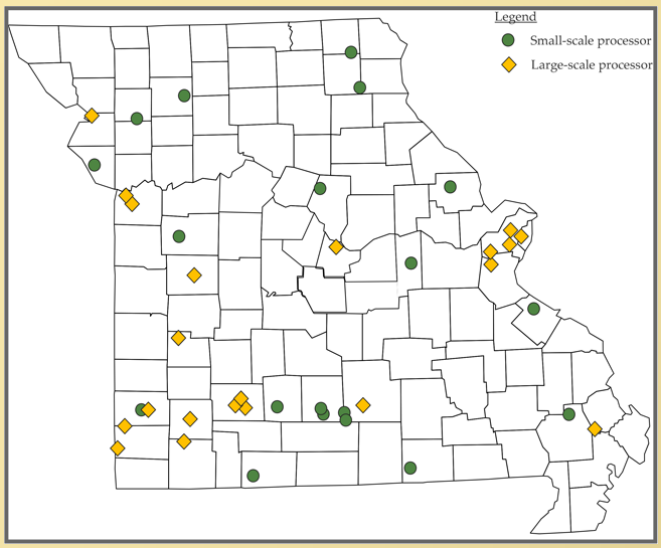
January 2015



Missouri Dairy Industry Revitalization Study

Section 4:

Value Chain, Marketing and Processing

UNIVERSITY OF MISSOURI
Extension
Commercial Agriculture Program

Missouri Dairy Industry Revitalization Study –
Section 4: Marketing, Processing and Value Chain

The following authors contributed content to this section:

Joe Horner	Agricultural Economist, Commercial Ag Program, MU Extension
Ryan Milhollin	Agricultural Economist, Commercial Ag Program, MU Extension
Alice Roach	Agribusiness and Agrimarketing Consultant

Other publications from this study include:

Executive Summary
A comprehensive overview of the overall Missouri Dairy Industry Revitalization study.

Section 1: Historical Perspective
Section 1 provides an in-depth discussion about Missouri's dairy industry historical trends concerning its dairy cow inventory, farms, production, prices, production economics and processing industry.

Section 2: Economic Contribution
Section 2 discusses what the economic contributions such as jobs, value-added and industry sales are from Missouri dairy farms and the Missouri dairy product manufacturing industry.

Section 3: Needs Assessment
A survey was conducted in fall 2014 to Missouri Grade A dairy farms and industry stakeholders. This survey was intended to gather their perspectives on producers' needs and characteristics of Missouri dairy farms. Section 3 provides a summary of all survey responses received.

Section 5: Comparative Analysis to Identify Gaps
What is the competiveness of Missouri's dairy industry versus other U.S. states? Section 5 seeks to create a common understanding of the Missouri dairy industry's competitive position, benchmark Missouri's dairy industry and environment against other states and look at ways that other states have attempted to revitalize their dairy industries.

Complete copies of all publications can be found at http://dairy.missouri.edu/revitalization/.

For further information about this report, please contact:
Joe Horner - (573) 882-9339 (phone) or HornerJ@missouri.edu (email)

Missouri Dairy Industry Revitalization Study
Section 4: Marketing, Processing and Value Chain

Table of Contents

Introduction

This section of the Missouri Dairy Industry Revitalization Study concentrates on emerging dairy marketing and processing opportunities. At present, many of the market opportunities discussed in this report are niches. Some market niches, such as those for local foods, may be small enough to create an opportunity for just one farmstead dairy processor. Other markets for new products may be large enough to attract interest from existing bargaining or processing cooperatives. Between these two market sizes is an opportunity for collective entrepreneurship, which would involve collaboration among a small group of like-minded dairy farmers. Note that the marketing and processing opportunities articulated in this section are general trends. Before proceeding with any of these markets, interested parties should confirm that the opportunities exist in the planned target markets. Market preferences and opportunities may vary by geography and consumer subsets.

At the niche market level, serving a given market may involve a relatively small number of passionate, entrepreneurial people committed to developing dairy brands that resonate with consumers and producing and delivering dairy products that complement their brands. To pursue niche markets, market participants may incur great capitalization costs and risks. To organize and operate, small firms may take the form of producer-owned limited liability companies or closed-member "new-generation" cooperatives. Small-scale, farmer-owned firms with adequate planning and a good business plan may be able to attract additional state and federal resources.

Ideally, a new dairy farmer-owned processing firm would be able to create and capture value for itself by tying an on-farm production protocol to a demanded trait, creating a brand and product offerings that fit with the brand and securing a marketing channel. Examples exist of virtual cooperatives that have developed product brands and co-packing agreements with existing dairy processors in order to reduce capital needs and rely on existing processing infrastructure. Within the organic segment, the Organic Valley Cooperative has used the virtual cooperative concept.

As niche or emerging markets develop, they may grow into larger market opportunities that create potential for more entities to participate in the market and operate on a greater scale. However, existing dairy marketing cooperatives may be reluctant to risk member capital and pursue higher risk new products, especially in a region with declining milk production. If existing cooperatives lack a request from food companies or retailers, then they may be further averse to pursue new markets. Even if a profitable product can be added, existing cooperatives may not pursue the opportunity because the niche product may not have significance for all members. In addition, because most Missouri milk is in a federal milk marketing order with more than 75 percent going toward Class I or fluid use, which is the highest value of milk in the federal classified pricing system, diverting more milk into manufacturing usage would lower the monthly blend price for producers in the region.

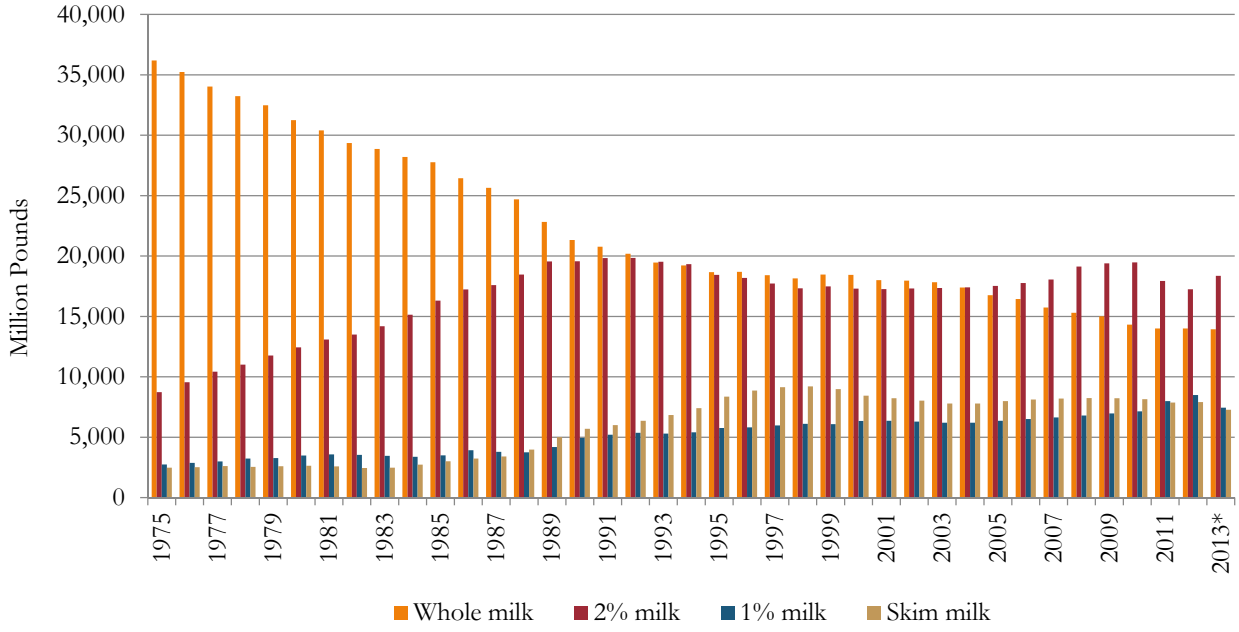
Existing dairy marketing cooperatives should not be discounted in the future value-added landscape for Missouri, however. With their processing and marketing knowledge and ability to balance milk supplies, cooperatives may complement entrepreneurial ventures. Value-added ventures that leverage resources from both new ventures and existing players – this may include arrangements such as co-ownership – may create profitable opportunities and lower the risk incurred for developing and serving new dairy markets.

1. Dairy Product Demand

1.1 Fluid Milk

Over time, the fluid milk category has lost traction with U.S. consumers. Total beverage milk sales decreased from 54.8 billion pounds in 1990 to 51.9 billion pounds in 2013. That is a 5.2 percent reduction. Within the fluid plain milk market, Exhibit 1.1.1 illustrates several well-defined sales trends and consumer preferences. Note that these data measure sales in million pounds. Overall, these data suggest decreasing interest in higher fat milk. From 1975 to the early 1990s, whole milk sales and 2 percent milk sales had an inverse relationship. Whole milk sales declined, and 2 percent sales increased. During the 1990s, Americans consumed whole milk and 2 percent milk at nearly the same levels. In this same decade, 1 percent milk and skim milk gained popularity. Beginning in the mid-2000s, whole milk sales began another decline, 2 percent milk sales showed improvement, 1 percent milk sales trended upward, and skim milk sales were relatively stagnant. As a share of total 2013 plain fluid milk sales in pounds, whole milk represented 29.6 percent of the total, 2 percent milk represented 39 percent of the total, 1 percent milk represented 15.8 percent of the total, and skim milk represented 15.5 percent of the total. Between 1990 and 2013, total plain fluid milk sales, measured in pounds, dropped 8.8 percent (USDA Economic Research Service).

Exhibit 1.1.1 – Fluid Plain Milk Sales in Pounds, 1975 to 2013



* 2013 data are preliminary.
Source: USDA, Economic Research Service

American attitudes toward breakfast have influenced milk sales. The dairy industry has a history of promoting milk as a breakfast food. However, U.S. consumers have increasingly decided to not eat breakfast, or they've chosen breakfast foods that they can consume while they're on the move. Reduced cereal sales have corresponded with reduced white milk sales. One recent effort between the dairy industry and Quaker Oats involves Quaker promoting oatmeal consumption with milk. In this

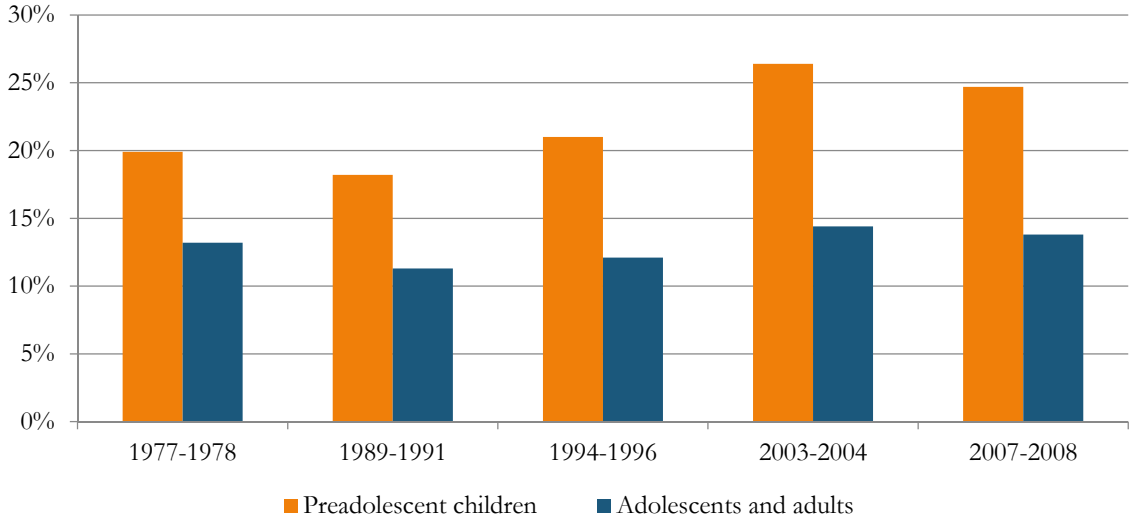
promotion, Quaker suggests preparing oatmeal with milk, not water, and drinking a glass of milk with an oatmeal breakfast. The effort may brand oatmeal and milk as complements much like consumers have the perception that cereal and milk are complements. If just 1 percent of oatmeal breakfasts adopted milk and displaced water use when making oatmeal, then that change would boost milk consumption by 30 million pounds (Carper 2014b).

Consuming milk at breakfast varies by generation. In 1977-1978, 71.3 percent of preadolescents consumed milk at their morning meal. That share dropped to 55.6 percent in 2007-2008. Among adolescents and adults, 38.8 percent consumed milk with a morning meal in 1977-1978, but only 28.2 percent did during 2007-2008 (Stewart, Dong and Carlson 2013).

Throughout the day, milk consumption is increasingly becoming less common. In 1977-1978, just 12 percent of preadolescent children didn't consume milk at all during the day. That share increased to 24 percent for 2007-2008. The percentage of adolescents and adults that didn't consume milk at all during the day rose from 41 percent in 1977-1978 to 54 percent in 2007-2008. Milk consumption frequency has also evolved. Among preadolescent children, 62 percent consumed milk more than once a day in 1977-1978, but by 2007-2008, that share had decreased to 45 percent. During 1977-1978, 30 percent of adolescents and adults drank milk more than once a day, but by 2007-2008, that share had dropped to 14 percent (Stewart, Dong and Carlson 2013).

Based on milk consumption data by daypart, like at morning meals, preadolescent children and adolescents and adults consuming milk at a mid-day meal and night meal also dropped from 1977-1978 to 2007-2008. However, the share of preadolescent children consuming milk as a snack has followed an upward trend. See Exhibit 1.1.2. The share of preadolescent children that consumed milk as a snack increased from 19.9 percent in 1977-1978 to 24.7 percent in 2007-2008, though the share reached its highest level, 26.4 percent, in 2003-2004. Adults didn't significantly increase milk consumption at snacking occasions, based on these data (Stewart, Dong and Carlson 2013).

Exhibit 1.1.2 – Percentage of Americans Consuming Milk as a Snack



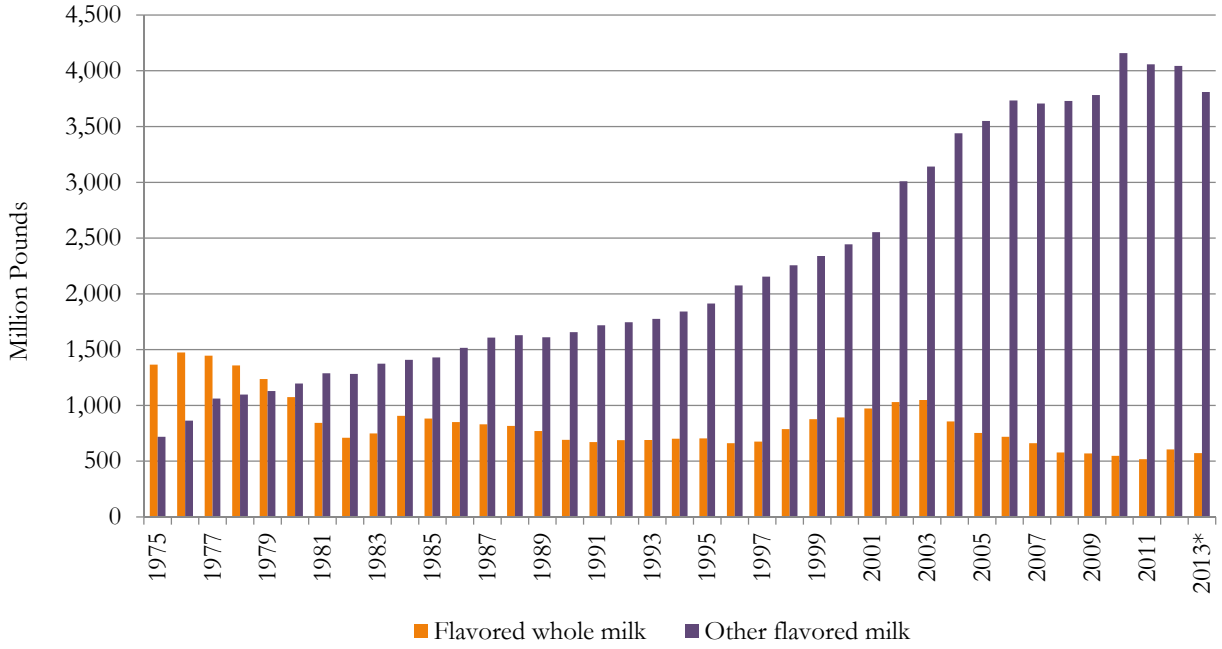
Source: USDA, Economic Research Service

Competition from products such as tap water, bottled water, carbonated soft drinks, tea, fruit juice and coffee has also stressed milk sales. When consumers choose a beverage, their selection depends on various consumption drivers. In order of their likelihood in driving beverage consumption occasions, consumers look to beverages for satisfying thirst, treating themselves, accompanying food, optimizing nutrition, increasing energy, counting calories and promoting relaxation. Research from the Innovation Center for U.S. Dairy indicates that milk ranks first for beverages that accompany food and second for beverages that provide nutritional benefits. However, thirst and treating themselves are the top two macro beverage consumption occasion drivers. "Accompany food" and "nutrition" rank third and fourth, respectively, as beverage consumption occasion drivers. To quench thirst, consumers most likely fulfill that need with tap water, bottled water and carbonated soft drinks. When treating themselves, consumers are most likely to choose carbonated soft drinks, coffee and tea (Innovation Center for U.S. Dairy 2011).

Additionally, nondairy milk products have presented a challenge for dairy. Plant-based milks are sourced from crops such as soybeans, rice, almonds and coconut. Mintel reports that milk alternatives represent 8 percent of all U.S. milk sales. Although this share is small, the category's growth indicates that milk alternatives will increasingly represent fierce competition for animal-sourced milk. Between 2011 and 2013, milk alternative sales increased 30 percent, and almond milk performed especially well. By comparison, total milk sales grew only 1.8 percent. Until at least 2018, nondairy milk sales growth is projected to exceed growth for dairy milk. Consumers have started to consider nondairy milk alternatives as they seek products claiming features such as no lactose, little sugar and few calories. Although some plant-based milk alternatives may offer some nutritional advantages, some lag cow's milk in calcium and vitamin D content (Van Allen 2014).

In the flavored milk category, some consumption trends have varied from those in the plain milk category. Exhibit 1.1.3 charts flavored whole milk and other flavored milk sales, measured in pounds, from 1975 to 2013. Although flavored whole milk sales have shrunk like in the plain milk category, other flavored milk sales have generally performed quite well. Between 1990 and 2013, flavored whole milk sales decreased by 17.1 percent, yet other flavored milk sales increased by 129.9 percent. In 2013, flavored whole milk represented 13.1 percent of all flavored milk sales, and other flavored milk sales represented 86.9 percent of total flavored milk sales. Although flavored milk sales, especially in non-whole fat varieties, has performed well relative to plain fluid milk sales, note that other flavored milk sales peaked during 2010 (USDA Economic Research Service).

Exhibit 1.1.3 – Fluid Flavored Milk Sales in Pounds, 1975 to 2013



* 2013 data are preliminary.
Source: USDA, Economic Research Service

A factor contributing to recent weakened flavored milk sales possibly links to school lunch programs. As the U.S. has focused attention on curbing childhood obesity, some school districts removed flavored milk as an option for their students, or they sought flavored varieties sweetened with ingredients other than conventional sweeteners such as high-fructose corn syrup. Some processors have adopted beet sugar, Truvia and chicory as sweeteners to appeal to stakeholders who want more "natural" sugar to appear in flavored milk products. As some districts have eliminated flavored milk as an option that they make available to their students, many industry groups have promoted that drinking flavored low-fat or skim milk would be better than risking that children forgo milk when they don't have a flavored option and, thus, could become deficient in nutrients like calcium, vitamin D and protein that they'd otherwise source from flavored milk. The Milk Processors Education Program reports that milk intake decreases 35 percent after students lack flavored milk as an option. Schools represent a significant market for flavored milk, too. Of the milk consumed at school, close to 70 percent has been flavored (Hoag 2011).

Because flavored milks are usually sweet, consumers choose them as desserts or treats. When marketing flavored milk, common flavors have included chocolate, strawberry and vanilla. Recently, introducing seasonal flavors has worked well for milk processors. For example, a jelly bean flavor works well in the spring. During the fall, pumpkin is a seasonal flavor option (Carper 2014b).

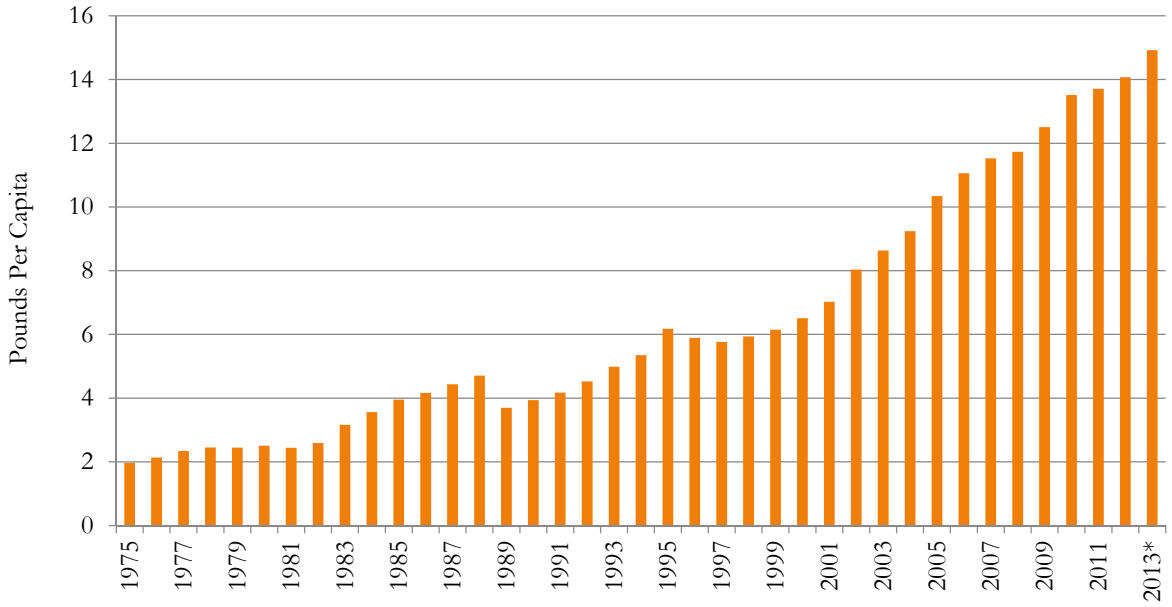
The dairy industry has started marketing chocolate-flavored milk to adults who exercise. The protein and sugar found in chocolate milk may help with post-workout recovery. Reaching active adults and promoting flavored milk at athletic events has been a marketing strategy employed by milk processors. For example, milk sponsorships have been seen at events like those for Ironman, Iron Girl and USA Hockey, and the industry seeks to target anyone who exercises (Carper 2014b).

Milk-derived protein drinks are another trend. To make these products, processors can choose to increase protein content by supplementing the drinks with protein powder or concentrating protein using a filtration process. Dairy-based coffee drinks, such as those that blend milk and coffee, are another product trend within the fluid milk category. Looking into the future, dairy processors may best position themselves in the fluid milk category by offering both commodity milk products, such as cartons of plain milk, and value-added dairy products, such as the flavored and specialty milk products shared in this section (Carper 2014b).

1.2 Yogurt

U.S. yogurt consumption has increased substantially during the past several decades. Based on per capita consumption data, the average American consumed more than seven times more yogurt in 2013 than in 1975. Exhibit 1.2.1 illustrates the trend in U.S. yogurt consumption per capita. In 1975, per capita yogurt consumption averaged 2 pounds, and by 2013, per capita consumption had risen to 14.9 pounds. Note that the yogurt consumption started its most substantial growth early in the 2000s (USDA Economic Research Service).

Exhibit 1.2.1 – U.S. Yogurt Consumption per Capita, 1975 to 2013



* 2013 data are preliminary.
Source: USDA, Economic Research Service

In terms of value, U.S. yogurt sales total an estimated $8 billion per year (Gasparro and Josephs 2013). Euromonitor International estimated that yogurt and sour milk product sales totaled $8.5 billion during 2013. The company also projects future growth for the yogurt category. During the next five years, Euromonitor projects 10 percent sales growth (Thornton 2014). Other estimates more conservatively estimate that annual yogurt sales total more than $7 billion (Hennessy 2014a).

Of all yogurt consumed, Greek varieties quickly have gained acceptance. In 2008, Greek yogurt represented 4 percent of all yogurt sales. One estimate suggested that Greek varieties had captured 44 percent of all yogurt sales by 2013 (Hennessy 2014a). In another projection, a brokerage firm estimated that Greek yogurt has grown to a 45 percent market share (Gasparro and Josephs 2013). The high protein levels found in Greek yogurt may have motivated consumer interest in the product. Within the Greek yogurt category, the market has become "increasingly crowded." Firms like Chobani, General Mills, Fage, Dannon and ConAgra Foods all offer Greek yogurt product lines. Chobani leads the group. Estimates suggest that Chobani sells more than one-third of Greek yogurt (Hennessy 2014a).

