%, Idaho 7.7% and South Dakota 4.1%. These were states where milk plants were offering forward contracts prior to the pilot program and/or had price risk management educational programs for producers. But, since Class I milk use could not be contracted, the opportunity to contract was low in the relatively high Class I utilization markets in the South and Northeast.

Results of the study show that those producers who did contract marketed 6.371 billion pounds of milk during this period of which 4.277 billion pounds, or 67 percent was...
contracted. For the period of September 2000 through March 2002, the average federal order minimum price was $13.32 per hundredweight. The average contract price at $14.018 was $0.698 per hundredweight higher than the federal order price but $0.494 per hundredweight lower that the $14.512 average price received on non-contracted milk. However, it is important to note that both contracted and non-contracted milk prices averaged higher than the federal order price. Data for the period of April 2002 through June 2003 show that the average federal order minimum price was $10.819 per hundredweight. The average price for contracted milk was $13.985, $2.258 per hundredweight higher than the federal order price, and $3.166 per hundredweight higher than the $11.727 average price received for non-contracted milk.

These results clearly demonstrate that at times forward contract prices will be higher than non-contracted prices and vice versa at other times. The objective of forward contracting and other price risk management tools, such as hedging and the use of options, is to protect a farm milk price that fulfills the business objectives of the producer and not to get the highest milk price. Forward contracting is not a risk management tool suited to all dairy producers. Forward contracting has been practiced for years with grain and other commodities as a producer risk management tool. It therefore seems logical that any dairy producer who is interested in using forward contracting as a price risk management tool for their dairy business should have this opportunity, not just producers who ship their milk to a dairy cooperative. Further, there is little justification to shut out Class I use handlers in offering their producers forward contracts.

Governments role in the future
Both the DOPP and forward contracting pilot programs clearly demonstrate the need for producer education. Hedging in dairy futures, using dairy options, or forward contracting with a milk buyer requires another management decision of producers. For effective utilization of these price risk management tools, a producer needs to develop a farm business plan that includes costs of production and established milk price levels to reach set business goals, knowledge of what are realistic milk prices the market historically has provided and the relationship between their mailbox price and futures prices (the basis). Further, producers should follow what is going on in the market—cow numbers, milk production, dairy product stocks, commercial sales and the like—to get a sense on the probability that milk prices in the future may increase or decrease. But, clearly there is no exact science in determining the probability that prices will increase or decrease, or in using these risk management tools. Nevertheless, applying a well develop farm business plan along with price risk management tools can enable a producer to reduce the risk of declining milk prices, achieve established business goals, protect cash flow and the like. Government subsidization of the cost to producers using price risk management tools is probably less important than providing funding for producer educational programs. Government funds could be provided to states offering extension/outreach producer programs on price risk management, and/or organizing dairy producer marketing clubs.

New Risk Management Tools

Dairy Revenue Insurance Products:
The Agricultural Risk Protection Act of 2000 authorizes USDA Risk Management Agency (RMA) to develop revenue insurance pilot programs. Revenue insurance products could be effective in reducing either or both price and production risk. Currently, USDA RMA has several pilot programs in selected states. These are:

- The Adjusted Gross Revenue (AGR) and AGR-Lite programs which cover an entire farm's gross revenue, including that from commercial livestock;
- A Livestock Gross Margin (LGM) program for swine;
- A Livestock Risk Protection (LRP) program for swine, fed cattle and feeder cattle.

The AGR product provides protection against low revenue due to unavoidable natural disasters and market fluctuations. AGR is designed to provide insurance coverage for multiple agricultural commodities in one insurance product. However, no more than 35 percent of the revenue can be from animals and animal products and aquaculture reared in a controlled environment. AGR uses historical IRS Form 1040F information as the basis for the level of guaranteed revenue. Producers can choose from several coverage and premium levels. Loss is based on the difference between the approved AGR when the coverage was purchased times the coverage level and actual AGR as filed in the producers 1040F for the coverage year. AGR-Lite is similar but allows for 100 percent of revenue to be from livestock. AGR-Lite is currently available in all Pennsylvania counties except Philadelphia.

LGM is currently only available for swine in 99 Iowa counties. LGM covers both hog price and feed costs. This product insures the producer's gross margin, hog price minus feed costs. LGM pays the difference, if positive, between the gross margin guarantee and the actual gross margin. The prices for the LGM are based on simple averages of futures contract daily settlement prices rather than actual market prices received by the producer. The feed equations are based on an optimal feeding ration developed through Iowa State University. In essence the LGM product is insuring a return over feed cost.

LRP insurance is a single peril price risk product. Producers of fed cattle, feeder cattle and swine can purchase a contract with specific price coverage to protect against declining prices. LRP utilizes commodity markets to establish coverage and determine premiums. Coverage is flexible and can be purchased on any business day and has variable ending dates. LRP utilizes pricing from the CME and uses the CME to manage the program risk.

These types of insurance programs could be used to cover
risks in dairy. The AGR-Lite program may fit well with dairy producers who may also grow and market grain or soybeans, for example. It could be modified to consider changes not only in gross revenue but also expenses, particularly feed cost which often constitutes 40 to 50 percent of operating costs. Alternatively, a LGM product could be developed that essentially protects returns over feed costs. Announced federal order Class III or Class IV prices or average all milk prices could be used along with USDA-NASS published milk-feed-price ratio or prices for some standardized dairy ration. For a LRP program milk prices could be protected using CME Class III and Class IV futures. CME dairy contracts could offer producers good price protection since they are offered for all 12 months of the year.

Dairy producers could use AGR-Lite program along with crop insurance programs and dairy futures, options or forward milk contracts. For those that do, the premiums for an Agri-Lite product could be reduced accordingly. A difficulty in developing these revenue insurance products is determining what are un-avoidable hazards and the probability of occurrence to determine a reliable premium structure. Management skills among dairy producers also vary considerably. One producer may be able to hold milk production under heat stress and while another producer experiences a significant drop off in production, for example. Further, like with crop insurance products, government premium subsidies need to be at a level that encourages producer participation.

Because of the complexities of dairying and different dairying styles (grazing versus tie stall versus free stall and etc.) and management expertise makes designing such an insurance product for dairy difficult. The USDA RMA pilot programs currently underway should provide useful information to assist in designing similar programs for dairy.

**Income Averaging**
A simple income averaging program would allow producers to spread above average income over the previous three to five years. If those were lower income years, averaging can maintain a more level taxable income versus being bumped into a higher tax bracket. A more stable after-tax income is a means of risk reduction.

**Dairy Risk Management Accounts**
Introducing legislation to implement risk management type of accounts for producers has been an annual event in US Congress. But, while not un-popular, the idea has not gathered enough support by itself to make it through Congress.

