Increasing California Dairy Exports to Japan and South Korea

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ABSTRACT

The opportunities for increasing exports of California dairy products to the Japanese and South Korean markets were determined by identifying current obstacles in the California dairy industry and determining the characteristics of consumers in the Japanese and South Korean markets. As the largest milk-producing state and the supplier of 7.5% of total U.S. dairy exports, California's economic activity greatly affects the rest of the nation and the world. The trends in the California dairy industry include increasing total milk production and per-cow milk production, a diminishing number of total dairy operations, and a rising number of large dairy operations. These factors are contributing the rising annual volumes of United States dairy exports to trade partners, including Japan and South Korea. However, domestic issues such as environmental regulation suggest that the cost of business in California may hinder growth opportunities and disenfranchise industry professionals from investing in California processes.

As diets and consumption become more westernized, the consumption of dairy foods in Japan and South Korea is increasing. Due to instability in the Japanese dairy industry following a butter shortage, the United States was able to enter another sector of the lucrative Japanese dairy import market and secure the largest share of butter imports to Japan. Despite desirable attributes of the product and recent trade agreements, the Japanese demand for United States' dairy products is depressed by the perceived inflexibility of the United States, inconsistent and questionable quality of its products, and disregard for the Japanese business environment.

These concerns prevent the development of stronger and potentially long-lasting partnerships between the United States and must be addressed with innovation from California and United States industry officials. Promotion targeting college-aged individuals and housewives in Japan are likely to realize the greatest return, based on the reported levels of

interest in new dairy products, however the demand for processed and unprocessed cheeses, as well as value-added organic products marketed as “healthy” will increase in Korea and should be anticipated. In addition to advertising United States’ products as “American Specialty,” California processors should continue to promote lactose and skim milk powder exports to Japan and South Korea, but incorporate the Japanese quality standards into production.

INTRODUCTION

Dairy cattle have played a major role in California's economy since the 1500s. Over the course of nearly 500 years, California's dairy industry matured from small herds accompanying friars along Calle Real to over 1.84 million cows producing over 41 billion lbs of milk in 2011 (Zurborg, 2005) (CDFA, 2012). In 1997, California surpassed Wisconsin as the top dairy state, leading the state in the production of every dairy product except cheese. According to the CDFA, total milk production in California has increased 52% since 1997 and total U.S. milk production has increased nearly 26% in the same period.

As domestic production has increased, so have U.S. exports of dairy product. As of 2011, the U.S. supplied nearly 1/5 of the world's dairy export market, which has historically been dominated by the European Union, New Zealand, Australia, and Argentina (USDEC, 2012). In 2008, California accounted for 35% of these U.S. exports, meaning that California alone represents roughly 7% of the world dairy exports (CMAB, 2012). The greatest importers of U.S. (and subsequently California) dairy products, are Mexico, Southeast Asia, Canada, China, Middle East, Japan, and South Korea (USDEC, 2012). Of the $4.82 billion 2011 U.S. exports, Japan purchased $277 million and South Korea purchased $222 million, increasing their cheese imports from 2010 by 54% and 82%, respectively. Although these economies continue to import large volumes of dairy ingredients, their growing demand for U.S. cheese is a new market to be secured.

Japan's trade policies and agreements with the world dairy industries are complex and detailed. These tariffs have historically limited the U.S. not only by the specific classes of products it may export to the Japanese, but by compositional standards within classes. In efforts

to dissuade the import of U.S. products, Japanese regulations make the import of whey protein concentrates prohibitively expensive, but ease tariffs on whey protein isolate (Saitama, 2013)

In contrast, South Korea recently opened its ports to more U.S. exports in the South Korea-U.S. Free Trade Agreement. This free trade agreement is likely a forecast for stronger international relations between the U.S. and South Korea, as is the westernization of the Japanese and South Korean diets, exemplified by the abrupt increase in demand for U.S. dairy products. Another factor in the future of trade between the U.S. and South Korea are the practices of the newly-elected South Korean president, Park Geun-hye, the country's first female president.

As the Japanese and South Korean economies progress through their respective cycles, the roles that California and the rest of the U.S. play in the global food supply will undoubtedly shift. The dairy industry is in a position to absorb the growing demand for dairy products in these markets, when other competitors may not be. If California's growing production volumes are allocated to the products demanded by theses economies, a larger share of the South Korean and Japanese dairy markets can be secured. By analyzing the U.S, California, and Japanese dairy industries, identifying current obstacles in the California dairy industry, and isolating characteristics of consumers in the South Korea-Japan market, the opportunity of increasing exports of California dairy products to the South Korea-Japan market will be determined.

ANALYSIS OF THE UNITED STATES DAIRY INDUSTRY

Production

As domestic production and export volumes increase, so does the presence of the U.S. in the global dairy products market. According to the National Agricultural Statistics Service, total U.S. milk production increased from 165.332 billion lbs in 2001 to 192.819 billion lbs in 2010, with a mean total production of 179.307 billion lbs for those ten years (**Table 1**) (NASS, 2011).

Although the total per cow production increased, the fat content consistently remained between 3.66% and 3.69% with a mean fat percentage of 3.68%. The increase in total production is not, however, correlated to the average number of milk cows in the U.S, which has fluctuated between 9,010,000 and 9,315,000 animals in the same ten years (NASS, 2011). The 192,819 million lbs of milk produced were processed into millions of lbs of dairy products, both for domestic consumption and exports.

Table 1. Milk and milk fat production: Number of producing cows, production per cow, and total quantity produced. United States, 2000-2010

Year	Number of milk cows[1]	Production of milk and milkfat[2]				
		Per milk cow		Percentage of fat in all milk produced	Total	
		Milk	Milk fat		Milk	Milk fat
	Thousands	*Pounds*	*Pounds*	*Percent*	*Million pounds*	*Million pounds*
2001	9,103	18162	667	3.67	165332	6073
2002	9,139	18608	685	3.68	170063	6264
2003	9,081	18759	688	3.67	170348	6247
2004	9,010	18960	696	3.67	170832	6266
2005	9,050	19550	716	3.66	176931	6480
2006	9,137	19895	734	3.69	181782	6700
2007	9,189	20204	744	3.68	185654	6832
2008	9,315	20395	751	3.68	189982	6998
2009	9,203	20573	755	3.67	189334	6949
2010	9,117	21149	774	3.66	192819	7052

[1]Average number during year, excluding heifers not yet fresh. Redrawn from National Agricultural Statistics Service
[2]Excludes milk sucked by calves

The top ten milk-producing states, in order from greatest total volume, are California, Wisconsin, Idaho, New York, Pennsylvania, Texas, Minnesota, Michigan, New Mexico, and Washington (USDA, 2010). Although milk production is recorded in all fifty states, 74.0% of all U.S. milk is produced by these top ten states and 90% of all U.S. milk is produced by the top twenty dairy producing states (IDFA, 2012). As Roger Hoskin states in the "Dairy Background" report, the majority of milk is produced in the Northern and Western regions, which he attributes to lower production costs resulting from "a variety of organizational and climatic reasons."