After Greek yogurt gained popularity during the 2000s, companies began introducing other international, country-specific yogurt products. Consumers may choose from multiple varieties, including Icelandic, Australian, Asian, Bulgarian, Swiss, French and Russian yogurts (Anderson 2014 and Pierce 2013). The new selections resolved boredom that Americans likely felt with the traditional yogurt that had been available to them. Each variety requires slightly different production practices. For example, Greek and Icelandic yogurt processors boost protein and calcium levels and reduce carbohydrates by removing whey, lactose and natural sugar. To make Asian yogurt, the process involves caramelizing milk sugar with heat. The product has smooth, creamy attributes, which make it resemble a dessert pudding (Pierce 2013).

Named for the town where its recipe was created, noosa is a whole-milk, Australian-style yogurt. Americans first had access to noosa in 2010 after a firm already selling the yogurt in Australia agreed to U.S. expansion at the urging of a native Australian who lived in Colorado. Since then, the product's distribution has grown to include many retail stores, including Target, Kroger, Whole Foods and Safeway. Relative to traditional yogurt, noosa contains more protein. It has a thick, creamy texture, and it balances sweetness and tartness. The company sources its milk from a family-owned Colorado dairy and processes yogurt at a facility built adjacent to the dairy farm. In the future, noosa foresees considering a second processing plant in the eastern U.S., and it would like to again work with a family-owned dairy to supply milk to the production facility (Watson 2014b).

As a fermented milk beverage, kefir is another trend. Although it's not identical to yogurt, the two have similarities. To produce yogurt and kefir, lactobacillus bacteria process the milk's lactose and generate lactic acid. Unlike in yogurt production, however, producing kefir involves yeast, and kefir grains facilitate fermentation. Adding yeast creates carbon dioxide and ethanol and, ultimately, carbonation and alcohol, which is typically removed from commercial kefir. As a final product, kefir has probiotic activity and has been known for its digestion and overall well-being benefits. However, it also has a sour taste. To improve acceptability among consumers, vanilla extract or pureed fruit can complement kefir, or it can be incorporated into products such as muffins, pancakes and bread (Reinagel 2014). Several companies market kefir products, including Lifeway Foods, Wallaby Organic, Greek Gods and Redwood Hill Farms. Growth opportunities for kefir include products targeted to kids and frozen products (Hennessy 2014b).

During 2012, most U.S. households – 83 percent – reported that they had purchased yogurt sometime during the year (Cheese Reporter 2014). In its "Eating Patterns in America" report, the NPD Group's National Eating Trends group quantified the extent to which Americans have integrated foods and beverages into their diets. To make its estimates, the NPD Group bases its research on a 2,000-

household sample. Between February 2004 and February 2014, yogurt was the top-ranked food or beverage for becoming part of American diets (Watson 2014a).

Flavor selection is an important factor in dairy product development. Only 10 percent of U.S. sales are for plain yogurt (Pierce 2013). Of the extensive flavors available, the 10 most popular flavors represent 25 percent of all flavors. In the U.S. spoonable yogurt category, the best-selling flavors are strawberry and blueberry. Other top flavors, ranked in order of their sales, have been vanilla, peach, plain, raspberry, honey, banana-strawberry, black cherry, berry, pineapple, cherry, key lime, lemon and banana. Berry flavors alone make 13.54 percent of sales. Increasingly, tropical flavors – for example, mango, coconut, guava and passion fruit – are gaining popularity. Other trends are dessert-like flavors including caramel and chocolate (Cassell 2013). In 2014, Chobani introduced its pumpkin spice Greek yogurt, made with pumpkin puree and spices as part of a "limited batch." Consumers quickly accepted the product, and it became the fastest growing SKU since the company started (Watson 2014c).

Savory yogurt is an emerging trend that includes flavored dips made with Greek yogurt and non-Greek savory flavors. Dannon markets Oikos Greek Yogurt Dips with flavors such as French onion and vegetable herb. Blue Hill, a New York company, introduced non-Greek savory yogurt last winter. Its flavors include tomato, carrot and beet (Hennessy 2014a). Innovation hasn't stopped at flavors. The yogurt category has seen interest in mix-in products like whole grains and nuts. Mix-in possibilities include chia seed, flax seed, pistachios, chocolate flakes and chocolate chunks (Cassell 2013). Although low-fat and nonfat versions have been most popular, full-fat and whole-milk products are gaining appeal (Pierce 2013 and Kennedy 2014b).

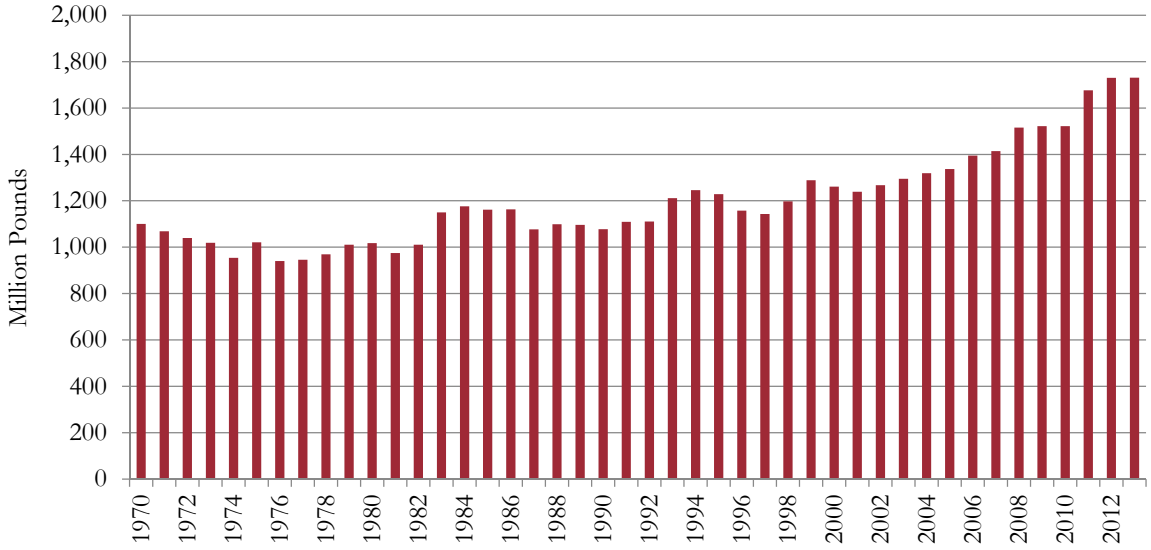
Typically, women have more commonly been recognized as a target audience for yogurt (Cassell 2013). Of the consumers who ate yogurt at home during 2012, 52 percent were women, 25 percent were men, and 23 percent were children and teenagers (Cheese Reporter 2014). High-protein yogurt works well with a male audience, however (Cassell 2013). After Greek yogurt products began to launch, the two main audiences consuming Greek yogurt were women who transitioned from traditional yogurt to Greek varieties and men who could use Greek yogurt for sports nutrition purposes and displace protein supplement consumption (Cheese Reporter 2014).

Regarding when Americans consume yogurt, the product works well at breakfast, lunch or dessert (Pierce 2013). It may also be a morning or afternoon snack (Kennedy 2014b). Its versatility works to its advantage, and its packaging and ready-to-consume characteristic make it a convenient choice (Pierce 2013). Chobani is attempting to encourage yogurt consumption at different dayparts (Watson 2014c). Mintel reports that more than 25 percent of yogurt consumers choose to consume the product as a dessert, and as such, they're seeking indulgent flavors that still reduce the calorie load relative to other desserts (Kennedy 2014b).

1.3 Butter

Recently, Americans have increased their butter consumption. Exhibit 1.3.1 illustrates the trend in U.S. total domestic butter utilization. Between 2000 and 2013, total U.S. butter utilization increased 37.3 percent. During this period, U.S. butter utilization reached its lowest level during 2001 at 1.24 billion pounds. In 2013, domestic butter utilization totaled 1.73 billion pounds. On a per capita basis, the average American consumed 5.5 pounds of butter in 2013, based on preliminary per capita consumption data (USDA Economic Research Service).

Exhibit 1.3.1 – Total U.S. Domestic Butter Utilization, 1970 to 2013



Source: USDA, Economic Research Service

Butter competes with margarine and spreads, and within the past decade, nutrition news and other food industry trends have supported growth in U.S. butter consumption and spending. Since 2011, U.S. butter sales have exceeded margarine sales. During 2013, IRI reported that butter sales totaled $2 billion, and by comparison, margarine and spread sales totaled $1.8 billion (Gee 2014).

From a nutrition perspective, consumers at one time had migrated from butter because it contains cholesterol and saturated fat that had been attributed to heart disease, and as they reduced their butter consumption, they chose margarine. This trend began reversing when the food industry and consumers recognized that many margarine products contained trans fat, which has negative implications for cholesterol and overall health. Additionally, U.S. consumers have increasingly begun understanding that eliminating fat from their diets may not be the ultimate goal (Gee 2014).

Historically, companies began producing oil-based margarine during the early and mid-20th century, and butter rations implemented during World War II benefited margarine and increased its popularity. Margarine was also cheap to make. Recently, spreads have struggled with their image as manufactured, processed goods. Butter has benefited from such views because it's perceived as a natural, simple product. Cooking at home and the emergence of food-focused TV channels have benefited the butter

category. When consumers watch the Food Network or the Cooking Channel, they see many TV personalities using butter (Gee 2014).

When choosing butter products, U.S. consumers usually prefer salted versions (Yonkers 2014). In 2013, flavored butters – both sweet and savory – were a category trend. Butter manufacturers had added several types of ingredients to butter: sea salt and cracked pepper, olive oil, canola oil, ginger, sesame and maple syrup. Blending butter and oil produces a spreadable butter, which has gained popularity because it's convenient and flavorful. Spreadable butters also may be more healthful alternatives. To flavor foods, Land O'Lakes introduced a sauté starter product. It blends butter and other flavorings, and consumers may use it to sauté chicken, fish, pork and vegetables. Half-stick butter packaging is another trend (Carper 2013).

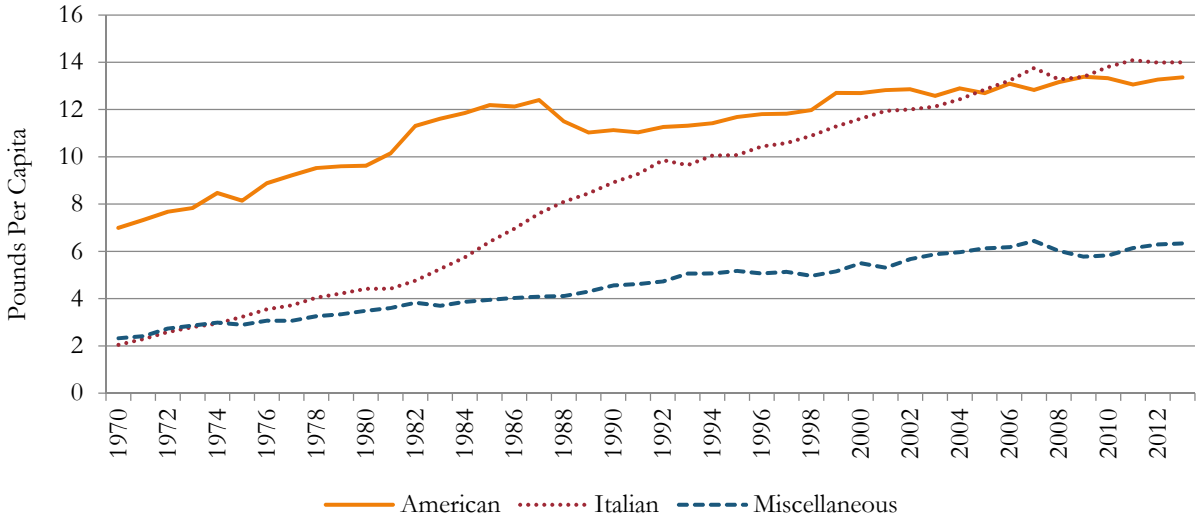
Seasonality influences butter sales. During the calendar-year fourth quarter, butter manufacturers record half of their annual sales. The holiday season and baking that occurs during that time drive sales (US Foods 2014).

As a new use for butter, Bulletproof Coffee has popularized mixing coffee and butter (Bratskeir 2014). The Bulletproof founder, who launched the concept during 2010, first tried butter added to a hot beverage when he traveled to Tibet and tried yak butter tea (Salahi 2014). In coffee, the butter would compete with other add-ins like cream and sugar (Bratskeir 2014). When Bulletproof makes butter coffee, it also supplements the drink with medium-chain triglycerides (Salahi 2014). Anecdotally, butter coffee drinks claim that blending high-fat butter in their coffee causes the body to metabolize caffeine more slowly and contributes to sustained energy (Bratskeir 2014). Mixing butter in coffee may also have satiety benefits. Among the consumers who add butter to their coffee, a subset prefers grass-fed butter (Salahi 2014).

1.4 Cheese

Between 1970 and 2013, total per capita cheese consumption increased by 196.5 percent. The USDA Economic Research Service classifies cheese into three main groups: American, Italian and miscellaneous. Exhibit 1.4.1 charts per capita cheese consumption for these categories over time. Of the three groups, Italian per capita cheese consumption increased at the greatest rate. From 1970 to 2013, Italian cheese consumption increased by 583.5 percent. During the 2000s, Italian cheese consumption per capita surpassed American cheese consumption per capita. For American and miscellaneous cheese categories, the growth totaled 91 percent and 172.8 percent, respectively (USDA Economic Research Service).

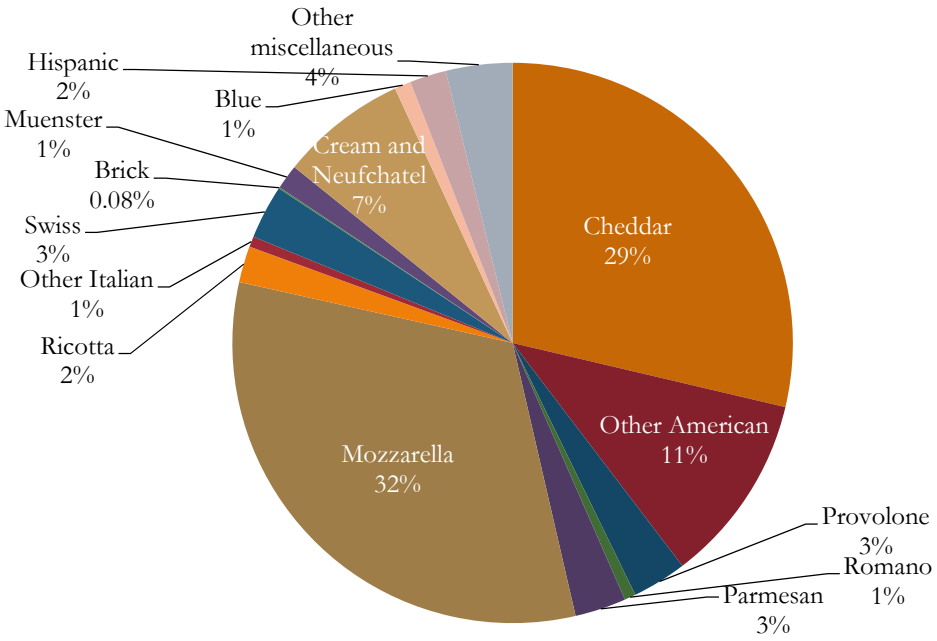
Exhibit 1.4.1 – Per Capita Cheese Consumption by Category, 1970 to 2013



* 2013 data are preliminary.
Source: USDA, Economic Research Service

The USDA Economic Research Service further subdivides per capita consumption data by cheese variety. Exhibit 1.4.2 presents the share of total per capita consumption captured by each variety for which USDA recorded data during 2013, based on preliminary data. Mozzarella, cheddar, other American and cream and Neufchatel cheeses represented the greatest shares of total per capita cheese consumption during 2013. Mozzarella and cheddar alone represented more than 60 percent of the average American's per capita cheese consumption. From 1970 to 2013, cheese varieties that experienced the greatest growth in per capita consumption were mozzarella, 811.1 percent growth; Parmesan, 499.8 percent growth; Provolone, 366 percent growth; and cream and Neufchatel, 302.2 percent growth. The only variety that experienced a per capita consumption decline between 1970 and 2013 was brick cheese (USDA Economic Research Service).

Exhibit 1.4.2 – Per Capita Cheese Consumption by Variety as Share of Total per Capita Consumption, 2013



* 2013 data are preliminary.
Source: USDA, Economic Research Service

Cheese consumption is increasing to fulfill growing demand for use in appetizers; prepared entrees; side dishes; and soups, sauces, dressings and dips, based on Mintel data. Cheese use falls into one of three categories: food processing, food service and retail. The Wisconsin Milk Marketing Board estimates that the largest category in the U.S. is food service, which absorbs about 39 percent of total cheese use. The retail channel uses 36 percent of cheese, and food processors use 25 percent. However, note that cheese used by the food processing sector reaches end-users through the retail and food service channels (Berry 2014a).

Natural cheese consumption far exceeds processed cheese consumption. In 2013, the USDA Economic Research Service projected that per capita processed product intake consumed as cheese totaled 3.63 pounds. By comparison, consumers on average consumed 28.67 pounds of natural cheese per capita (USDA Economic Research Service). To make natural cheese, manufacturers typically limit the recipe to four ingredients: milk, bacterial culture, enzymes and salt. Processed cheese has added emulsifiers and sometimes may include other ingredients, such as shelf life-, color- or flavor-related additives. Both natural and processed cheeses have slightly different attributes. For example, natural cheese properties don't lend well to melting. Melt characteristics are important to flavor and have been the source of development efforts for products such as pizza and cheeseburgers, which both require different melt characteristics (Nassauer 2014b).

Among specialty foods, cheese is the most significantly consumed product, and consumers have indicated growing interest in being adventurous in their cheese selections (Prisco 2013). Packaged Facts reports that specialty and natural cheeses collectively represent a $16 billion market, and between 2014 and 2018, the firm estimates that the market will increase by a 4 percent compound annual growth rate (The Gourmet Retailer 2014). Cheesemakers in states typically known for commodity

cheese production – such states include California and Wisconsin – have shown interest in more specialty production, typified by smaller batches, handmade practices and emphasis on style and quality (Prisco 2013).

Artisanal is also a trend driving the cheese product category. To differentiate itself, artisan cheese typically refers to cheese primarily made by hand. Artisan cheese has contributed to raising the profile for American-made cheese. It's produced in various states, even those like North Carolina and Maine that aren't typically regarded for their cheese production. Cheesemakers who adopt artisanal practices reach buyers through farmers markets, cheese shops, grocery stores and restaurants (Lippman 2014). In some cases, producing artisan cheese has enabled dairies to maintain their viability (Worthen 2011). A study from the University of Missouri measured Missouri consumer interest in artisan cheese products based on a 1,079-consumer sample size. Of the consumers that answered the question about artisan cheese purchase frequency, the study found that 42 percent purchased artisan cheese. Of those consumers, the greatest share – 44 percent – purchased artisan cheese weekly. Missouri consumers are more likely to consume cheese as a snack than at other occasions, and they noted that the most important artisan cheese attributes were taste, made with natural milk, price, package size and health or fat content (Parcell and Moreland 2013).

Cheese preferences may also vary by generation. Millennials want "exciting new flavors." This group also appreciates authenticity, short ingredient lists and smaller portions. On the other hand, protein and calcium content are important to baby boomers. Convenience continues to be important when reaching consumers. Packaging cheese as slices, shreds, spreads and sticks make consuming cheese more convenient (Finkel 2014).

Other innovation in cheese products has included reducing sodium content, eliminating artificial ingredients like preservatives and adding flavors. Kraft has attempted all three of these formulation strategies in its products (Lippman 2014). The low-sodium trend may be slowing as fewer new product launches have featured "low-sodium" labels. However, some companies have already made significant strides in sodium reduction. For example, during the past two years, Kraft decreased sodium by about 20 percent in its Singles slices. From a flavor perspective, cheese manufacturers have introduced many options including cheese flavored with jalapeno, herbs, garlic, blueberry and cranberry (Finkel 2014). Adding nuts is another option (The Gourmet Retailer 2014). Labeling to highlight cheese nutrition represents a growth opportunity. Mintel reports that a majority of consumers – 55 percent – recognize cheese as "an inexpensive source of protein" (Finkel 2014). Cheese also benefits from being a gluten-free product (Berry 2014a).

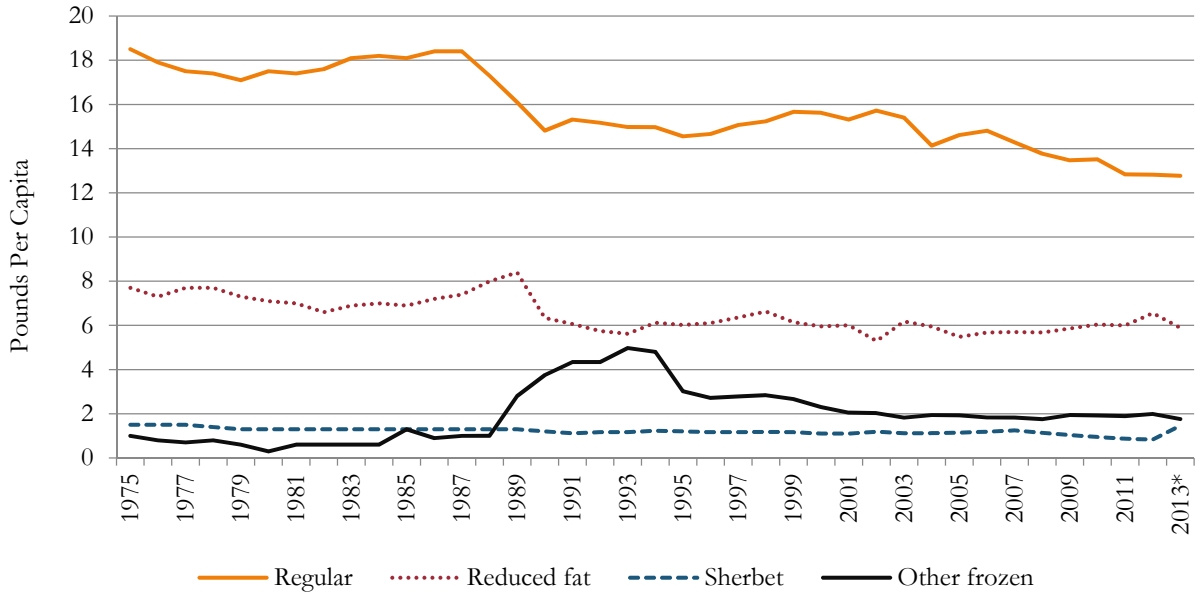
When purchasing cheese, sales have seasonality effects. Based on 2013 sales data, cheese sales were noticeably higher before Thanksgiving and Christmas. Relative to the rest of the year, IRI sales data illustrate that cheese sales were about 20 percent higher than average during the week before Thanksgiving and about 35 percent higher than average during the week before Christmas. New Year's and the Super Bowl are other popular times for cheese sales. Variety preferences may change by season, too. Near Thanksgiving and Christmas, popular varieties include brie, Edam and blue cheese gain popularity. Gruyere, cream cheese and Goumay are other cheese examples that have appeal during Thanksgiving time. During the Christmas season, many varieties see boosted sales including brick, camembert, fontina, gorgonzola and ricotta cheeses. Super Bowl cheese purchases tend to favor mozzarella and blended cheeses like cheddar/jack and Italian blends (Berry 2014c).

1.5 Ice Cream and Other Frozen Dairy

The ice cream and frozen category includes several products. For the year preceding Aug. 10, 2014, IRI reports that ice cream sales totaled $5.4 billion, frozen novelties sales totaled $4.1 billion, and frozen yogurt/tofu sales totaled $337 million (Carper 2014a). Excluding restaurant sales, NPD estimates that 2013 ice cream sales in the U.S. totaled $13.7 billion. Every two weeks, four in 10 consumers choose to consume ice cream. Per year, the average U.S. consumer ate ice cream 28.5 times in 2014. That's a drop from 41.3 times on average during 1989 (VanderMey 2014). Although ice cream sales have been challenged, IBISWorld projects that the product will "bounce back" in the future (McMillan 2014).

In the frozen dairy category, total per capita consumption decreased by an estimated 16.2 percent from 1990 to 2013. Exhibit 1.5.1 illustrates per capita consumption rates for four frozen dairy products: regular ice cream, reduced fat ice cream, sherbet and other frozen products. Of the two ice cream products, per capita consumption of both has declined. However, based on consumption data from 1990 and 2013, the drop has been more significant for regular ice cream than reduced fat ice cream. Between 1990 and 2013, regular ice cream per capita decreased by 13.8 percent, and reduced fat ice cream consumption per capita decreased by 7 percent. Sherbet consumption has maintained a relatively consistent rate per capita. For other frozen products, per capita consumption surged during the late 1980s and into the 1990s. Since then, however, per capita consumption has retreated (USDA Economic Research Service).

Exhibit 1.5.1 – Ice Cream Consumption Per Capita by Product, 1975 to 2013



* 2013 data are preliminary.
Source: USDA, Economic Research Service

Although the USDA Economic Research Service data indicate that regular fat ice cream consumption has declined more than reduced fat ice cream consumption on a per capita basis, consumers have a growing preference for premium ice cream that contains more fat than regular ice cream, according to member companies of the International Ice Cream Association that participated in a 2013 survey. The member companies produce 85 percent of U.S.-consumed ice cream and frozen desserts (Dairy Reporter 2013). Market research firm Canadean reports that 47 percent of U.S. ice cream consumption fulfills an indulgence need for consumers needing a treat (Nunes 2014).

