U.S. Dairy Export Council®

INSIDE:

USDEC News

June 2009

Contraction Underway in U.S. Dairy Industry

After five years of nearly continuous expansion, U.S. dairymen are cutting production in response to low milk prices. With demand slowing, further correction to bring supply back into balance is expected in the second half of 2009.

A severe drop-off in export sales, which reached record levels in 2008, has left a surplus in the U.S. dairy market. Commodity prices have tumbled close to government support price levels and inventories have grown.

In the first quarter of 2009, U.S. cow numbers declined by 47,000 head, falling below year-earlier levels for the first time since October 2004. U.S. milk production in the first quarter was 20.8 billion liters, up just 0.5% from a year ago (adjusting for leap day in 2008). The U.S. Department of Agriculture (USDA) forecasts a decline in output over the rest of the year: production is anticipated to be down 0.4% in the second quarter, 1.5% in the third quarter and 2.4% in the fourth quarter.

With profitability at historically low levels, farmers will continue liquidating their herds throughout the year. Dairy producers face a double-whammy this year; not only are milk prices low, but feed and other input costs are high. The cost of corn, for instance, is nearly double what it was three years earlier. Meanwhile, the availability of bank credit is much tighter this year, which will force highly leveraged producers to liquidate sooner.

The area most affected by the profitability-squeeze is California, where milk production was down 2.5% in the first quarter of 2009. In recent years, more than one-fifth of U.S. milk production – as well as a large percentage of cheese, butter and milk powder production – has come from California. A continued slowdown in the state will eventually lead to reduced inventories of manufactured products.

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At the end of the first quarter, cheese and powder stocks were well above year-earlier levels, while butter stocks were slightly below. Commercial American cheese inventories on March 31, 2009 were 255,000 metric tons (MT), up 7% from the year before. Commercial butter inventories were 98,000 MT, down 4%. But it's the powder market where growing inventories are more problematic. Commercial nonfat dry milk (NDM) stocks on February 28, 2009 (the most recent data available) were 86,000 MT, up 19%. Compounding the problem, from October 2008 through April 2009, the government bought an additional 105,000 MT of NDM under the price support program.

In late March, the USDA announced plans to allocate 91,000 MT of its powder inventories for domestic feeding programs. However, more than two-thirds of this volume will be bartered for other foods. This will put thousands of tons of product back on the market in the short term, competing with fresh production. In addition, since the announcement was made, manufacturers have sold 2,300 MT of powder per week to the government, increasing the stockpile.

The U.S. NDM market will likely struggle to move much above the support price until export sales start to increase. In the first two months of 2009, U.S. exports of NDM and skimmed milk powder (SMP) were down 50% from a year earlier. U.S. manufacturers exported just 24% of the powder they produced in early 2009, a dramatic difference from last year when they exported 46% of their production.

The whey market has firmed in recent months. Dry whey is trading in a range of 22–27¢ per pound (lb) or $485–595/MT – up more than 7¢ since late January and the highest price since last August. Gains are attributed to declining production and stronger exports.

U.S. whey production has lagged year-earlier levels for more than a year. In January–February 2009, output was down 8.2% from two years earlier. Meanwhile, dry whey exports topped 30,000 MT in the first two months of the year, an increase of 18.3% over 2008 levels.

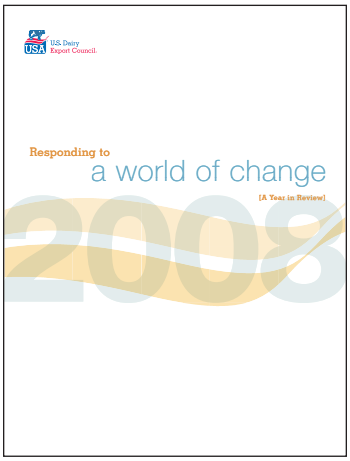
On the other hand, the whey protein concentrate (WPC) market has flattened out. Prices rose dramatically from November through March, but since then have stabilized around 53–56¢/lb or $1,168–1,235/MT. In the first two months of the year, WPC production was up just 0.3% from the year before (adjusted for leap day), but exports were down 22.9%.

More from USDEC

2008 USDEC Annual Report: Responding to a World of Change

USDEC's 2008 annual report details programs and initiatives that assisted member exporters in reaching record levels last year and expounds upon the economic factors that led to this year's challenging market conditions.

Please visit http://usdec.files.cms-plus.com/PDFs/AnnualReports/USDECAR08.ForWeb.pdf to view the USDEC 2008 Annual Report.



USDEC News is published by the U.S. Dairy Export Council (USDEC) and is designed to provide up to date information about the U.S. dairy industry for the benefits of our international partners.

USDEC was formed by Dairy Management Inc. in 1995 to enhance the U.S. dairy industry's ability to serve international markets. USDEC is an independent non-profit membership organization representing dairy processors, exporters, milk producers and industry suppliers.

USDEC supports international buyers of dairy products by providing information about U.S. suppliers, their products and capabilities. We bring buyers and sellers together through conferences, trade missions and trade shows. USDEC furnishes application and usage ideas for U.S. dairy ingredients through seminars, one-on-one consultations and technical publications. We assist with foodservice promotions, menu development and education. We also work with local authorities to resolve market access issues that ensure reliable delivery for customers and importers. When you work with USDEC and its members, you are partnering with companies that manufacture and export more than 85% of all U.S. dairy products.