(Hoskin, 2012). These reasons may include proximity to borders with trading companies and active ports and cargo ships.

Nearly half of all the milk produced annually is allocated to cheese production. In 2012, the total domestic cheese yield was 912 million lbs, with mozzarella and cheddar as the two top cheeses produced in the U.S. (NASS, 2013). In addition to cheese and fluid milk, 144 million lbs of butter, 85.02 million lbs of frozen dairy foods, as well as 349.2 million lbs of concentrated and fractionated milk powders were produced. The U.S. consumption of dairy products has fluctuated in the last three decades and in 2010, consumption reached 368.33 lbs per capita. The per capita consumption of fluid milk alone has decreased annually from 28.77 gallons in 1975 to 20.69 gallons in 2010 (IDFA, 2012). The general trend of diminishing per capita consumption of fluid milk in the U.S. is likely attributed to the increasing availability of imitation milk and milk alternatives, such as soymilk and almond milk.

Exports

In 2010, the U.S. imported 1,336.87 million lbs of non-liquid dairy products and 2.63 million gallons of liquid dairy products. Non-liquid dairy products include, but are not limited to, yogurt, ice cream, condensed and evaporated milk, cheese and curd, whey and whey products, lactose, casein, milk protein concentrates, butter and milk fat, dry milk products (IDFA, 2012). Because, in part, of subsidies around the world, the global market price of many products, such as casein, is lower than the price of the same product in the U.S. Even though the U.S. is capable of producing many of these products, it is more cost efficient to import them from other global suppliers (Tong, 2013). If evaluated in terms of U.S. production, the quantity imported would account for .593% of total U.S. milk production (IDFA, 2012).

The U.S. has a growing presence in the global dairy products market as domestic production and export volumes increase. From 2009 to 2010, the volume of U.S. dairy exports increased 38.9% to 3556.6 million lbs of liquid and non-liquid dairy products (IDFA, 2011) and from 2011 through 2012, U.S. exports corresponded to more than 13% of domestically-produced milk solids (USDEC, 2013). With the exception of 2005 and 2009, the U.S. share of the world dairy product exports has increased annually over the last ten years. In 2010, the U.S. was responsible for 8.7% of global cheese exports, 7.0% of global butter (including butter oil) exports, and 26.3% of skim milk powder (including nonfat dry milk) exports (IDFA, 2011). According to the U.S. Dairy Export Council, of the top five exporters (New Zealand, European Union, United States, Australia and Argentina), the U.S. is responsible for 19% of the total export volume to the world market (USDEC, 2012). The total volume of liquid dairy product exports in 2010 was 24.3 million lbs, a 28.1% increase from 2009. The total volume of non-liquid dairy exports in 2010 was 3,532.3 million lbs, a 38.9% increase from 2009 (USDEC). This growth may be associated with the increasing populations, and thus demand for food products, throughout the world, as well as the increasing affluence in many of the economic areas that currently import U.S. dairy products.

As domestic production and export volumes increase, the U.S. secures a larger portion of the global market as a leading supplier of dairy products. By volume, the top three exported products are whey products, butter and milk fat, and lactose. Although by dollars from sales, the top three exported products are whey products, cheese and curds, and non-fat dry milk. Exports of nonfat dry milk account for 47% of all domestic nonfat dry milk production (USDEC, 2013). Dairy exports totaled 382.4 metric tons in 2010, up from 239.0 metric tons in 2009, and in 2012, the U.S. maintained 19% share of total export volume from 5 major suppliers- New Zealand,

European Union, United States, Australia, and Argentina (USDEC, 2013). In 2011 alone, the U.S. was responsible for greater than 25% of the world's skim milk powder market, 8.7% of the world's butter market and 7% of world's cheese market. (IDFA, 2011).

The sheer size and lack of supply controls attract foreign investors to the U.S. dairy market (Blayney, et al., 2006). As the U.S. secures a larger portion of the global market, it becomes situated to absorb the increasing demand for dairy foods when other competitors may be nearing the production capacity of their respective economies. When these suppliers cannot accommodate the heightened demand, the U.S. may be in a position to further increase its exports and potentially strengthen its diplomatic relations.

Demand in the Global Dairy Market

Anita Regmi states in the Economic Agricultural Service article "A Richer World Wants a Richer Diet", the global demand for higher value foods, such as meat and dairy, is increasing across all income levels (Regmi, 2011). She also states that this increase in demand is correlated to an increase in global per capita income, regardless of the degree of change in income. However, Blayney et al state that the demand for specific products varies with economic status and culinary culture within a society (Blayney, et al., 2006). Therefore, although product differentiation between socio-economic status remains, global demand for assorted dairy products is expected to increase.

The Foreign Agricultural Service states that the U.S.'s top 5 trading partners from 2009 to 2010, in order from greatest to least tonnage of U.S. cheese imports, are Mexico, South Korea, Japan, Canada, and Egypt (**Table 2**) (Foreign Agricultural Service). These economies account for 59% of U.S. cheese exports (IDFA, 2011), but South Korea and Japan combined account for 75.4 metric tons (19.67%) of the U.S.'s 382.4 metric ton cheese exports in 2010 (USDEC, 2013).

The U.S. accounts for 26% of the South Korean dairy import market, or 73,000 mt out of total South Korean dairy imports (USDA, 2010). The high levels of cheese exports to South Korea and Japan are correlated to the higher incomes and standard of living in these areas. In the affluent areas, individuals eat out of the home more frequently and diets become more westernized and western diets incorporate more dairy products (Saitama, 2013). As Japan and South Korea experience a growth in the presence of western cuisine, their demand for dairy products, particularly cheese, will continue to increase.