Health factors usually don't affect U.S. ice cream intake. For consumers concerned about health, they typically decide to consume something other than ice cream, or if they choose decadent ice cream on occasion, then they limit the portion size (Nunes 2014). Despite the popularity of premium ice cream, most companies offer at least one ice cream or frozen dessert product line marketed for its healthful characteristics (Convenience Store News 2014). When making ice cream purchases, price sends certain signals. Consumers perceive that products priced too low may disappoint from a taste perspective (Nunes 2014).

Ice cream manufacturers produce ice cream with diverse flavors. However, in 2013, International Ice Cream Association members that participated in the association's member survey reported that the most popular ice cream flavors were vanilla, chocolate, pecan, Neapolitan and rocky road (Dairy Reporter 2013). The International Dairy Foods Association shares a slightly different top-flavor list: vanilla, chocolate, cookie 'n cream, strawberry and chocolate chip mint. Seasonal flavors are popular around the holidays (International Dairy Foods Association). However, ice cream can celebrate other seasonal-related experiences like a vacation (Carper 2014a). Flavor preferences vary somewhat by state. Based on Baskin Robbins sales data, most states have one of five flavors as their favorites. In Missouri, the preferred flavor is vanilla. Exhibit 1.5.2 shares the best-selling ice cream for U.S. states (Nguyen 2014). Although these data only reflect Baskin Robbins sales, they do indicate that ice cream flavor preferences may change by geography.

Exhibit 1.5.2 – Best Selling Baskin Robbins Ice Cream Flavors by State

Source: Parade Magazine (Nguyen 2014)

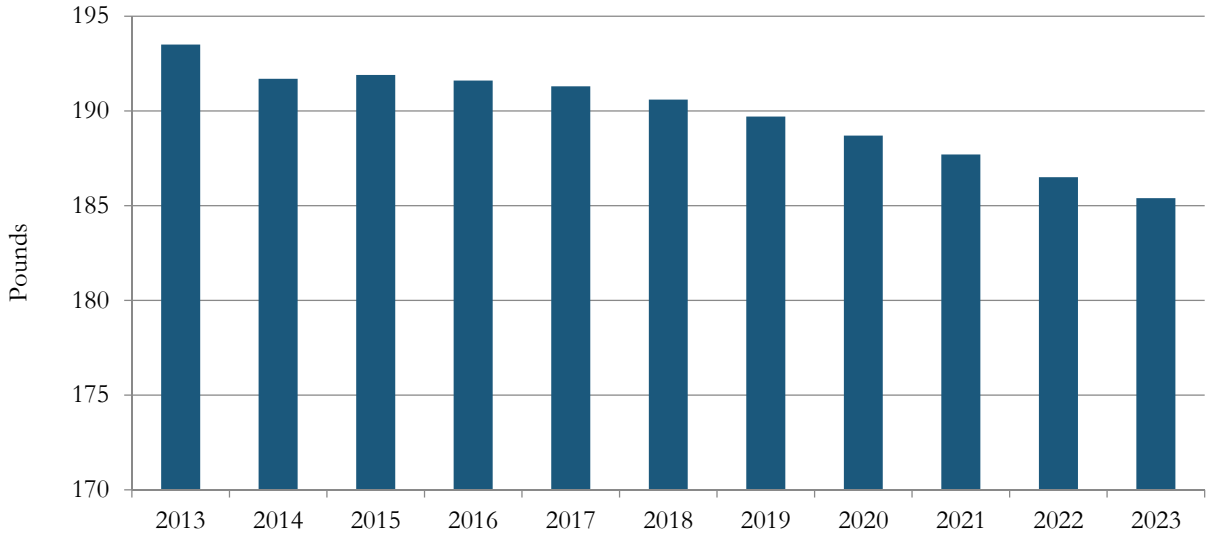
Several flavor trends have emerged recently. Coconut flavors have gained appeal because consumers associate coconut with healthfulness and its tropical origin (Convenience Store News 2014). For consumers seeking a novel product, manufacturers have created ice cream with sweet and savory flavor blends and sorbet-like textures (Nunes 2014). Several manufacturers have started blending sweet and salty flavors, and adding liquor to ice cream (Carper 2014a). Yet another trend involves combining ice cream with other dessert-like flavors such as red velvet cake, cheesecake, cobbler and tiramisu (Cassell and Fusaro 2014). Co-branding is another flavor-related trend. When manufacturers blend ice cream with branded candy, cookie, fruit or flavors, they can co-brand the ice cream brand with the add-in brand (International Dairy Foods Association).

Frozen yogurt has increasing appeal. Of the International Ice Cream Association member companies that participated in the previously mentioned survey, half noted higher frozen yogurt demand (Dairy Reporter 2013). Annual sales growth averaged 21 percent between 2008 and 2013 (VanderMey 2014). When marketing frozen yogurt, manufacturers and food service entities have emphasized the product's low fat content and probiotic levels. Recently, frozen Greek yogurt introductions have allowed manufacturers to market a high-protein frozen yogurt (Convenience Store News 2014). Despite the interest in frozen yogurt, the average U.S. consumer only ate frozen yogurt 1.2 times per year during 2014 relative to eating ice cream 28.5 times that year. By as early as 2019, the frozen yogurt category is projected to start contracting (VanderMey 2014). Gelato has also been a recent source for many new product introductions (Carper 2014a).

1.6 Projected Dairy Product Consumption

Each year, the Food and Agricultural Policy Research Institute at the University of Missouri releases its baseline briefing book of long-range agricultural forecasts. The briefing book published in March 2014 shares projections for 2013 to 2023. From a dairy consumption perspective, FAPRI projects that U.S. dairy processors will require gradually less fluid milk each year. Exhibit 1.6.1 shares projected fluid milk demand. Between 2013 and 2023, FAPRI projects that end-users will decrease their total fluid milk consumption by 4.2 percent or 8.1 pounds per capita (Westhoff et al. 2014).

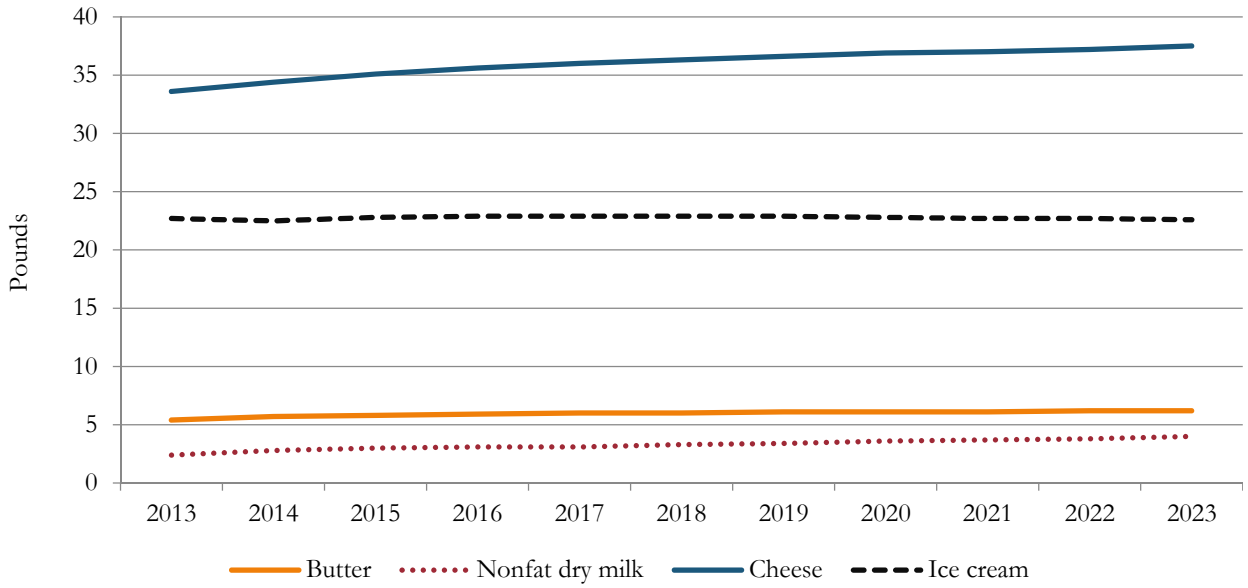
Exhibit 1.6.1 – Projected Total Fluid Milk Consumption per Capita, 2013 to 2023



Source: University of Missouri, Food and Agricultural Policy Research Institute

During the next decade, FAPRI projects that average consumers will increase consumption of nonfat dry milk, butter and cheese. On the other hand, the projections suggest that ice cream consumption per capita will change slightly. Exhibit 1.6.2 presents projected per capita consumption changes for these four dairy product categories. Between 2013 and 2023, FAPRI forecasts that consumers will increase nonfat dry milk consumption by 66.7 percent or 1.6 pounds. During 2023, FAPRI projects that U.S. consumers on average will eat 3.9 more pounds of cheese and 0.8 pounds more of butter than they consumed on average during 2013. Note that the FAPRI projections don't articulate projected yogurt or other milk product consumption changes (Westhoff et al. 2014).

Exhibit 1.6.2 – Projected Dairy Product Consumption per Capita, 2013 to 2023



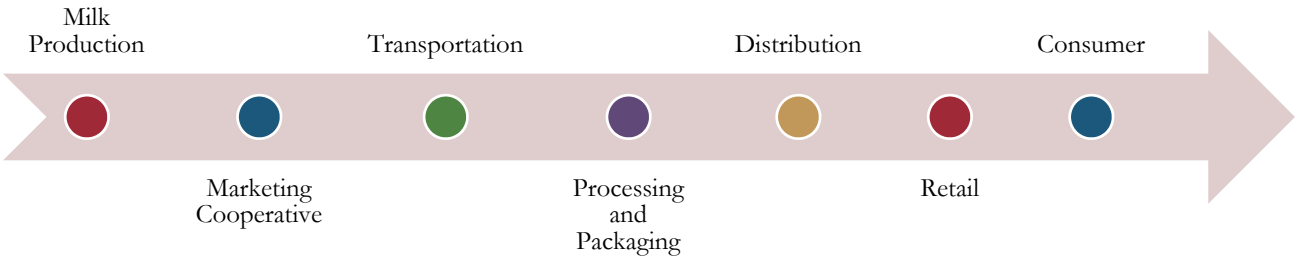
Source: University of Missouri, Food and Agricultural Policy Research Institute

2. Missouri Dairy Value Chain

2.1 Overview of Value Chain

Value chains are a way to explain a complex set of inputs, outputs, activities and operations for a product or industry. They demonstrate all steps, from the raw input stage to becoming a final product and reaching consumers. For the dairy industry, a diagram of the entire industry can be found in Exhibit 2.1.1. The value chain begins in the production of milk at the farm level and follows various stages until the creation and selling of various dairy products. Note that some stages may be bypassed or occur together, depending on the specific path used for a certain product. A key point to understand is that products add value throughout each stage of production until they reach the final consumer.

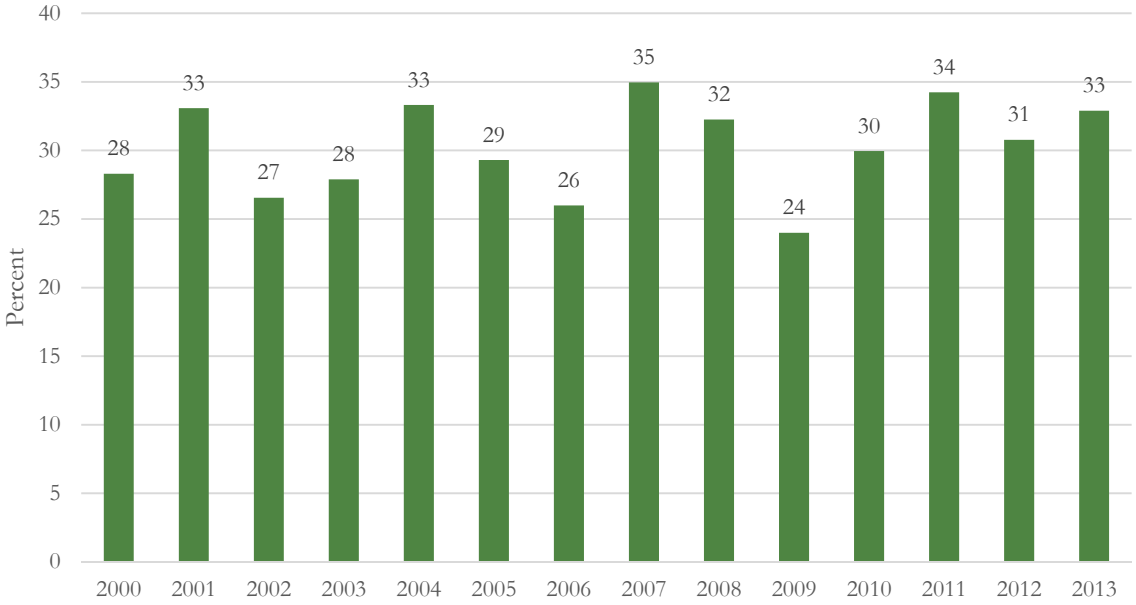
Exhibit 2.1.1 – Dairy Industry Value Chain



Historically, most dairy farmers have only captured a limited amount of value out of the final dairy products that are produced for consumers. Exhibit 2.1.2 illustrates the farm value share for dairy products over time. Dairy products represent the basket of dairy products that U.S. households purchased for at-home consumption during the base year (2003) in the analysis. The basket would include retail foods such as butter, cottage cheese, cream, ice cream, skim/low-fat/whole milk, cheese and yogurt. Farm receipts were based on the average all-milk price received by producers that was reported by USDA-National Agricultural Statistics Service. Retail prices and quantities purchased were reported through the Bureau of Labor Statistics based on its survey and Neilsen Homescan data.

For every dollar spent on the milk/dairy basket in 2013, dairy producers received approximately 33 percent in farm value share. From 2000 to 2013, a slightly increasing trend and much year-to-year volatility in the farmer value share are noticeable from this data series.

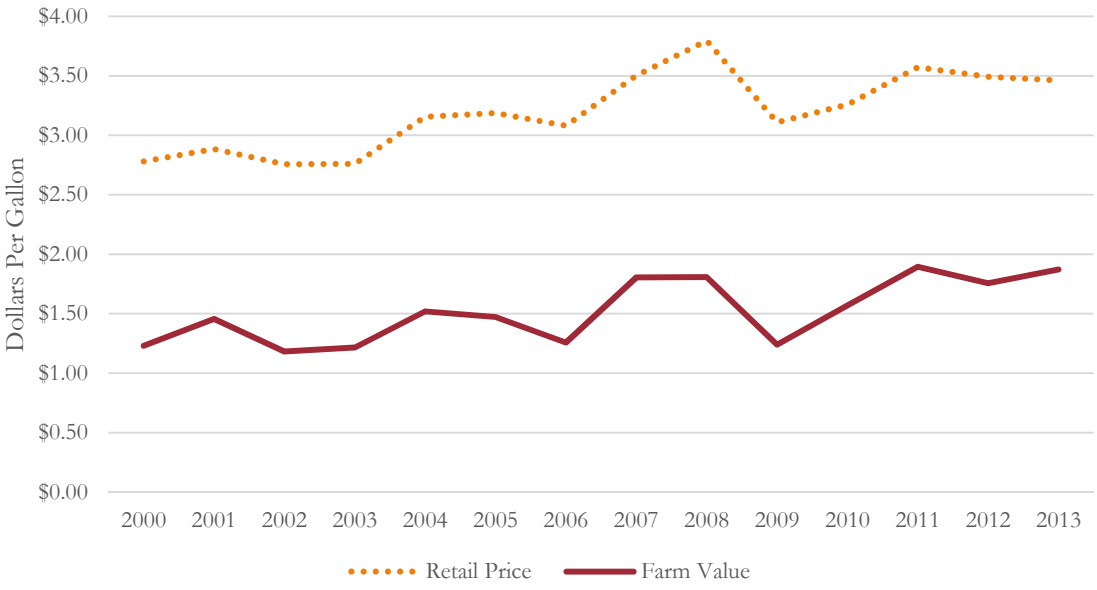
Exhibit 2.1.2 – Farm Value Share of the Milk and Dairy Basket, 2000 to 2013



Source: USDA – Economic Research Service

Various dairy products report varying spreads from the farm value to retail sectors. A look at whole milk on a per gallon basis is reported in Exhibit 2.1.3. U.S. city average retail prices for whole milk peaked in the year 2008 at $3.80 per gallon. Farm value reached its high in the year 2011 at $1.90 per gallon. Note both the farm and retail prices have trended upward over the past 14 years. Whole milk represents one of the simplest value chain routes from the farm to a fluid milk manufacturing plant that processes and packages products for retail sales.

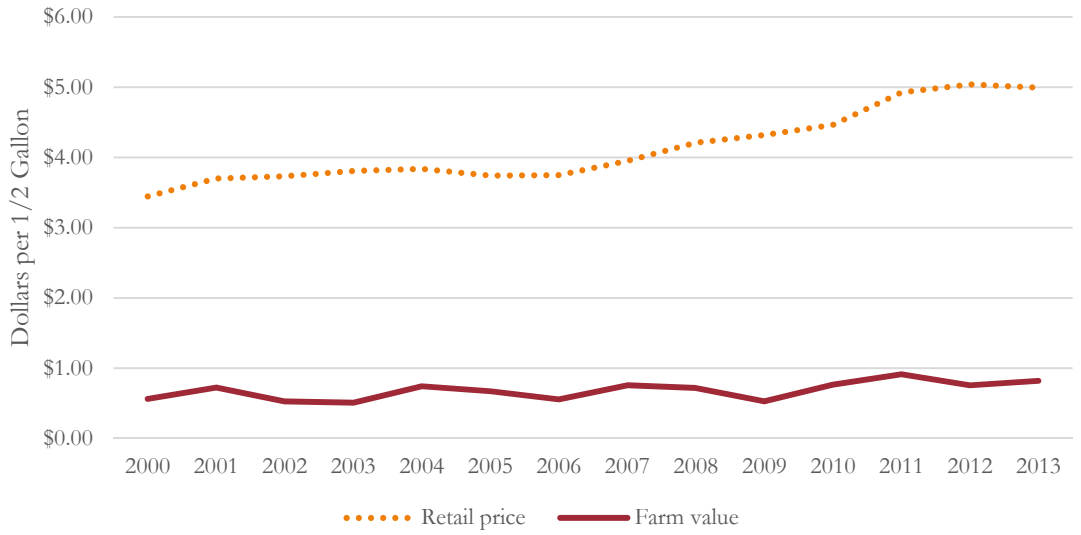
Exhibit 2.1.3 – Whole Milk, Farm Value and Retail Prices, per Gallon, 2000 to 2013



Source: USDA – Economic Research Service

Exhibit 2.1.4 looks at ice cream in farm and retail prices per half gallon from the years 2000 to 2013. Note that the spread between farm and retail is a much wider than the spread for whole milk, which may be due to further processing and steps needed in creation of ice cream. Additionally, the farm value of ice cream has not increased as dramatically as the retail prices have. Only in one year analyzed has the farm share percent been at 20 percent or higher of the retail price.

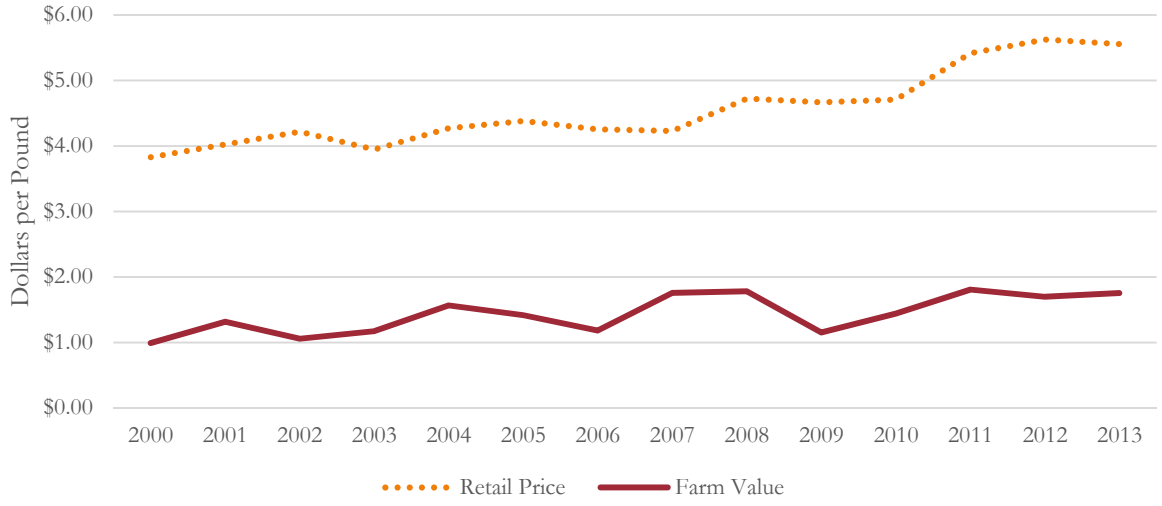
Exhibit 2.1.4 – Ice Cream, Regular, Farm and Retail Prices, per Half Gallon, 2000 to 2013



Source: USDA – Economic Research Service

Farm value and retail prices for cheddar cheese can be found in Exhibit 2.1.5. For the year 2013, retail prices for cheddar cheese per pound were $5.56, and the farm value of this retail price represented $1.76 per pound.

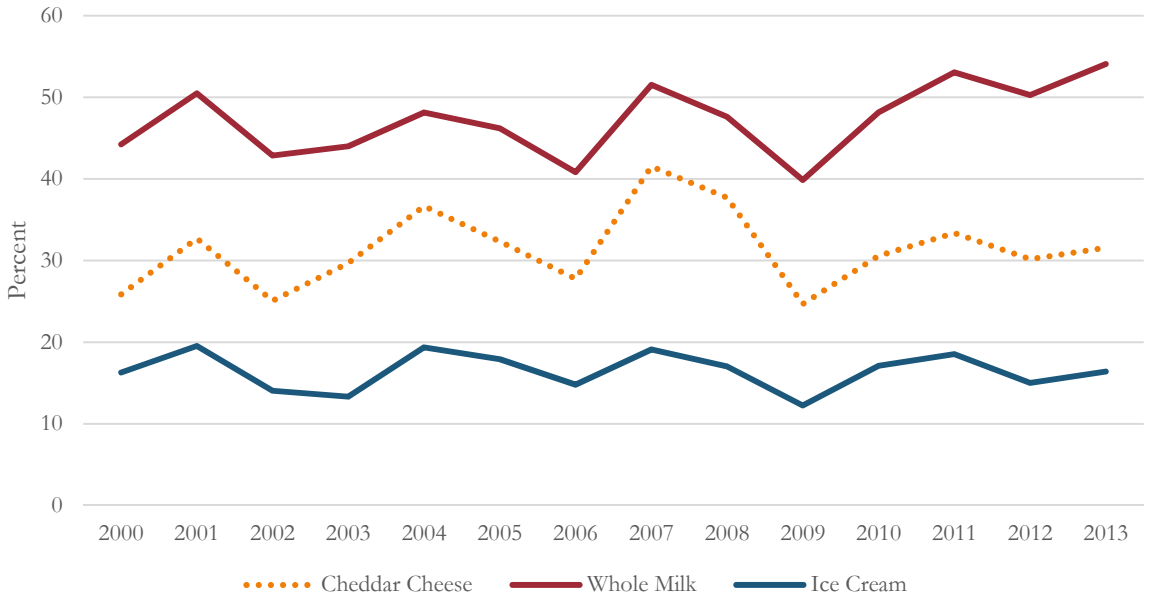
Exhibit 2.1.5 – Cheddar Cheese, Farm and Retail Prices, per Pound, 2000 to 2013



Source: USDA – Economic Research Service

As noted before in the previous exhibits, each dairy product has a different farm share of the retail price. Exhibit 2.1.6 displays the farmer's share of whole milk, cheddar cheese and ice cream prices. Dairy products with more levels of complexity due to further processing, storage and transportation result in a lower farmer share of the retail price.

Exhibit 2.1.6 – Various Dairy Products, Farm Share Percent of Retail Price, 2000 to 2013



Source: USDA – Economic Research Service

2.2 Milk Production Stage

In Missouri, the Grade A and manufacturing-grade dairy farms represent the first stage with their farm-level production of milk. Exhibit 2.2.1 shows an overview of the milk production stage. Primary inputs used in the creation of milk would include breeding stock, feed, land, equipment, facilities, water, utilities and supplies. Outputs from milk production would include milk, dairy beef, dairy replacements and manure. Although milk is the primary output, dairy farmers generate additional income from selling dairy bull calves, raising/selling dairy replacements not needed on their operations and selling purebred stock. Supporting services to the milk production stage would include financial/banking sector, veterinarians, nutritionists, professional services (insurance, accounting, herd testing, etc.), facility/equipment/farm supply providers, custom operators and heifer raisers. Each service provider provides an important function and indirect benefit to dairy farmers.