In the News…

New Plants and Upgrades

- **Crave Brothers Farmstead Cheese** doubled the size of its Waterloo, Wisconsin, plant to 1,850-square-meters. New equipment was brought in to add additional varieties to its product line.
- **Land O'Lakes** will expand its cheese and whey plant in Tulare, California. The $35-million project is expected to start in late 2010 and should be complete in 18 months.
- **HP Hood** will expand its aseptic processing and filling capacity at its Sacramento, California, plant. Addition of a new filler, which can pack 600 plastic bottles per minute, will enable the company to serve domestic as well as export markets.
- **Sorrento Lactalis** asked county planners for a zoning variance to add a 53-meter-high whey drying tower to its Nampa, Idaho, cheese plant. If approved, the dryer could be functional by the summer of 2010.
- **Southwest Cheese** will invest $90 million to expand its Clovis, New Mexico, cheese plant by one-third. The plant, which opened in 2005, now handles 3 million liters of milk per day; capacity will grow to 4.6 million liters. Daily output will grow to 500 MT of American cheese and 33 MT of whey proteins. The project is expected to be complete in 2010.
- **Valley Queen Cheese**, Milbank, South Dakota, is nearing completion of an 18-month, $40-million expansion project that includes a 7,400-square-meter warehouse addition and a new 1,100-square-meter dryer.
- Wisconsin dairy companies plan to invest $781 million on plant expansions over the next five years, after spending $1.24 billion over the last five years, according to a survey from USDA's National Agricultural Statistics Service (NASS). Four out of five processors surveyed said they plan to expand in the next five years. About half of the new investment is expected to go to cheese plants, NASS said.

Moves and Consolidations

- **Dean Foods** will close two general-line dairy plants this summer: its **Meadow Gold** plant in Lincoln, Nebraska, and its **Country Fresh** plant in Flint, Michigan. Production will be moved to other facilities in the Dean system.
- **Humboldt Creamery**, Fortuna, California, filed for bankruptcy and received $3 million in emergency financing to continue operations. The co-op, owned by 62 member dairies, is attempting to restructure its financing following a scandal involving its former CEO. The company has also put its Los Angeles, California, ice cream plant on the selling block.
- **Land O'Lakes** will close its butter plant in Madison, Wisconsin, by mid-June and move production to other facilities.
- **Unilever** will close its **Breyers** ice cream plant in Framingham, Massachusetts, shifting production to other U.S. facilities next year. The plant produces nearly 100,000 MT of ice cream per year.

Acquisitions and Mergers

- **Arla Foods, Inc.** will market the whey steam from **Green Meadows Foods'** new cheese plant in Hull, Iowa. Arla will also provide product and process technology. Green Meadows opened in November 2008 with capacity to handle 1.1 million liters of milk per day, and plans to double throughput.
- **Dean Foods** bought two Wisconsin milk processing plants from **Foremost Farms** for an undisclosed price. Foremost will continue to supply bulk milk to these factories, which produce milk for the Golden Guernsey and Morning Glory brands. Foremost will focus on the manufacturing of cheese, butter and dairy ingredients.
- **Ingredia Group** acquired the Wapakoneta, Ohio, assets of **Kantner Ingredients**, a manufacturer of blends and distributor of dairy proteins for food ingredients. The plant has a blending capacity of 16,000 MT per year. The deal does not include Kantner's operations in California, Nebraska or New Jersey.
- **Lifeway Foods**, Morton Grove, Illinois, the nation's leading manufacturer of kefir, acquired its top competitor, **Fresh Made Dairy**, for $14 million. Fresh Made, which posted 2008 sales of approximately $10 million, gives Lifeway shelf space in the Northeastern U.S. market.
- **Milk Specialties Global**, Carpentersville, Illinois, acquired **Edan Naturals**, a nutrition supplement manufacturer based in Wautoma, Wisconsin. Edan specializes in high-speed tablet compression, powder blending and encapsulation.
- **Stater Bros. Markets**, a Southern California-based retailer, sold its **Santee Dairies** business to **Dean Foods**. Stater Bros. will continue buying milk from Santee.

New products

- **Land O'Lakes** introduced a reduced-fat, reduced-sodium, processed cheese targeted at formulators of "good-for-you" products. The product has 50% less fat and 35% less sodium than regular processed cheese.