Table 2 U.S. Exports of cheese to 5 largest trading partners[1]; 2009-2010

	Quantity			Value		
	2009	2010	% Change 09-10	2009	2010	% Change 09-10
	(Metric Tons)			(Million $)		
1. Mexico	88.5	107.7	21.7%	143.9	187.4	30.2%
2. South Korea	23.9	42.4	77.3%	42.3	78.8	86.2%
3. Japan	15.5	32.8	111.7%	42.9	73.2	70.3%
4. Canada	22.6	25.3	11.8%	47.8	53.8	12.4%
5. Egypt	2.8	18.2	550.6%	4.2	28.7	578.9%
Total U.S. Exports	239.0	382.4	60.0%	430.2	694.1	61.3%

[1]Ranked by 2010 value

Redrawn from Foreign Agricultural Service

International Trade

GATT Uruguay Round Agreement.

The General Agreements on Agriculture and Trade (GATT) Uruguay Round Agreement was the first global trade contract to address agriculture, drastically changing the export and import volumes of dairy products throughout the globe. The negotiations resulted in signed dairy market access agreements between 42 countries and the European communities (GATT, 1994). The focus of the negotiations was to correct domestic policies that resulted in "sharply fluctuating world prices" and led to instability in domestic markets. The participants of the Uruguay Round agreed to several policies, including tariffication and reduction of export subsidies, market access, and sanitary requisites for trade.

Many countries used several measures for protecting their farmers from imports, including subsidies and tariffs on import quotas, such as Japan's over-quota tariff and in-quota tariffs. Japan historically maintained an import quota which permitted ALIC to regulate the quantity of imports in order to product the domestic Japanese dairy producers from competing with cheaper foreign milk. According to Blayney et al, Japan upheld a 10% tariff rate on imports within the quota, but a 227% tariff rate on imports that exceeded the quota; the U.S. rates were 12% and 43%, respectively (Blayney, et al., 2006). These rates effectively protected domestic producers, but artificially influenced prices as supply was not subject to real quantity demanded. Furthermore, domestic markets were subsidized by the government, which only provided incentive to increase production, regardless of demand. The GATT (now the World Trade Organization, or WTO) agreement states that although governments are still permitted to support their local economies, policies should allow for flexibility and cause less distortion to trade, including the replacement of quotas with just tariffs (GATT, 1994).

To prevent countries from simply converting their import quota tariffs to barrier-like rates, the agreement also mandates that all participating developed countries are to "cut tariffs by an average of 36%, in equal steps over six years," which was completed in 2000. This policy, in addition to eliminating import bans on certain products contributed to the increased market access to many markets by decreasing the artificial manipulation of global supply and demand.

One of the final decisions in the trade negotiations regarded international sanitary regulations. Although some participants argued for globally standardized sanitary requirements, it was ruled that individual governments would continue to develop their own standards, but those standards are to reflect science-based disciplines, comply with generally accepted

standards, and the methods and records of those standards are to remain transparent (USDEC, 2013).

The consequences of the Uruguay Round have increased the opportunities for international trade in the agricultural industries. By changing to a tariff-only system, the dairy market has become more predictable and aids both importers and exporters by providing stability in supply, even though tariffs on dairy products are among the highest of all commodities in international trade (Blayney, et al., 2006). Furthermore, the elimination of product bans also allows for demand to develop, thus naturalizing and strengthening global markets. Although individual sanitary standards differ, it is in each exporter's best interest to comply and support its trade partner's standards. By maintaining the freedom and flexibility to accommodate these standards, the WTO has maintained the potential for natural competition within the global market and innovative economies can further develop desirable products without inhibition by global standards that would be nearly impossible to comply with as technology, preferences, products, and the dairy market matures over time. The Uruguay Round was the first agreement of its kind, but another agricultural negotiation is likely to be scheduled within the next decade to readjust policies as economies continue to develop.

South Korea-U.S. Free Trade Agreement

The U.S. currently has Free Trade Agreements (FTA) with Australia, Bahrain, Central American and the Dominican Republic, Chile, Israel, Jordan, Morocco, Canada, Peru, Singapore, Oman, Colombia, Panama, South Korea, Malaysia, and the South African Customs Union, but USDEC states that the FTA with South Korea (KORUS FTA) represents "the most significant potential benefits" (USDEC, 2013). The negotiations with South Korea concluded in 2007 despite difficulty and sensitivity regarding the agricultural sectors, particularly dairy. The FTA

was implemented in March 2012 and will increase U.S. competition in the South Korean market by phasing out tariffs on milk products.

According to Youngsook, the KORUS FTA outlines a duty-free tariff-rate quota for cheeses, increasing the in-quota amount from 7,000 mt to 10,280 mt in 2014 (Youngsook, 2012). It is projected that that the 35% import tax rate as of October 2012 will decrease on schedule and all U.S. cheeses will be completely duty-free by 2026. This drastic change to the costs of exporting to the South Korean market will greatly increase the opportunities for the U.S. dairy industry to expand its large share of the South Korean dairy market. By eliminating tariffs on cheese, the U.S. will export more specialty cheeses to appeal to the maturing palates of the South Korean consumer, capitalizing on a cheese demand that is not already satisfied by European or Oceanic exports. This trade agreement, accompanied by the growing demand for U.S. products in South Korea, will expand the U.S. share of the cheese and NFDM markets, potentially at the expense of New Zealand and Australia, further strengthening the U.S. dairy market as a competitive force in the global market.

ANALYSIS OF THE CALIFORNIA DAIRY INDUSTRY

Production

California has held its rank as the leading dairy state in the nation since 1993 and continues to increase its share of national milk production. The California share equated to 21% of the U.S. milk supply in 2004, up from 11% in 1980 (McKinsey, 2006). McKinsey claims, as of 2006, California's milk supply has increased annually by 4%, although in the Overview of the U.S. Dairy Industry, the USDA states that California milk production has increased by 19% from 2001 to 2009, or, averaging just under 2.5% annually (USDA, 2010). The latter is consistent with

2.7% increase from 2010 to 2011, as reported by the CDFA (CDFA, 2012). Despite these discrepancies, it is accepted that the California milk supply will continue to increase.