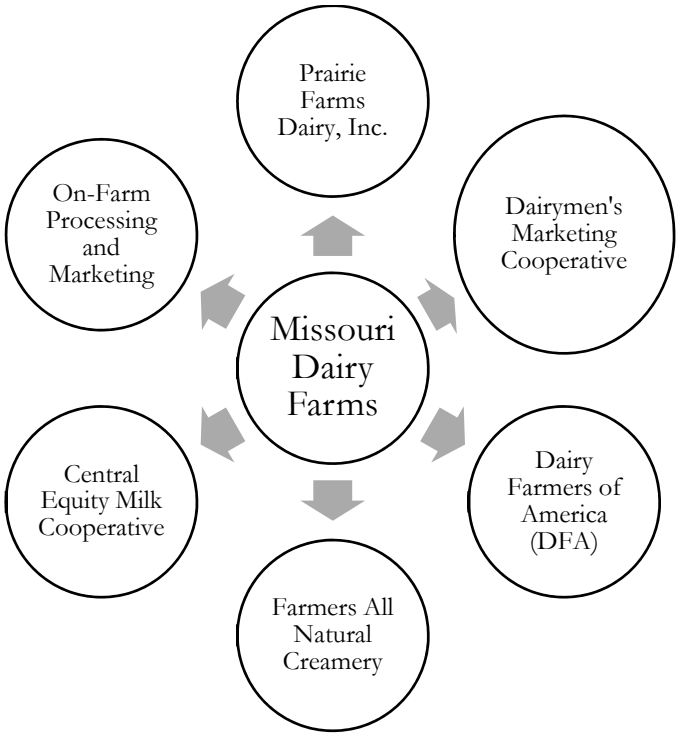
Exhibit 2.2.1 – Dairy Industry Value Chain – Milk Production Stage

Supporting Services	Inputs	Outputs
• Financial/banking • Veterinarian • Nutritionist • Professional services (acct., ins., herd testing) • Facility/equipment providers • Farm supply providers • Custom operators • Heifer raisers	• Breeding stock • Feed • Land • Equipment • Facilities • Water • Utilities • Farm supplies	• Milk • Dairy beef • Replacement heifers • Purebred stock

2.3 Marketing Stage

In Missouri, as in most of the U.S., dairy producers market almost all their milk through milk marketing cooperatives. By choosing to be a member, a milk cooperative producer has elected to be a commodity producer rather than seek to capture value individually by further processing milk from his or her own cows. Milk cooperatives typically are classified as bargaining cooperatives or processing cooperatives or a combination. In Missouri, Prairie Farms would be an example of processing cooperative; DFA would be a combination bargaining and processing cooperative; and Central Equity would be a bargaining cooperative. Milk marketing cooperatives play an important role in balancing supply and demand for processing plants. Exhibit 2.3.1 details current marketing options for Missouri dairy producers. Dairy Farmers of America (DFA), Prairie Farms Dairy, Dairymen's Marketing Cooperative, Central Equity, Organic Valley and Farmers All Natural Creamery all have existing Missouri dairy producers as suppliers. Additionally, a few Missouri dairy producers have elected to process and market their own milk to retail outlets or niche markets. According to the Missouri State Milk Board, as of December 2014, a total of 11 farmers operated small-scale processing facilities that were using cow's milk as a feedstock.

Exhibit 2.3.1 – Market Outlets for Missouri Dairy Farms, December 2014



Two of the marketing cooperatives serving Missouri dairy producers are ranked in the top 25 by milk volume. Exhibit 2.3.2 details the nation's top dairy cooperatives based on milk volume. DFA is the largest cooperative. It is based out of Kansas City, Missouri, and it had 39.4 billion pounds of milk marketed through 7,711 members in the year 2013. They market Grade A milk throughout Missouri and a bit of manufacturing-grade milk in certain Amish areas of Missouri. As of 2014, No. 8 ranked Dairylea Cooperative merged with No. 1 ranked DFA. Prairie Farms Dairy, Inc. is headquartered in Carlinville, Illinois, and ranked 20th in 2013. Missouri producers marketing through Prairie Farms are typically located in the eastern region of Missouri. Prairie Farms and Dairy Farmers of America are distinct cooperatives, but they operate joint ventures in bottling plants in Missouri in an effort to more efficiently use producer-owned processing facilities.

Exhibit 2.3.2 – Nation's Top Dairy Cooperatives, 2013

Rank	Dairy Cooperative	Milk Volume (Billion Lbs.)	Members
1	Dairy Farmers of America, Inc. (DFA)	39.4	7,711
2	California Dairies, Inc.	17.6	470
3	Land O'Lakes, Inc.	12.9	2,261
4	FarmFirst Dairy Cooperative	11.0	4,662
5	Northwest Dairy Association	8.1	504
6	Foremost Farms USA	5.9	1,689
7	Associated Milk Producers, Inc.	5.8	2,600
8	Dairylea Cooperative, Inc.	5.5	1,200
9	Dairy Business Marketing Cooperative	5.2	387
10	Select Milk Producers, Inc.	4.4	60
11	Michigan Milk Producers Association	4.3	1,269
12	United Dairyman of Arizona	3.8	66
13	Lone Star Milk Producers	3.5	192
14	Maryland & Virginia Milk Producers Coop.	3.2	1,521
15	Agri-Mark, Inc.	2.8	1,201
16	Southeast Milk, Inc.	2.4	162
17	Continental Dairy Products, Inc.	2.0	34
18	Upstate Niagara Cooperative, Inc.	2.0	360
19	First District Association	1.9	682
20	Prairie Farms Dairy, Inc.	1.8	797
21	National Farmers Organization	1.5	1,377
22	Organic Valley/CROPP	1.5	1,787
23	Swiss Valley Farms Company	1.4	529
24	St. Albans Cooperative Creamery, Inc.	1.3	416
25	Magic Valley Quality Milk Producers, Inc.	1.0	31

Source: National Milk Producers Federation

In the U.S., dairy cooperatives are a relatively common form of collective ownership. They "provide members an assured market for their milk." In some cases, these cooperatives also process dairy products. USDA Rural Development classifies dairy cooperatives into two main groups. The first exclusively negotiates price and trade terms for raw milk on behalf of members. The second type processes milk and provides more control over managing milk supply and demand. Among the cooperatives that manufacture products, USDA Rural Development further subdivides them into four groups: those that manufacture bulk commodity products like butter, nonfat dry milk powder and

cheese; those that produce specialty, niche products such as cheese; those that specialize in fluid milk bottling and may also produce ice cream and soft products like yogurt, sour cream and dips; and those that diversify to include milk bottling, commodity and differentiated dairy product production and milk sales to other handlers (Stafford, Ling and Liebrand 2005).

In 2012, 132 dairy cooperatives operated in the U.S. Dairy cooperatives handled 84.1 percent of all U.S. milk. Of all milk handled by cooperatives, 96.2 percent originated from cooperative member-producers during 2012. The U.S. west north central region, which encompasses Missouri, Kansas, Nebraska, Iowa, Minnesota, South Dakota and North Dakota, had 42 dairy cooperatives in 2012 that operated in the region and 8,165 producers who were cooperative members. In the west north central region, milk volume handled by cooperatives represented 97 percent of the region's total milk volume marketed during 2012 (Ling 2014).

During 2012, cooperatives used 34 percent of milk that they marketed for processing or manufacturing purposes at their facilities. Exhibit 2.3.3 shares the number of cooperatives that participated in marketing various dairy products in 2007 and 2012. Of all products listed, more cooperatives sold bulk raw milk than any other product in 2012. Other popular products marketed by dairy cooperatives include natural cheese other than cottage cheese, nonfat dry milk and butter.

Exhibit 2.3.3 – Number of Cooperatives Marketing Dairy Products, 2007 and 2012

Product	2007	2012
Bulk raw milk	136	114
Butter	19	15
Nonfat dry milk	14	16
Skim milk powder*	--	9
Dry whole milk	5	7
Dry buttermilk	10	13
Natural cheeses other than cottage cheese	31	25
American cheese	18	16
Italian cheese	6	8
Swiss cheese	4	4
Other (specialty) cheese	15	14
Cottage cheese	6	6
Sour cream	8	6
Packaged fluid milk products	13	10
Yogurt	6	6
Dry whey	11	12
Whey protein concentrates and isolates	6	11
Lactose	4	6

* Separately counted for 2012.
Source: USDA, Rural Development (Ling 2014)

The number of cooperative-owned and -operated plants marketing dairy products varies by region. Exhibit 2.3.4 shares the total number of U.S. cooperative plants that participated in several dairy marketing-related functions during 2012, and it breaks down the location of those plants by region. In total, U.S. cooperatives operated the most plants to package fluid milk, conduct other dairy-related activities, make dry products and make American cheese (Ling 2014).

Exhibit 2.3.4 – Number of Cooperative Plants by Region, Marketing Function, 2012

Function	Atlantic	Central	Western	Total
Receive and ship milk*	0	10	3	13
Churn butter	5	8	11	24
Make dry products	8	10	17	35
Make American cheese	3	23	6	32
Make Italian cheese	1	13	3	17
Make other cheeses	0	18	0	18
Package fluid milk	8	34	7	49
Make cultured products	3	8	4	15
Make ice cream	0	7	1	8
Make condensed products**	1	1	0	2
Make dry whey products	2	16	6	24
Other dairy-related activities	7	28	12	47
Total	26	119	39	184

* Facilities that only performed milk receiving and shipping functions.
** Plants that only condensed milk as final products without further processing on site.
Source: USDA, Rural Development (Ling 2014)

By region, the central region comprises Missouri and 19 other states: South Dakota, North Dakota, Minnesota, Nebraska, Iowa, Kansas, Oklahoma, Texas, Louisiana, Arkansas, Alabama, Mississippi, Tennessee, Kentucky, Ohio, Indiana, Illinois, Michigan and Wisconsin. The western region encompasses states that lie west of the central region, and the Atlantic region consists of states that lie east of the central region. Relative to the other regions, the central region supports more fluid milk packaging plants and milk receiving and shipping plants. It also has more plants that make American cheese, Italian cheese, other cheeses, cultured products, ice cream and dry whey than any other region. In total, 119 cooperative plants operated in the U.S. central region in 2012 (Ling 2014).

U.S. cooperatives produce a significant share of several dairy products. Exhibit 2.3.5 lists dairy product output from cooperatives and all U.S. manufacturers, and it also shares cooperatives' share of total production in 2012. For several products, dairy cooperatives marketed more than half of the total U.S. production: nonfat and skim milk powders, 91 percent; dry buttermilk, 89 percent; butter, 75 percent; dry whole milk, 68 percent; milk protein concentrates, 63 percent; and dry whey and reduced lactose and minerals, 62 percent. As a share of total U.S. production, dairy cooperatives tend to produce little of niche-type products like Hispanic and Muenster cheeses (Ling 2014).

Exhibit 2.3.5 – Dairy Product Output Marketed by Cooperatives and Total U.S. Dairy Product Production, Thousand Pounds, 2012

Product	Cooperative Production	U.S. Production	Cooperative Share of Total
Butter	1,396,363	1,859,554	75%
Dry milk products	2,168,143	2,424,495	89%
Dry whole milk	39,783	58,132	68%
Dry buttermilk	96,609	109,132	89%
Nonfat and skim milk powders	1,967,341	2,154,913	91%
Milk protein concentrates	64,410	102,318	63%
Natural cheeses other than cottage cheese	2,385,980	10,890,144	22%
American cheese	1,513,174	4,358,477	35%
Blue and Gorgonzola	13,701	87,940	16%
Hispanic	6,503	224,259	6%
Italian cheese	732,572	4,633,627	16%
Muenster	13,183	152,630	9%
Swiss cheese	31,363	320,599	10%
Not separately identified and all other cheese	75,484	1,112,612	7%
Dry whey products	1,125,349	2,620,581	43%
Dry whey, and reduced lactose and minerals	678,781	1,088,565	62%
Whey protein concentrates and isolates	195,878	505,890	39%
Lactose	250,690	1,026,126	24%

Source: USDA, Rural Development (Ling 2014)

From a financial perspective, Exhibit 2.3.6 shares an aggregated 2012 balance sheet for 89 dairy cooperatives. Per hundredweight, total assets averaged $10.90. Of all assets maintained by the dairy cooperatives included in this analysis, the current assets line is most significant perhaps because of dairy product inventory carried by these cooperatives. Note the magnitude of net property, plant and equipment and other assets. During 2012, the 89 cooperatives sharing data with USDA recorded $4.37 billion in net property, plant and equipment and other assets (Ling 2014). Because cooperatives have significant access to property, plant and equipment resources to handle milk and process it into dairy products, being a member of a cooperative that manufactures dairy products may be more cost-effective for producers than investing in on-farm processing capital. Processing profits from patron-supplied milk typically become member equity that is used by cooperatives to fund capital needs, but it's eventually revolved back to members.

Primarily, dairy cooperatives finance their assets with liabilities. Based on 2012 financial data from 89 dairy cooperatives, liabilities financed nearly three-quarters of the cooperatives' aggregated assets. Because cooperatives are member-owned, they also have equity as a financing component. Allocated equity represented most equity issued by dairy cooperatives in 2012 (Ling 2014).

Exhibit 2.3.6 – Aggregated Balance Sheet for 89 Dairy Cooperatives, 2012

	Thousand Dollars
Assets	
Current assets	$8,623,306
Net property, plant and equipment and other assets	$4,371,161
Investments in other coops and subsidiaries	$945,765
Total assets	*$13,940,232*
Liabilities	
Current liabilities	$6,883,584
Long-term and other liabilities	$3,499,336
Total liabilities	*$10,382,920*
Equity	
Common stock	$1,163
Preferred stock	$247,959
Allocated equity	$2,980,614
Retained earnings and unallocated equity	$270,680
Non-controlling minority interests	$56,896
Total equity	*$3,557,312*
Total liabilities and equity	*$13,940,232*
Total assets per hundredweight	$10.90
Total liabilities per hundredweight	$8.12
Total equity per hundredweight	$2.78

* 15 cooperatives reported export sales at a total of $1.5 million.
Source: USDA, Rural Development (Ling 2014)

Dairy cooperatives also may have an advantage relative to on-farm processing in earning a positive return for the members. Exhibit 2.3.7 presents an aggregated 2012 income statement for 89 dairy cooperatives that provided data to USDA. Per hundredweight, the net margin before taxes averaged $0.22 based on the 2012 aggregated income statement data.

Exhibit 2.3.7 – Aggregated Income Statement for 89 Dairy Cooperatives, 2012

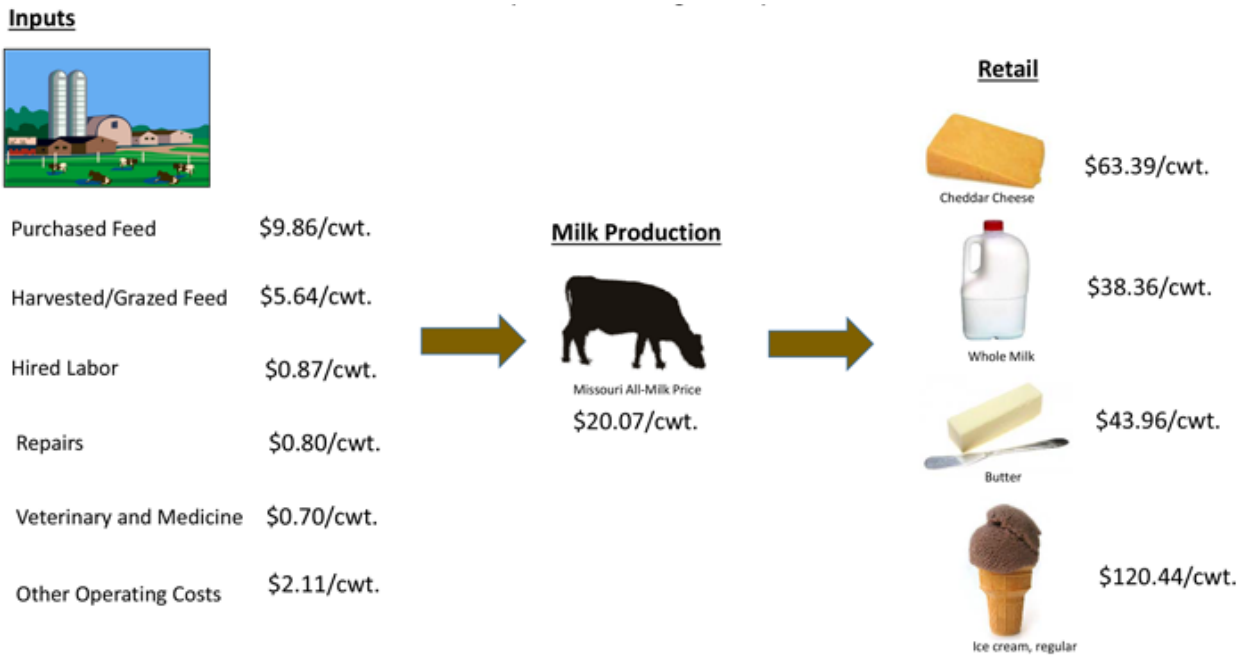
	Thousand Dollars
Revenue	
Milk and dairy product sales*	$36,963,760
Supply and other sales	$10,684,699
Service receipts, subsidiary and other income	$306,622
Total revenues	*$47,955,081*
Costs and expenses	
Cost of goods sold	$44,628,358
Expenses	$2,739,858
Non-operating income and nonrecurring losses	$301,477
Total costs and expenses	$47,699,693
Net margin before taxes	$285,388
Net margin before taxes per hundredweight	$0.22

Source: USDA, Rural Development (Ling 2014)

2.4 Opportunities for Value Chain Enhancement

Stages in the value chain that dairy producers manage and control present opportunities for them to improve their financial position. Exhibit 2.4.1 provides a snapshot of the dairy production value chain that shows the dairy production and retail stages. All prices reported were converted into farm milk equivalents. Three-year average (2011-2013) cost of production data from the USDA-Economic Research Service represent the input costs. The Missouri all-milk prices (average of 2011-2013) from USDA – National Agricultural Statistics Service represent the farm value for milk production. Farmer's share of the dairy product retail prices as reported by USDA – Economic Research Service were used to extrapolate what the total value of cheese, whole milk, butter and ice cream was based on the Missouri all-milk price.

Exhibit 2.4.1 – Dairy Production Value Chain, in Farm Milk Equivalents (Cwt.)



Source: Derived from USDA – Economic Research Service and USDA – National Agricultural Statistics Service Data

If dairy producers were to pursue value-added dairy product production, there are significant financial enhancement opportunities that could be captured by selling cheese, whole milk, butter, ice cream or other products. On the retail side, dairy products varied on a farm milk equivalent basis of as low as $38.86/cwt. for whole milk to $120.44/cwt in selling ice cream. But each opportunity also encompasses more risk than most dairy farmers have currently as just commodity producers of milk. Learning how to market/distribute their products and operate/manage a dairy product plant are just a few of the new skill sets that dairy producers would encounter along with their continuing milk production operations. Additionally, these new products have to displace other existing dairy products in the consumer marketplace. While dairy farmers could venture into further wholesale/retail stages in the value chain, there are already existing opportunities available to them for improving their position in the value chain. Controlling costs and managing their milk margins are other ways farmers can improve their profitability and compete with others in the marketplace.

3. Processing Opportunities

3.1 On-Farm Processing

On-farm processing involves bottling milk and processing products like cheese and ice cream on farms and selling those products at venues such as farmers markets, retail shops, community-supported agriculture programs or on-farm stores. Dairy producers may consider on-farm processing to improve income consistency or provide consumers with local, homegrown food products (Goodnow et al. 2012). Alternatively, if family members have an interest in farm employment or enjoy the food business, then on-farm processing may be an option to engage those family members and provide employment opportunities for them (Moynihan 2006).

Choosing the right product mix will depend on factors such as the market conditions, competitors, estimated demand, operator preferences and resource availability. Regardless of the product, each has benefits and drawbacks. See Exhibit 3.1.1. For example, cheese production yields a product less perishable than fluid milk and produces byproducts that have animal feed applications, but it also requires time to age cheese and learn the right processes. Bottling milk provides the potential to earn revenue from cream and milk sales, facilitate a close relationship with customers and supply a frequently demanded product, but on-farm bottlers may have high start-up costs and struggle with differentiating their milk products from commodity milk. Producing ice cream may boost profitability and require less start-up capital investment; however, ice cream sales have some seasonality and more complicated distribution (Goodnow et al. 2012).

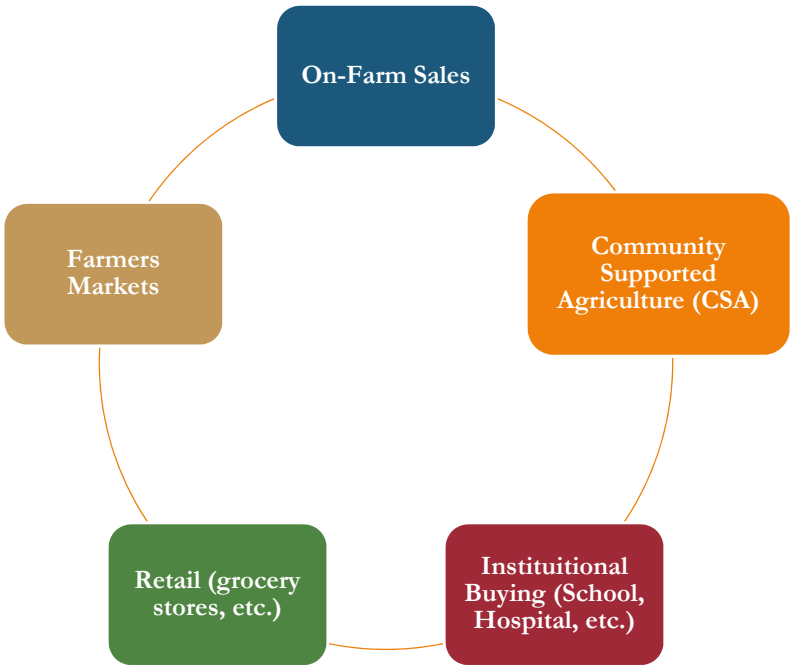
Exhibit 3.1.1 – Advantages and Disadvantages of Producing Various Dairy Products

Product	Advantages	Disadvantages
Cheeses	*Product is less perishable, making supply and demand imbalances less of an issue than with products with a shorter shelf-life *Easy interaction with consumers *Ability to catch any imperfections and control quality *By-product whey can be used as animal feed	*Time required for some aged cheeses *Art required to produce a good cheese is difficult to master. It may take years to produce a truly quality product.
Milk	*More personal connection with consumers *Price maker rather than price taker *Receive payment from cream and skim milk *High-demand product	*High start-up costs ($500,000+) *Heavy demands on labor, time, and variable costs *Quality control is essential *Can be difficult to differentiate from commodity milk
Ice Cream	*Can be very profitable *Can offset losses on a dairy enterprise at different times of the year *Less capital and equipment are needed to start, particularly when using a purchased mix	*Somewhat seasonal product *High input costs *More challenges with distribution *Product differentiation

Source: Goodnow et al. 2012

When marketing products, on-farm processors need to identify methods to differentiate their products from others available and target a specific audience (Moynihan 2006). Market channels are also important to consider. In other words, where should your products be sold? See Exhibit 3.1.2. In addition to product-related decisions, dairy producers interested in on-farm processing must also consider regulations with which they'd need to comply, financing options, communication needs with various stakeholder groups and labor requirements for the farm and processing businesses (Goodnow et al. 2012). Cost-related considerations include the necessary capital investment for the facility and equipment, costs for making the products and consumers' willingness-to-pay for the farm's processed products (Moynihan 2006).

Exhibit 3.1.2 – Market Channel Options for a New Dairy Processor



Source: Goodnow et al. 2012

On-farm dairy processing has a high failure rate (Goodnow et al. 2012). A study presented at the 2007 American Agricultural Economics Association Annual Meeting evaluated financial performance for 27 on-farm processors, and the findings indicate that on-farm processing ventures may have challenges when attempting to profitably produce and process milk. Because the study assessed financial data for just 27 businesses located in New York, Vermont and Wisconsin, the authors caution that the findings may not be generalizable. However, their conclusions and observations may help producers considering on-farm processing (Nicholson and Stephenson 2007). Moss (2012) presented financial budgets for value-added milk/yogurt/cheese production and they can be found in Exhibits 3.1.3 and 3.1.4. It is important for farmers to understand if the economic rewards justify the investments, time and risk involved in on-farm dairy processing.

In evaluating on-farm processor financial data for the farm and processing operations, the Nicholson and Stephenson (2007) study found that cow's milk processors tend to not only process some milk

but also sell some milk into traditional channels. From an expenses perspective, cow's milk processors tend to incur the greatest expense for materials and supplies. Marketing, hired labor and milk were the other major costs. After accounting for each on-farm processor's revenue and expenses, average processing net income indicated a loss. Even after removing a highly unprofitable outlier, the remaining processors still averaged a net processing loss. Just one of the 27 study participants earned profit for both producing milk and processing it. Cow's milk on-farm processors tended to perform better from a profitability perspective in their milk production business units relative to their processing business units.