Mitigating Risk: Hedging Tools for Cheese

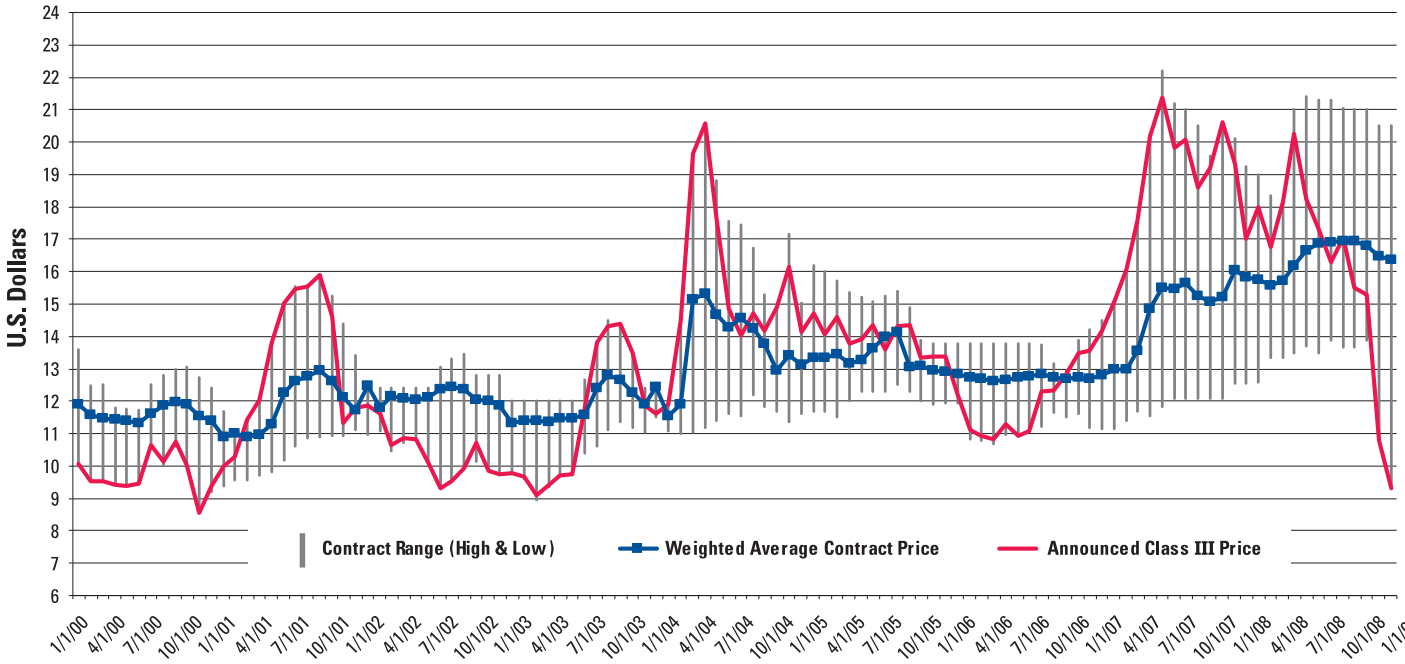
Volatility in global commodity markets has been at record levels; dairy is no exception. Large swings in commodity pricing present challenges for both exporters and customers. When prices move quickly and dramatically, it's difficult for exporters to quote prices for future delivery. It is also difficult for buyers to lock in the costs of their inputs. However, the United States (U.S.) dairy market possesses a unique feature to help deal with market volatility and mitigate risks; regardless of whether or not fixed-price contracts are offered by suppliers, each buyer can still "lock in" a price through the use of hedging tools, such as dairy futures and options.

The United States is the only country in the world with dairy futures and options. In other words, the United States is the only place that provides the ability to secure a purchase price, using tools separate from the physical transaction. One account is established strictly for financial transactions (hedge) and a second account for the physical product purchase. Despite the separation of the activities, correlations allow the two accounts to balance each other. So a financial gain in your dairy hedge account will offset an increase in cheese prices that you may pay. The CME Group manages these financial hedge tools. CME Group is a commodities futures exchange where buyers can secure a price today, on a financially settled basis, for the dairy products they wish to purchase in the future.

Hedging tools allow buyers and sellers to stabilize their prices and reduce risk. Figure 1 shows the results of a successful risk management program. The red line represents a monthly announced Class III milk price (the milk used to produce cheese), the grey lines show the ranges of each individual hedge and the blue dotted line reveals the weighted average of all hedges placed. The results are compelling; over a nine-year period, this hedging program successfully smoothed out the volatility in the market and helped to forecast profit margins and anticipate cash flow for enhanced budgeting capabilities.

Figure 1. Example of a Successful Risk Management Program for Class III Milk Prices

Weighted Average Contract Prices vs. Announced Class III Prices January 2000 through February 2009
Contract Ranges Reflected Weighted Average Value - $13.17 vs. Class III Average - $13.43



Current hedging tools for buyers of U.S. dairy products include:

Futures Contracts

As a financial hedge, futures contracts allow you to lock in a price without altering physical buying/selling processes. Futures are an obligation to buy or sell a specific amount of commodity at a predetermined price and time.

Currently, CME Group does not offer a cheese contract. However, because of the high correlation between cheese prices and the Class III milk price (see figure 2), Class III futures are used as a proxy to hedge cheese prices.

In order to secure a cheese purchase price, assume you purchase Class III milk futures at current trading values (at time of writing) of $14.95 per hundredweight (cwt), or per 100 pounds of milk, for the month of November 2009 (when delivery of the physical product is expected). That would secure a cheese price of $1.65 per pound (lb) or $3,637 per metric ton (MT). If between now and November the price of cheese increases to $2.20/lb, or $4,850/MT, your futures would increase by an equal amount, showing a gain of $0.55/lb or $1,212/MT. While you would pay the $2.20/lb to the supplier, the gain in your futures contract would be used to compensate for the higher cash price of cheese ($2.20 minus $0.55 = $1.65), effectively locking in the price. The gain results from both the futures price and physical price moving in unison; the correlation between the two allows one to offset the other.

Call Options

An alternative method is buying a call option (a price ceiling). An option is the right, but not the obligation, to buy or sell a specific amount of a commodity at a predetermined price and time. Buying a call option works like a price cap; the hedger pays a premium for protection against prices going higher than desired. Buying a call option would only define your maximum risk level, while maintaining the ability to benefit from dropping prices as well.

Conversion Factors

To convert the price/cwt or price/lb to the price/MT use the following conversion factors:

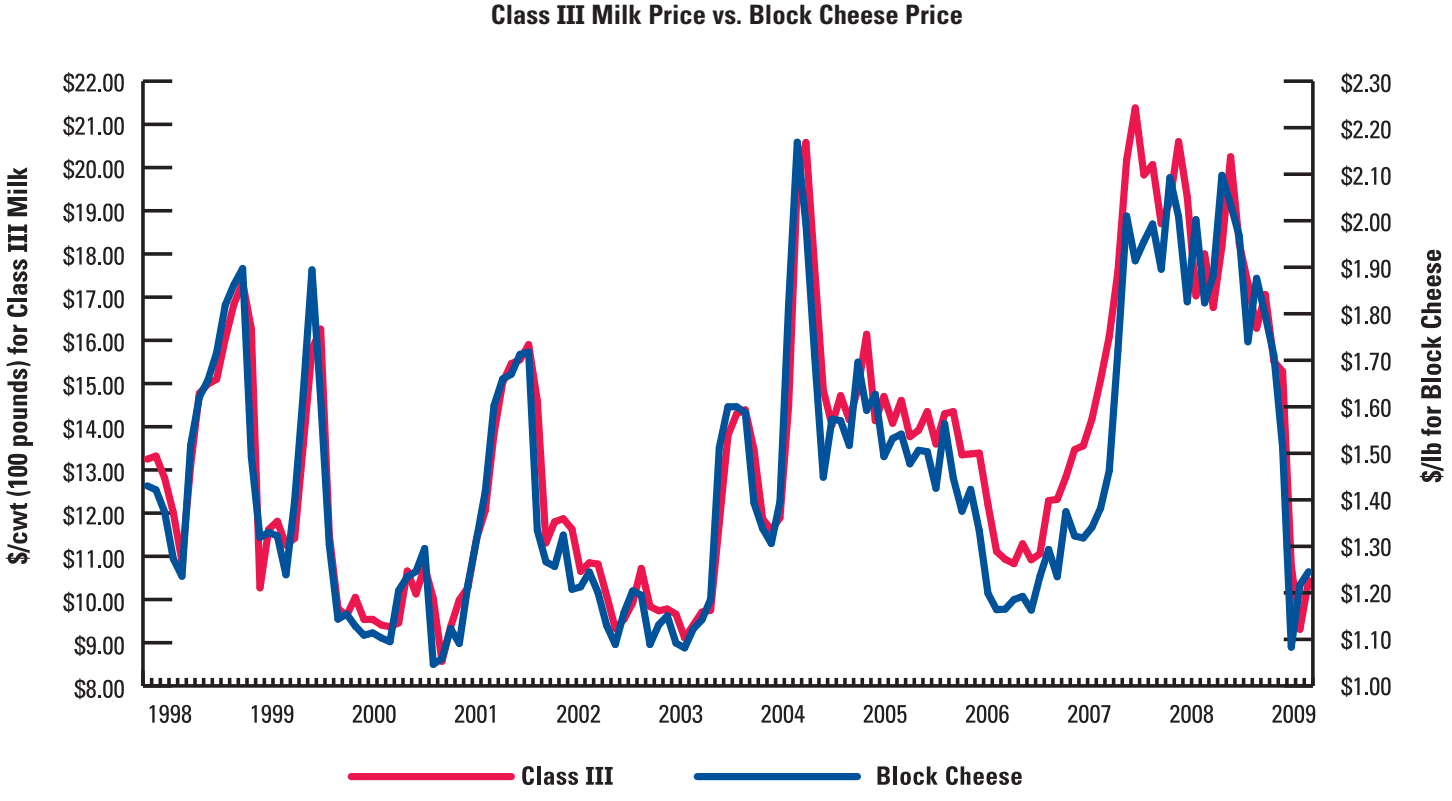
1 MT = 22.0459 cwt
1 MT = 2,204.59 lbs

For example:

- Price/cwt is $13.00
  $13.00/cwt x 22.0459 = $286.60/MT
- Price/lb is $1.50
  $1.50/lb x 2,204.59 = $3,306.89/MT

For example, if you desire protection from prices rising above $1.90/lb of cheese ($4,190 per MT) but also want the ability to pay $1.60/lb should prices decline, you purchase a call option which might cost $0.18/lb or $400/MT, resulting in a maximum price of $4,590/MT ($4,190 plus $400). If cash prices exceed $1.90/lb your option would also gain by an equal amount, enabling you to offset the increase in costs, thus capping your price. In

Figure 2. Correlation between Monthly Class III Milk and Block Cheese Prices



other words, if in November, when you buy the physical cheese, the price is $2.20/lb, than the futures price will also be $2.20/lb, showing a gain of $0.30/lb. Hence, the gain in your futures contract would go toward offsetting the higher cost of your physical purchase ($2.20/lb minus $0.30/lb = $1.90/lb). Conversely, if November realized cash prices are $1.59/lb ($3,500/MT), your final cost would ultimately be the reduced cash price of the cheese ($1.59/lb) plus the premium that was initially paid to set the maximum price ($3,500 plus $400 = $3,900).

Swaps

Over-the-counter dairy swaps are tools utilized independent of CME Group by FC Stone. These tools allow the direct trading of cheese contracts, as opposed to using the Class III milk contract offered through CME Group. Swaps are utilized because they can provide a reduction in basis risk by settling directly on CME Group spot block cheese price, which is more than likely what your physical purchase is based on. These contracts function outside of the CME Group, with FC Stone in the counter-party role. They can offer greater variety and flexibility as they allow for the trading of many contracts that are not offered by CME Group. These contracts include, but are not limited to, CME block/barrel cheese hedging, whey protein concentrate and milk protein concentrate contracts.

All the above hedging tools can assist international buyers in managing the price fluctuations in cheese products. While other foreign suppliers may offer short- or long-term fixed-price contracts, providing a set price and contractually obligating participation with physical product; these U.S. tools allow buyers to establish future costs, even without a guaranteed price from the U.S. cheese product supplier, up to two years in advance, while providing the flexibility to exit at any time. Additionally, they provide the ability to predetermine only a maximum pay price — which allows participation in declining price markets. These hedge tools correlate to the U.S. market and secure purchase prices on physical product regardless of who the supplier is, as long as the product is sourced from the U.S. By securing this price independent of the supplier, buyers have often increased their negotiation strength when the time comes to make the physical purchase because they have already established their effective price without the supplier's involvement or knowledge. Also, the safety and security of having an independent middle party in their transactions greatly mitigates counter-party credit risk, since CME Group has never defaulted on a contract. Additionally, if any of these hedging tools that secure a purchase price are used in conjunction with a fixed-price sales contract, a profit margin can be locked in. Through the combination of hedging both sides, not only is purchase price volatility minimized but so is the volatility associated with profit margins.

