DAIRY

Appendix B

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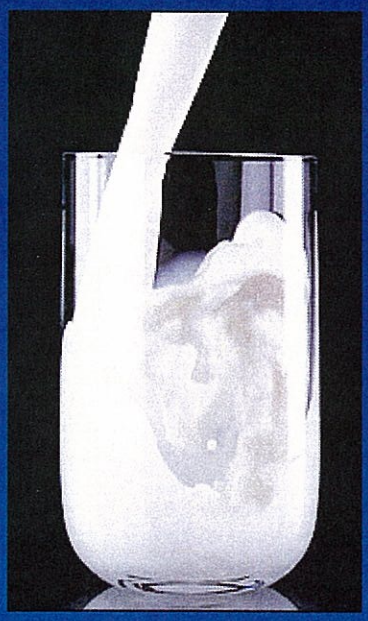
Part 1

Issues Related to Hawaii's Dairy Industry



By

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A Review and Assessment of Some Issues of the Milk Act-Hawaii's Revised Statues: Chapter 157.

Abstract

In recent years the dairy industry experienced a rapid decline in farmgate value. This is due to a decline in cow numbers and dairy operations. The industry once in the top 3 component of diversified agriculture is now barely hanging onto the top 10 spot. The Hawai'i State Dept. of Agriculture (HDOA), requested assistance from the College of Tropical Agriculture and Human Resources (CTAHR) to review issues that it had identified as critical within the industry. This report reviews the following issue: quota, prices, class, utilization, quality, importing, milk sheds and market demand for "Island Fresh" milk. Changes are probably needed in the Milk Act and its administrative rules to bring regulatory issues up to date reflecting current market trends and to revitalize the industry. There is a need to consider a single milk shed for the industry due to the small number of operators and to provide incentive(s) to grow the industry to reflect consumers' preference for wholesome food. Hawaii isolation makes her vulnerable to global security events. Today milk is imported from the mainland without refrigeration for more than 7 days. Given the present regulatory issues and the price of land, serious consideration to assist (or establish) dairies on Oahu to be on pastures is crucial for food security issues. Oahu with over 80% of the state's population will prove to be most vulnerable in times of crisis. The report dealt with each of the issues identified by HDOA. It is time to act for Hawaii's food security or loose an industry that was once valued over $33 million.

Brief History of the Dairy Industry

The dairy industry in Hawaii began in 1793 when the first cattle were introduced into the islands. Records suggest that dairy cattle arrived in late 1800's and first commercial dairy was operated in 1869. By 1880, there were 5 dairy operations. During the Second World War, dairy farms played an important role in the health of the military as milk, a crucial item in the nutrition, was provided free to the injured military personnel. By 1955, the number of dairies recorded was 86 and the cow populations peaked in 1965 with 15,100 head (6). Another publication cited 90 dairy operations (14). The state's population then was 711,000 people. The growth in population resulted in the demand of milk and this was met by producers importing cows from mainland. In 1960, 2,495 head were imported. By 1965, 3,833 heads of replacement were shipped in (2).

Oahu had the largest concentration of dairy cows and operations. However, by 1974 as urbanization increased, the dairy operations began to decrease. Cows per farm continued to increase. By 1978, Hawaii dairy operations registered 500 milking cows per farm versus Wisconsin 30 cows per farm (6). Urbanization on Oahu resulted in dislocation and displaced operations. Dairies moved from Kapahulu, Kaimuki, Kahuku and Hawaii Kai to Waianae. This change in location brought new challenges as dairies which were on pasture were turned into dry lot operations in the hottest district of Oahu. It resulted in higher calf mortality, lower conceptions and seasonal depression in milk supply (which coincided with the start of the new school year). The state cow population began to decrease in 1980.