Based on the study's findings, Nicholson and Stephenson (2007) made several conclusions. Among them, they recommended that low milk production income should not solely motivate decisions about entry into on-farm processing. Although on-farm processing does provide diversification, it also creates a more complex operation that needs more resources like time and management skills. Operators need to study processing capital investment requirements because many study participants made more investments than they could sustain, and some ex ante feasibility studies may not realistically estimate milk production and processing costs. To profitably operate a milk production and processing operation, the study's analysis suggests that operations must earn at least $100 per hundredweight for their products. Keep in mind, though, that this estimate is based on data that are more than seven years old, and evolving revenue and cost assumptions may change the viability of this estimate.

The following insights, shared in a publication from the National Sustainable Agriculture Information Service, from farmers who've successfully pursued food product sales are other ideas to consider. Their recommendations included start with a small operation and scale it "naturally," keep good records to inform decision-making, focus on quality, consider consumer demand, encourage participation from all family members or partners, assess the business on a regular basis and ensure the business has the necessary capital resources (Born 2001 and Moynihan 2006).

For farmers interested in on-farm processing, they have some resources available to them. For example, smalldairy.info is an online resource that hosts a marketplace for sourcing animals and equipment; lists educational opportunities for learning about dairy processing and products; and links to information about procuring supplies, ingredients and equipment needed for processing (smalldairy.com).

Exhibit 3.1.3 – Value-Added Milk & Yogurt Production Estimated Costs and Returns

ITEM	DESCRIPTION	UNIT	QUANTITY	PRICE	TOTAL	PER COW
REVENUE						
Milk Sales	1 year	Quart	223836	2.25	50631.00	5036.31
Milk Sales	1 year	½ Gal	111918	2.75	307774.50	3077.75
Milk Sales	1 year	Gal	55959	3.75	209846.25	2098.46
Yogurt Sales	1 year	Quart	95930	4.00	383720.00	3837.20
Butter Sales	1 year	Pound	32228	4.25	13969.00	1369.69
Total Revenue					1541940.75	15419.41
VARIABLE EXPENSES						
Fluid Milk	100 Cows	Cwt	165.00	16.75	276375.00	2763.75
Vitamin A Palmitate		Kg	67	60.00	4029.05	40.29
Vitamin D3		Kg	67	200.00	13430.16	134.30
Cocoa		Pound	525	6.75	3541.16	35.41
Sugar		Pound	2098	0.75	1573.85	15.74
Starch		Pound	174	5.00	870.86	8.71
Salt		Pound	174	0.63	109.73	1.10
Carrageenan		Pound	7	43.00	297.77	2.98
Evaporated Cane Juice		Pound	14090	1.75	24657.01	246.57
Cultures		Pound	222	2.00	443.68	4.44
Puree		Pound	47965	1.25	59956.25	599.56
Pectin		Pound	881	3.00	2644.07	26.44
Inhibitor Testing		Test Kit	9	65.00	585.00	5.85
Petrifilm Testing		50 Pack	5	70.00	350.00	3.50
Pasteurization Check		Test Kit	3	40.00	120.00	1.20
PH & Acidity Checking		50 Pack	5	20.00	100.00	1.00
Direct Microscopic Slides		70 Pack	4	5.00	20.00	0.20
Utilities		Month	12	2500.00	30000.00	300.00
Cleaning Supplies		Day	156	33.62	5243.94	52.44
Jugs-Quart		EA	319766	0.31	99127.46	991.27
Jugs-1/2 Gal		EA	111918	0.35	39171.46	391.27
Jugs-Gal		EA	55959	0.38	21264.42	212.64
Caps		EA	487643	0.03	14629.29	146.29
Labels		EA	51871	.03	15596.13	155.96
Butter Packaging		EA	32228	0.02	644.56	6.45
Cardboard Boxes		EA	46524	0.75	34892.81	348.93
Supplies		Month	12	2083.33	24999.96	250.00
Transportation		Month	12	25000.00	300000.00	3000.00
Waste and Water Treatment		Month	12	94.58	1134.96	11.35
Lot Improvements		Month	12	75.00	900.00	9.00
Advertising/Marketing		Month	12	5000.00	60000.00	600.00
Product Loss/Samples		Month	12	6424.75	77097.04	770.97
Phone and Internet		Month	12	1000.00	12000.00	120.00
Credit Card Transaction Fees		Month	12	152.59	1831.05	18.31
FICA		Month	12	1107.46	13289.58	132.90
Insurance		Month	12	888.56	10662.72	106.63
Worker's Comp		Month	12	684.75	8217.00	82.17
Unemployment Taxes		Month	12	213.75	2562.00	25.65
Licenses, Permits, and Fees		Month	12	25.00	300.00	3.00
Secretarial/Bookkeeping/Accounting		Month	12	2083.33	24999.96	250.00
Legal Costs		Month	12	833.33	9999.96	100.00
Total Variable Expenses					1197670.72	11976.71
Return Above Variable Expenses					344270.03	3442.70
DEPRECIATION AND REPAIRS						
Depreciation	Equip & building				89210.00	892.10
Repairs	Equip & building				27715.00	277.15
Total Fixed Expenses					116925.00	1169.25
Total Variable & Fixed Expenses					1314595.72	13145.96
Return to Land, Labor, Capital, Management, Risk					227345.03	2273.45
INTEREST						
Equipment					71013.00	710.13
Total Interest Expense					71013.00	710.13
Total Variable, Fixed, Interest Expense					1385608.72	13856.09
Net Return to Land, Labor, Management, Risk					156332.03	1563.32
LABOR EXPENSES						
Labor		Hour	14872	10.00	148720.00	1487.20
Total All Expenses					153432.72	15343.29
Return to Land, Management, Risk					7612.03	76.12

Source: Moss (2012)

Exhibit 3.1.4 – Value-Added Cheese Production Estimated Costs and Returns

ITEM	DESCRIPTION	UNIT	QUANTITY	PRICE	TOTAL	PER COW
REVENUE						
Cheese Sales	1 year	½ lb	104000	5.00	520000.00	5200.00
Total Revenue					520000.00	5200.00
VARIABLE EXPENSES						
Fluid Milk		Cwt	5200	16.75	87100.00	871.00
Coloring		Ounces	520	0.50	260.00	2.60
Salt		Pounds	1482	0.63	933.66	9.34
Calcium Chloride		Ounces	1560	0.38	596.70	5.97
Starter Cultures		Pounds	3	1.84	1148.16	11.48
Rennet		Ounces	2	2.00	3120.00	31.20
Inhibitor testing		Test Kit	1	65.00	195.00	1.95
Petrifilm testing		50 Pack	2	70.00	140.00	1.40
Pasteurization Check		Test Kit	1	40.00	40.00	0.40
PH & Acidity Checking		50 Pack	12	20.00	40.00	0.40
Direct Microscopic Slides		70 Pack	52	5.00	5.00	0.05
Utilities		Month	104000	1375.00	16500.00	165.00
Cleaning Supplies		Day	104000	11.63	604.76	6.05
Packaging		EA	12	.02	2080.00	20.80
Labels		EA	12	.03	3120.00	31.20
Supplies		Month	12	833.33	9999.96	100.00
Transportation		Month	12	4583.33	54999.96	550.00
Waste & Wastewater Treatment		Month	12	31.35	376.25	3.76
Lot Improvements		Month	12	75.00	900.00	9.00
Advertising/Marketing		Month	12	2500.00	30000.00	300.00
Product Loss/Samples		Month	12	1666.66	19999.92	200.00
Phone and Internet		Month	12	1000.00	12000.00	120.00
Credit Card Transaction Fees		Month	12	1029.17	12350.00	123.50
FICA		Month	12	391.17	4694.04	46.94
Insurance		Month	12	846.24	10154.88	101.55
Worker's Comp		Month	12	356.75	4281.00	42.81
Unemployment Taxes		Month	12	95.00	1140.00	11.40
Licenses, Permits, and Fees		Month	12	25.00	300.00	3.00
Secretarial/Bookkeeping/Acct.		Month	12	1250.00	15000.00	150.00
Legal Costs		Month	12	413.66	4999.92	50.00
Total Variable Expenses					297079.21	2970.79
Return Above Variable Expenses					222920.79	2229.21
DEPRECIATION AND REPAIRS						
Depreciation	Equip & building				67570.00	675.70
Repairs	Equip & building				21123.00	211.23
Total Fixed Expenses					88693.00	886.93
Total Variable & Fixed Expenses					385772.21	3857.72
Return to Land, Labor, Capital, Management, Risk					134227.79	1342.28
INTEREST						
Equipment					61342.50	613.43
Total Interest Expense					61342.50	613.43
Total Variable, Fixed, Interest Expense					447114.71	4471.15
Net Return to Land, Labor, Management, Risk					72885.29	728.85
LABOR EXPENSES						
Labor		Hour	6136	10.00	61360.00	613.620
Total All Expenses					508474.71	5084.75
Return to Land, Management, Risk					11525.29	115.25

Source: Moss (2012)

3.2 Co-Packing

Co-packers are firms that offer manufacturing capabilities to other companies. Most of the time, co-packers not only provide manufacturing services to other companies, but they also manufacture and brand their own products. For these co-packers, manufacturing products on other companies' behalf allows them to more efficiently use resources and provide consistent work for their employees. However, sometimes, co-packers exclusively manufacture products for other companies. In addition to manufacturing products for their clients, co-packers may also advise those clients about research and development, product formulation and quality control (Berry 2014b).

Engaging a dairy co-packer can have several benefits. For companies new to the dairy industry, hiring a co-packer can postpone immediate capital investment needs and enable a start-up to focus more energy on marketing and less on operations. However, co-packers may assist established companies, too. For example, if a co-packer's facility presents a logistical advantage when distributing products and serving a given market, then a company may entertain producing dairy goods at that co-packer's location. Because dairy production and processing has some seasonality effects, a co-packer may extend a firm's manufacturing capabilities when that firm's own facilities are operating at capacity. Additionally, co-packers have much production-related experience, so they can be referred to as experts in their given specialties (Berry 2014b).

Co-packers can assist dairy companies in many ways, but when choosing a co-packer, companies should target creating a good business relationship centered on trust. Before committing to a given co-packer, factors to consider include confidentiality, ingredient sourcing and segregation, quality control, packaging, product traceability, sustainability and regulatory considerations, sanitation and record keeping (Berry 2014b).

Prairie Farms is one firm that offers co-packing and contract manufacturing services. About half of the company's sales originate from products branded with a name other than Prairie Farms. Its resources enable the company to manufacture products including fluid milk, dips, sour cream, cottage cheese, yogurt, ice cream, sherbet, frozen novelties and frozen yogurt. Within the Midwest and mid-South regions, Prairie Farms has access to 24 of its own plants, and it works with 13 other facilities through other types of arrangements. At these locations, Prairie Farms works with clients including McDonalds, Dairy Queen, Steak n' Shake and Dippin' Dots (Prairie Farms).

A few industry resources may help Missouri dairy farmers to identify and reach prospective dairy co-packers. Berry on Dairy, a dairy industry blog, recently started a database that lists finished product co-packers and other firms that provide product development services. To access the list, producers may go to http://www.berryondairy.com/DairyCoPackers.html (Berry on Dairy).

Exhibit 3.2.1 lists dairy plants located within Missouri. Some of these facilities may entertain co-packing arrangements with other companies. For dairy producers who are interested in engaging a co-packer and who live close to the state's borders, they may consider whether identifying a co-packer in a neighboring state could be an alternative.

Exhibit 3.2.1 – Possible Dairy Co-Packers for Missouri Dairies

Plant	City	Website
Baetje Farms	Bloomsdale	www.baetjefarms.com/
Belfonte	Kansas City	www.belfontedairy.com
Borgman's Dairy Farm	Holden	www.borgmansdairyfarm.com/
College of the Ozarks	Point Lookout	www.cofo.edu/page/students/academic-programs/agriculture/farms-work-stations.383.html
Dairiconcepts	Eldorado Springs	www.dairiconcepts.com/
Danisco	St. Joseph	www.danisco.com/
DFA - Cabool	Cabool	www.dfamilk.com/
DFA - Springfield	Springfield	www.dfamilk.com/
Goatsbeard Farm	Harrisburg	www.goatsbeardfarm.com/
Golden L Creamery	Silex	www.goldenlcreamery.com/
Green Dirt Farm	Weston	www.greendirtfarm.com/
Heartland Dairy	Newark	heartlandcreamery.com/
Hiland Dairy (formally Roberts Dairy)	Kansas City	www.hilanddairy.com/
Hiland Dairy	Springfield	www.hilanddairy.com/
Homestead Dairy	Jamesport	
International Food Products Corp. (formerly Dairy House)	St. Louis	ifpc.com/
Ice Cream Specialties	St. Louis	www.prairiefarmsdairy.com/index.php?p=534
Jasper Products	Joplin	www.jasperproducts.com/
Kraft, Inc.	Springfield	www.kraftfoodsgroup.com/
M & T Farms	Owensville	http://www.coolcowcheese.com/
Madison Farms	St. Louis	www.prairiefarmsdairy.com/index.php?p=540
Marlee's Creamery	Carthage	www.agrilicious.org/Marlees-Creamery
Memory Lane Dairy	Fordland	www.memorylanedairy.com/
Milnot	Seneca	www.milnot.com/
Oakridge Goat Dairy & Creamery	Advance	
Ozark Mountain Creamery	Mountain Grove	ozarkmtncreamery.com/
Pacific Valley Dairy	Pacific	www.pvdairy.com/
Prairie Farms (Central Dairy)	Jefferson City	www.centraldairy.biz/
Real Farm Foods	Norwood	http://www.realfarmfoods.net/
Sanitary Dairy Foods	St. Louis	
Schreiber Foods	Mount Vernon	www.schreiberfoods.com/
Schreiber Foods	Carthage	www.schreiberfoods.com/
Schreiber Foods	Monett	www.schreiberfoods.com/
Schreiber Foods	Clinton	www.schreiberfoods.com/
Shatto Milk Company	Osborn	www.shattomilk.com/
Springhill Dairy	Mountain Grove	
Terrell Creek Farm	Fordland	terrellcreekfarm.com/
Trickling Springs Creamery	Koshkonong	www.tricklingspringscreamery.com/
Unilever Ice Cream	Sikeston	www.unileverusa.com/
Weiler Dairy	Rutledge	

Source: Missouri State Milk Board

3.3 Processing Technologies

New dairy processing plants have opened and new technologies have been adopted to meet end-consumer demands and the needs of other processors sourcing ingredients. Processing milk into its components has had potential to meet growing needs of active and aging consumers and create new marketing opportunities for milk. USDA has identified two technological advances that would influence dairy processing's future. First, filtration technology separates milk into various compounds. Depending on the process, filtration may remove water during reverse osmosis; monovalent ions during nanofiltration; minerals, nonprotein nitrogenous compounds and lactose during ultrafiltration; or lactose, minerals and small proteins during microfiltration. Nanofiltration retains solids other than the monovalent ions; ultrafiltration retains protein and fat; and microfiltration retains fat, large proteins and other particles. In milk, ultrafiltration may be the best-suited technology, and its resulting product can decrease shipping costs and reduce whey yield during cheese production. Drying ultra-filtered milk yields powdered milk protein concentrate, which helps in standardizing milk protein levels in cheese-making ingredients. It also has application in sports drinks, sports bars, nutraceuticals and other health foods (Ling 2005).

Second, the report projected adopting more technology that uses dairy-based ingredients and relatively little fresh milk when manufacturing dairy products. Using dry ingredients at dairy facilities can reduce needs for refrigerated storage at final product processing facilities and doesn't necessitate that the final product processing facilities be located near fresh milk sources (Ling 2005).

Several recent examples illustrate the industry's progress in technology innovation. For example, the Upstate Niagara Cooperative markets its members' milk to two New York yogurt production facilities: Alpina Foods and Muller Quaker Dairy. To make Greek yogurt using traditional methods, manufacturers must strain the product to get the right protein content and texture. However, the Upstate Niagara Cooperative adapted facilities at another cooperative facility it owns – the O-At-Ka Milk Products Cooperative – to produce liquid protein concentrate. Although the concentrate would have application in several products, it can remove the need for straining Greek yogurt yet achieve the optimal product protein levels and thickness. Also serving the yogurt category, Dairy Farmers of America and a group of New York dairy farms also are pursuing innovative processing technologies to serve Greek yogurt processors. At a York, N.Y. facility, the collective will cold process milk to separate it into cream and skim milk. The group sees potential for the skim milk being attractive to companies that process Greek yogurt (Carter 2013).

Producing Greek yogurt generates a large volume of acid whey – for every 100 pounds of milk entering Greek yogurt processing, the process yields approximately 66 pounds of acid whey – that has largely been considered a waste product. To add value to the acid whey, Denmark-based Arla Foods Ingredients created a process that uses a special dairy protein to convert the whey into an ingredient suitable for beverage, drinkable yogurt, cream cheese or dessert applications. The special protein controls the off-taste associated with acid whey and improves the product's protein content (Decker 2014).

In the fluid milk business, several innovative technologies enable processors to deliver products that meet consumer needs. For example, Core Power, a high-protein beverage, uses a membrane-filtration process to increase protein, decrease fat and eliminate lactose (Salter 2014). The process isn't the only interesting feature of Core Power drinks. Fairlife involves Coca-Cola and Select Milk Producers, a

dairy cooperative (Cross 2013). Coca-Cola acquired equity in Fairlife and facilitated national Core Power distribution efforts (Salter 2014). Created using a process similar to that used when making Core Power, Fairlife milk planned to debut during late December 2014. It uses a cold filtration process to reduce the fat and sugar content found in commodity milk and increase the protein and calcium content (Peterson 2014). During filtering, the process segregates water, butterfat, protein, vitamins and minerals and lactose found in milk. To fit the Fairlife specifications, the process then reassembles the milk components in the desired proportions (Astley 2014).

Aseptic packaging is an alternative processing and delivery option for fluid milk. In an aseptic system, milk undergoes processing that gives it shelf-stable characteristics and packaging in juice box-like containers. Distributing a shelf-stable product introduces cost efficiencies because it wouldn't require refrigeration during transportation. Aseptic packaging is part of a recently announced Dairy Management Inc. campaign to revitalize the dairy industry (Barrett 2014).

Tetra Pak has a "Milk Unleashed" campaign centered on teaching moms about shelf-stable milk benefits and use occasions. The campaign suggests that moms purchase multiple single-serve, shelf-stable milk containers. They can refrigerate them immediately before use; however, because the milk doesn't necessitate refrigeration, moms can bring along one or two cartons when they leave the house and need a convenient beverage option other than soft drinks and sport drinks for their kids. Tetra Pak has identified another processing-related opportunity for the industry. By packaging attribute-specific milk products in package sizes smaller than one gallon, consumers may purchase different products for each family member given his or her specific needs. For example, milk products could be differentiated based on fat, lactose, fiber, plant sterol, omega-3 or calcium content (Carper 2012). In a family with two kids, parents with high cholesterol may purchase the plant sterol-supplemented milk for themselves. However, one lactose-intolerant child would need a lactose-free variety, and another child would benefit from a variety with added calcium.

Despite opportunities for aseptic packaging, not all dairy industry participants envision aseptic packaging as a move to improve the dairy industry's viability. The president and CEO of The Ice Cream Bar Inc. has said that movement to aseptic packaging would harm milk because the product would no longer be displayed prominently in cases familiar to all consumers. Instead, milk could be shelved among thousands of other products and essentially become "lost" in stores. He did note, however, the potential that aseptically packaged U.S. milk could have in export markets (Orris 2012).

As health initiatives have focused on educating consumers about heart health and encouraging them to consume less sodium, food companies have attempted to control sodium in processed foods, and this trend has influenced dairy processors. The Mayo Clinic and other health groups recommend consuming no foods that contain more than 200 sodium milligrams per serving. Some processed cheese and dairy dips and spreads have contained sodium at levels higher than this benchmark. Thus, dairy processors have experimented with technologies that would control sodium levels in such products. In cheese, salt gives the product an appealing flavor and texture and desirable shelf life. By adjusting the cultures and enzymes used in natural cheese processing, Chr. Hansen A/S discovered that it could use less salt because selected cultures provide the desirable flavor and selected enzymes control product bitterness and texture. Accommodating the different ingredients would require process changes, but the extent of the changes necessary would vary depending on the desired sodium content (Berry 2013).

For salt reduction, the Center for Dairy Research at the University of Wisconsin-Madison has researched another option. Adding whey permeate, which is derived from milk during a whey membrane filtration process, creates a salt-like flavor that could work in cheese, sauces, dips and spreads (Berry 2013). Processing technologies related to salt reduction – like the two described here and others that have been developed – may maintain dairy products' viability in consumer diets formulated to reduce sodium and maintain heart health.

To assist industry in developing new technologies and product applications, the Dairy Research Institute supports National Dairy Foods Research Centers. Housed at universities throughout the country, these centers "provide industry with dairy product and ingredient research and technical resources to help industry innovate to address unmet consumer demand for dairy and dairy-based products." Centers have a presence at California Polytechnic State University-San Luis Obispo, the University of Minnesota, South Dakota State University, Iowa State University, Cornell University, North Carolina State University, Mississippi State University, Utah State University, Oregon State University, Weber State University, Brigham Young University and the University of Wisconsin-Madison. At these facilities, the resources, services and capabilities will vary. However, each center has facilities, processing equipment, analytical equipment and experts that can assist with research and development efforts. These centers may also host conferences and workshops throughout the year that educate participants about processing dairy products (Dairy Research Institute).

3.4 Processing Trends and Outlook

Dairy processors have several challenges looking into the future. Based on 2013 research insights collected by The Association for Packaging and Processing Technologies, top North American dairy processors and other industry representatives shared four industry concerns that have emerged since the last report released in 2009: satisfy sanitation, product safety and worker safety expectations; control costs; improve production efficiency with available human resources; and address shrinking fluid milk, frozen product and certain cultured product intake. The four trends identified in 2009 that may be still relevant were persisting industry concentration, increasing farm size and geographic farm movement to the West, growing dairy product intake and choosing sustainable packaging (The Association for Packaging and Processing Technologies 2013).

The interaction with processors and dairy industry professionals also revealed top-of-mind improvements that the dairy processing industry may emphasize in the future. The following items were ranked as the top five identified improvement opportunities: enhancing productivity, adhering to Food Safety Modernization Act provisions, maintaining safety of machine operators, introducing automated packaging solutions; and conducting preventative maintenance (The Association for Packaging and Processing Technologies 2013).

Within the dairy industry, the processors and professionals participating in the study from The Association for Packaging and Processing Technologies identified several upcoming trends that will impact the dairy industry at the farm and manufacturer levels. Those included regulations like the Food Safety Modernization Act; preferences for safe, healthy and high-quality dairy products; government role in global milk procurement and prices; convenient, sustainable packaging; potential for marketing non-refrigerated dairy in the U.S.; attempts to boost milk intake; farm and processor consolidation; need for skilled equipment operators; and stand-up pouch packaging (The Association for Packaging and Processing Technologies 2013).

4. Dairy Niche Marketing Opportunities

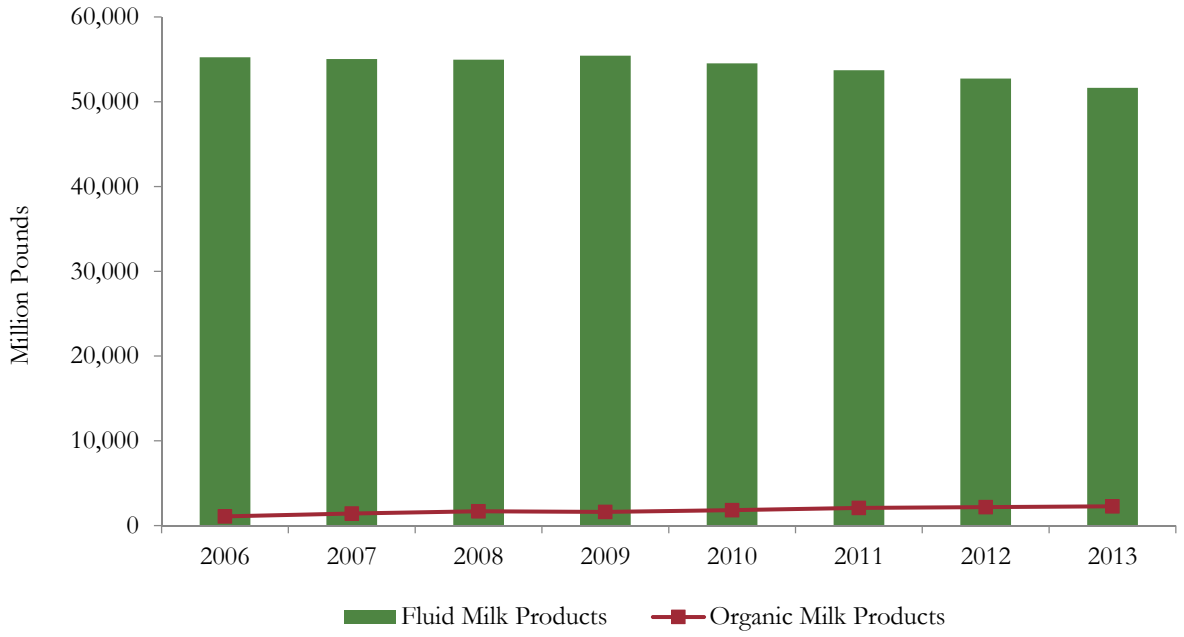
4.1 Organic

To qualify for an organic label, organic products must meet standards set by the National Organic Program. For dairy, these standards require that cows only consume 100 percent organic feed and acceptable vitamin and mineral supplements; have been in an organic system at least 12 months; be treated with approved medication; graze at least 120 days per year and during the whole grazing season; record at least 30 percent of dry matter intake from pasture; have year-round access to the outdoors; and receive no growth-promoting hormones or antibiotics. Organic products need at least 95 percent of their ingredients to be organic to be eligible for the USDA organic seal. For products that contain at least 70 percent organic ingredients, they may use a "made with organic" label to signify that select ingredients have been produced organically (National Organic Program 2011). Exhibit 4.1.1 presents the seal that certified organic products may bear.