A risk management or tax deferred savings accounts would allow producers to build cash reserves in years of higher income that could then be withdrawn in years of lower income to stabilize the financial situation and reduce risk. There are several important issues about the functioning of these accounts. These include the amount producers would be allowed to deposit in any given year, whether the government would match any funds deposited, whether there would be any time limit on maintaining funds in the account, whether there would be a market trigger or other mechanism to initiate fund withdrawals, and disposition of the fund if the operator dies or otherwise quits farming.

There are potential benefits of these types of risk management programs. Producers, perhaps, would be more comfortable with these programs than dairy futures, options or forward contracting. The reason being tax deferred savings accounts do resemble regular savings and IRA accounts. Further, any improved financial stability for producers would reduce the need for farm program subsidies such as the current Milk Income Loss Contract program and emergency assistance programs. But, meeting these benefits as a risk management tool would mean that the risk management accounts create new savings rather than transferring other accounts to risk management accounts. These new savings would likely have to come from reduced living draws or from diverting funds that would have been invested in the farm business.

**Innovation in the Dairy Industry**
The federal dairy price support program no doubt has delayed or discouraged innovation within the dairy industry. This was particularly true during the mid-1970s to the mid-1980s when the support price was set at a level where it determined dairy product prices and farm level milk prices most all of the time. With high support prices and little price risk dairy producers, cooperatives, processors and wholesalers can become every comfortable with how they are operating. But a support level, or no support price that allows market forces to determine prices provides opportunities for improving business performance for innovators. Dairy producers who are able to lower production costs through innovative production and business management may still cash flow at low milk prices and do very well at average and above average prices. But, seldom is there a year when dairy futures and options (or cash forward contracts offered by milk buyers) do not at some point, while maybe a very short period, offer dairy producers the opportunity to protect milk prices near or above historical averages. At the same time, using similar tools to protect feed costs enables innovative producers to protect profitable operating margins. For innovative producers who use price risk management tools there will be periods where they give up some of the opportunity for higher prices but, more importantly they are protected against falling or low prices. The objective of these producers is to add stability to their milk revenue stream and to protect a milk price level that enables them to fulfill their business objectives each year. As a result, these price risk management tools enable dairy producers to take financial risks of modernization of their dairy facilities or making major expansion decisions.

Allowing markets to work does result in price risk. But competition for markets forces cooperatives, processors and wholesalers to be innovative in product development, processing, packaging, and product distribution. These risk management tools enables innovators to take the risks as-
sociated with making major changes in their business operation via protecting inventory values, operating margins, advanced product pricing, and etc.

In summary, allowing markets to work and the resulting price volatility actually offers innovators opportunities to improve their business performance over that of relatively little price risk due to high federal support prices and/or deficiency payments. Frankly, many of these innovators welcome the opportunities that markets do offer.

Summary

Unless federal dairy price support policy is changed to provide a higher safety net that reduces price volatility, an unlikely event, considerable dairy product and milk price volatility and associate price risk will continue for dairy processor, wholesalers and producers. Learning how to managing this price risk is necessary, if producers wish to protect the financial soundness of their operation and cash flow during periods of relatively low milk prices, especially those producers who are highly leveraged and not able to withstand long periods of low milk prices. If appropriately applied, dairy futures, options and forward contracts are price risk management tools that can reduce this price risk exposure. But, effective producer educational programs will be required to increase the level of knowledge amongst producers so they fell comfortable in using these tools.

Revenue insurance products could be effective in reducing either or both price and production risk. But, because of the complexities of dairying and different dairying styles (grazing versus tie stall versus free stall and etc.) and management expertise makes designing such an insurance product difficult. The USDA RMA pilot programs currently underway should provide useful information to assist in designing similar programs for dairy.

Income averaging and tax deferred savings accounts maybe easier to design than revenue insurance products and maybe more familiar to producers. But, these programs do not necessarily replace the need for other risk management products.

None of these risk management products will likely be accepted by the majority of producers. All probably would require government assistance to encourage producer participation whether this be financial assistance for producer educational programs, subsidized insurance premiums, or matching tax deferred savings accounts. Further, not all producers prefer the same type of risk management product, and some of these products may be used together to reduce price and/or income risk for a given producer. Therefore, it makes sense to offer a variety of these risk management products.
Animal agriculture is becoming more concentrated each day. The concentration that started in poultry and pork production appears to be moving slowly into dairy and even into beef production. While the changes in the dairy industry are less pronounced than what has occurred in poultry and pork production, there has and continues to be a movement toward fewer but much larger dairy farms in the United States (Collins).

It has been well documented that the number of dairy farms and dairy cows in the United States has been declining over time. In 2002 there were about 91,000 dairy farms in the United States, down 6 percent from 2001 and 73 percent from 1980 (NASS, p. 16 and Agricultural Statistics). At the same time, the average dairy herd size has increased. Of the 91,000 farms, in 2002, there were 380 dairy farms having a herd size of over 2,000 cows, up 19 percent from 2001 (NASS, p. 22). These 380 farms account for 15 percent of U.S. milk production.

The increase in herd size comes as a result of several complementary factors such as widely available and relatively inexpensive grain and forages freeing up labor from farming activities, enhanced management capacity, and improved technology in several areas including production and information. It has been suggested that this combination of factors has resulted in significant economies of size within dairy farming (Phillips, pp. 189-202). These economies of size not only are reflected in lower costs of production as size of farm expands, but in some instances the ability to garner higher net prices for milk.

When dairy farms reach a certain size, they may have the ability to efficiently engage in several different types of vertical integration including input sourcing, taking on additional processing functions and/or becoming formal partners to other dairy and food industry participants. The latter functions can be loosely characterized as those associated with being a producer-handler.

It is the purpose of this paper to address the issues associated with producer-handlers and speculate on the potential impacts of the movement toward producer-handler activities by some of the nation’s largest dairies. The word “speculate” is used as opposed to “analyze” because for all practical purposes there is no published data. That is, the available information is largely anecdotal. Yet, anecdotal information on cutting edge developments can be very useful in suggesting potential industry structural change that needs to be considered by dairy and food industry managers in intermediate-term and long-term strategic planning.

Background on Producer-Handlers

There have been producer-handlers operating in the dairy industry for many years. While the focus of the current paper is on large farms, it should be pointed out that in the past, the majority of producer-handlers tended to be smaller operators who developed and operated in small niche markets. More recently, larger farms have found increased ability to generate higher milk prices (quantity premiums) for comparable quality milk than smaller farms. An increasing number of these farms have become directly engaged as ingredient suppliers of products other than raw milk, as processors and distributors of products such as ultrafiltrated milk, specialty cheeses, or bottled milk, or having an influence on the location of processing facilities (such as cheese plants) owned by partners in the milk business. These developments have the potential for substantially impacting the future structure of the milk business in the United States, if not internationally.

While there are efficiencies to be gained by producer-handlers, there are also additional costs that need to be considered such as the cost of balancing. Many producer-handlers self balance while still others have both formal and informal arrangements to take excess milk or to supply any shortfalls in production. The cost of these functions is not trivial, however, the lack of available data limits what can accurately be said about the cost of balancing.