Consistent with the national trend, California's milk production is growing, despite a decline in the overall number of dairy operations. From 2010 to 2011, the number of dairies in California decreased from 1,716 to 1,638 (CDFA, 2012), however, on a national scale, the number of dairy operations with herds greater than 500 milk cows increased by 20% from 2001 to 2009 (USDA, 2010). The total number of milk cows on California dairies decreased from 1,813,000 in 2007 to 1,754,000 2010, recovering slightly in 2011 to 1,769,000 (CDFA, 2012). Nationally, per cow production has increased during this period, but percent fat and percent protein have remained idle, as stated in Agricultural Statistics, 2011 (NASS, 2012). Yet, according to the CDFA, California's per cow production, average percent milk fat, and average percent non-fat-solids increased annually from 2009 to 2011 and remained higher than national averages each year (CDFA, 2012).

The five major trends in the California dairy industry are:

- Increasing total milk production;
- Increasing per-cow total milk production, total milk fat, and total solids-non-fat
- Relatively stable cow population;
- Diminishing number of total dairy operations; and
- Rising number of large operations

This suggests that within the state, owners of smaller dairy operations are selling their businesses to larger firms, which are in turn, adding the purchased herds to their own larger populations.

The long-term increase in total milk production in the state may be attributed to increasing efficiency of operations, advances in dairy nutrition, or advances in breeding and genomics.

Consumption/ Allocations of Milk Supply

Raw milk is allocated to one of five categories: Class 1- fluid milk products, Class 2- cream and soft dairy products, Class 3- frozen dairy products, Class 4a- milk powders, or Class 4b- cheese. These five classifications are specific to the California Milk Marketing Order, not to be confused with the Federal Milk Marketing Order, which defines Class I, II, III, and IV differently (**Table 3**). These classifications are used by the California Milk Marketing Order in order to pay producers on the basis of how their milk was utilized. The CDFA states the 2013 class prices per cwt in **Table 4**.

Table 3 Milk class definitions per the California Milk Marketing Order and Federal Milk Marketing Order

California	Federal Order	Description- milk used in:
Class 1	Class I	Fluid products
Class 2	Class II	Heavy cream, cottage cheese, yogurt, and sterilized products
Class 3		Ice cream and frozen products
Class 4a	Class IV	Butter and dry milk products, such as nonfat dry milk (NFDM)
Class 4b	Class III	Cheese, other than cottage cheese, and whey products

Redrawn from California Department of Food and Agriculture, 2007

Table 4 Current California Milk Prices as of February 2013

Class	Price per cwt	Month
Class 1: Fluid Milk Products	$19.47*	March
Class 2:	$17.93*	February and March
Class 3:	$17.76	February and March
Class 4a:	$17.08	January
Class 4b:	$15.84	January

*Northern and Southern California prices averaged

In 2011, 13.5% of the 712,822,457 lbs of milk produced in California were used in the production of Class 1 products, 2.4% for Class 2, 3.5% for Class 3, 35% for Class 4a, and 43.1%

for Class 4b (CDFA, 2012). The pounds of milk allocated to the production of Class 4a (butter and powder) and 4b (cheese) products increased by 8.6% and 13.8% in 2011, respectively, bringing total butter and powders production to 622.4 million lbs and total cheese production to 2.25 billion lbs (CDFA 2012). Despite a decrease in the proportion of total milk supply allocated to Class 3 products, the total volume of frozen dairy foods produced increased by 2.3% in 2011, which is consistent with the increase in total milk production in the state. However, the quantity of milk used for the other three classes decreased, indicating that in addition to an increasing supply of raw milk, a greater percentage of the milk supply is being allocated for butter, powder, and cheese production (CDFA, 2012).

Exports

In 2011 alone, California was responsible for 11% of total U.S. exports (CA Chamber of Commerce, 2012). The goods were valued at $159 billion, up from $143 billion in 2010, and were received by 227 foreign markets, led by Mexico, Canada, China, Japan, and South Korea (Klowden and Wolfe, 2012). According to the California Chamber of Commerce, the top export in 2011 was computers and electronics, which accounted for 29% of all California exports, or about $46.11 billion (CCC, 2012). It is evident that the dot-com boom and bust has not prevented the information technology industry from securing an active role in the state's economic profile.

The agriculture sector is accustomed to volatility and the supplies and demands of food items have historically fluctuated. The value California's share of U.S. agricultural exports, however, has increased to $14.7 billion in 2010; a 125% increase from 2000 (California Agriculture Statistics Service, 2012). The increase in export value may be attributed to the diversity of products harvested and manufactured in the western regions, as 57 of the top commodities account for 88% of all California's agriculture exports (CCC, 2012). Almonds

continued to be the top exported commodity with $2.3 billion in sales, or 16.2% of California exports in 2010, followed by dairy products, which accounted for nearly 7.5% of California agriculture exports in 2012.

From 1980 to 2000, California dairy exports increased from 700 million lbs to 15 billion lbs (McKinsey, 2006). By 2010, 32% of all U.S. dairy exports came from California (CASS, 2012) (**Table 5**). In 2009, approximately 17% of the milk produced was exported as various dairy products, nearly half of which was non-fat dry milk and skim milk powders (CDFA, 2012). The 2011 value of California's dairy export totaled over $1.5 billion (**Table 6**).

Table 5 Value of California's share of total U.S. dairy exports in 2009 and 2010.

2009		2010	
Value (billion)	**Percent of U.S. market**	**Value (billion)**	**Percent of U.S. market**
$2.189	27.7%	$3.578	32.0%

Redrawn from California Agriculture Statistics Service, 2012

Table 6 2011 California dairy exports by product.

Dairy Product	**Export value (1,000s)**
Milk powder	$690,800
Dry Whey	$90,100
Cheese	$346,434
Butter	$124,485
All other	$270,512
Total	$1,522,331

Redrawn from Babcock Institute, 2012

Challenges

Although California has held its position as the leading dairy state since 1993, it is faced with many challenges that may compromise the prosperity of its dairy industry in the future. Total California exports grew 66% from 1998 to 2011, but in the same period, other states experience rates in excess of 100% and the national average growth rate was 139% (Klowden & Wolfe, 2012). Many of the factors behind this statewide lag effect are highlighted by the

McKinsey Company in their 2006 analysis of the California dairy industry. In the report, McKinsey claims that the industry and legislators alike must address 2 comprehensive issues: environmental regulation and a lack of investment in innovative and local processing.