This article was contributed by Robert Chesler and Dr. Ken Bailey, risk management consultants with USDEC member Downes-O'Neill/FC Stone, a leading dairy market brokerage group and risk management consulting firm. For more information about Downes-O'Neill/FC Stone and on how they can help you determine the right hedging strategy for your organization, see their profile in the Meet our Members section of the June 2008 edition of USDEC**News**, *visit their websites at* www.downesoneill.com *&* www.fcstone.com *or call 1-800-504-5633.*

In addition to Class III milk, the CME Group also offers futures and options on butter, whey, nonfat dry milk and Class IV milk. Class IV milk is the milk used to manufacture milk powder and butter products. Additional contracts are under development. For more information, contact CME Group (312-930-3116, www.cmegroup.com) or USDEC at info@usdec.org.

WPC 80 for Improved Beef Quality

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Variability in intramuscular fat, also known as marbling in beef, is due to a number of different factors including genetics, feedstuffs and environmental conditions. The United States Department of Agriculture (USDA) recognizes that beef cuts with greater amounts of intramuscular fat tend to be more tender, juicy and flavorful, resulting in products that provide the consumer with a more enjoyable eating experience. Accordingly, the USDA has established quality grades for beef consisting of Prime, Choice, Select and Standard for young carcasses, and Commercial, Utility and Cutter for more mature carcasses. USDA grading is based on the density of marbling on the cut ribeye surface between the 12th and the 13th beef carcass ribs and is adjusted based on other carcass merits. Below is a quality grade chart indicating the various degrees of intramuscular fat and how they are categorized by the USDA.

"Wagyu" refers to several breeds of cattle that are naturally predisposed to produce beef that is heavily marbled. In fact, Wagyu beef surpasses USDA marbling standards for Prime-grade beef. The meat from Wagyu cattle is known worldwide for its marbling characteristics, superior eating quality owing to its naturally enhanced flavor, tenderness and juiciness, and thus high market value. Several areas in Japan are famous for the quality of their Wagyu cattle. Their beef is exported bearing the area's name, for example Kobe, Mishima and Ohmi beef.

Because of the high market value of Wagyu beef, several attempts have been made to make regular beef closer in quality to Wagyu beef. Injecting fat into lower quality beef has achieved limited success. Instead, injecting a stable beef fat emulsion utilizing 80% whey protein concentrate (WPC 80) can provide a viable solution to raise the quality grade of beef.

This study was conducted to test the effect of injecting a fat emulsion made with WPC 80 into low quality (low intramuscular fat) beef with the aim to create intramuscular fat, both to enhance the appearance and to provide a more tender, juicy, and flavorful beef product.

Comparison of USDA and Wagyu Quality Grades for Beef

USDA Quality Grade	USDA Marbling Score (each degree of marbling is divided into 100 subunits)	BMS Number	Wagyu Quality Grade
–	Extremely Abundant 50–99	11 or 12	A5 (Excellent)
–	Extremely Abundant 0–49	10	A5
–	Very Abundant 50–99	9	A5
–	Very Abundant 0–49	8	A5
Prime	Abundant	7	A4 (Good)
Prime	Moderately Abundant	6	A4
Prime	Slightly Abundant	5	A4
Choice	Moderate	4	A3 (Average)
Choice	Modest	3	A3
Choice	Small	–	–
Select	Slight	–	–

Source: Japanese Meat Grading by J.R. Busboom and J.J. Reeves, Washington State University

Beef Grading Standards

Japanese beef grading standards include five quality grades (1– 5) based on the following four categories of attributes: 1) marbling, 2) color & brightness, 3) firmness & texture and 4) color, luster & quality of fat. The carcass is reviewed by slicing it between the 6th and 7th rib bones. All the information needed for grading the animal is collected at this point and values are awarded for each of the categories.

The quality of Wagyu beef is determined by a 12-point marbling score called the Beef Marbling Score (BMS). The BMS is determined by how much intramuscular fat there is adjacent to the eye of the rib and within the eye. The score can range from 1 to 12; a score of 8–12 would get a grade 5 rating of "Excellent". Using the Wagyu scale, USDA Prime beef would have a BMS score of 5–7. Typically, the mass-marketed variety of Wagyu will have a marbling score at the low end of the 12-point scale.

Preparation of a WPC 80 Beef Fat Emulsion

The emulsion (1 part WPC 80 to 25 parts beef tallow, 5 parts vegetable oil and 15 parts water) was produced in a bowl cutter. The beef tallow was chopped at high speed in the bowl cutter for approximately 5 minutes, until the temperature stabilized (between 27°C and 35°C). Then the WPC 80 and vegetable oil were added. Finally, boiling water was slowly added until the emulsion inverted. The chopping was continued at high speed for a few more minutes. The final emulsion temperature was 35–40°C. The resulting emulsion was white, stable and smooth with a viscous texture.

The emulsion was kept warm, above 40°C, before injecting into USDA Select beef top round roasts, achieving a 15% pick-up from the initial weight of the meat. The 15% pick-up was obtained in two or three passes through the injector to achieve a more consistent emulsion pattern in the meat. During injection, the emulsion was kept warm; however, once injected into the chilled top round, the emulsion cooled and solidified immediately. Following injection, top round roasts were tumbled under vacuum at 8 rpm for 30 minutes. Following tumbling, the roasts were cut to 2.5-cm-thick steaks and grilled to an internal temperature of 71°C.