The Size of the Producer-Handler Share and Regional Distribution

The volume of milk sold by producer-handlers in the United States has been declining over time. In 2002 there were about 91,000 dairy farms in the United States, down 6 percent from 2001 and 73 percent from 1980 (NASS, p. 16 and Agricultural Statistics). At the same time, the average dairy herd size has increased. Of the 91,000 farms, in 2002, there were 380 dairy farms having a herd size of over 2,000 cows, up 19 percent from 2001 (NASS, p. 22). These 380 farms account for 15 percent of U.S. milk production.

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States has decreased from 1.47 billion pounds in 1980 to 1.16 billion pounds in 1998 -- the last data reported by USDA. Over the past few years the data was reported, the percent of all producer sales made up by producer-handlers ranged between 0.65 percent in 1993 to a high of 0.86 in 1996.

Producer-handlers operate in most of the major milk producing states. Individual producer-handler data was reported for about a quarter of the states in the final 1998 report. Over much of the 1990s, producer-handlers in California, Pennsylvania, and Washington accounted for more than three-quarters of all producer-handler marketings.

A Profile of On-Farm Processors
The increased interest and emphasis in value added businesses by producers led to a survey of on-farm dairy processors (Schwart, et al.). This national survey was sent to 127 dairy producers in 15 states. On-farm processors were identified by state departments of agriculture and state extension economists. The response rate was 26 percent or 33 usable surveys.

The on-farm processors were generally smaller in size. The amount of milk processed ranged from 25,000 pounds to 36 million pounds. The average amount of milk processed across the 33 respondents was about 3.5 million pounds annually providing evidence of the smaller size operations that were surveyed. This would equate to the annual production from about 187 cows.

The profile of the operations indicates that the oldest operation began processing in 1913 while 44 percent began processing since 1993. Forty-five percent of respondents process and sell 3 or more products from milk with 32 percent having trademarked products. From a pricing standpoint, the average cheese prices received ranged from $2.75 to $10.00 per pound. Packaged milk prices ranged from $1.15 to $3.59 per half gallon.

While the survey respondents tended to be smaller they reflect one part of the producer-handler population, that of smaller producers trying to develop a value added business. The rest of the producer-handler population (and the focus of the remainder of this paper) is large milk producers who have grown to the size and scale to capture economies of size and to be able to enter into direct contractual relationships with large commercial processors or own the processing facilities themselves.

How Big Does a Producer-Handler Need to Be?
From an economic perspective, a large farm is one that realizes most of the economies of size and is able to most effectively serve the needs of the market(s) being addressed. Simply selling raw milk does not require as large an operation as becoming a processor or a partner to a processor. Work with representative dairy farms at Texas A&M has led to the conclusion that the costs of producing milk decline to a herd size of at least 2,000 (Phillips, pp. 189-202). Conventional wisdom among some large producers and industry experts contend that the optimum is 2,500 cows. A 1996 study by AFPC concluded that areas having large farms were in the best position to increase their net worth and continue to grow (Knutson, et al.).

Legal Issues Associated with Producer-Handlers
Dairy farmers have certain policy privileges that other agriculture industry segments do not enjoy. For example, farmers enjoy special privileges under bankruptcy laws. They can form cooperatives, as can all farmers, and pay their farmer-members less than the blend price under Federal Milk Marketing Orders (FMMOs). Other agriculture segments do not have policies that have formed comparable entities to FMMOs. Cooperatives can vote as a bloc in support of FMMOs or to throw them out. Cooperatives also enjoy certain antitrust privileges.

The primary legal issue associated with farmers who operate as producer-handlers has been their exemption from the pricing and pooling provisions of FMMOs. This means that they do not have to account to the pool at the Class I price for milk that they bottle. There has been a recent hearing on the producer-handler exemption in the Pacific Northwest and Arizona-Las Vegas marketing areas requested by producer groups – primarily cooperatives who advocate treating farms who are producer-handlers above a certain size different than smaller farms. This contentious argument revolves around the extent that large producer-handlers undermine the current regulatory system by creating a situation of disorderly marketing. Many dairy industry observers expect that without changes to the regulatory system, large dairy farms will continue to explore arrangements directly with processors or becoming processors themselves. A few dairy industry observers, such as the authors, feel that there are enough economies of size benefits for producer-handlers that these changes will occur even if the exemption is eliminated.

This raises questions of whether a “farmer” involved in processing functions other than selling raw milk should be treated as a farmer or as a processor? Is there a point at which a dairy farmer is no longer a farmer or does not enjoy all the privileges of being a farmer? At that point, if a cooperative has members who are not farmers, should the cooperative enjoy all the rights and privilege of a cooperative that includes only farmers. For example, if a farmer becomes an ingredient supplier to a cooperative through performing further processing functions on raw milk, should the various exemptions enjoyed by the cooperative be revoked? Put differently, can a producer-handler be a member of a cooperative and the cooperative retain all or some of its exemptions? It is not the purpose of this paper to answer these questions, but rather to point out that they become issues as the size of dairy farms increases and the
functions they perform changes. Perhaps most important is that the dairy industry needs to determine in advance the degree to which issues of farm size and functions performed by farmers affect the structure of agriculture and the laws under which they operate.

**Structural Implications of Producer-Handlers**

The following are a number of ways in which the development of large farms could affect the conventional structure of the milk industry:

- Large farms could become processors and supply specific retail segments with milk and its products. This is not a new concept. Throughout history some farmers have chosen to be producer-handlers by processing milk or specialty cheeses and selling directly to consumers. The difference today lies in the scale of farm operations and structural change within the retail sector. The retail segments that have been proven to be the most adaptable to this structural change is the warehouse or membership supermarkets that sell a limited line of products such as gallon jugs of whole, 2 percent, and skim milk. These supermarkets account for the largest share grocery sales in particular markets. Aside from the potentially lower price, linking up with a larger producer-handler provides a closed source of produced and processed milk that is 100 percent traceable, an increasingly important requirement to supermarkets and the general public.

To how large a farm can this structural change be adapted? Conventional wisdom indicates that economies of size in fluid milk processing and distribution are very large (Erba, Aplin, and Stephenson). However, it also indicates that specialized plants and streamlined distribution systems have substantially lower costs. The question is the extent to which processing and distribution technology can be adapted to take advantage of the special characteristics and requirements of warehouse or membership supermarkets and ability of large dairies or families of dairies to grow to the required size? While the illustration used here is fluid milk, the same reasoning can be applied to ice cream, cream/milk for coffee shops, and specialty outlets for cheese. The issue is one of adapting technology to specific markets, specialization, and downscaling the economies of processing and distribution.