Exhibit 4.1.1 – USDA Certified Organic Seal

During 2013, organic dairy sales totaled $4.9 billion, which was 8 percent growth (Organic Trade Association 2014). Although U.S. consumers have gradually consumed less fluid milk and cream over time, organic milk sales have grown. Exhibit 4.1.2 charts total U.S. organic fluid milk and total fluid milk product sales data. Organic milk sales represent a relatively small portion of total fluid milk sales, but organic's share of total fluid milk sales increased from 1.92 percent in 2006 to 4.38 percent in 2013 (USDA Economic Research Service).

Exhibit 4.1.2 – U.S. Organic and All Fluid Milk Sales, 2006 to 2013*



* These figures are based on the consumption of fluid milk products in Federal milk order marketing areas and California, which represents approximately 92 percent of total fluid milk sales in the U.S.; an estimate of total U.S. fluid milk sales is derived by interpolating the remaining 8 percent of sales from the Federal milk order and California data. Total fluid milk products include the products listed plus miscellaneous products and eggnog. Note that total fluid milk products sales volume is adjusted for calendar composition for all years but 2013.
Source: USDA, Economic Research Service

In the cheese category, Packaged Facts estimates that organic cheese sales will total $750 million by 2018 and grow by double digits to achieve those sales (Watrous 2014). As fresh and frozen prepared food demand has grown, more bulk organic cheese is needed as an ingredient. Organic cheddar and Monterey Jack varieties are especially demanded, and buyers have limited organic Swiss options. For an aged cheese like Swiss, producing it with organic milk makes the product very expensive. Not only does the product include high-priced organic milk and need segregation from non-organic products, but storing the cheese as it ages further adds cost (Berry 2014a).

Some dairy processors lack adequate access to organic milk to allow them to convert their products to be organic. As an example, Chobani intended to introduce its first organic product during summer 2014. However, after failing to source enough organic milk, the company postponed those plans until 2015 (Watson 2014c).

4.2 Natural

In 2012, Mintel found that 51 percent of U.S. consumers look for "all natural" food when they buy food. For the year preceding November 2013, Nielsen recorded $40 billion in retail sales for "natural" food. Only products with labels featuring low-fat claims garnered greater sales (Esterl 2013). Based on July 2011 research conducted for the HealthFocus International Natural Study, consumers have five top descriptions for food and beverage products that are "natural." Those were 1) "foods with no additives, chemicals or artificial ingredients;" 2) "no added preservatives;" 3) "not processed;" 4) "comes from nature or nothing added;" and 5) "grown with no pesticides, chemicals or hormones." Consumers also like products that include few ingredients and ingredients that they recognize, according to the Innovation Center for U.S. Dairy. When natural and organic food and beverage purchasers buy products with those claims, 69 percent buy milk, 67 percent buy yogurt, and 65 percent buy cheese (Miller 2012).

The Food and Drug Administration technically hasn't created standards for products bearing a natural label. The agency has recognized "natural" to mean that "nothing artificial or synthetic (including all color additives regardless of source) has been included in, or has been added to, a food that would not normally be expected to be in the food" (Esterl 2013).

Increasingly, firms are forgoing natural labels on their products because of lawsuits being filed to challenge whether labeled products are truly natural. Many suits claim false advertising. Brands like Ben & Jerry's, Kashi and Skinnygirl have been affected. Fewer companies are also adding the natural labels when they launch products. For the first half of 2013, 22.1 percent of newly launched U.S. food products and 34 percent of newly launched U.S. beverages had a "natural" claim. By comparison, 30.4 percent of new U.S. food products and 45.5 percent of new U.S. beverages had "natural" claims when launched in 2009 (Esterl 2013). Some companies have retained the natural claims, however. For example, Chobani continues to use such claims. The company has said that a commitment to natural ingredients promotes trust among its customers, and it perceives that natural claims have credibility and believability (Watson 2014c).

Natural's effectiveness may depend on the product. For example, natural cheese is outperforming processed cheese. In the year preceding Jan. 26, 2014, the value of natural cheese sales increased 2.9 percent and totaled $11.7 billion. Natural cheese unit sales increased 2.5 percent. During the same time period, processed cheese sales value decreased 1.5 percent and totaled $3.1 billion. By units, processed cheese sales dropped 3.3 percent (Kennedy 2014a). Perhaps unlike other products, natural cheese has generally accepted ingredients that differentiate natural products from those considered to be further processed. Natural cheese usually includes just milk, bacterial culture, enzymes and salt. Processed cheese has added emulsifiers and sometimes may include other ingredients focused on changing the product's shelf life, color or flavor (Nassauer 2014b).

4.3 Grass-Fed

Grass-fed is another label claim creating interest within the dairy products sector. Currently, no federal guidelines outline requirements for using dairy product grass-fed marketing claims (Nassauer 2014a). In October 2007, USDA approved a marketing claim standard for grass-fed beef products, however (Agricultural Marketing Service 2007). As an alternative to government oversight, the Pennsylvania Certified Organic group, a third-party certification organization, created a program with standards for PCO 100% Grassfed certification. Exhibit 4.3.1 shares the label that certified firms may use on their eligible grass-fed products. To apply, an operation must also seek or have sought USDA National Organic Program certification (Pennsylvania Certified Organic 2014). Dairy producers who raise animals in a grass-based system encouraged the third-party certification's creation because no regulations exist to uphold grass-fed dairy claims (Dairy Foods 2014b).

Exhibit 4.3.1 – PCO Organic 100% Grassfed Certification Label

Several firms have entered into grass-fed dairy production. About five years ago, Whole Foods encouraged Organic Valley to consider marketing grass-fed milk because the store had received inquiries from customers looking for grass-fed dairy. In response, Organic Valley started marketing lightly pasteurized grass-fed milk that has cream on top. Today, Organic Valley sells more grass-fed whole milk at Whole Foods than any other Organic Valley product. The sales data indicate that some consumers are willing to pay the premium associated with grass-fed milk. Relative to the average organic milk, Organic Valley grass-fed milk, marketed as Grassmilk, has a $1 premium per half gallon. Relative to traditional milk, the Grassmilk is more than twice as expensive. Despite Grassmilk's success, most mainstream stores don't offer the product. Instead, it now has limited distribution. In addition to its grass-fed milk, Organic Valley has also started producing and marketing Grassmilk organic cheddar cheese. The company hasn't added other grass-fed products to its Grassmilk product line because the whole milk sells well enough that Organic Valley lacks the cream needed for manufacturing products such as butter and half-and-half (Nassauer 2014a).

Another firm pursuing grass-fed dairy products, Maple Hill formed during 2009, and since 2013, it has produced yogurt at its Stuyvesant, N.Y., facility (Maple Hill Creamery LLC 2014). The company produces full-fat, organic, grass-fed yogurt (Nassauer 2014a). In addition to its whole milk creamline and drinkable yogurts, Maple Hill added Greek yogurt during fall 2014 (Dairy Foods 2014b).

During 2014, the company started distributing nationally at Whole Foods stores, and it's added Kroger Co. as another retailer for its yogurt. In the future, Maple Hill intends to expand its grass-fed product line to include organic butter. To grow its business, Maple Hill is seeking more locally sourced grass-fed milk (Nassauer 2014a). As of 2015, Maple Hill Creamery sources milk from several dozen farms, including Amish operations, located within 150 miles of the company's processing facility (Maple Hill Creamery LLC 2015). Maple Hill was the "first national dairy brand" to certify its grass-fed products with the 100% Grassfed Organic program available from Pennsylvania Certified Organic (Dairy Foods 2014b).

Rather than distribute product nationally, some dairies that adopted grass-fed practices market their products locally or regionally. Cedar Summit Farm, a family farm located in New Prague, Minn., started as a dairy farm. Over time, the family gained interest in grass-based production, and it also diversified to include beef, poultry and pork production. Today, the farm continues to produce beef and pork. The farm also operates a creamery to process the milk from its dairy cows. Today, about 130 dairy cows at the farm produce milk for the creamery's plain milk, chocolate milk, cream, half-and-half and drinkable yogurt products. Additionally, the farm sells milk to the Alemar Cheese Company, which processes the milk into two cheeses. Cedar Summit Farm serves customers throughout the Minneapolis-St. Paul area, and its distribution also reaches consumers in Wisconsin, Michigan and Minnesota communities outside of the Twin Cities (Cedar Summit Farm 2014).

In the South, Dreaming Cow has produced grass-fed, full-fat yogurt since 2009, but its family operators have maintained grass-fed dairy production for more than 20 years. Located in Pavo, Ga., the family business produces milk in a New Zealand-style model, characterized by rotational grazing and open-barn milking. The farm's location in southern Georgia enables year-round grazing for the Jersey, Holstein, New Zealand Friesian, Dutch Belted and Brown Swiss cows that call the farm home. Dreaming Cow yogurt is made using non-homogenized milk, which produces a cream-top product. Consumers may choose from plain Dreaming Cow yogurt or one of the six flavored varieties available. The company distributes product in six southern states: Florida, Georgia, Alabama, South Carolina, North Carolina and Tennessee (Dreaming Cow).

Among a consumer subset, grass-fed products have appeal because of the perception that grass-fed products contain healthy fats that promote health. In some cases, research supports these thoughts. For example, some research has quantified higher omega-3 fatty acid concentrations in milk produced by cows that graze relative to milk from those that consume feed-based rations. Consumers may also perceive that grass-fed contributes to a more natural product (Nassauer 2014a).

4.4 Non-GMO

Nielsen data indicate that 2013 non-GMO food sales totaled $3 billion, which was 28 percent growth, in the U.S. (Gasparro 2014). Consumer concerns about genetically modified organisms (GMOs) are motivating interest in non-GMO products. NPD measured the extent to which consumers noted being very or extremely concerned about GMOs. The share of consumers indicating these attitudes increased from 15 percent in 2011 to 20 percent in 2013 (Malone 2014). Unlike organic products, non-GMO products don't have government-issued requirements to meet. Instead, certifying non-GMO products involves verifying products with a third-party such as the Non-GMO Project, which provides a "Non-GMO Project Verified" seal to products that fulfill the program's expectations (Thornton 2014).

Within the dairy case, several companies have expressed interest in supplying non-GMO dairy products. For two years, Ben & Jerry's Homemade Inc. has attempted to convert its ice cream products to non-GMO ingredients. Already, the company – the fifth largest U.S. ice cream brand by sales – has worked to source non-GMO ingredients for its add-ins, such as caramel and cookie dough. By fall 2014, it anticipated finishing this portion of the switch to non-GMO ingredients. Ben & Jerry's has shared that non-GMO ingredients typically are 5 percent to 20 percent more expensive than the GMO alternatives. Accessing adequate non-GMO milk supplies to produce its ice cream has thus far eluded the company, which estimates an additional five- to 10-year timeline for sourcing enough non-GMO milk. Sourcing non-GMO milk has been a challenge because most dairy feed contains corn, soybeans or alfalfa that has undergone genetic modification (Gasparro 2014).

In at least one instance, failing to adopt non-GMO ingredients has contributed to pulling dairy products from store shelves. In December 2013, Whole Foods announced that it would cease carrying Chobani Greek yogurt in early 2014. When making decisions about stocking refrigerated products, especially Greek yogurt, Whole Foods has prioritized exclusive products, new products and flavors and products eligible for non-GMO or organic label claims (Strom 2013). Proliferation of Greek yogurt brands and products prompted Whole Foods to seek novel products (Gasparro and Josephs 2013). Because Chobani currently doesn't market non-GMO products, this partially motivated the Whole Foods decision to discontinue Chobani sales; however, it has continued selling other products that haven't transitioned to using non-GMO ingredients. By 2018, Whole Foods will require companies distributing products in its stores to label products if they contain GMO ingredients (Strom 2013).

To supply enough milk to meet yogurt demand, Chobani must source milk from more than 78,000 dairy cows. Feeding non-GMO feed to all of those cows requires significant volume, and sourcing adequate non-GMO feed for these cows has been a struggle (Strom 2013). Chobani has said that it has yet to access enough non-GMO milk at a reasonable price (Gasparro and Josephs 2013).

Other brands have responded to Whole Foods' request for product novelty and exclusivity. As an example, Stonyfield created non-GMO Brown Cow yogurt in a Greek variety. It's only available at Whole Foods stores (Gasparro and Josephs 2013). Stonyfield has also committed to certifying its non-GMO products with Non-GMO Project Verified (Thornton 2014). Exhibit 4.4.1 presents the seal that products meeting the program's standards can display on their labels.

Exhibit 4.4.1 – Non-GMO Project Verified Seal

Milk processors are also attaching non-GMO claims to their products. Snowville Creamery, based in Ohio, announced in 2014 that it would label its milk with non-GMO and grass-fed labels. Producers marketing their milk to the Snowville Creamery earn a 30 percent premium if they adhere to non-GMO, grass-fed production. Snowville distributes products to certain markets in Ohio, Pennsylvania, Kentucky and Washington, D.C. (Malone 2014).

4.5 Local and Origin Location

Demand for local products has gradually increased over time. The Hartman Group, a consumer research firm, conducted a national survey that addressed factors that affected food and beverage purchases. Based on the survey findings, the share of shoppers who seek locally grown or produced food and beverages increased from 13 percent during 2007 to 25 percent during 2013 (Mayer 2014). Benefits of local foods include the products aggregating fewer food miles and theoretically being fresher and more nutritious and flavorful because they travel fewer miles. From a sales perspective, a University of Missouri agricultural economist emeritus shared that local food sales increased from $4 billion in 2002 to $11 billion in 2011(Voight 2012).

The definition of local may vary depending on different consumers and entities. Among food advocates, 100 miles is generally an acceptable distance when determining whether a food product is "local." The U.S. government considers a product to be "local" if it's sourced within 400 miles (Voight 2012). Although "local" isn't a label that conveys the same distance definition for everyone, preferences for local products are driven by growing interest in knowing where food originates. Local food markets include schools, food hubs, community-supported agriculture programs and farmers markets (Mayer 2014). Big buyers have also committed to local foods. As an example, Walmart set a goal to double locally sourced produce sales by the end of 2015. It's also invested in infrastructure necessary to source and stock fresh food more quickly (Voight 2012).

Local has been a product attribute motivating interest in dairy products. For example, within in the cheese category, artisanal cheese labels usually list the product's origin state (Lippman 2014). Specialty cheeses that include local ingredients have captured consumer interest (Prisco 2013). The International Dairy-Deli-Bakery Association notes consumer interest in "local" and "farmstead" cheese products (Finkel 2014).

A study from the University of Missouri surveyed Missouri consumers about their attitudes toward artisan cheese and clarified those consumers' expectations for local products. Exhibit 4.5.1 summarizes "local" definitions held by consumers. Of the cheese eaters and artisan cheese buyers who responded, both groups had similar thoughts about "local" products. If a product at least comes from a consumer's state, then most consider it "local." Among both groups, 36 percent of respondents noted that they consider a product to be "local" if it comes from the consumer's home county or the surrounding counties (Parcell and Moreland 2013).

Exhibit 4.5.1 – Consumer Definition of "Local" Product

When purchasing a "local" product, what do you consider local?	% of Total Cheese Eaters (N=1,040)	% of Artisan Cheese Buyers (N=440)
From within my city or town	17%	14%
From within my county or surrounding counties	36%	36%
From within my state	35%	39%
From surrounding states	9%	8%
Other (please specify)	2%	3%

Source: University of Missouri (Parcell and Moreland 2013)

Small-scale and family-operated ice cream shops – or at least shops that evoke a similar vibe – have benefited from consumer interest in local ingredients. In large cities, these small stores are performing well because their independent spirit appeals to consumers. Growth in ice cream retail has mostly benefitted smaller scale entities compared with the large-scale shops (McMillan 2014).

4.6 Other Label Claims

Other nutrition-related labels being added include those supplemented with omega-3 fatty acids, plant sterols, prebiotics and probiotics. Sterol-supplemented dairy products may help to lower cholesterol levels (Berry 2014d).

4.7 Heritage Breeds

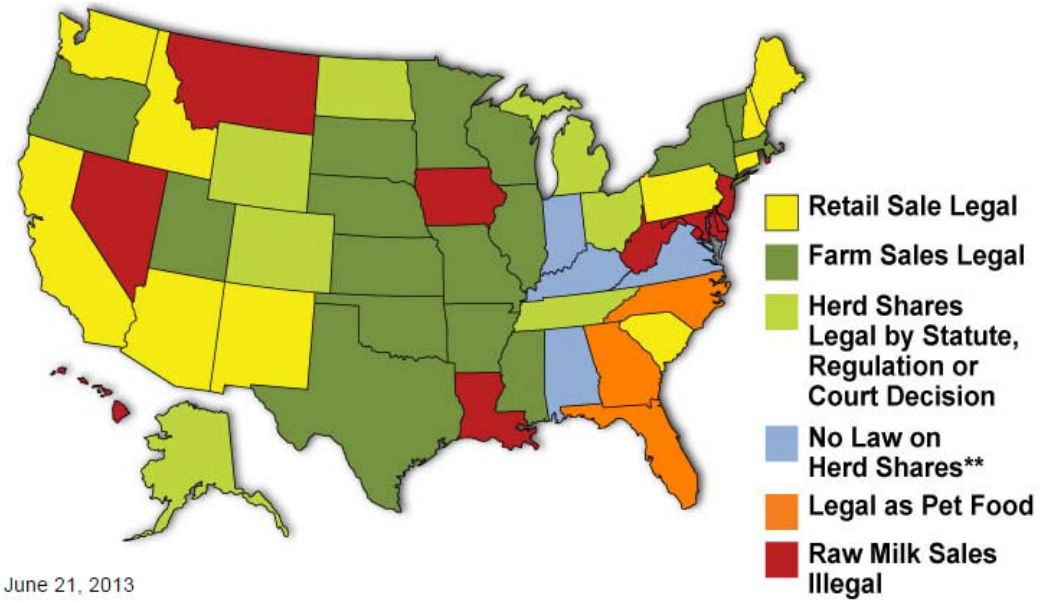
One breed dominates the U.S. dairy herd. Holstein Association USA estimates that the breed it represents – the Holstein – comprises 93 percent of all U.S. dairy cow inventory. Over time, the U.S. dairy herd has lost genetic diversity. Producers maintained about a half dozen of different breeds about 50 years ago (Estabrook 2010). Lesser-known breeds are referred to as heritage breeds. After World War II, farms started to prioritize selecting dairy cows that produced more milk and were larger because animals with these characteristics fit well in confinement systems. Breeds that didn't offer these benefits became less popular. Recently, however, niche breeds have had some regained interest, especially among smaller farms (West 2010).

Using cow, goat and sheep milk from rarer dairy breeds, some producers have created opportunities for value-added dairy production. For example, heritage cheese is one such niche market opportunity, especially if consumers have an opportunity to learn about the unusual breeds providing milk for the products. Milking heritage breeds and converting that milk into value-added products generally occurs on a small scale. For example, during 2010, Finger Lakes Dexter Creamery in New York milked just seven Dexter cows. The two kefir cheese products created from milk produced at the farm carried a premium price. Per pound, the price ranged from $26 to $28. Another farm in New York, Heamour Farm markets cheese from Ayrshire and Kerry cows and Arapawa and Saanen goats. Per pound, the cheese price ranges from $16 to $22 (West 2010).

4.8 Raw Milk

Raw milk hasn't been pasteurized, or heated to eliminate salmonella, listeria, *E. coli* or other bacteria that may be present in the milk. Since 1987, interstate milk sales have prohibited raw milk transactions. Thirty states permit raw milk sales within their borders, but 20 states fully ban such sales (Pipkin 2014). In Missouri, producers may sell and/or deliver raw milk for the buyer's individual use, but they may not market raw milk at an off-site distribution center (Missouri Department of Agriculture). Exhibit 4.8.1 shares information about raw milk sales laws in the U.S. by state on June 21, 2013. In addition to Missouri, several states permitted farm sales, such as Nebraska, Kansas, Oklahoma, Arkansas and Illinois. Relatively few states – 10 of them, which are primarily located on the coasts – allowed retail raw milk sales for milk from any animal source (Farm-to-Consumer Legal Defense Fund 2013). In 2009, more dairies in Pennsylvania had raw milk permits than any other state (Brenhouse 2009).

Exhibit 4.8.1 – U.S. State-by-State Raw Milk Laws, June 21, 2013



Source: Farm-to-Consumer Legal Defense Fund (2013)

Unlike for raw milk sales, the Food and Drug Administration allows raw milk cheese sales if the product ages at least 60 days. The aging process and acid and salt ingredients control pathogens that may have been present in the raw milk (Brenhouse 2009). In January 2014, the FDA began a testing program for raw milk cheeses aged at least 60 days. The tests were meant to measure salmonella, L. monocytogenes and E. coli O157:H7 exposure from raw milk cheeses. At the earliest, FDA would release its results in January 2015 (The Gourmet Retailer 2013).

The raw milk debate stems from concerns that raw milk may cause illness. The Food and Drug Administration shares caution about raw milk consumption considering that "non-pasteurized dairy products are 150 times as likely to cause illness as their pasteurized counterparts," based on Centers for Disease Control research. Recently, based on concern for pregnant women and children, The American Academy of Pediatrics called for a national raw milk ban. However, proponents stress that heat applied during pasteurization removes good bacteria and nutrients found in the raw milk (Pipkin

2014). Based on some research results, consuming raw milk may lead to less tooth decay, infection, allergies and asthma (Brenhouse 2009). If consuming raw milk increases illness incidence, then some dairy producers worry that such illness instances linked to raw milk will ruin milk's reputation as a safe product (Pipkin 2014).

Despite possible concern about raw milk, a consumer niche still chooses raw milk. FDA estimates suggest that less than 1 percent of U.S. consumers use raw milk. Another study indicates that 3 percent of consumers in some states had chosen raw milk in the week preceding their participation in the study (Pipkin 2014). The Weston A. Price Foundation has supported A Campaign for Real Milk since 2000. The effort started in 1999 when Sally Fallon Morell created realmilk.com. The project supports milk and dairy products that are pasture-fed, unprocessed and full-fat. On its website, the group lists farms that sell raw milk. Missouri has more than 90 listings, including those for goat and cow's milk and other products (The Weston A. Price Foundation 2014).

Consumers who purchase raw milk generally will pay more for the raw attribute, and when pasteurized fluid milk sales have been sluggish, raw milk has been considered an opportunity to capture more value from milk sales. Consuming raw milk tends to fit with consumer preferences for organic and local foods (Brenhouse 2009).

4.9 Lactose-Free Milk

In the U.S., an estimated 12 percent of consumers can't tolerate lactose. African Americans and Hispanic Americans tend to be more susceptible to lactose intolerance. Lactose-intolerant consumers lack the ability to disconnect glucose and galactose, the two sugars that comprise lactose. When the body doesn't separate the two sugars, consumers feel bloated and may have gas, loose stools and stomach pain. To stay healthy, however, lactose-intolerant consumers should try to have dairy products in their diets to avoid developing calcium and vitamin D deficiencies (Amidor 2013).

By 2016, the U.S. market for lactose-free milk is estimated to reach $650 million (Astley 2012). Lately, lactose-free milk products have done well (Berry 2014d). The predominant global brands are Lactaid, Zero Lactose and Lactofree (Astley 2012). Some companies have been hesitant to pursue a lactose-free market because addressing lactose may have given the impression that milk had something wrong with it (Astley 2013). In addition to lactose-free milk being available, the dairy industry has also created products such as lactose-free cottage cheese and ice cream. Greek yogurt contains little lactose because straining the yogurt removes a lot of lactose. Cheddar and Swiss hard cheeses also contain little lactose (Amidor 2013).

Two factors have largely influenced the lactose-free dairy sector. First, consumers have increasingly self-diagnosed themselves as lactose-intolerant and have, thus, sought lactose-free options. Second, the industry had inferior technology for some time that led to an expensive yet unpleasant-tasting product. Over time, the technology has improved. Despite improvements, however, poor U.S. innovation may limit the U.S. lactose-free dairy market opportunity (Astley 2012). To produce lactose-free milk, processors may filter milk to remove the lactose (Berry 2014d). Alternatively, adding lactase to milk triggers a reaction that manages lactose and processes it into components that the body may more easily manage (Hendrickson 2012).

4.10 A2 Beta-Casein

For some people, consuming dairy products isn't a good option because they feel discomfort as their bodies try to digest such products. Generally, choosing A2 beta-casein dairy leads to easier digestion regardless of whether a consumer has milk tolerance problems (Berry 2014d). The A2 milk also leads to less bloating (Hoard's Dairyman 2014). In addition to affecting gastrointestinal health, the A1 protein has been linked to beta-casomorphin 7, or BCM-7, levels. A1 protein consumption and BCM-7 levels have been linked to health problems such as heart disease, sudden infant death syndrome, autism and schizophrenia (Kaminski, Cieslinska and Kostyra 2007). A2 beta-casein gained attention after the book *Devil in the Milk* debuted in 2007 (Snowville Creamery).