Injecting beef round roasts with a fat emulsion using WPC 80 showed pronounced fat deposits emulating more naturally occurring intramuscular fat within the beef muscle. Vegetable oil was used in conjunction with refined beef fat to create a softer emulsion which would melt at low grilling temperatures. No problems were encountered during the formation of the emulsion in the bowl cutter or during injection of the emulsion. The fat was not apparent on the exterior of the product after injection, but after cutting into steaks the injected emulsion was noted to be clearly distributed, enhancing its visual appeal. The steaks were then grilled and the steaks with injected emulsion were found to be juicier and more succulent, tender and flavorful compared to the control with no emulsion.

The use of WPC 80 in the form of a stable emulsion is found to be a viable option to enhance the quality of beef. WPC 80, when used as an emulsifier of beef tallow with vegetable oil and water, aids in stabilizing the system within the beef product during the high-temperature grilling process. Without the use of this stabilizing ingredient, injected fat would melt and drip out during the grilling process.

Beef Round Prior to Injection

Beef Round After Injection with WPC 80. Left - "Exterior", Right - "Interior".

Interior of Beef Round After Injection with WPC 80 and After Tumbling.

Emulsion Formulation

Ingredient	Ratio	%
WPC 80	1	2.17
Refined beef fat (shelf stable beef tallow)	25	54.35
Vegetable oil	5	10.87
Water	15	32.61
Total	**46**	**100.00**

Beef Round Steaks After Cooking. Left - Control, Right - Injected Steak

The Unique Components of Dairy: A Review

Whey protein, representing 20% of the protein found in cow's milk, is valued for its unique and special benefits. In today's market, this pure and natural dairy product is recognized by both consumers and professionals as a powerhouse in terms of health and nutrition. The growing incidence of health concerns around the world has increased consumer awareness about the importance of improved nutrition in protecting their health. Dairy ingredients provide a natural choice for these consumers.

The individual components, or fractions, in whey work in conjunction with each other to deliver a wide array of benefits. Investments in advanced processing technology have enabled U.S. dairy ingredient manufacturers to provide isolated and concentrated forms of these components with desirable functional and health-related properties. This in turn provides more options in new and innovative ingredients for food, health and nutrition products and specialty products.

This article provides a review of recently published findings on both whey protein and its individual fractions, and highlights opportunities for new products in the marketplace.

Cancer

Cancer remains one of the leading causes of death in the world and experts predict the number of cases will increase by over 40% during the next 20 years. A poor quality diet is one of the leading risk factors for cancer, along with obesity and insulin resistance.

In the past, concerns have been voiced that dairy products may have a contributing effect to certain types of cancer. However, recent studies indicate just the opposite. Colorectal cancer is one of the top five most common cancers and is second only to lung cancer in terms of mortality. A study of 74,000 Japanese men and women explored the correlation of calcium and vitamin D intake with the risk of colon cancer. Although no link was observed for women, the men who consumed the highest amount of calcium had a 29% lower risk of colorectal cancer compared with those who consumed less than half this amount. A combination of dietary calcium and vitamin D reduced the risk by 40%.[1] Whey and other dairy ingredients are an important source of dietary calcium.

Beta-lactoglobulin is the primary whey protein in terms of composition. It is well known to be a high quality, easily digestible protein and one of the richest available dietary sources of branched-chain amino acids (BCAAs). BCAAs are important to active individuals and athletes to help prevent the breakdown of muscle tissue associated with exercise and sports activities. Results from another recent study, also conducted in Japan, indicate that a diet supplemented with BCAAs may help improve insulin resistance and help prevent the development of pre-cancer malignancies in the colon. Incorporating whey protein into the diet may be beneficial to obese individuals with a higher risk of colon cancer or as part of chemotherapy treatment.[2]

Immune Health

Whey ingredients have a beneficial effect on the immune system and this can be related back to several of its individual components. Immunoglobulins, for example, are immune enhancing proteins which are essential to the body for a healthy immune response. They are naturally present in whey protein and in human breast milk.

The Journal of Nutrition reviewed a study by Canadian researchers investigating the effects of a whey protein extract purified from bovine lactoserum on the functions of neutrophils. Neutrophils are the most abundant white blood cell in the human body and they have a critical role in the functioning of the immune system. According to the authors, when neutrophils were pre-treated with whey protein extract they showed an increased ability to defend against microorganisms.[3] The next step is to transfer the findings to new technologies in the areas of wound healing and immune enhancement.

Lactoferrin accounts for a small portion of whey protein but purified forms are now commercially available to fortify food and clinical nutrition products. It has been shown to have antibacterial and antiviral properties in the intestinal tract; however, the exact mechanisms of action are still under review. When consumed in oral form, lactoferrin was recently reported to show promise as an anti-inflammatory in pregnant women, helping to reduce some of the complica-

Table: Composition of Whey Protein in Cows' Milk

Protein	Approximate % of Whey Protein
Beta-lactoglobulin	50–55%
Alpha-lactalbumin	20–25%
Immunoglobulins	10–15%
Bovine Serum Albumin	5–10%
Glycomacropeptide (GMP)	2–5%
Lactoferrin	1–2%

tions of pregnancy. Other vulnerable groups afflicted with infection and inflammation, such as individuals with diabetes or those in long-term care facilities, may also benefit.[4]

Although not related to immune health, a separate study (animal model) recently suggested that dietary lactoferrin has a beneficial effect on post-menopausal bone loss by helping to regulate the formation and resorption of bone. This may help lead to new options for women in the prevention of osteoporosis.[5]