- How will cooperatives, conventional processors, and conventional retailers react to these developments? In the past their first reaction has been to regulate them out of existence—call in the lobbyists and attorneys. This strategy seldom works. Aside from the historical reluctance of policy makers and courts to regulate vertical integration, the efficiency advantages may be sufficiently great to overcome regulatory constraints.

- An alternative strategy by processors and large dairy farmers could be to abandon the traditional processors’ reliance on cooperative full supply arrangements and go directly to large farmers as their main supply sources. This strategy could be attractive to large farms that desire not to engage in processing and to farmers in the 500 cow to 1500 cow size range that desire to grow. It would require that processors reestablish their procurement operations, which have been largely abandoned in deference to cooperatives. It may also require assistance to farmers in developing more large farms. It could require a reconfiguration and streamlining of processing plants. The question is whether the investors in major national and multinational dairy firms would be willing to put up the capital required to make such structural adjustments. A roadblock to this type of arrangement is the movement of retailers and processors toward fewer suppliers. An arrangement with one cooperative may be easier.

- Cooperatives would need to adapt their structure and operating procedures to large farmers. This requires giving large farmers a bigger voice in their cooperative, which many dairy cooperatives have done. This may not be sufficient. Cooperatives may need to consider segmenting their operations into large and small farmer subsidiaries. Alternatively, separate cooperatives may need to be developed to serve the needs of large farmers. Either of these strategies would require agonizing adjustments within the cooperative sector.

**Impacts on Dairy Product Innovation**

Clearly the movement toward fewer but larger dairy farms will continue. Whether the operators of these larger farms desire to take on additional processing functions is yet to be seen, however, recent evidence suggests that producer-handlers will foster innovation in supply-chain management (from cow to consumer). Perhaps some of the biggest innovations will occur at the processing level as new technologies become more scale neutral. To the extent that regulated producers are suffering due to the current exemption allowed producer-handlers, then innovation for these producers is likely to be negatively impacted.

Any changes to the current regulations could alter these relationships in the future, however, the movement toward larger operations will not be stopped. These operations will continue to be a major source for future innovation in the industry.

**Summary**

The development of a growing large farm segment having more than 2,000 cows creates the potential for major
changes in the structure of processing segments of the milk industry. While these large farms have demonstrated the ability to obtain advantageous pricing arrangements, by further growth and/or amalgamating these farms into even larger operations, opportunities are created for further processing. Traditional processor and cooperative segments will need to develop strategies for adjusting to these changes. Creating large farmer partnerships with conventional processors may be required. Further cooperative adjustments will be required to give large farms at least a portion of the benefits they could obtain from engaging in further processing or developing partnerships with conventional processors.

Endnotes

1 Such formal partnerships may take a number of forms such as joint ventures and various other formal contractual relationships.

2 This is not to suggest that larger farms always have lower costs. Large farms vary in quality of management and operate under varying milk production conditions, leading to differences in production costs.

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Large Farm Issues:
Payment Limits

David Anderson and Joe Outlaw
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Limiting farm program payments to farmers has been a contentious issue for many years. Limiting payments has been discussed as the means to target payments to smaller farms in order to hold back the tide of structural change in agriculture, to target those who “really need” the money, to prohibit some producers from getting “too much” money, and to limit overall farm program spending. Payment limits, themselves, have also created another area for dissension between large and small farmers. The side of the argument one falls on, to limit payments or not, generally is dictated by one’s perspective on the goals of farm programs. Those putting more weight on the goal of supporting family farms tend to support payment limits. Those seeing the primary goal of farm programs being to maintain a large supply of inexpensive food supplies generally do not support payment limits (Payment Limit Commission).

Prior to the 2002 farm bill, payment limits have not been an issue in dairy programs. Although the Dairy Market Loss Assistance program did have limits on eligible production. This is in stark contrast to crop programs where payment limits have been an issue since the 1960s. However, with the introduction of the Milk Income Loss Contract (MILC) program in the 2002 farm bill, payments were limited and thus program benefits were targeted towards smaller farmers. The push to target benefits is tied to the rapid structural change in the industry. The discriminatory impact of the MILC program towards large farms indicates that the future of direct payments in dairy policy will concern large farms.

Section one of this paper reviews the role of payment limits in U.S. agricultural policy, particularly with regards to crop policy. The effectiveness of limits, their problems, use, and their end result are detailed. Section two examines dairy programs and any past limits on benefits. Section three discusses payment limits as a large dairy farm issue. The paper concludes with some lessons learned from payment limits.

Background from Crop Programs

Commodity programs, as we know them today, began in the 1930s. Support prices in the form of non-recourse loan rates for program crops and the milk classified pricing system under the Federal Milk Marketing Orders both began during this period. Over time, farm programs evolved to include supply controls in the form of acreage reduction programs and diversion programs. Also over this time the number of farms continued to shrink and farms continued to expand in size.

Payment limits became an issue during the 1960s when it became known that a few cotton farmers were receiving more than $1 million each in government farm program payments (Jenkins, 2003). Numerous attempts were made to limit farm program payments during the 1960s on the grounds that no one should receive that much money from the government, that large payments were contributing to the demise of family farms, and to reduce government outlays. The lines of debate were quickly drawn on regional grounds due to the regional differences in farm sizes and major crop enterprises across the country. Smaller farms in the Midwest growing corn and soybeans did not receive nearly as large a payment as did larger cotton and rice farms in the South. The higher costs of production for cotton and rice, relative to corn and soybeans, also contributed to the larger payments made to cotton and rice.

Payment limitations were largely defeated by agricultural interests on the grounds that if payments were limited then farm program participation would be reduced, making supply controls ineffective and thus sharply increasing government spending. Legislation limiting farm program payments was finally passed as part of the 1973 farm bill. Over the next 3 decades the levels of the individual limits varied widely and by type of payment.

The current limits included in the 2002 farm bill are $40,000 for direct payments, $65,000 for counter-cyclical payments, and $75,000 for loan deficiency payments/marketing loan gains. However, that is not the entire story. Shortly after the implementation of payment limits, a determination was made on who was a “person” for payment purposes. Many farmers had partners, often with family members, or were family corporations. And the delicate question of "Are
wives people?” had to be answered. (The answer was yes!) Thus the true limits are equivalent to one payment “limit” plus one half of two others. This is known as the 3-entity rule \((1+1/2+1/2)^2\).

Means testing, another type of benefit targeting related to payment limits, was enacted in the 2002 farm bill. The farm bill contained a provision to prohibit anyone with an adjusted gross income greater than $2.5 million from receiving farm program benefits unless 75 percent of their adjusted gross income was earned in agricultural enterprises. That agricultural designation included fishing and timber businesses.

Effectiveness
The effectiveness of payment limits in crop programs has always been questioned. The end result has been that payment limits in crop programs have not been effective in limiting payments for a number of reasons.