Agricultural enterprises, particularly dairies, have been held responsible for the contamination of environmental resources in California, such as the Chino River Basin and the Orange County water supply (California Regional Water Quality Control Board, 1990). These contaminants are typically classified as excess nitrogen levels and salts in soils and water as a result of manure storage in lagoons or in crop fields. The U.S. Environmental Protection Agency (2002) concluded that agriculture was the top polluter of water bodies and contributed to over 35% of contaminated waters (Sneeringer, 2011). Government grants, such as those provided by the Bay Delta Initiative in Merced and Stanislaus counties, are intended to aid dairies in the treatment and utilization of the high volumes of manure produced daily.

In addition to compromising water quality, the dairy industry has been accused of being a significant contributor to regional smog, according to the U.S. Environmental Protection Agency (2002). Due to a lack of a measurement system, figures and estimates of atmospheric pollution caused by dairies are not reliable. For example, the dairy industry representatives and the San Joaquin Valley Air Pollution Control District (SJVAPCD) are very different. The SJVAPCD claims that dairies are a major source of volatile organic compounds (VOCs). The EPA defines VOCs as, "organic chemical compounds whose composition makes it possible for them to evaporate under normal indoor atmospheric conditions of temperature and pressure." (EPA, 2012). Regulatory agencies have argued that the nitrogen produced by cattle is classified as a VOC and VOCs create smog (McKinsey, 2006). McKinsey also claims that agencies like the SJVAPCD concentrate on agricultural emissions because they do not have the authority to

regulate emissions from other sources, such as vehicles (McKinsey, 2006). This has allowed regulations to proceed without standardized methods for measure and evaluation of volumes and composition, and therefore greatly increased production costs within the dairy industry.

In order for California dairies to comply with these regulatory costs, McKinsey estimates the industry will face an increase from $650 million to $2.6 billion. It is also estimated that only dairies with more than 2,500 cows possibly have the profit margins necessary to comply, and even still, those dairies would lose approximately 1/3 of their profits. All smaller dairies would face bankruptcy from either the prohibitive cost of compliance or fines from violation.

Processors are not exempt from these challenges either, as the EPA has stated that boilers, dryers, and engines also contribute to air pollution and wastewater salts, minerals, and other chemicals may contaminate groundwater. McKinsey recommends the replacement of equipment with low-emissions equipment, as well as implementing salt-concentration systems in wastewater reservoirs. These changes can also be prohibitively expensive for small processors, such as Straus Family Creamery, but also for large processors who may be using older equipment.

The second issue that the California dairy industry must address is the absence of investment in innovative processes and local processing. Although large processors, such as Leprino Foods, have built new plants and continue to grow, more processing capacity is required to absorb the increasing raw milk supply and meet the rising global demand for cheese. The state's restrictive and unfriendly business environment deters companies from further expanding their operations in California, despite the proximity to major ports, such as Port of Long Beach and Port of Los Angeles. However, these regulations can be contested if the industry participants

become proactive in the defense of dairy industry practices, as well as refuting unsupported claims that have led to the adoption of detrimental regulation.

In addition to pressuring legislature, the industry must also be innovative in its practices. The dairy industry is notorious for possessing an inflexible stance and when faced with the opportunity to change, the mantra seems to be, "We've always done it this way." Many businesses are resistant to change, but by accepting the changing environment and adapting to it, a business is strengthened. The dairy industry must evolve if it is going to survive.

Innovation and diversity are pillars of risk management. The dairy industry must be innovative in the production, processing, and marketing of its products. More time and resources should be allocated to the pursuit of new procedures and products to strengthen business and meet the shifting demands of the world's consumers. These innovations may include:

- Assessment of resource usage
- Increasing efficiency of energy usage by adopting newer technologies
- Water recovery for Clean-In-Place (CIP) systems, thus decreasing wastewater
- Capturing heat lost from evaporators and dryers
- Methane digesters to power farm operations
- Adding value to either raw or processed product, such as increased nutrient composition
- Individual marketing campaigns versus government agency-regulated promotion

ANALYSIS OF THE JAPANESE AND SOUTH KOREAN DAIRY INDUSTRIES

Domestic Production

The histories of dairy production in both Japan and South Korea have been significantly affected by global events, such as drought, as well as local events, such as supply manipulation and disease. These events are outlined in their respective sections.

Japan.

Unlike the U.S., Japan's dairy market is characterized by maximum production quotas to prevent a milk supply greater than domestic demand. The maximum quantities for drinking milk and manufacturing milk are designated by a board of directors, which penalizes producers who exceed them (Blayney, et al., 2006). 60% of the 8.3 million metric tons of milk produced in Japan is processed as fluid drinking milk and the remaining 40% is further processed into other dairy products, such as cream cheese, butter, and skim milk powder (SMP) (USDEC, 2009). The quotas prevent Japanese producers from exceeding the domestic demand for milk and thus avoiding another "butter crisis" like that of 2007, which was partially caused by an over- and then under-supply of milk.

South Korea.

The South Korean dairy industry continues to be very dynamic. Domestic milk production decreased annually, from 2.18 million mt in 2007 to 1.89 million mt in 2011, but is expected to increase in 2012 and peak in 2013 at 1.94 million mt (Youngsook, 2012). Milk production was adversely affected by outbreaks of Food and Mouth Disease (FMD), resulting in the slaughter of 34,000 dairy cows, or 8% of South Korea's national herds (Youngsook, 2012). In order to effectively eradicate the highly-contagious disease, the South Korean government

mandated that every hoofed animal within 500 yards of an infected animal was to be immediately quarantined and culled before the virus could be spread further (Youngsook, 2012). The epidemic and consequential mass slaughter is blamed for the 185,000 mt decrease in milk production from 2010 to 2011, but as the number of cases decrease and herds recover, the production volumes expect to recover as well.