Of the protein found in milk, about 30 percent is beta-casein. Historically, cows produced A2 beta-casein. However, a mutation that occurred over time led to some cows having a gene that programmed a different beta-casein amino acid sequence and caused cows to produce A1 beta-casein. Commonly, Holstein and Friesian breeds have the mutation. Depending on a cow's genes, it may produce only A1 beta-casein, only A2 beta-casein or a combination of the two. Guernseys typically produce more A2 beta-casein (Snowville Creamery). The A2 gene is rarer (Hoard's Dairyman 2014).

Based in North Sydney, Australia, The a2 Milk Co. has already recognized A2 beta-casein products as an opportunity to pursue. It's sold its a2 milk products in New Zealand and Australia since 2003 (Berry 2014d). In Australia, A2 milk has captured a 9 percent share of fluid milk sales (Hoard's Dairyman 2014). After experiencing success in its current markets, The a2 Milk Co. plans to launch its fresh milk products within the U.S. sometime during 2015 (Berry 2014d). This wouldn't be the first effort to introduce a2 beta-casein milk to the U.S. Prairieland Dairy, a dairy collective located in southeast Nebraska, has collaborated with The a2 Milk Co. to produce a2 milk. In 2007, Prairieland started selling a2 milk at regional Hy-Vee stores with assistance from The Original Foods Co., a distributor. Relative to commodity milk, a2 milk carries a premium to compensate producers for needing to test their cows for A2 genetics and segregating the A2 milk production stream from the A1 milk production stream (Toner 2007).

U.S. companies interested in pursuing A2 milk production as a niche market will face challenges, considering that The a2 Milk Co. has already secured 11 U.S. patents, which protect cattle genetic testing and A1-free marketing claims. Until 2034, The a2 Milk Co. will have active U.S. patents (Hoard's Dairyman 2014). Several farms, however, already promote that their milk would contain high A2 levels and educate consumers about the different beta-casein forms. Yoder Farm, which is a Pennsylvania farm that markets Golden Guernsey milk, describes a high A2 beta-casein concentration as a benefit of its Guernsey milk (Yoder's Country Market 2014). Cedar Summit Farm explains that its breeding efforts have emphasized producing milk with high A2 beta-casein levels (Cedar Summit Farm 2014).

4.11 Agritourism

Agritourism allows value-added dairies to further differentiate their farms and brands. At farms, dairy producers may choose to add pumpkin patches, corn mazes, farm tours, hayrides, farm admission or a "haunted woods" to their agritourism offerings (Wilkins 2012). Other ideas include hosting egg hunts, harvest celebrations, meet Santa holiday parties and Sundae on the Farm events. One New Jersey dairy sponsors a summer dairy day camp. At the camp, each student has a calf assigned to them, and throughout the camp experience, students are responsible for naming their calves, caring for them and learning to show them. Campers also have the opportunity to make dairy products such as ice cream, butter and milk paint; participate in hayrides; and milk a cow. During 2013, cost for a five-day camp was $425, and a three-day camp cost $300 (Epstein 2013).

Agritourism development is possible for processors, too. For example, a farmstead cheese company in Point Reyes, Calif., opened a culinary center on the farm. Using this center, the farm planned to provide farm visitors with tours and create space for cheese-making classes and other on-farm events. In areas where multiple farms produce cheese, the farms can collectively promote themselves by creating a "cheese trail" that brands the area as a cheese destination. Attracting consumers to dairy farms that produce cheese is similar to the approach taken by wineries that encourage consumers to visit the production location and sample the product (Worthen 2011). In New York, Byrne Dairy planned a 10,000-square foot agritourism center dedicated to teaching visitors about the dairy industry and agriculture. The center, planned for Cortlandville, N.Y., would provide a cow-milking viewing area, offer yogurt facility tours and include a yogurt-tasting bar (Groom 2012)

Opening a farm to the public through agritourism efforts requires some special considerations. For example, dairies would need to address parking, signage, crowd control and liability insurance. Because agritourism involves interaction with on-farm guests, producers must enjoy interacting with people, and they need to have the extra time to dedicate to the agritourism operation and not ignore the dairy operation itself (Wilkins 2012).

4.12 Protein

Despite most North Americans not being protein-deficient, consumers have interest in protein. Consumers use protein-rich products to manage weight; complement their active lifestyles; adhere to a Paleo diet; prevent losing muscle mass; support their immune systems, bones and joints; and improve muscle strength and tone. Interest in protein varies somewhat by lifestage. Protein tends to rank most important with 18- to 34-year-olds and consumers older than 65. In the year that preceded March 31, 2014, 6 percent of newly launched U.S. food and beverage products included a "high-protein" or "source-of-protein" message (Bizzozero 2014).

Based on a 2013 study from The NPD Group that surveyed adult primary grocery shoppers, most consumers recognize that "protein contributes to a healthy diet." Seventy-eight percent of the survey respondents indicated that they agreed with that statement. A relatively small niche group of consumers seek protein content information when they shop. However, when consumers incorporate protein into their diets, the survey results also indicated that "many are looking beyond the usual sources" (The NPD Group 2014).

Despite dairy products like milk, Greek yogurt and cheese being protein sources, most consumers don't collectively consider consuming dairy items to be the best way to get protein. Based on The NPD Group survey from 2013, half of consumers identified animal protein – this includes beef, chicken, fish, turkey, pork, ham, lamb, shellfish and bacon – as the best protein source. Of the various animal proteins, consumers thought that beef and chicken were the best sources for protein. Only 10 percent of the respondents indicated that dairy would be the best protein source (The NPD Group 2014). That said, "existing and novel dairy-based" protein has opportunity, according to an Innova Market Insights representative (Bizzozero 2014).

Several recent dairy product introductions have centered on protein. For example, Dean Foods piloted its TruMoo Protein Plus beverage in the West, but in September 2014, it announced that it would initiate a national launch for the product. Chocolate and vanilla flavors will be available. The product's promoted for not only its protein content but also for delivering calcium. Dean Foods makes the product with real, artificial growth hormone-free milk. TruMoo Protein Plus also doesn't include high-fructose corn syrup (Refrigerated & Frozen Foods 2014).

As another dairy protein drink, Core Power is "a high protein recovery shake" innovated by a dairy cooperative leader. Some protein shakes start as water that's later supplemented with protein and milk powder. Alternatively, Core Power production involves filtering milk and concentrating the protein and mineral content. Available in regular-calorie and reduced-calorie products, Core Power offers chocolate, vanilla, banana and strawberry banana flavors. In April 2012, Coca-Cola started distributing Core Power on a limited basis and later expanded to national distribution (Cross 2013).

In November 2014, Coca-Cola announced that it would launch Fairlife milk during December 2014. The Fairlife product trialed in Minneapolis, Denver and Chicago and experienced an "amazing" response (Astley 2014). Positioned as a premium milk, Fairlife will differ from traditional commodity milk because it undergoes a cold-filtered process that yields a final product with 50 percent more protein, 30 percent more calcium and 50 percent less sugar. Additionally, Fairlife doesn't contain lactose or added protein (Peterson 2014). Exhibit 4.12.1 shows the product's packaging. Priced twice as high as commodity milk, Fairlife milk will be packaged as 2 percent, skim and chocolate varieties

(Astley 2014). Dairy Management Incorporated has supported the product through a partnership that aims to improve the state of the fluid milk market (Meyer 2014). Coke's goal is to grow Fairlife into the milk equivalent of its Simply juice product line, which is positioned as a healthy juice that hasn't been frozen or had sweeteners added (Peterson 2014). With the same patented filtration process that leads to the Core Power beverage, the brand's expected to expand into products like smoothies, breakfast drinks, afternoon snacks and yogurt in the future (Cross 2013).

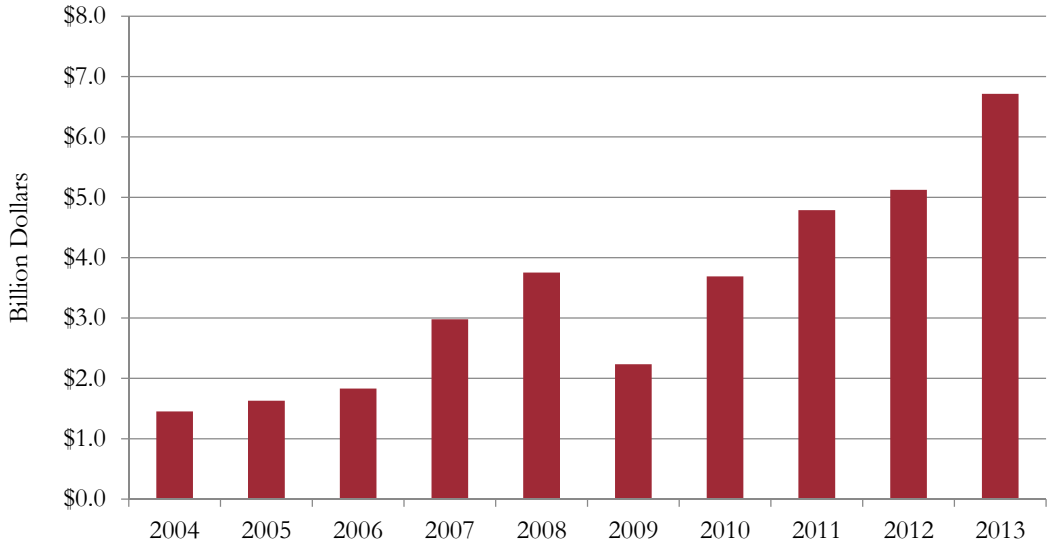
Exhibit 4.12.1 – Fairlife Milk Packaging

Source: Brownfield Ag News (Meyer 2014)

4.13 Exports

Dairy product exports are a potential niche market as foreign countries increase milk and dairy demand and seek to diversify their dairy supply. Exhibit 4.13.1 presents the growth in U.S. dairy product export value from 2004 to 2013. Dairy product export value increased more than four times during the observed period. Export value increased more than $1.5 billion between 2012 and 2013 alone. Some states are more significant contributors to total U.S. dairy product export value than others. During 2013, California added the most value – nearly 40 percent of the total – to U.S. dairy product exports. Other top states for dairy product export value were Texas, Wisconsin, Washington and Idaho. Missouri dairy product export value, which exceeded $50.7 million during 2013, caused the state to rank 20th of all states' export value (USDA Foreign Agricultural Service).

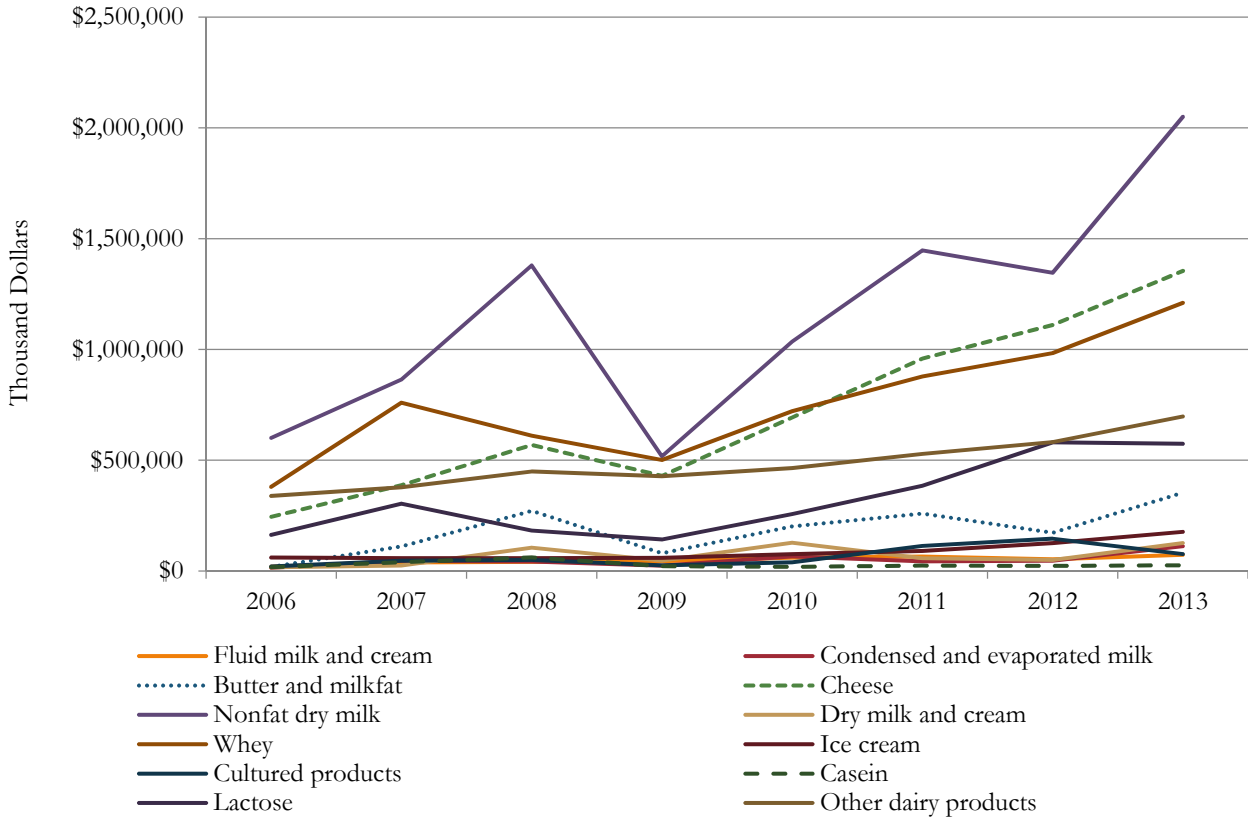
Exhibit 4.13.1 – Trend in U.S. Dairy Product Export Value, 2004 to 2013



Source: USDA, Foreign Agricultural Service, Global Agricultural Trade System

By value, U.S. dairy product exports have been greatest for nonfat dry milk, cheese and whey. During 2013, U.S. nonfat dry milk exports exceeded $2 billion. For cheese and whey, their export values totaled $1.35 billion and $1.21 billion, respectively. Of all dairy products exported during 2013, nonfat dry milk represented 30 percent of the total export value. The shares of total export value were 19.8 percent and 17.7 percent for cheese and whey, respectively. Exhibit 4.13.2 illustrates the change in dairy product export values from 2006 to 2013. During that time, export value growth was greatest for nonfat dried milk, cheese and whey. Note that casein, fluid milk and cream and cultured product exports contributed little to total U.S. dairy exports in 2013. Their shares of total 2013 U.S. dairy export value during 2013 were 0.4 percent, 1.1 percent and 1.1 percent, respectively (U.S. Dairy Export Council).

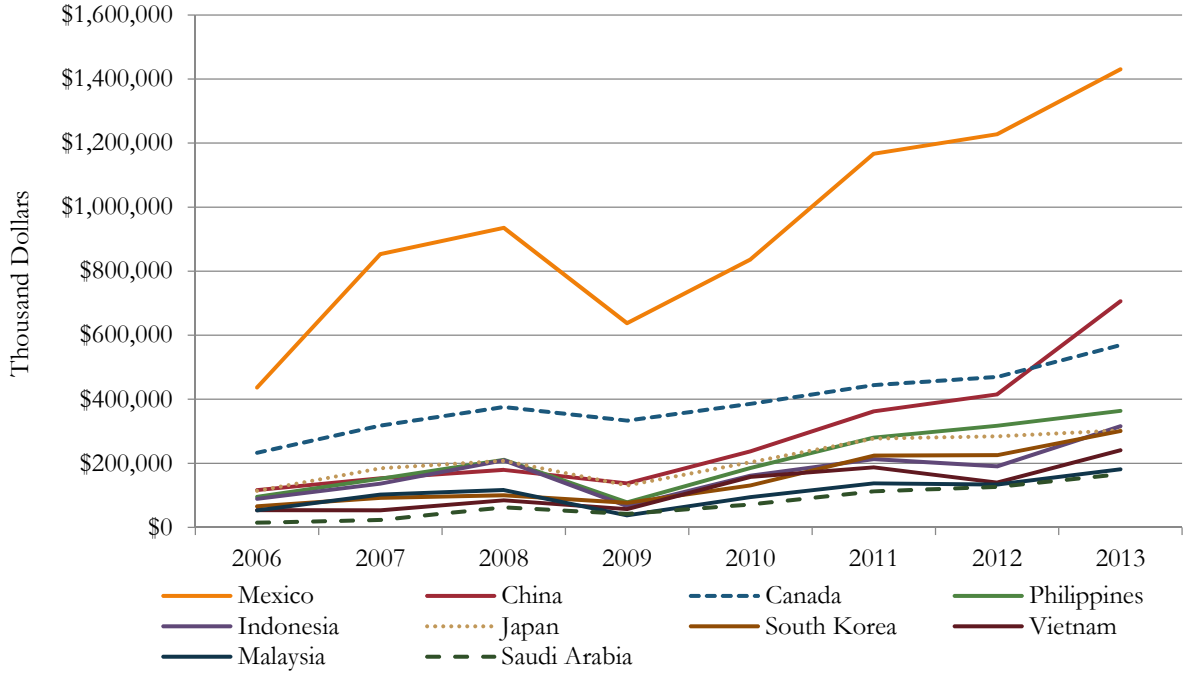
Exhibit 4.13.2 – U.S. Dairy Exports by Product Category and Export Value, 2006 to 2013



Source: U.S. Dairy Export Council

Historically, Mexico and Canada have been the primary importers of U.S. dairy products. However, within the past few years, China has emerged as a major export market. Exhibit 3.7.3 illustrates the trend in dairy product export value to the top 10 countries doing business with U.S. exporters. During 2013, Mexico, China and Canada ranked first, second and third, respectively, for U.S. dairy imports by value. Other top countries for U.S. dairy product exports in 2013 were the Philippines, Indonesia, Japan, South Korea, Vietnam, Malaysia and Saudi Arabia. Thus, seven of the top 10 countries are located in Asia. The types of U.S. dairy products being imported varies by country. For example, by value, Mexico imports a lot of nonfat dry milk with less than 1.5 percent fat and cheese. Nonfat dry milk with less than 1.5 percent fat is also the leading U.S. dairy export to China by value, but China also buys a lot of whey products (USDA Foreign Agricultural Service).

Exhibit 4.13.3 – U.S. Dairy Exports by Importer and Export Value, 2006 to 2013



Source: USDA, Foreign Agricultural Service, Global Agricultural Trade System

In November 2014, Dairy Farmers of America and Inner Mongolia Yili Industrial Group, which is based in China, announced a milk powder facility partnership. Dairy Farmers of America would provide $70 million in financing, and Inner Mongolia Yili Industrial Group would provide $30 million in financing. The facility would have capacity to annually produce 88,000 tons of milk powder. The plant's positioned to serve growing export markets, including China (Everly 2014). In April 2014, Dairy Farmers of American opened a Nevada facility that produces whole-milk powder for export. At the time, no other U.S. plant had a whole-milk powder specialization. Nonfat milk powders commonly produced at U.S. facilities aren't well-accepted in export markets (Martin 2014).

China has potential as a growing export market because a larger population and higher earnings in the country has led to more Chinese consumers choosing milk products (Everly 2014). China itself hasn't produced enough milk, and food safety has been a concern within the country (Martin 2014). Although China has historically sourced a majority of its dairy imports from New Zealand, depending too heavily on one country creates a problem if that country experiences a shortage. For example, a New Zealand drought in 2013 led to challenges in meeting demand (Everly 2014).

As more countries grow their populations and disposal income, they'll likely be positioned to consume more dairy. Vietnam is an example. The country is on the cusp of growing its foodservice sector. U.S. fast-food companies such as McDonald's, Burger King and Pizza Hut have already entered the market. As Vietnamese consumers patronize these fast-food outlets, consume cheese-containing products and acquire a preference for cheese products, Vietnam will require more cheese. Already, for the past eight years, Vietnam has increased its cheese imports annually by 17 percent on average (Hollister 2014).

4.14 Marketing by Species

In addition to marketing cow's milk and products processed from that milk, producers may consider producing and marketing milk from other dairy species as a niche opportunity. Goat milk is an example. Compared with alternatives, goat milk has higher protein levels and lower cholesterol content, and generally, consumers can digest it easily. Popular dairy goat breeds include Alpine, LaMancha, Nubian, Oberhasli, Saanen and Toggenburg (Geisler and Huntrods 2013). On Jan. 1, 2014, Missouri producers had 9,300 milk goats in inventory, and the U.S. inventory totaled 355,000 milk goats. Thus, Missouri represented just 2.6 percent of the country's dairy goat inventory (USDA National Agricultural Statistics Service).

Goat milk may be processed into products such as cheese, yogurt and ice cream. Commonly produced goat cheeses include feta, gjetost, chabichou and pyramide (Geisler and Huntrods 2013). Goat cheese works well when packaged as small-format products. In fresh varieties, goat cheese may be complemented with added oils or herbs, or the cheesemaker may wrap the cheese in leaves. Aging small-format goat cheese produces a smooth interior and more savory flavors (Dickerman 2011). To produce an appealing low-fat ice cream, using goat milk may be an opportunity. When The Wall Street Journal tested three vanilla ice creams, the Laloo's Goat's Milk Ice Cream Co.'s version prevailed over a full-fat option from Ben & Jerry's and a light option from Haagen-Daz. Although the goat milk version may be more appealing, it also cost more (Lieber 2006).

From a marketing perspective, the U.S. may have more opportunities to produce goat milk products because it sources more than half of the goat cheese that it consumes from abroad. France is the most significant supplier. However, because goat milk production is seasonal, reliably supplying products to distribute year-round may be a challenge. To reach consumers, goat dairies may consider direct marketing, farmers markets, internet sales, presence in retail stores or restaurant sales (Geisler and Huntrods 2013).

Sources

Agricultural Marketing Service. 2007. "Grass Fed Marketing Claim Standards." USDA. Accessed at http://www.ams.usda.gov/AMSv1.0/ams.fetchTemplateData.do?template=TemplateN&rightNav1=GrassFedMarketingClaimStandards&topNav=&leftNav=GradingCertificationandVerfication&page=GrassFedMarketingClaims&resultType=.

Amidor, Toby. 2013. "Have lactose intolerance? You can still drink milk and eat cheese." New York Daily News. Accessed at http://www.nydailynews.com/life-style/health/lactose-intolerance-drink-milk-article-1.1504333.

Anderson, L.V. 2014. "Greek. Icelandic. French. Vietnamese. Why Are There So Many International Yogurts?" Slate. Accessed at http://www.slate.com/blogs/browbeat/2014/08/15/greek_icelandic_french_and_asian_yogurts_where_are_they_really_from_a_quiz.html.

Astley, Mark. 2012. "Self-diagnosed lactose intolerance driving lactose-free dairy sales – analyst." Dairy Reporter. Accessed at http://www.dairyreporter.com/Markets/Self-diagnosed-lactose-intolerance-driving-lactose-free-dairy-sales-analyst.

Astley, Mark. 2013. "Dairies 'see more opportunities' in lactose-free: Valio." Dairy Reporter. Accessed at http://www.dairyreporter.com/Manufacturers/Dairies-see-more-opportunities-in-lactose-free-Valio.

Astley, Mark. 2014. "Double-the-price US premium Fairlife milk brand will 'rain money': Coca-Cola." Dairy Reporter. Accessed at http://www.dairyreporter.com/Manufacturers/Double-the-price-US-milk-brand-Fairlife-will-rain-money-Coca-Cola.

Barrett, Rick. 2014. "Dairy industry pumps $500 million into campaign to bulk up milk sales." Milwaukee Journal Sentinel. Accessed at http://www.jsonline.com/business/dairy-industry-pumps-500-million-into-campaign-to-bulk-up-milk-sales-b99398388z1-284213941.html?ipad=y.

Berry on Dairy. n.d. "Co-Packers of Finished Dairy Products and Companies that Offer Dairy Foods Product Development Assistance." Berry on Dairy. Accessed at http://www.berryondairy.com/DairyCoPackers.html.

Berry, Donna. 2013. "Dairy product sodium reduction strategies." Food Business News. Accessed at http://www.foodbusinessnews.net/articles/news_home/Regulatory_News/2013/04/Dairy_product_sodium_reduction.aspx?ID=%7B635F8339-DAC2-4478-8284-F8AA03B1C9E7%7D.

Berry, Donna. 2014a. "Capitalizing on growing passion for cheese." Food Business News. Accessed at http://www.foodbusinessnews.net/articles/news_home/Dairy_News/2014/01/Capitalizing_on_growing_passio.aspx?ID=%7BA88F5D58-D685-4221-AD17-8716E779A491%7D.

Berry, Donna. 2014b. "Co-Packing Dairy Foods and R&D Assistance for Innovation." Berry on Dairy. Accessed at http://berryondairy.blogspot.com/2014/08/co-packing-dairy-foods-and-r-assistance.html.

Berry, Donna. 2014c. "Cheese: Make Sure it's on Everyone's Holiday Menus." Berry on Dairy. Accessed at http://berryondairy.blogspot.com/2014/11/cheese-make-sure-its-on-everyones.html.

Berry, Donna. 2014d. "Innovation in face of fluid milk decline." Food Business News. Accessed at http://www.foodbusinessnews.net/articles/news_home/Dairy_News/2014/09/Innovation_in_face_of_fluid_mi.aspx?ID=%7BD0E7DDC5-3F68-4B34-A29D-7E432DF47214%7D.