Perhaps the most important reason for the ineffectiveness of payment limits is that large farmers reorganized their operations, on paper at least, into more, smaller units. These structures were small enough to maximize the farm program payments. In that way, no money was “left on the table.” The classic example of this practice was called the Mississippi Christmas Tree. In this example multiple farm units were established using partnerships and corporations with various family members and others. It is important to note that this practice did not result in actual, or real, changes in farm operation or in ownership. Large farms continued to produce as they did before to capture economies of size in production.

Another reason for the ineffectiveness of payment limits is that Congress often increased the limits during times of financial crisis. When prices and crop farm incomes were low and consequently both the payments would be larger and the need would be greater -- Congress increased the limits. This occurred, for example, in the late 1990s when the limit on loan deficiency payments was doubled to $150,000.

The use of generic certificates rendered limits on loan program gains ineffective. Generic certificates were introduced during the 1985 farm bill to allow the Secretary of Agriculture to make in-kind payments in the form of negotiable certificates for commodities in government stocks instead of cash payments (Glauber, 1988). The sale of those certificates, or their redemption for cash, does not count against the payment limit.

While payment limits have been implemented for program crops they have proved ineffective overall. The 2002 farm bill established a commission on payment limits to study the issue and resulting impacts if limits were tightened. The commission reported back to Congress in 2003. The primary recommendation of the commission was to do nothing on the issue until the next farm bill. The practical reason for this recommendation was not to harm producers who had made investment decisions based on the current rules. Other recommendations were to tighten the rules on persons involved in the farming operation and to make the system more transparent by tracking individual’s involvement using social security numbers, for instance. The end result, however, is that the issue will remain contentious over the next few years.

Payment Limits in Dairy
Government programs in dairy have been different from crop programs. Direct payments have, generally, not been used in dairy, as in the crop programs, until recently. For example, there was no limit on the amount of money one could receive in the dairy herd buyout. Direct payments that have been used in the past were one time shots. A one year payment would be less likely to induce farm organization changes than would a multi-year program as seen in crop programs.

The MILC program is different from past direct payments in the dairy industry. It pays 45 percent of the difference between $16.94 and the Boston Class I price on up to 2.4 million pounds of milk. MILC was enacted in the 2002 farm bill to run through 2005. The multi-year nature of the program made it more like other commodity programs. This program limits eligible production rather than a specific dollar amount of payments. About half of milk production was ineligible for payments. This type of limit is one that has not occurred in crop programs. However, crop programs also include a limitation on eligible quantity as direct and counter-cyclical payments to crop base holders are paid on 85 percent of base acres multiplied times their payment yield.

There is little evidence of restructuring operations, on paper, in the dairy industry comparable to that in the crop sector. Anecdotally, that may be due to the nature of milk production with the cows going through a milking parlor. The parlor is a large fixed investment that is in one place. Local Farm Service Agency (FSA) offices may also have implemented the rules in different ways in different parts of the country. Some parts of the country may have used more strict interpretations than others. Operations that were clearly defined partnerships prior to the MILC program may have had the opportunity to register as separate units. On balance, it would appear that the payment limit built into the MILC program has been effective in targeting payments to smaller farmers.

Limits as a Large Dairy Farm Issue
The payment limit contained in the MILC program has been effective in targeting benefits to smaller farms. Whether or not to continue MILC with or without this targeting mechanism depends on the social goal of the program.

However, large farms have been affected by the MILC program beyond simply only receiving payment on 2.4 million pounds of milk. The MILC program has kept mar-
ginal or retiring dairy farms in production longer than they otherwise would have been. It has insulated smaller farms from the very low milk prices of the last couple of years. In doing so, MILC has exacerbated the problem of low milk prices and has extended the period of low prices. In the case of MILC, large farms have been limited in the amount of government support payments they could receive and have received even lower prices that more than offset the payments they do receive. Early estimates of the impact of programs like MILC indicated that payments would fail to offset lower prices for dairies over about 400 cows (Anderson, et al, 2001). The end result is that MILC has had a detrimental impact on larger dairy farms.

While the MILC payments were targeted to smaller producers and have probably kept some of those producers in business longer, it has not changed the fundamental structural changes going on in the industry. Farms continue to expand and grow because there is an economic incentive to do so.

Payment Limits and Product Innovation

Little has been written about payment limits and their impact on innovation. Limiting payments, as done in dairy, has had a detrimental impact on large farms. In crop agriculture, it has often been argued that effective limits would result in higher production costs because it would keep farms small with higher per unit costs unable to take advantage of economies of size. It is reasonable to argue in dairy that direct payments, as currently implemented, negatively impacts the largest, lowest cost segment of the industry. That is the segment of the industry that may be most able to create production innovations.

Conclusions

The issue of payment limits has been a thorny one for policy makers. Payment limits have been in place for crop commodity programs for more than 30 years, but have not been effective. It would appear that the attempt to limit, or target, MILC payments has been successful. That may either be due the program not being attractive enough to make getting around the limit worthwhile or it has been more difficult to make the operation changes on paper that would enable paper limit avoidance.

The issue of targeting benefits to smaller farmers has clearly had detrimental large farm impacts. Continued direct payments in the form of MILC will continue to have a negative impact on large farms and add divisiveness to an industry already in turmoil over structural change.

Endnotes

For a more detailed discussion of the 3-entity rule and farm program payment limits see the Payment Limit Commission’s report.

References


The Idaho Situation and Brief History

Prior to the early 1990’s dairy cow numbers in Idaho had been declining or stable. The high point had been reached in 1944 at 277,000 head and then declined until 1978 to only 139,000 head. Dairy policy helped raise that number to 175k for the dairy reduction program in 1983 and a rebound to 174k for the dairy termination program in 1986. After bottoming at 160,000 numbers began climbing and really accelerated in 1994. At the same time, facility sizes began increasing. At first a 1,000 to 1,500 cow facility was “big”. By 1998 you had to have over 2,500 cows to be “big” and a few “Grandé” facilities of between 5 and 10 thousand head have been built.

Pre-MOU

How this looked depended on one’s perspective. Dairymen viewed the whole process as “what problem or no problem”. At the time the EPA was the only regulatory agency in town – rarely we might add – and their view was that these CAFO’s had major potential for pollution. For the general public it was a bit of a “Shock and Awe” situation that eventually turned ugly. In their view they simply stink.

The 1990’s was a good economic period in Idaho and as the economy grew so did many rural towns. Owning your piece of the country was desirable and the rural urban interface came face-to-face. Often.

Increasing concentration of animals, increased rural subdivisions, greater concern about the potential environmental consequences of the waste issues and water quality issues heightened concern about the advisability of more dairy expansion. To cap things off there was little to no regulation by state or local entities over dairy operations.

The EPA was charged with checking on water quality violations. Their enforcement usually meant coming to town in the spring and citing 6 to 10 facilities for pollution of canals or streams. Fines typically ranged from $20,000 to $50,000. This grabbed headlines every spring. The dairies would appeal and normally get the fine reduced to a few thousand dollars. No real change would occur and next year someone else would be the target of enforcement. This persisted through the mid-1990’s.