According to Oh Youngsook, South Korea's drinking milk market was the category most weakened by the FMD outbreak as 86% of raw milk produced in South Korea is allocated to drinking milk and the remaining 14% is marketed for processing (Youngsook, 2012). The FMD caused a drop in the supply of raw milk, which in turn created a shortage of drinking milk. Unlike the butter shortage in Japan, product was not imported, due likely in part to the logistical difficulties of importing a costly, perishable product, and instead many consumers simply substituted soymilk in the absence of dairy milk. However, the demand for organic drinking milk is increasing, indicating that South Korean consumers differentiate between a dairy product and an imitation dairy product.

As consumer preferences shift in the wake of the FMD outbreaks, total cheese production in South Korea decreased, as did the production of NFDM. South Korea's trend in the cheese market from 2007 to 2011 showed an increase in the production of processed cheese and a decrease in the production of fresh cheese, concurrent with an increase in the import of fresh cheese and a decrease in the import of processed cheese. In 2011, NFDM production was reported at 4,000 mt- a 58% drop from the previous year. It should be noted that most domestically processed cheese is manufactured from imported fresh cheese. These changes in supply are consistent with a shift in the demand for various dairy products in South Korea.

Consumer Preferences

According to the World Bank, Japanese and South Korean per capita incomes increased annually from 2009 to 2011 and Prabhu Pingali states "… as income increases, the consumption of animal protein (fish, meat, dairy) increases." (Pingali, 2004). Furthermore, the diets in these countries are becoming more westernized as consumers are repeatedly exposed to American foods when traveling. Although the preferences of Japanese and South Korean consumers developed independently, they are both societies characterized by innovation and affluence. Dong notes that Japan and South Korea have "higher disposable income and are more Westernized that other Asian countries" (excluding India) and consumed much greater volumes of dairy products per capita than those countries between 2000 and 2005 (Dong, 2005). Consumption of dairy products in Japan and South Korea is expected to continue to increase not only due to increasing affluence, but to urbanization and repeat exposure to western diets, new dietary preferences by younger generations, and an overall trend towards 'well-being.'

In addition to income growth, urbanization contributes extensively to the Westernization of many Asian diets. Not only does it increase the demand for convenience food and dining out, but according Beghin, urbanization serves as a "proxy for … large retailers and restaurant chains expanding the set of choices of consumers." (Beghin, 2005). This is demonstrated by the increasing number of supermarkets in urban and suburban areas, replacing the central food markets and street vendors that previously dominated the food retail market. In addition to supermarkets, fast food chains such as McDonalds have increased their presence in Asia. From 1987 to 2002, the number of McDonald's restaurants in Japan and South Korea increased from 604 in 3891 and 0 to 357, respectively (Pingali, 2004). McDonalds' expansion throughout Japan

and Korea over the 15 year period is indicative of the Westernization of Japanese and South Korean diets.

In addition to urbanization and increasing societal affluence, the number of households with two members contributing to the household income is increasing, which may contribute to greater consumption of dairy products. In "Westernization of Asian Diets and the transformation of food systems" Pingali suggests a correlation between the growing trend of women's participation in the workforce and the rising demand for "non-traditional 'fast-food' in the urban areas of many countries" (Pingali, 2004). It is stated that more women are entering work in the urban services sector, which reduces the available time for meal preparation and thus increasing the demand for ready-made food items and decreasing the demand for traditional meals with longer preparation time. These smaller working families are more likely to dine out and consume western foods, as exemplified by the growing popularity of pizza and pasta, as well as wine and cheese (Youngsook, 2012). Clearly, as the time allocated for meal preparation decreases, the practice of dining out increases, subsequently contributing to a greater demand for dairy products as western food trends emerge within the urban populations.

In addition to income and family size, age is associated with dietary preferences. While older generations prefer more traditional diets of rice, vegetables, and fruits, younger generations consume more beer and beef. This trend may continue as each generation's diet becomes globally homogenous (Wilkinson, 2003). Regarding dairy products, cheese consumption is expanding across all generations, but cheese varieties continue to be segregated by age. Unprocessed cheeses, such as camembert and feta, lead the market in consumption and are more common with adults, who recognize them as dessert cheeses to be accompanied by wine, either at home or in wine bars (Youngsook, 2012). This market is expected to increase its consumption

of hard cheeses in the near future. Conversely, processed cheeses are marketed for children as a "nutritious food". Much of the processed cheese consumed in Korea is produced from imported fresh, unprocessed cheeses and other dairy ingredients to appeal to this growing market.

Another significant trend in the Japanese and South Korean diet is the movement toward "well-being" through food. Despite the projection that South Korea's dairy consumption will increase by 15% in ten years because of increased pizza and pasta consumption alone, many consumers seek products they deem "healthy." This contradiction between a westernizing diet and a health-conscious movement was addressed by Sumio Aoki and Svetlana Sumina at the American Cuisine Fair in Japan in 2012. The aim of the fair was to expose Japanese consumers to U.S. food ingredients and healthy recipes in which to use them (Aoki, Sumina, & Nashimoto, 2012). Dairy proteins are already commonly used as ingredients in sport and energy bars, cereals, desserts and ice cream, baby food, bakery, and soft drinks, creating value-added products, and milk marketed for babies is fortified with DHA and omega-3 fatty acids, but consumers are demanding more (Youngsook, 2012). A diner at the fair was quoted as saying, "I didn't realize how healthy American cuisine could be" (Aoki, Sumina, & Nashimoto, 2012). This suggests that Japanese consumers may view American food as an unhealthy alternative to current cuisine, but also that a proper marketing program can easily be employed to demonstrate the healthful and palatable options using U.S. ingredients.

The well-being trend is further exemplified by the priorities of milk selection, as reported in the Republic of Korea Dairy Products Annual Update. Youngsook stated that South Korean consumers hold freshness, brand name, price, and safety as high priorities when selecting milk (Youngsook, 2012). Freshness and safety is likely highly regarded due to the Snow Brand scandal and the on-going problems with FMD in the region. The increase in demand for organic

milk products can likely be attributed to these concerns as well, as organic milk is often perceived as healthier by populations, in addition to Asia's disapproval of the use of rBST in dairy cattle (USDEC, 2009).