Until the Heptachlor incident in Hawaii in 1982, Hawaii was self-sufficient in milk (14). Not one drop of milk was imported until 1984. Safeway was the first to import processed milk into the market place. The industry saw periodic sparks of growth in the mid 80s and early 90s. However, in past dozen years, environmental issues, feed costs, transportation, milk prices to farmers, an aging ownership in the industry along with changing dynamics of the market place triggered the decline of the industry.

Most farms on Oahu were on 9-12 acres parcel. Current waste management regulations would make dairy operations with land restriction impossible. Today the survival of the industry hangs on thread. Government actions will be needed if it was to survive. We are at a crossroad. An industry that once was worth over $33.3 million at farmgate (1998) was valued at $18.3m in 2005. It saw a 45% decline in 7 years! Peak milk production was in 1988 where 160 million pounds were produced versus 57 million pounds in 2006; 64.4% drop in local milk production. The once mighty component of the diversified agriculture needs a "transfusion" to ensure Hawai'i's children have milk in event of a transportation disruption in today's heighten security due to global terrorism.

The rapid growth of dairy operations in the 1955-65 in the islands where there were limited processors was not without challenges. Discriminate purchasing practices and prices across the market place resulted in turmoil. The unrest was unmatched in the local livestock industries. At its peak, dairy producers' blockaded the state capital demanding action. Gun shots were fired and milk was dumped at the state capital. The turmoil was settled by the legislation that created the Milk Act whose intend was to ensure order in

the market place. Hawaii Revised Statues Chapter 157 was passed in 1967 after the legislative body found that "…that the dairy industry is a paramount agricultural industry of this state…., milk is an enterprise that is of significance importance to the economy of the State and to the health of the consuming public, which ought to be safeguarded and protected in the public interest."(1). Records showed administrative rules regulations were adopted in November 1970 (10). This report reviewed issues that were identified within the Milk Act and other related items affecting the dairy industry.

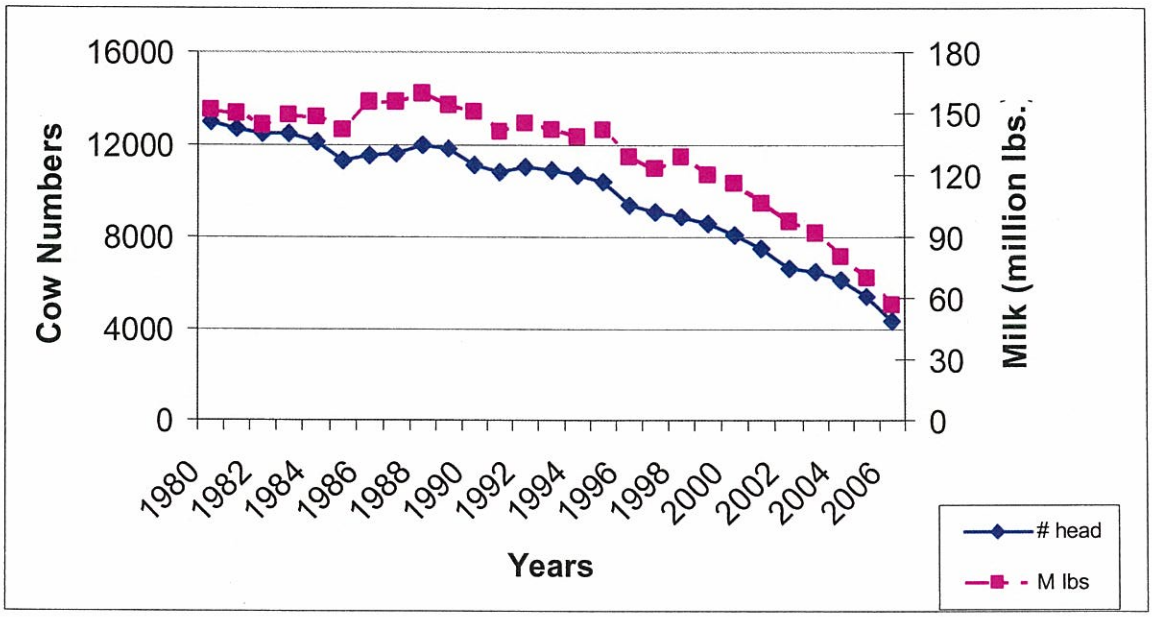

Figure 1. Cow numbers (head) and milk production (million pounds) in Hawaii from 1980 to 2006