- Most Dairymen failed to see a problem, either real or as public perception
- Access of animals to water ways was an issue
- Most operations lacked or had inadequate runoff control
- Agronomic application of wastes (solid and liquid) was minimal
- Lagoons would discharge into canals, sometimes by design

A brief Regulatory History

The 1972 Clean Water Act made it illegal to discharge pollutants into waters of the United States from a specific point unless permitted. Idaho is an undelegated state. EPA funded a study in 1985 to look at surface water pollution. In May of 1987 the EPA issued Idaho a general permit to regulate waste water discharges from Idaho CAFO’s. That expired in 1992. As a response to the NPDES permit in 1987 Idaho developed waste management guidelines for CAFO’s to assist operators and regulators understand best management practices (BMP) to prevent pollution and aid in compliance with State and Federal regulations.

In 1990 the legislature passed the Idaho Nutrient Management Act that required a formal plan for nutrient management in impaired river basins. The Mid-Snake river Basin is designated as impaired. A Mid-Snake plan was developed with input from all interested parties. This was revised in 1997 and continues to be the basis for Idaho dairy regulations.

A proposed draft to revise the EPA permit was developed by EPA with public input in 1993-94. Meanwhile the Dairymen’s organization – United Dairymen of Idaho (UDI) – conducted an independent evaluation of the dairy waste issue and reported findings at the annual meeting that fall. Awareness of the situation was raised considerably as a result.

Post-MOU

As a result of the awareness of the situation, potential
problems and increasing public scrutiny, UDI formed a task force to change the way regulation was handled. This group met through 1994 and continued into 1995. The memorandum of understanding (MOU) was signed and went into effect in October of 1995. The MOU had the full support of Governor Batt and was signed by the Idaho state Department of Agriculture, Idaho Department of Environmental Quality, the US-EPA and the Idaho Dairy Association.

The MOU converted from a system that was complaint driven and regulated by EPA and DEQ to an inspection system regulated by the ISDA Dairy Bureau. Since the Dairy Bureau is on all dairies 1 to 2 times per year for Grade A/B inspections adding waste compliance to the inspection made sense. The MOU also provided a “Big Stick” with the ability of the Dairy Bureau to stop shipment of milk from farms in non-compliance.

The process was implemented in 3 phases. First were initial inspections of waste systems and identification of potential waste issues. The second phase was to bring dairies into compliance with short term and long term solutions. Inadequate storage of wastes, especially liquid waste, was a problem for many dairies. Of approximately 1150 dairies in 1996, nearly 800 were in non-compliance and over 400 had discharge violations. Lined storage of 180 days and a 25 year 24 hour weather event need to be met. EQUIP funds aided many operations in affording the compliance measures necessary.

The third emphasis of the program was to address issues around transfer of title on existing facilities, new dairies, construction standards, and planning/zoning issues. The solution to that was legislation requiring comprehensive nutrient management plans for all dairies. That involved training nutrient management planners, producer awareness and education of responsibilities and a due date of July 1, 2001 for plans to be filed with IDSA. In addition, new facilities or ownership changes had to have a plan filed prior to ISDA issuance of a milk permit.

All Idaho dairies did meet the July 1, 2001 deadline for filing CNMP plans. The ISDA dairy Bureau has been reviewing these and many do not comply with at least some of the BMP requirements. In part, this is due to the fact that until the last 120 days only about 150 of 935 dairies had filed or were in the process of developing a plan. Many were rapidly put together to meet the criteria of something to file. Not the criteria of meeting BMP guidelines.

In 2002 the legislature, after extensive pressure from a concerned public, passed odor legislation. That has not been fully implemented as odor standards are being developed.

**The Hoops**

In Idaho to obtain a permit to build or expand a dairy there are several steps to go through. These are the same in either case. To obtain a permit dairymen start at the local level in counties that have a CAFO ordinance. While marking off the local check list they must also get federal and state permits taken care of.

**Federal**

Any CAFO in Idaho must comply with all EPA – CAFO/AFO regulations. A new rule went into effect December 15, 2002 requiring all CAFO's to apply for a non-point discharge elimination system (NPDES) permit. As with any good bureaucratic program, there are numerous pages listing a multitude of requirements.

In a nutshell, you first have to be an AFO, and then you might be a CAFO, in which case you are one of three kinds.

An AFO is any facility that confines animals for 45 days in any 12 month period. No vegetation is sustained in the confinement area. An AFO becomes a CAFO if:

- It has 700 or more mature dairy cows it is considered a “large-size” facility
- It has 200-699 mature dairy cows and it has discharged to the waters of the U.S. it is considered a “medium-size” facility
- It has less than 200 mature dairy cows, it has been previously inspected, it has discharged to the waters of the U.S., and has been designated as a CAFO it is considered a “small” CAFO.

If a dairy is a CAFO it must have an NPDES permit. If the operator is not sure they can call EPA and find out if they are. Once an NPDES permit is applied for the operator must comply with the permit requirements. Major areas for permit compliance include a nutrient management plan, wastewater storage and application, manure storage and application, recordkeeping and annual reporting requirements.

Idaho will receive a single general permit from the EPA for the state. The permit will outline the final specific requirements that dairy producers will need to comply with. The permit is expected to be approved in the fall of 2004.

**State**

With the MOU in 1995, ISDA handles all regulations for CAFO’s in the state. Waste regulations encompass both solid and liquid material, their storage, containment structures and land application. To facilitate the process for operators about six years ago the state began development of the “One Plan” internet site. This brings together various agencies and procedures for agricultural interests. Not only dairy but beef, other livestock and crops can work through the information and permits they may need at the state level all in one place. As the web page defines its concept:

“To provide an efficient way for farmers and agencies to interact so as to reduce the regulatory red tape and cross agency bottle necks farmers have faced. The OnePlan will provide a focal point where a grower can find the various conservation requirements of the assortment of agencies regulating them. More
dramatically. The OnePlan site will provide data and downloadable software enabling the grower to develop a single conservation farm plan that will be pre-endorsed by the various agencies, thus streamlining and simplifying the entire regulatory process facing some farmers."

In 2001 when dairies were mandated to have CNMP's filed by July 1 the program was not generally operable. Some certified planners were able to access it but it was not able then to do a complete plan. Now, the ISDA routinely uses it to revise the plans not meeting standards and can usually do a plan in about 4 hours.

In addition to the CNMP a dairy is also often faced with a water right transfer. That is handled by the Idaho Department of Water Resources (IDWR). In western states like Idaho water rights are based on the doctrine of "first in time, first in right" or prior appropriation. In Idaho the right is for a specific amount or flow of water attached to a specific physical acreage.