Total dairy consumption increased greatly from 1970 to 2000 (**Table 7**). Dong suggests that the fluid milk consumption market is saturated as it increased by 3% over ten years, but projects that cheese consumption in Japan will increase by 16.5%, due to high volume usage in food service (Dong, 2005). Cheese imports into Japan and South Korea are expected to increase for by 24.5% and 48% over ten years, respectively (Dong, 2005). This is arguable when compared to the increasing demand for value-added products previously mentioned, as well as specialty milks, such as children's milk with added nutritional value and zero fat milk for young women (Youngsook, 2012). As demand continues to increase, a market for innovative products remains open.

Table 7. Dairy Consumption in Japan and South Korea for selected years (kg per capita)

Country	Product	Per Capita Consumption			
		1970	**1980**	**1990**	**2000**
Japan	Milk	25.14	33.71	40.96	39.23
	Butter	0.4	0.52	0.71	0.66
	Cheese	0.4	0.71	1.12	1.89
	NFDM	1.12	2.05	2.19	1.85
	Total	27.06	36.99	44.89	43.63
South Korea	Milk	0.46	5.66	28.17	31.96
	Butter	0.05	0.22	1.02	1.18
	Cheese	0	0	0	0.93
	NFDM	0.31	0.8	0.93	0.91
	WMP	0.42	0.4	0.77	0.61
	Total	0.83	6.97	30.32	35.1

Redrawn from Dong, Fengxia. The Outlook for Asian Dairy Markets: The Role of Demographics, Income, and Prices, June 2005

Product Demand

Japan's dairy products market is shaped in part by market instability and the butter crisis of 2007, whereas South Korea's dairy products market is shaped by a cultural trend of "wellbeing" and an increasing demand for products perceived as "healthier."

Japan

Due to specific events, the proportions of dairy products demanded in Japan shifted considerably in the 1990s and 2000s, which contributed to the butter crisis of 2007. The demand for SMP and total drinking milk, which includes fresh milk for direct consumption and processed milk for direct consumption, declined in that time period. Processed milk is produced by the recombination of SMP and butter, so as the demand for processed milk declined, the demand for SMP declined as well (USDEC, 2009). The causes for the decrease in demand for fresh drinking milk, processed milk, and SMP (and the subsequent change in the Japanese butter market) were an increase in the production and consumption of bottled beverages, such as sports drinks and teas, and the Snow Brand milk scandal.

In 1982, the beverage industry in Japan was permanently altered with the approval of plastic for use in the manufacture of beverage bottles. Over the following 12 years, consumers drank less milk as products such as mineral water, tea, carbonated beverages, and sports drinks became available in single-serving plastic bottles. Even though some of the new beverages included milk or milk components, the consumption of standardized drinking milk still decreased by 11% from 2004 to 2007.

In 2000, Japan's largest milk processor, Snow Brand, was responsible for a food-borne illness outbreak that was quoted to have sickened over 14,000 people (Dairy Industries International, 2000). It was determined that low fat processed milk was contaminated with enterotoxin-producing strains of Staphylococcus aureus due to inadequate cleaning procedures in the plant (Yamashita, et al., 2003). The company was also publicly criticized for its response to the outbreak, which included a 2 week delay before issuing a recall and the destruction of evidence prior to the police investigation (Dairy Industries International, 2000). The scandal resulted in a nearly-immediate drop and a consistent annual decline in the demand for fresh drinking milk as the Japanese consumers ceased to trust the quality of the total drinking milk supply.

The SMP required for the production of processed milk is a by-product of butter manufacture. Until 2000, the Japanese produced butter according to butter demand and any subsequent deficit in the demand for SMP was imported (USDEC, 2009). The import volumes are regulated by the Agriculture and Livestock Industries Corporation (ALIC) and in accordance with requirements from the World Trade Organization (WTO) (ALIC, 2012). However, as the demand for processed milk decreased after the Snow Brand scandal, the demand for SMP also declined and as butter production continued, the supply of SMP increased (USDEC, 2009). Even though ALIC halted SMP imports, an over-supply of SMP resulted. In an effort to balance the relationship between the supply and demand of butter and SMP production, the Japanese government mandated that domestic production would target SMP demand the resulting deficit of butter would be imported.

Unfortunately, processed milk demand continued to decrease, resulting in a 93,200-mt store of SMP in 2003, despite the production changes and utilization of domestic SMP over

imported SMP. Dairy farmers couldn't sell their milk to processors and opted to dump it instead. In an effort to protect local dairy farmers, the Japan Dairy Council "reduced the planned production of drinking milk" for 2007 and in the second half of 2006, ordered the slaughter of many animals simply to reduce the volume of raw milk, which successfully decreased the production of fresh milk by 3% in 2006.

The efforts by the Japan Dairy Council may have succeeded if not for the growing market for domestically-produced cheese, which was unaccounted for. As the demand for the cheese grew, more milk was allocated to cheese production and less for butter and SMP production, resulting in an unprecedented shortage of domestically-produced butter in the Japanese market. In addition to Japan's domestic shortage of dairy products, much of the world faced a shortage of milk as Australia experienced a severe drought in 2007. Butter demand escalated as the media advertised the shortage and retailers began rationing their butter supplies, only allowing for "one pack per household". In 2008, global production fell below market demand and Japan was in the midst of a butter crisis.

According to the General Agreement on Trade and Tariffs (GATT) Uruguay Round in 1993, Japan would import up to 8,600 tons of butter annually, but ALIC had the authority to import above this quota when market demand exceeded the supply (Cropp & Dobson, 1995). ALIC advanced 4000 mt of butter imports from the U.S. from the next fiscal year, but by the end of April 2008 (the first month of the new fiscal year), ALIC imported the remaining 4600 mt of butter. ALIC also imported another 4,500 mt of butter before the end of the 2008 fiscal year and encouraged large Japanese dairy processors to allocate more of their milk supplies for butter production instead of for cheese, helping the butter market stabilize by fall of 2008 (USDEC, 2009). The U.S.'s ability to fill the Japanese butter deficit provided the U.S. with the opportunity

to expand its trade agreements and export volumes to Japan, as well as securing a larger position in the global dairy export market.

South Korea

South Korea's well-being trend is reflected in its growing market for dairy products. In 2011, total consumption of raw milk equivalents (RME) reached 3.49 million mt and is expected to peak in 2017 at 3.62 million mt (Youngsook, 2012). Per capita consumption increased from 63.6 kg in 2006 to 73.2 kg in 2011, with a low point of 61.3 kg in 2008, and is expected to continue increasing through 2022. This trend can be attributed to trade liberalization in the last 20 years, as well as the westernization of Asian diets.