Purpose of the study

It has been 40 years since the Milk Act was passed and the rules established. The ever changing market dynamics and the presence of new technology brought new challenges to the industry. This report addresses some but not all the issues related the industry. It does not necessary provide the solutions. It reviewed the items identified within the Milk Act if they were still relevant and how it might affect the industry and offered some foundation information for the members of the Board of Agriculture on the subject matter. It might hint at the potential actions for consideration but ultimately it would be the Board's decision to determine if there was value in sustaining the industry and then to take appropriate course of actions to ensure that the industry could be sustained for the next 20-30 years.

Economic Impact of the Dairy Industry

At the peak, the dairy industry provided employment in excess of 170 direct jobs on farms in the rural districts. Indirect jobs contribution was larger as there were 6 processing plants up to 1999. The two largest processors on Oahu; Foremost Dairies Inc. and Meadow Gold Hawaii Inc., together hired over 300 employees in processing and distribution. Their joint sales (a value added industry due to processing and packaging)

exceeded $220 million annually in 2001(5). Jobs associated with the industry (trucking, mechanics, miscellaneous on farm repairs, etc.) in the rural districts were not accounted even though the industry provided demand for such skills. Since 1999, over 100 jobs at the farm level were loss due to the closing of dairy operations. This reduction was overshadowed by the closing of sugarcane plantations. It was a gradual process hence the impact was camouflaged by other news event.

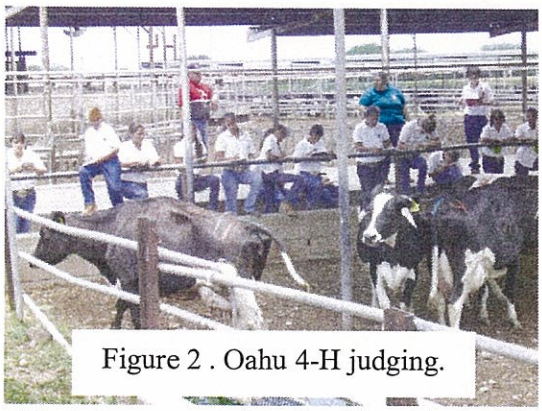

Figure 2 . Oahu 4-H judging.

The downsizing of the dairy industry also saw the end of the industry's support to youth organizations: 4-H, school programs, children's art contest, soccer clubs and State Farm Fair. Historically, the dairy industry had spent over $40,000 annually for such programs from 1986-1998. [I was involved with the annual planning and implementation of the programs in those years.] Records prior to 1986 were not available but many of such activities existed. This was the industry's efforts to promote local milk with the "Island Fresh" logo.

With the closing of the only dairy farm in the islands of Maui and Kauai at the turn of the century, consumers on these islands loss their supply of fresh milk. Each closing of a dairy operation resulted in Hawaii's increased dependence on imports. It increased the state's vulnerability to global and national events that were out of our control. The most recent was the dock workers strike in 2002. There was no shortage of milk in the retail stores then as the remaining 5 farms on Oahu and 5 farms on the Big Island would send milk into the processing plant daily. Some even provided multiple deliveries. We are at the crossroads where this safety net will no longer exist for the largest market, for fluid milk in the state, Oahu.

Fluid milk's uniqueness as a farm product

All the states in the nation have special laws to ensure the reliable supply of fluid milk. Some states have very extensive measures within their respective agriculture code. The aim is to ensure a sufficient supply of fluid milk that is safe and of high quality. The traditional dairy states of New York, Pennsylvania, Minnesota, Wisconsin and Illinois did not establish a quota system. For the states where demand once outpaced the supply, quota were established to provide an avenue to pay a higher price for fluid milk, thus ensuring sufficient supply. Examples of this are the western states. The success of such a program can be seen in California and Arizona where today's milk supply surpassed the demand for fluid milk resulting in exports and manufacturing of dairy products.