In the 1980’s a lawsuit over flows at Idaho Power’s Swan Falls dam for adequate flows to generate power led to a moratorium on issuances of any new permits and eventually to the adjudication of all rights in the Snake River basin. That is 121,684 Idaho water rights. The adjudication process has been in process for 15 years, is 88% accomplished, and is planned for completion in 2005. One thing that has become certain is that both aquifer and surface water have been appropriated to the max. And more.

In order to obtain water for a dairy the dairyman typically purchases crop ground with a water right. He then applies to IDWR for a transfer of the water from the crop ground to the dairy location. He also applies for a change of use from crop to livestock. Part of the permit process is a public hearing on the transfer application. Any interested member of the public can testify at the hearing. This has been one of the most commonly used avenues by parties opposed to

<table>
<thead>
<tr>
<th>5 County Comparison</th>
<th>Canyon</th>
<th>Gooding</th>
<th>Jerome</th>
<th>Twin Falls</th>
<th>Cassia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restricted to Specific Zones</td>
<td>Ag, Lt Industrial, Heavy Industrial</td>
<td>Ag Only</td>
<td>Agricultural</td>
<td>Agricultural, Ag Range Preservation</td>
<td>Residential Ag, Ag Prime, Multi-Use</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
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<td>Annual report to Co.</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
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<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
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<td>Signed Contracts for manure disposal on other property</td>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>Y – Waste Management Area’s</td>
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<td>Y</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
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<td>Lagoons/Waste storage Containment structures</td>
<td>¼ mile to homes 300 ft inside property line</td>
<td>¼ mile to homes 300 ft inside property line</td>
<td>300 ft to homes 300 ft/inside property line. 50 ft for wells from anything 300 ft</td>
<td>¼ mile to homes 300 ft inside property line</td>
<td>¼ mile to homes 175 ft inside property line</td>
</tr>
<tr>
<td>Subdivisions/Municipal boundaries</td>
<td>1 mile ½ mile; ½ mile from SR</td>
<td>¾ mile; ½ mile from SR</td>
<td>½ ft per AU</td>
<td>¼ mile</td>
<td>¼ mile</td>
</tr>
<tr>
<td>Site Inspection Livestock Density</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>N</td>
<td>10 AU/AC</td>
<td>10 AU/AC</td>
<td>10 AU/AC</td>
<td>10,000 HD MAX</td>
<td>5 HD/AC</td>
</tr>
<tr>
<td>Lighting Ordinance Approval of plan by Fire, Highway, Irrigation, Health districts</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
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<td>NRCS Soils approval for waste plan</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
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<tr>
<td>ISDA Milk Permit</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

As a side note, an animal unit (AU) is defined as a mature 1,000 pound cow. All the above counties define a dairy cow as 1.4 AU’s.
expansion of the dairy industry to protest. In several cases it has been successful, and has often resulted in delay and additional expense to the dairy to work through the hearing process.

Local
The late great Speaker of the House of Representatives and Irish-American “Tip” O’Neil once stated that “All politics is local”. In Idaho local planning and zoning often plays a role in dairy siting.

Counties where cattle feeding or dairy has traditionally occurred have had lives stock ordinances for CAFO’s in effect for some time. Other counties haven’t had or still don’t have CAFO ordinances. Nearly all of Idaho’s 412,000 cows reside in south central or south western Idaho. Three south central counties –Jerome, Gooding and Twin Falls – have seen most of the historical development. Canyon County in southwestern Idaho has lately been a growing dairy area. More recently Cassia County, just east of Twin Falls County, has become home to several dairies. All counties conduct a public hearing on any zoning permit application such as a dairy. This provides another forum for input and protest. (See table on 5-County Comparison on previous page.)

A Quick Look at Some Dairy States

In over 42 states the US-EPA has authorized state agencies to carry out the NPDES program for CAFO operations. This allows the dairyman to deal only with state agencies and satisfy federal regulatory requirements. States also have specific regulatory programs for air and water quality protection that must be met.

The West
Much of the recent growth has been in a few western states. Most notably in California, the largest dairy state since the early 1990’s. Other western states have also been home to increasing numbers of dairy cows. In addition to Idaho, Arizona, New Mexico, and Texas have gained in prominence. This is in contrast to other traditional milk sheds where cow numbers have often been stable or declining. A few states were randomly selected to contrast differences in how dairy permits are regulated.

California
The permit process in California is governed by the State Water resources control board. However, that is split into nine Regional Water Quality Control Boards (RWQCB) which each control the regulations in their respective districts regarding water quality/waste management regulations. Region 5, the Central Valley Board, governs the fate of the major milk shed in the state. Until last year all dairies operated under a conditional waver for waste discharge pending regulation reform. That was dropped and dairies had to elect one of 3 permits, a conditional discharge waver, a waste discharge requirement or an NPDES permit. In December of 2002 EPA finalized its CAFO rule and dairies of greater than 700 cows now have to file an NPDES permit rather than a conditional waver. RB5 rescinded its pending rule and undertook to write regulations meeting the EPA CAFO guidelines. Those were available for comment in January and the final rule should be in place later this spring.

Parties seeking to apply for a permit for a new facility or expansion of an existing facility would need to apply to the RWQBC as well as meeting local P & Z building permit requirements. First the applicant (dairy operator) typically works with a consulting firm to prepare the documentation. Then it is submitted to the lead agency for review. The lead agency makes the document available for public review, and then holds a public meeting to receive comments on proposed land use activity. The lead agency can require modifications to the document and hold a second public meeting. At present most RWQBC’s have requested that local counties be the lead CEQA agency.

Required documentation includes a nutrient management plan and a Report of Waste Discharge. This also triggers the California Environmental Quality Act (CEQA) for an analysis on ALL resources including water, uses of water, lighting, biological habitat, etc., etc. The CEQA documentation includes an Environmental Impact Report that clearly shows the adverse effects of the project. The process has taken from over a year up to three years.

Basically, the recordkeeping requirements have jumped and the cost has gone up. An annual report will be required showing that nutrient management plans are in effect and how they are working. All dairies were required to have taken the Environmental stewardship classes by the end of 2003. A California Dairy Quality Assurance (CDQA) program can assist by giving the dairyman an evaluation of the facility that is private. This allows for correcting problems before trying to meet the EPA certification which will be required by the end of 2006.

New Mexico
While New Mexico has had regulations for groundwater protection in place for years, the buildup of dairies has heightened the attention of them. Ground water is the main water source for much all of New Mexico including agriculture. The two main agencies at the state level are the Ground Water Quality Bureau and the New Mexico Environmental Department. The federal CAFO regulations have a large overlap with New Mexico state regulations. Currently the state agencies are working with the dairy industry to reduce duplication.

To build or expand a dairy in New Mexico, the applicant must submit a ground water discharge permit application, plans for operation, monitoring and closure that are deemed appropriate for the waste system, plans for the entire waste treatment and disposal system. Monitoring wells may be necessary to assure that ground water quality is being maintained. The public is notified and a hearing on the proposed application is held. The Environment department can then approve the permit. Or request corrective action, or deny the permit.
Texas
Texas operates the Texas Pollutant Discharge Elimination system or TPDES program. CAFO permits are issued through the Texas Natural Resource Conservation Commission (TNRCC). Applications include facility information, technical information on the waste management system, location, and a pollution prevention plan and water quality permit.