The increasing demand for dairy products is supported by growing volumes of dairy product imports, despite the decline in domestic production. It is estimated that South Korea's domestic milk production will increase by about 1.4% annually, but cheese imports alone will increase by 48% over the next ten years (Dong, 2005).

Import Specifications

Japan

According to the USDA, Japanese requirements for foods, both domestically produced and imported, consist of 4 major laws: the Food Safety Basic Law, Food Sanitation Law, Japan Agricultural Standards Law, and Health Promotion law (Hayashi, Sato, Obara, & Ito, 2009). The Food Safety Basic Law outlines the requirements for food safety programs and describes the roles of the Food Safety Commission as a regulatory body. The Food Sanitation Law aims to certify the quality and safety of food and outlines all standards for foods, additives, packaging, and labeling under the Ministry of Health, Labor, and Welfare (MHLW), which assesses risk in food production and manufacture.

The MHLW strictly enforces all regulations within the law, particularly the chemical residues standards. If an imported product is determined to exceed the maximum allowable concentration of any chemical listed, the product is rejected at port and the importer is subject to monitoring. The importer must complete either 60 consecutive tests without fault or 1 year without an additional violation. If a second violation is earned, imports are subject to 100% hold and test and the importer must complete 300 consecutive tests and 2 years without fault. For any chemical not currently on the list, the law mandates a maximum concentration of 0.01 ppm. In addition to chemical residues, all food products are tested for a wide variety of biological hazards, such as aflatoxins and pathogens and other harmful contaminants. A coliform test must yield an undeniably negative result. All products must be accompanied by import notifications, health certificates, results of examination, and manufacturer certification describing ingredients, additives, and the manufacturing process.

In addition to these examples of standards, Japan also has very strict regulations regarding any genetically-modified food product or any food product produced using recombinant DNA techniques not already approved by the Japanese Government. These restrictions include BST, a hormone commonly used with U.S. dairy cattle to increase milk production. This is a major setback for trade between the U.S. dairy industry and Japan.

South Korea

South Korea's sanitary restrictions on imports are less strict than those of Japan, and are in line with standard U.S. treatment of milk products (APHIS, 2008). If the imports are coming from a country deemed free of FMD, a government-issued health certificate is not required. South Korea requires all products to have been pasteurized by either the vat or continuous

method, under the same time-temperature relationships as outlined the U.S. Pasteurized Milk Ordinance, as well as certification documenting the proper handling of the product.

CONCLUSION

The current U.S. share of the global dairy market, when compared to its performance 20 years ago, exemplify its maturation and potential as a key producer and exporter of dairy product. In order to capitalize on that potential, the California dairy industry must evaluate its strengths and weaknesses and use them to continue to increase production and exports and seize the recent opportunities for trade in Japanese and South Korean markets. This will be accomplished by using innovative methods to appeal to the consumers of each country, increasing exports of butter and western-style foods to Japan, and increasing exports of cheese and organic, healthy dairy products to South Korea.

Japan

California should maintain its well-established position in the dairy ingredients market in Japan in addition to increasing its share of Japan's butter imports. Japan's constant butter deficit will ensure a constant demand for butter from foreign markets, but California will face competition from the European Union and Oceana. An advantage in the butter market is that California butter is considered "white" in color, and therefore preferred to the "yellow' butter from New Zealand and Australia. However, a significant complaint from ALIC is that U.S. butter is still new to their market and therefore of questionable quality. It has been stated that U.S. butter has higher bacterial counts and there have been cases of foreign materials found in product, resulting in product recalls. Additionally, the Japanese feel that the U.S. does not honor the manner in which they conduct business.

These obstacles can by overcome if California butter processors confirm long-term shipment contracts with ALIC, demonstrating commitment and reliability, as well as faith in California's dairy industry. A key way to project faith in business and express quality of products is by actually demonstrating an improvement in the quality of product to the client. California has the ability to make a very powerful statement simply by increasing the quality standards of the products it exports to its trade partners. By reevaluating HACCP methods in processing plants, educating production managers, and incorporating quality inspections regularly, the quality of product can be expected to increase. The Japanese will take note of this improvement and will seek more products from the U.S. dairy market.

South Korea

South Korean consumer preferences are changing with every generation, but certain trends are to be noted. The first trend is that every successive generation becomes more westernized in its diet and demands more American-style food, whereas the older generations consumer more tradition diets. The second trend is that the South Korean consumer will pay for higher quality products, value added products, and foods that are deemed "health," "organic," or "contributing to well-being." These evolutions are correlated to an increasing per capita income and increasing standard of living in South Korea. The KORUS FTA allows for the U.S. to have a competitive advantage in the South Korean dairy market and it should analyze and develop products to meet these demands.

The younger generations are eating more beef, dairy, and western foods such as pizza and pasta. California processors, such as Leprino Foods, should export increasing volumes of pizza cheeses, like mozzarella, to accommodate this growing demand as the tariff rates decline. By establishing long-term contracts with Korean buyers, CA secures more of the cheese market and

will experience reciprocity of faith in trade and business. In addition to pizza and pasta cheeses, processed cheeses should be marketed for children. Children often prefer the milder, creamier tastes and textures of processed cheeses, such as Kraft Singles, which can be fortified with dairy ingredients and marketed as a good source of vitamins and minerals. Snack foods, school milks, flavored milks, and specialty milks marketed for children is likely to be successful in increasing the demand for fluid milk and dairy ingredients- a significant opportunity for California to both increase dairy ingredient exports, as well as form partnerships with specific processors to make the fortified beverages.

Healthy products and luxury products should be marketed for young adults to middle aged generations who demand more flavorful cheeses, such as camembert and feta, to accompany their wine. The reduction in cheese tariffs will open opportunities to develop a specialty cheese market in South Korea, which is a niche market for California processors. California's growing supply of organic milk can be processed into products suitable for the South Korean palate, such as cheeses, fortified beverages, and ready-to-eat and convenience foods. Organic processors should increase their capacity, develop innovative products, and prepare to export their products to South Korea and secure a share in the niche market.

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