Infant Nutrition

Alpha-lactalbumin is the second most common whey protein fraction in cow's milk. Its major presence in human breast milk attests to its high quality and digestibility attributes and low allergenic risk. During the past decade alpha-lactalbumin has become more widely used to enrich infant formulations to make their composition more closely resemble human breast milk. A study by Wyeth Nutrition last year on 166 healthy infants evaluated the nutrient intake of infants receiving a formula enriched with alpha-lactalbumin. The results demonstrated that the formula provided all of the essential amino acids required by the infants. It also showed that the gastrointestinal tolerance to the formula was very similar to that observed in breastfed infants.[6]

When breastfeeding is not an option, hydrolyzed whey protein is often recommended for infants intolerant to formulas prepared using an intact protein source. Scientists and physicians in Germany secured a government grant to learn more about the long-term effects of this on growth. Their study compared the differences after a six-year period in the body mass index (BMI) of breastfed infants to those fed a traditional formula or one with hydrolyzed whey protein. They concluded there were no long-term differences in BMI based on the type of formula fed in the first 16 weeks of life.[7]

Sports Nutrition

Whey protein has been noted as being superior to other proteins in terms of

building and repairing lean muscle following intense exercise due to its rich BCAA content. Dr. Kevin Tipton, an expert in exercise metabolism, states, "there seems to be mounting evidence regarding the potential beneficial effects of whey protein, possibly due to its high leucine content." Leucine is known to stimulate muscle protein synthesis and anabolism. Dr. Tipton and colleagues recently explored whether or not additional amounts of leucine, above the amounts naturally present in whey protein, would increase net muscle protein balance in conjunction with resistance exercise. The study showed that whey protein supplemented with leucine was no more effective than previously reported responses to whey protein alone. For most active individuals, whey protein provides just the right mix of amino acids to support their lifestyle.[8]

Weight Management

Diets with increased protein and lower amounts of carbohydrates have been shown to improve adult health. They are also effective for weight loss, both initially and over the long-term. Whey protein has been shown to help regulate body weight, in part due to its effect on satiety. It is often the "protein of choice" for weight management products designed to help control appetite. Research continues in this area and one study on 25 healthy individuals reported that whey protein decreased hunger more than soy protein when consumed as 10% of a breakfast meal. The research suggested the difference in appetite occurred when certain amino acids, including the BCAAs, were either above or below a set threshold value.[9]

Specialized Nutrition

Individuals with phenylketonuria (PKU) are unable to metabolize the amino acid phenylalanine. If left undiagnosed or untreated, PKU usually leads to impaired brain development, mental retardation and/or frequent seizures – all of which are permanent. The good news is that PKU may be controlled by diet and more consumer-friendly food options are being developed at the University of Wisconsin in Madison, Wisconsin. According to Dr. Denise Ney, "GMP is the only known dietary protein that contains only trace amounts of phenylalanine; thus, it provides an alternative to unpalatable amino acid formulas that are currently required in the PKU diet. Our studies show that GMP is acceptable, safe and improves protein retention and utilization of phenylalanine in subjects with PKU. Further long-term studies are needed, but our results to date suggest that GMP improves the nutritional management of PKU."[10]

In summary, whey protein ingredients, either in the form of whey protein concentrate (WPC), whey protein isolate (WPI), individual protein fractions, or in a custom blend enriched with one or more of the individual whey fractions, have proven health and nutrition benefits to consumers. The challenge for companies formulating specialized health and nutrition products is to determine the right product for each need. U.S. dairy ingredient suppliers are readily available to partner with customers to help identify the best solutions for their business.

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Arla Foods, Inc.

Arla Foods, Inc. (USA), based in Basking Ridge, New Jersey, is an importing, manufacturing and exporting unit of Arla Foods AmbA, one of the top 10 dairy processors in the world. Arla Foods currently offers a full line of U.S.-made specialty cheeses to all U.S. markets and to Mexico. Gouda, edam and havarti are manufactured in the United States for export to Central America and the Caribbean. A new ingredients business also gives Arla Foods whey supply capabilities.

Strong Specialty Cheese Player

The Danish-Swedish cooperative Arla Foods, Inc. was the result of an appetite for traditional northern European specialty cheeses in the New World, and the question of how best to meet that demand. For Arla Foods, the answer was to establish sales, and then manufacturing facilities, in the United States.

"Like most European companies, when we started here, we focused on the kinds of products we made at home," says Henrik Mortensen, food service and export manager, Arla Foods, Inc. "The products we have chosen to manufacture in the United States are mainly northern European cheeses and we work very hard to make the product the same way here as we do in Scandinavia. It's truly European cheese produced in the United States."

The idea is to provide the highest possible quality to Arla's customers, Mortensen says. "We want to stay close to the heritage of our products," he emphasizes.

The United States accounts for about 5% of Arla Foods' $10-billion global turnover, by no means a small volume of business.

"We are one of the largest specialty cheese manufacturers in the United States and as this is a focus market in the global Arla strategy, we have strong growth expectations here," Mortensen says.

Arla Foods AmbA's history traces back to the late 19th century. A series of mergers and acquisitions brought it to where it is now — the largest merger being between Swedish Arla and MD Foods of Denmark in 2000. When Arla Foods, Inc. (USA) exports product they are part of a global production and sales operation with plants in 12 countries and products in over 100 markets.

Arla's production operations in the U.S. were launched in 1998 following over 20 years of exporting from Europe. U.S.-made cheese brands now include *Saga* and *Dofino*. The U.S.-made products come from two company-owned production facilities – in Hollandtown, Wisconsin, and Muskegon, Michigan – and an additional licensed manufacturer in Wisconsin.

Arla Foods is currently in the process of a series of investments totaling $15 million in the Hollandtown cheese plant to increase production capacity. Arla officials say the company is continuously open to exploring further export opportunities.