When TNRCC accepts the application, a public hearing process is initiated, the hearing held, and a determination made on the status of the application.

The Rest
States with a long-standing tradition of dairying are also seeing applications for larger dairies as the industry consolidates. That has brought about changes to state laws that often were in place for the traditional “family farm” operations.

Wisconsin
Wisconsin has just passed legislation changing dairy siting regulation in the state. The new law was based on recommendations of a 21 member study committee that had broad representation of concerned parties.

Essentially the new law requires local governing entities to conform to standardized code for approving applications to expand or site new facilities.

The law includes:

- The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) will determine best management practices and performance standards livestock operations will be required to use.
- Counties will have to use the DATCP standards to determine whether an application is approved or denied.
- Counties must approve livestock siting applications that conform to the DATCP standards.
- Operations of more than 500 animal units must use DATCP standards except in certain situations.
- Counties can adopt more stringent standards only if the provisions are necessary for public health and safety and supported by findings of fact.

As with other states, the nutrient management, NPDES and other requirements will still apply as part of the DATCP standards.

Ohio
Most permitting and regulation of large dairies was transferred to the Ohio Department of Agriculture (ODA) in 2002. (See table below.)

The first step for an Ohio dairymen intending to build a facility of 1,000 head or more or expand to that size is a permit to install. The PTI includes information about the applicant, the size of facility, water use, site map, soils information, manure handling and storage, and construction plans.

The PTI is followed by a Permit to Operate. As part of the permit application a detailed manure management plan must be submitted. Also an insect and rodent control plan, a mortality management plan and an emergency response plan are required. An NPDES permit must be applied for 180 days before beginning operation of the CAFO.

<table>
<thead>
<tr>
<th>Size of operation</th>
<th>Discharge?</th>
<th>Permits Required</th>
<th>Regulatory Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1,000 animal units</td>
<td>No</td>
<td>No permits</td>
<td>ODNR</td>
</tr>
<tr>
<td>Less than 1,000 animal units</td>
<td>Yes</td>
<td>Individual NPDES</td>
<td>ODA*</td>
</tr>
<tr>
<td>Greater than 1,000 animal units</td>
<td>No</td>
<td>Individual Permit to Operate or General Permit to Operate</td>
<td>ODA</td>
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<tr>
<td>Greater than 1,000 animal units</td>
<td>Yes</td>
<td>Individual Permit to Operate and Individual NPDES or General Permit to Operate and General NPDES</td>
<td>ODA for Permit to Install, Permit to Operate, or General Permit to Operate; ODA for NPDES permits*</td>
</tr>
<tr>
<td>Greater than 10,000 animal units</td>
<td>No</td>
<td>Individual Permit to Operate</td>
<td>ODA</td>
</tr>
<tr>
<td>Greater than 10,000 animal units</td>
<td>Yes</td>
<td>Individual Permit to Operate and Individual NPDES</td>
<td>ODA for Permit to Install or Permit to Operate; ODA for NPDES permit*</td>
</tr>
</tbody>
</table>

* ODA was given NPDES authority in August 2002
According to the Ohio code, county commissioners and township trustees, as well as their boards of zoning and zoning appeals, cannot restrictively zone agriculture on parcels of land consisting of five or more contiguous acres. This limits local governing boards from selectively restricting agricultural activities.

A public hearing will likely be required on larger facilities or expansions. ODA can then issue a final determination on the application.

New York
As with many other states, New York's department of Environmental Conservation regulates a general permit for CAFO's in the state. Part of that permit is a CNMP. Both medium (300-999 AU's) and large (1000+ AU's) CAFO's are regulated. As for local zoning or other ordinances, state right-to-farm provisions prohibit localities from restricting farming activities in agricultural districts. Proposed legislation from municipalities is reviewed by New York's Department of Agriculture & Market's Division of Farmland Protection to see if they comply with the law. It is one of the few instances where statewide regulation overrides a strong tradition of local "home rule."

In general a dairymen will need an agricultural waste management plan, site plan, wastewater storage and runoff control, and State Pollution Discharge Elimination System (SPDES) permit. In addition, NRCS-BMP's are considered minimum generic BMP's for all CAFO's.

Summary
Increased public concern over the location and pollution potential from large confinement dairies has led to a number of solutions. Many involve state level regulation "guiding" local regulation. In other cases local governance supercedes statewide regulatory judgment. Overriding all states is US-EPA's CAFO regulations and the NPDES permit. In most cases state and local agencies have worked out a division of regulation to suit the situation. As more scrutiny is applied to agricultural practices the onus will be on farmers to be "good neighbors" as defined by the neighborhood. That is possible but the world is also more complicated than it used to be.
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**11th Annual Workshop for Dairy Economists and Policy Analysts**  
Washington D.C.

**Thursday, April 15, 2004**

7:00 Registration & Continental Breakfast

**Big Picture & Overview**
8:00 **Who Pays for of Dairy Programs?**  
Andrew Novakovic, Cornell University
9:00 **Processing Technology Innovations**  
Angela Gloy, Cornell University
9:45 **Group Polling and Discussion**
10:15 Break

**Impacts of Past & Current Programs**
10:30 **History and Future of Budget Reconciliation**  
Hal Harris, Clemson University
11:00 **Dairy Price Support Program & MILC**  
Mark Stephenson, Cornell University
11:30 **Group Polling and Discussion**
12:00 Lunch

**New Programs and Challenges**
1:00 **National Dairy Equity Act**  
Scott Brown, FAPRI
1:45 **Classification of New Products**  
Chuck Nicholson, Cornell University
2:30 **Group Polling and Discussion**
3:15 Break

3:30 **CWT as a Long-Term Tool**  
Jim Tillison, Alliance of Western Milk Producers
4:00 **Risk Management & Price Volatility**  
Bob Cropp, University of Wisconsin
5:00 Adjourn Meeting
6:00 Cocktails and Conversation
6:45 Dinner

**Friday, April 16, 2004**

7:00 Registration & Continental Breakfast

**Large Farm Issues**
8:00 **Producer-Handlers**  
Joe Outlaw, Texas A&M University
8:30 **Payment Limits**  
Dave Anderson, Texas A&M University
9:00 **Permitting Large Dairies**  
Wilson Gray, University of Idaho
9:30 **Polling and Discussion**
10:00 Break

**“No Programs” Panel**
Moderator: Andrew Novakovic
10:15 Panelists: Elvin Hollon, Mary Ledman, and George Mueller
11:15 **Group Polling and Discussion**
12:00 **Summary and Wrap-Up**  
Hal Harris, Clemson University
1:00 Adjourn