Bizzozero, Judie. 2014. "2014: The Year of Protein Innovation." Food Product Design. Accessed at http://www.foodproductdesign.com/blogs/trending-foods/2014/06/2014-the-year-of-protein-innovation.aspx.

Born, Holly. 2001. "Keys to Success in Value-Added Agriculture." The National Sustainable Agriculture Information Service. Accessed at https://attra.ncat.org/attra-pub/viewhtml.php?id=271.

Bratskeir, Kate. 2014. "Why People Are Putting Butter In Their Coffee." The Huffington Post. Accessed at http://www.huffingtonpost.com/2014/09/22/butter-in-coffee-bulletproof_n_5851456.html.

Brenhouse, Hillary. 2009. "Raw Milk Sales Could Reinvigorate U.S. Dairy Farms." The New York Times. Accessed at http://www.nytimes.com/2009/11/17/business/global/17iht-rbofmilk.html?pagewanted=all&_r=0.

Carper, Jim. 2012. "Can technology save fluid milk?" Dairy Foods. Accessed at http://www.dairyfoods.com/articles/88716-can-technology-save-fluid-milk-.

Carper, Jim. 2013. "Butter trends: processors innovate with new flavors/convenient packaging." Dairy Foods. Accessed at http://www.dairyfoods.com/articles/90013-butter-trends-processors-innovate-with-new-flavorsconvenient-packaging.

Carper, Jim. 2014a. "State of the Dairy Industry: Ice cream makers say 'ciao' to gelato." Dairy Foods. Accessed at http://www.dairyfoods.com/articles/90819-state-of-the-dairy-industry-ice-cream-makers-say-ciao-to-gelato.

Carper, Jim. 2014b. "State of the Dairy Industry: Who can fix milk?" Dairy Foods. Accessed at http://www.dairyfoods.com/articles/90811-state-of-the-dairy-industry-who-can-fix-milk.

Carter, Diana Louise. 2013. "Yogurt boom a boon for milk and more." Rochester Democrat & Chronicle. Accessed at http://www.democratandchronicle.com/story/money/business/2013/11/04/yogurt-boom-a-boon-for-milk-and-more/3429267/.

Cassell, Deborah. 2013. "2014 Flavor Trends: Yogurt's Fruitful Union." Food Processing. Accessed at http://www.foodprocessing.com/articles/2014/flavor-trends-yogurt/.

Cassell, Deborah and Dave Fusaro. 2014. "Desserts Are Inspiring Ice Creams." Accessed at http://www.foodprocessing.com/articles/2014/desserts-are-inspiring-ice-creams/.

Cedar Summit Farm. 2014. Cedar Summit Farm. Accessed at http://www.cedarsummit.com/.

Cheese Reporter. 2014. "Greek Yogurt: Not Just A Fad, Expected To Become Enduring Part of US Food Landscape." Cheese Reporter. Accessed at http://www.cheesereporter.com/Greek%20Yogurt.pdf.

Convenience Store News. 2014. "Consumers Screaming for Healthy Ice Cream." Convenience Store News. Accessed at http://www.csnews.com/product-categories/other-merchandise-services/consumers-screaming-healthy-ice-cream.

Cross, Amy. 2013. “From Grass to Glass: Core Power Shakes Up Protein Drink Category.” Coca-Cola. Accessed at http://www.coca-colacompany.com/stories/from-grass-to-glass-core-power-shakes-up-protein-drink-category.

Dairy Foods. 2014a. "Dairy Plants USA Directory." Dairy Foods. Accessed at http://www.dairyfoods.com/dairyplantsusa.

Dairy Foods. 2014b. “Maple Hill Creamery adds new full-fat, grass-fed Greek yogurt to its line.” Dairy Foods. Accessed at http://www.dairyfoods.com/articles/90741-maple-hill-creamery-adds-new-full-fat-grass-fed-greek-yogurt-to-its-line.

Dairy Reporter. 2013. “Vanilla still most popular US ice cream flavor, says industry survey.” Dairy Reporter. Accessed at http://www.dairyreporter.com/Markets/Vanilla-still-most-popular-US-ice-cream-flavor-says-industry-survey.

Dairy Research Institute. n.d. “National Dairy Foods Research Centers.” Dairy Research Institute. Accessed at http://www.usdairy.com/~/media/usd/public/researchcenterbrochure.pdf.

Decker, Kimberly. 2014. “State of the Dairy Industry: Natural colors, sweeteners improve dairy foods.” Dairy Foods. Accessed at http://www.dairyfoods.com/articles/90831-state-of-the-dairy-industry-natural-colors-sweeteners-improve-dairy-foods.

Dickerman, Sara. 2011. "Good Cheeses Come in Small Packages." The Wall Street Journal. Accessed at http://online.wsj.com/articles/SB10001424052970204002304576629602694763110.

Dreaming Cow. 2014. Dreaming Cow Creamery. http://www.dreamingcow.com/.

Epstein, Rick. 2013. “Agri-tourism student from Wisconsin runs Dairy Day Camp in Hunterdon County.” NJ.com. Accessed at http://www.nj.com/hunterdon-county-democrat/index.ssf/2013/07/agri-tourism_student_from_wisc.html.

Estabrook, Barry. 2010. "Rare Breeds, Frozen in Time." The New York Times. Accessed at http://www.nytimes.com/2010/01/06/dining/06frozen.html?pagewanted=all&_r=0.

Esterl, Mike. 2013. “Some Food Companies Ditch ‘Natural’ Label.” The Wall Street Journal. Accessed at http://online.wsj.com/articles/SB10001424052702304470504579163933732367084.

Everly, Steve. 2014. “Dairy co-op teams with Chinese company on $100 million powdered milk plant in Kansas.” The Kansas City Star. Accessed at http://www.kansascity.com/news/business/article3986118.html.

Farm-to-Consumer Legal Defense Fund. 2013. “State-by-State Review of Raw Milk Laws.” Farm-to-Consumer Legal Defense Fund. Accessed at http://www.farmtoconsumer.org/raw_milk_map.htm.

Finkel, Ed. 2014. “State of the Dairy Industry: Flavorful cheeses are the trend.” Dairy Foods. Accessed at http://www.dairyfoods.com/articles/90817-state-of-the-dairy-industry-flavorful-cheeses-are-the-trend.

Gasparro, Annie. 2014. “The GMO Fight Ripples Down the Food Chain.” The Wall Street Journal. Accessed at http://online.wsj.com/articles/the-gmo-fight-ripples-down-the-food-chain-1407465378.

Gasparro, Annie and Leslie Josephs. 2013. “Whole Foods to Stop Selling Chobani Yogurt.” The Wall Street Journal. Accessed at http://online.wsj.com/articles/SB10001424052702304367204579266201175528672.

Gee, Kelsey. 2014. "Butter Makes Comeback as Margarine Loses Favor." The Wall Street Journal. Accessed at http://online.wsj.com/articles/butter-makes-comeback-as-margarine-loses-favor-1403745263.

Geisler, Malinda and Diane Huntrods. 2013. "Dairy Goats." Agricultural Marketing Resource Center. Accessed at http://www.agmrc.org/commodities__products/livestock/goats/dairy-goats/.

Goodnow, Brianna, Elizabeth Chaney, Julia Hofmeister and Jeffrey Bewley. 2012. "Considerations for Starting an On-Farm Dairy Processing Enterprise." University of Kentucky Cooperative Extension Service. Accessed at http://www2.ca.uky.edu/agc/pubs/ID/ID207/ID207.pdf.

Greve, Justine. 2012. "Kansas welcomes the (big) dairy business." Harvest Public Media. Accessed at http://www.harvestpublicmedia.org/article/1376/kansas-welcomes-big-dairy-business/5.

Groom, Debra. 2012. "Byrne Dairy plans new yogurt plant, agritourism center in Cortlandville." Syracuse Media Group. Accessed at http://www.syracuse.com/news/index.ssf/2012/10/byrne_dairy_plans_new_yogurt_p.html.

Hendrickson, Kirstin. 2012. "How Is Lactose-Free Milk Made?" Livestrong. Accessed at http://www.livestrong.com/article/337301-how-is-lactose-free-milk-made/.

Hennessy, Maggie. 2014a. "Dannon: There's almost nowhere Greek yogurt can't go." Food Navigator-USA. Accessed at http://www.foodnavigator-usa.com/Manufacturers/Dannon-There-s-almost-nowhere-Greek-yogurt-can-t-go.

Hennessy, Maggie. 2014b. "Macho yogurt, nuts & eco-eating: why there's still growth in protein." Food Navigator-USA. Accessed at http://www.foodnavigator-usa.com/Markets/Packaged-Facts-why-there-s-still-growth-in-protein.

Hoag, Christina. 2011. "More Schools Consider Flavored Milk Bans." The Huffington Post. Accessed at http://www.huffingtonpost.com/2011/05/09/flavored-milk-in-schools-_n_859311.html.

Hoard's Dairyman. 2014. "Editorial: A2 Milk – Myth, Fad or the real deal?" Hoard's Dairyman. Accessed at http://www.hoards.com/T14sep25-ed-A2-milk.

Hollister, Angelique. 2014. "Vietnam: Cheese consumer in the marking." U.S. Dairy Export Council. Accessed at https://www.usdec.org/files/PDFs/Sept14_toolkit.pdf.

Innovate with Dairy. 2013. "Find an Ingredient Supplier." Dairy Management Inc and U.S. Dairy Export Council. Accessed at http://www.innovatewithdairy.com/Pages/Home.aspx.

Innovation Center for U.S. Dairy. 2011. "Milk in the Competitive Arena." Innovation Center for U.S. Dairy. Accessed at http://www.usdairy.com/~/media/usd/public/milk%20in%20the%20competitive%20arena.pdf.pdf.

International Dairy Foods Association. n.d. "What's Hot in Ice Cream." International Dairy Foods Association. Accessed at http://www.idfa.org/news-views/media-kits/ice-cream/what's-hot-in-ice-cream.

Izzi, Martha Herbert. 2011. "On the Danger List: The Saga to Save the Randall Lineback Cattle Breed." Cornell University Small Farms Program. Accessed at http://smallfarms.cornell.edu/2011/01/09/on-the-danger-list-the-saga-to-save-the-randall-lineback-cattle-breed/.

Kaminski, S., A. Cieslinska and E. Kostyra. 2007. "Polymorphism of bovine beta-casein and its potential effect on human health." Journal of Applied Genetics. Accessed at http://www.ncbi.nlm.nih.gov/pubmed/17666771.

Kennedy, Sarah M. 2014a. "Natural cheese products still winning against processed." Dairy Foods. Accessed at http://www.dairyfoods.com/articles/90390-natural-cheese-products-still-winning-against-processed?v=preview.

Kennedy, Sarah M. 2014b. "State of the Dairy Industry: Yogurt buoys the cultured club." Dairy Foods. Accessed at http://www.dairyfoods.com/articles/90814-state-of-the-dairy-industry-yogurt-buoys-the-cultured-club.

Lieber, Ron. 2006. "Low-Fat Ice Cream." The Wall Street Journal. Accessed at http://online.wsj.com/articles/SB115094305627787152.

Ling, K. Charles. 2005. "Dairy Cooperative Growth Challenges: Technology, Ingredients (Proteins) and Equity Financing." USDA Rural Development. Accessed at http://www.rurdev.usda.gov/supportdocuments/RR206.pdf.

Ling, K. Charles. 2014. "Marketing Operations of Dairy Cooperatives, 2012." USDA Rural Development. Accessed at http://www.rurdev.usda.gov/supportdocuments/BCP_RR230.pdf.

Lippman, Daniel. 2014. "Not Your Grandmother's American Cheese." The Wall Street Journal. Accessed at http://online.wsj.com/articles/SB10001424052702304367204579270480576072704.

Malone, JD. 2014. "Snowville Creamery milk to carry non-GMO label." The Columbus Dispatch. Accessed at http://www.dispatch.com/content/stories/business/2014/11/06/snowville-milk-carries-non-gmo-label.html.

Maple Hill Creamery LLC. 2014. "FAQ." Maple Hill Creamery LLC. Accessed at http://maplehillcreamery.com/faq.html.

Maple Hill Creamery LLC. 2015. "FAQ." Maple Hill Creamery LLC. Accessed at http://maplehillcreamery.com/faq.html.

Martin, Andrew. 2014. "America's Got Milk and China Wants It." Bloomberg Businessweek. Accessed at http://www.businessweek.com/articles/2014-06-05/china-wants-americas-milk-and-u-dot-s-dot-dairy-exports-benefit.

Mayer, Amy. 2014. "Signs point to more local food sales." Harvest Public Media. Accessed at http://harvestpublicmedia.org/content/signs-point-more-local-food-sales#.VGbrZ_l4r3o.

Meyer, Bob. 2014. "Fairlife will be on store shelves in December." Brownfield Ag News. Accessed at http://brownfieldagnews.com/2014/11/24/fairlife-will-store-shelves-december/.

McMillan, Bo. 2014. "Ice cream's sweet outlook – just don't be vanilla, man." CNBC. Accessed at http://www.cnbc.com/id/101846293.

Miller, April. 2012. "You say 'organic,' I say 'natural.'" Dairy Foods. Accessed at http://www.dairyfoods.com/articles/88561-you-say--organic---i-say--natural-?v=preview.

Missouri Department of Agriculture. "Raw Milk." Missouri Department of Agriculture. Accessed at http://agriculture.mo.gov/animals/milk/rawmilk.php.

Moss, Jonathan. 2012."Feasibility of On-farm Milk Processing, Packaging, and Marketing for Tennessee Dairy Farmers." A ThesisPresented for theMaster of Science Degree, The University of Tennessee, Knoxville. Accessed at https://ag.tennessee.edu/cpa/Documents/Workshops%2c%20Seminars%20and%20Webinars/Thesis.pdf.

Moynihan, Meg, ed. 2006. "Chapter 7: Value-Added Processing." Dairy Your Way. Accessed at http://www.cias.wisc.edu/publication-profiles-business-options-for-dairy-producers/.

National Milk Producers Federation. 2014. "Dairy Data Highlights." Arlington, Virginia. www.nmpf.org

National Organic Program. 2011. "Organic Production and Handling Standards." National Organic Program. Accessed at http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELDEV3004445.

Nassauer, Sarah. 2014a. "Grass-Fed Milk Is Taking Off With Health-Conscious Shoppers." The Wall Street Journal. Accessed at http://online.wsj.com/articles/grass-fed-milk-is-taking-off-with-health-conscious-shoppers-1406675201.

Nassauer, Sarah. 2014b. "Melted Cheese's Delicious Secret." The Wall Street Journal. Accessed at http://online.wsj.com/articles/SB10001424052702303942404579362751443853662.

Nguyen, Vi-An. 2014. "Californians Prefer Vanilla: Most Popular Ice Cream Flavors by State." Parade. Accessed at http://parade.com/315950/ice-cream-map/.

Nicholson, Charles and Mark Stephenson. 2007. "Financial Performance Value-Added Dairy Operations in New York, Vermont and Wisconsin." American Agricultural Economics Association Annual Meeting. Accessed at http://digitalcommons.calpoly.edu/cgi/viewcontent.cgi?article=1081&context=agb_fac.

Nunes, Keith. 2014. "Indulgence, decadence driving U.S. ice cream category." Food Business News. Accessed at http://www.foodbusinessnews.net/articles/news_home/Consumer_Trends/2014/07/Indulgence_decadence_driving_U.aspx?ID=%7B3A210FC9-9B83-45D6-BCAC-CBE5DB0E3223%7D.

Organic Trade Association. 2014. "Organic sales break $35 billion." Engredea. Accessed at http://m.newhope360.com/breaking-news/organic-sales-break-35-billion.

Orris, Daryl J. 2012. "Aseptic packaging won't save fluid milk." Dairy Foods. Accessed at http://www.dairyfoods.com/blogs/14-dairy-foods-blog/post/88863-aseptic-packaging-wont-save-fluid-milk.

Parcell, Joe and Jill Moreland. 2014. "Market Opportunities for Missouri Artisan Cheese." University of Missouri. Accessed at http://dairy.missouri.edu/business/MissouriArtisanCheeseMarket.pdf.

Pennsylvania Certified Organic. 2014. "PCO 100% Grassfed Certification." Pennsylvania Certified Organic. Accessed at http://www.paorganic.org/grassfed.

Peterson, Kim. 2014. "Coca-Cola's latest gambit: A new kind of milk." CBS News. Accessed at http://www.cbsnews.com/news/coca-cola-is-introducing-fairlife-milk/.

Pierce, Ellise. 2013. “Imported yogurt capturing Americans’ taste buds.” The Daily Herald Co. Accessed at http://www.heraldnet.com/article/20130910/LIVING/709109991.

Pipkin, Whitney. 2014. “On raw milk, FDA and proponents engage in a battle of statistics.” Washington Post. Accessed at http://www.washingtonpost.com/lifestyle/food/on-raw-milk-fda-and-proponents-engage-in-a-battle-of-statistics/2014/01/17/e2c9a760-7e2e-11e3-9556-4a4bf7bcbd84_story.html.

Prairie Farms. 2014. "Let Us Put Our Vast Capabilities & Distribution Network to Work for You." Prairie Farms. Accessed at http://www.prairiefarmsdairy.com/index.php?p=508.

Prisco, Joanna. 2013. “More Cheese, Please: Americans Hungry for Specialty Cheese.” ABC News. Accessed at http://abcnews.go.com/Lifestyle/cheese-americans-hungry-specialty-slices/story?id=20438304.

Refrigerated & Frozen Foods. 2014. “Protein Plus Milk.” Refrigerated & Frozen News. Accessed at http://www.refrigeratedfrozenfood.com/articles/88454-88454-protein-plus-milk.

Reinagel, Monica. 2014. “Kefir: From Russia with Love.” Food & Nutrition Magazine. Accessed at http://www.foodandnutrition.org/July-August-2014/Kefir-From-Russia-with-Love/.

Salahi, Lara. 2014. “New Craze? Coffee Lovers Add Butter Instead of Creamer.” Boston Globe. Accessed at http://www.boston.com/health/2014/06/20/new-craze-coffee-lovers-add-butter-instead-creamer/MzlwH673Xfc8wAXE1VzeIO/story.html.

Salter, Chuck. 2014. “The World’s Top 10 Most Innovative Companies in Food.” Fast Company. Accessed at http://www.fastcompany.com/3026682/most-innovative-companies-2014/the-worlds-top-10-most-innovative-companies-in-food.

smalldairy.com. 2014. small.dairy.com. Accessed at http://www.smalldairy.info/.

Snowville Creamery. n.d. "About A1 and A2 beta-casein in cow's milk." Snowville Creamery. Accessed at http://www.snowvillecreamery.com/a1-and-a2-beta-casein-in-cow-milk.html.

Stafford, Thomas, K. Charles Ling and Carolyn Liebrand. 2005. “Cooperatives in the Dairy Industry.” USDA Rural Development. Accessed at http://www.rurdev.usda.gov/rbs/pub/cir116.pdf.

Stewart, Hayden, Diansheng Dong and Andrea Carlson. 2013. “Why Are Americans Consuming Less Fluid Milk? A Look at Generational Differences in Intake Frequency.” USDA Economic Research Service. Accessed at http://www.ers.usda.gov/media/1118789/err149.pdf.

Strom, Stephanie. 2013. “Whole Foods Won’t Sell Chobani Greek Yogurt as of Early Next Year.” The New York Times. Accessed at http://mobile.nytimes.com/2013/12/19/business/whole-foods-wont-sell-chobani-greek-yogurt-as-of-early-next-year.html?_r=1.

The Association for Packaging and Processing Technologies. 2013. “2013 Dairy Industry – A Market Assessment.” The Association for Packaging and Processing Technologies. Accessed at http://www.pmmi.org/files/Research/ExecutiveSummaries/2013DairyExecSummary.pdf.

The Gourmet Retailer. 2013. “FDA Launching Pilot Testing Program for Raw Milk Cheese.” The Gourmet Retailer. Accessed at http://www.gourmetretailer.com/top-story-perishables-fda_launching_pilot_testing_program_for_raw_milk_cheese-11446.html.

The Gourmet Retailer. 2014. "Specialty Cheese Market Poised to Grow: Packaged Facts." The Gourmet Retailer. Accessed at http://www.gourmetretailer.com/top-story-profiles___trends-specialty_cheese_market_poised_to_grow__packaged_facts-11699.html.

The NPD Group. 2014. "Protein Perceptions and Needs Report Excerpts." The NPD Group. Accessed at https://www.npd.com/latest-reports/food-and-beverage-protein/.

The Weston A. Price Foundation. 2014. "A Campaign for Real Milk." The Weston A. Price Foundation. Accessed at http://www.realmilk.com/.

Thornton, Taylor. 2014. "Yogurt industry milking non-GMO trend." Medill Reports – Chicago, Northwestern University. Accessed at http://news.medill.northwestern.edu/chicago/news.aspx?id=227995.

Toner, Ann. 2007. "Dairy pioneers a2 milk in U.S." Nebraska Farmer. Accessed at http://magissues.farmprogress.com/NEF/NF10Oct07/nef008.pdf.

US Foods. 2014. "Farmer's Report Market Trends." Accessed at http://www.usfoods.com/content/dam/usf/pdf/farmers_report/FarmersReport_9.12.pdf.

U.S. Dairy Export Council. 2014. "Export Trade Data." U.S. Dairy Export Council. Accessed at https://www.usdec.org/Why/Export.cfm?ItemNumber=82452&navItemNumber=82562.

USDA Economic Research Service. Various Datasets. Accessed at http://www.ers.usda.gov/.

USDA Foreign Agricultural Service. Global Agricultural Trade System. Various Datasets. Accessed at http://apps.fas.usda.gov/gats/default.aspx.

USDA National Agricultural Statistics Service. Quick Stats. Various Datasets. Accessed at http://www.nass.usda.gov/Quick_Stats/.

Van Allen, Jennifer. 2014. "Got milk? From a cow or a plant?" The Washington Post. Accessed at http://www.washingtonpost.com/news/to-your-health/wp/2014/06/10/got-milk-from-a-cow-or-a-plant/.

VanderMey, Anne. 2014. "Do we still scream for ice cream?" Fortune. Accessed at http://fortune.com/2014/07/24/ice-cream-sales/.

Voight, Joan. 2012. "As Americans Rush to Fresh Food, Supermarket Chains Follow." CNBC. Accessed at http://www.cnbc.com/id/49101716#.

Watrous, Monica. 2014. "Cheese market driven by natural demand." Food Business News. Accessed at http://www.foodbusinessnews.net/articles/news_home/Consumer_Trends/2014/06/Cheese_market_driven_by_natura.aspx?ID=%7B4052A835-2AB3-412B-9555-9494B5CDB501%7D.

Watson, Elaine. 2014a. "How have American eating habits changed since 2004?" Food Navigator-USA. Accessed at http://mobile.foodnavigator-usa.com/Markets/How-have-American-eating-habits-changed-since-2004/?utm_source=newsletter_daily&utm_medium=email&utm_campaign=13-Nov-2014&c=f3oEVtFJGCp84xa0ffAFVyJs9qMWAZxX#.VGT2o_l4r3p.

Watson, Elaine. 2014b. "Noosa co-founder: Greek yogurt isn't the only game in town." Food Navigator-USA. Accessed at http://www.foodnavigator-usa.com/People/Noosa-co-founder-Greek-yogurt-isn-t-the-only-game-in-town.

Watson, Elaine. 2014c. "Pumpkin Spice fastest growing SKU in our history says Chobani (and 'natural' claims still resonate, says marketing chief)." Food Navigator-USA. Accessed at http://www.foodnavigator-usa.com/Manufacturers/Pumpkin-Spice-fastest-growing-SKU-in-our-history-says-Chobani.

West, Melanie Grayce. 2010. "Crop of Small Dairies Hits Market." The Wall Street Journal. Accessed at http://online.wsj.com/articles/SB10001424052748704638304575636791305368762.

Westhoff, Pat, Scott Gerlt, Jarrett Whistance, Julian Binfield, Wyatt Thompson, Scott Brown and Daniel Madison. 2014. "U.S. Baseline Briefing Book." Food and Agricultural Policy Research Institute. University of Missouri. Accessed at http://www.fapri.missouri.edu/outreach/publications/2014/FAPRI_MU_Report_02_14.pdf.

Wilkins, Dave. 2012. "Dairies plant agritourism seeds with pumpkin patches." Progressive Dairyman. Accessed at http://www.progressivedairy.com/index.php?option=com_content&view=article&id=8641:dairies-plant-agritourism-seeds-with-pumpkin-patches&catid=72:producers&Itemid=115.

Worthen, Ben. 2011. "To Save the Farm, Some Turn to Cheese." The Wall Street Journal. Accessed at http://online.wsj.com/news/articles/SB10001424052970204479504576637172340616088?mod=rss_US_News&mg=reno64-wsj.

Yoder's Country Market. 2014. "Guernsey Milk." Yoder's Country Market. Accessed at http://www.yoderscountrymarket.com/milk.php.

Yonkers, Bob. 2014. "State of the Dairy Industry: High butter prices open the door to imports." Dairy Foods. Accessed at http://www.dairyfoods.com/articles/90827-state-of-the-dairy-industry-high-butter-prices-open-the-door-to-imports.