Dairy Ingredients

Until now, U.S. production has been limited to cheese, but that is about to change. In March 2009, Arla Foods signed a letter of intent with Green Meadows Foods, LLC, a new cheese manufacturer in Hull, Iowa. The plan calls for Arla to oversee production and sales of all whey products originating from the whey stream at the Green Meadows plant. The facility opened in November with an initial capacity to handle 1.1 million liters of milk per day, turning that milk into 36,000 metric tons (MT) of cheese and 21,000 MT of whey annually. A second phase of expansion to double capacity is already under way.

"The American market is approximately 50% of the global whey protein market and we are now entering with a strong partner," says Henrik Andersen, senior vice president of Arla Foods.

Peter Hassing, president of Arla Foods Ingredients, Inc. USA, adds that having local production will be major asset. Products will include high-quality whey protein concentrates (WPC 80) and whey permeate.

Organic and Green

Arla Foods claims to be the world leader in organic dairy and has recently launched a strong trademarked sustainability program, Closer to Nature. Arla Foods' efforts to make natural foods available to everybody are reflected in all functions of the company, from purchasing requirements to production and logistics. The global initiative also has applications in the U.S. operations.

"We have a very clean ingredients list," Mortensen notes. "For example, we manufacture a naturally smoked gouda, using real hickory wood for smoking rather than injecting it with smoke flavoring. Packaging is another focus area and we are constantly making improvements to achieve the most environmentally-friendly package possible." Arla Foods, Inc. (USA) is also working on its milk collection operations to lower their environmental impact.

Export Products

- **Blue Brie**
- **Blue Cheese**
- **Brie**
- **Camembert**
- **Edam**
- **Fontina**
- **Gorgonzola**
- **Gouda**
- **Havarti**

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Milk Specialties Global

Milk Specialties Global Food Solutions, based in Eden Prairie, Minnesota, was created in 2008 to diversify and expand the company into specialized dairy-based food ingredients. They are a business unit of Milk Specialties Global which prides itself on having manufactured U.S. dairy-based feed ingredients for customers around the globe since 1944.

Milk Specialties is supported by six manufacturing facilities in Minnesota and Wisconsin. Liquid whey from local dairies is processed into over 1.6 million metric tons (MT) of whey and milk ingredients annually.

Milk Specialties Food Solutions routinely partners with customers to create novel dairy ingredient formulations for next-generation health and sports nutrition products. In less than a year the accomplishments of this group has surpassed all expectations.

The mission at Milk Specialties Food Solutions is to exceed customer expectations by providing outstanding service and the highest quality, science-based products. According to Jing Hagert, international sales manager/market analyst of Milk Specialties Food Solutions, "The main goal of Milk Specialties is to provide nutrition products for an active, healthy world through our extensive line of customized protein ingredients."

Creativity, imagination and innovation are frequently used terms at Milk Specialties Food Solutions. They are a "One-Stop Shop" starting from product formulation all the way through to consumer packaging. Customized products (developed by proprietary methods) can be manufactured, packaged and labeled for shipment to export customers, ready for sale to the consumer.

Exports represent 30% of Milk Specialties' current volume, key markets including Europe, Japan, Korea and China. "Our export customers value the ability of the Milk Specialties team to deliver just the right product for their business and to have it there on time. We are excited about increasing our presence in the global market during the next several years," says Hagert.

Milk Specialties Food Solutions is committed to delivering enhanced dairy protein ingredients with targeted benefits for consumers. A Scientific Advisory Council has been established to support customers and to identify new initiatives based on sound science, backed by clinical research. Dairy ingredients with research-proven functional and nutritional attributes are the backbone of the company. A new research and development laboratory with in-house formulators at the Eden Prairie, Minnesota, location offers additional support to customers.

Facilities

A manufacturing facility in Mountain Lake, Minnesota, is primarily responsible for supplying the Food Solutions group. It was recently expanded to increase capacity by 30%. New, state-of-the-art, advanced membrane technology, gives this facility the capability to produce specialized and highly functional dairy protein ingredients for the health and nutrition market. It also produces organic and halal dairy ingredients. Manufacturing capabilities include protein hydrolysis, agglomeration, granulation and nano-filtration.

A recent addition to the Milk Specialties manufacturing portfolio in Wautoma, Wisconsin, specializes in encapsulation, tableting, enteric (barrier) coating and nano-particle processing. The acquisition has expanded the ability of the Food Solutions group to provide a broader line of new and innovative ingredients.

New Products

From the beginning Milk Specialties has promoted its ability to create customer-specific dairy ingredients in an extremely short time-frame. The following new products, geared to the health and sports nutrition industry, have recently been launched:

BioVale™: A whey protein hydrolysate with targeted amounts of di- and tri-peptides for faster absorption into the body and increased muscle support.

Mito-Whey™: Formulated for athletes and seniors to help increase energy levels. A proprietary encapsulation process incorporates cold-filtered whey proteins with a scientifically supported formula of vitamins, minerals, anti-oxidants and other natural components.

Time-Release Whey: Designed for the serious athlete who needs nutritional support for optimal muscle growth. Formulated to provide all the benefits of whey protein at a slower absorption rate (25–50%) than standard whey protein.

Export Products

- **Milk Proteins:** Micellar casein, milk protein concentrates and isolates (instant and non-instant).
- **Lactose**
- **Whey Proteins:** Whey protein concentrates and isolates, available in high-gel, instantized, clear and heat-stable formulations.
- **Hydrolysates:** Whey, milk and casein.
- **Specialty Proteins:** Whey crisps, 50% and 70%.
- **Specialty Products:** *BioVale*™, *Mito-Whey*™ and *Time-Release Whey*; custom-blended dairy ingredients.

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