Fluid milk is seen as an essential component in the daily diet especially for the children and the elderly. Quota ensured a steady supply of fluid milk to meet this needs. Along with quota, fluid milk pricing within the state is set to assure those who venture into the business would see a stable income and safe return to investment. Hence this leads to the issues in the dairy industry that had been identified by the Hawaii State Dept. of

Agriculture (HDOA) Chairperson, Ms. Sandy Kunimoto, in a communication with CTAHR's dean A.Hashimoto in December 2006.

Pertinent issues related to the dairy industry in Hawaii.

Quota

In Hawaii's dairy industry, quota has always represented the fluid milk demand within a milk shed. Historically, this sets the base for milk production within a farm. Milk quota is based on Grade A, Class I utilization. This means fluid milk purposes only. In event there should be surplus or over production, the Milk Act provided an avenue to balance this with the used of the "extra" milk for Class II utilization. Class II milk is used for soft manufacturing e.g. yogurt, cottage cheeses.

Quota in Hawaii is measured by "cans". Can refers to the container once commonly used to transport milk (see picture). Each can in Hawaii is an equivalent of 86 pounds or 10 gallons. Quota represents the estimated daily fluid milk needs within a milk shed. On the Oahu, there are 3,919.73 cans while on the Big Island, there are 722.10 cans. The amount of fluid milk needs for Kauai, Maui, Lanai and Ni'ihau were never managed under the Milk Act. Kauai and Maui opted to be independent in the market place. The best estimates for their fluid milk demand are: a) Kauai – 260 cans and b) for Maui – 460 cans. These estimates are based on the last number of cows milked in the respective islands and the milk production per animal. These are conservative estimates. Hence, the total fluid milk needs in the state is estimated to be 5,361.83 cans or 461,117.38 pounds daily minimum. Two other factors may suggest that the base needs are higher: a) the increased in population in the state especially Oahu, Big Island and Maui and b) the shift in milk marketing from the square cartons to trendy bottles in schools had resulted in increased demand of milk by teenagers. The increased in fluid demand in the Big Island is evident in the available monthly records in HDOA on milk quota. The island produced 140% of it based quota. In addition, personal conversation with the shipper (Dec. 2006) indicated that 5-6 containers were imported monthly. Each of the super cooled container that holds 6,000 gallons. Hence, a very conservative estimate would suggest the state demand for fluid milk today is about 500,000 pounds daily. [This also suggests that the HDOA needs to revisit the Big Island milk shed quota now to ensure equitable treatment to producers.]

Quota is administered by the HDOA via the Milk Control Branch. Quota has been traded (bought and sold) among farmers without the interference of the any state entity. The price varied with circumstance and demand. It has intrinsic value because is the "assurance" that milk produced within the quota will be paid Class I price since quota represents the fluid milk demand. Banks had used quota as collateral for loans. The price of a "can" in the past 20 years had ranged from $1,500.00 to the most recent $833.00 per can (due to retirement in 2006).

Failure to produce quota milk can also result in forfeiture of the quota. The forfeited quota can be redistributed to producers on a per rata basis. Such act and policies were enforced in the 1980s. This system was cumbersome to the staff and the board of HDOA.

Whenever a producer failed to produce his/her share of milk in the market place, action had to be taken to forfeit the quota. In addition, the redistribution of the quota created financial hardship for the farmer if he had an outstanding loan with a financial institution. It also seeds discord among producers. Any reallocation of quota had to be executed per rata. This meant he would not be able to get back into his peak production level unless there was additional quota increases in the whole milk shed. Such matters related to the milk industry frequently appeared on the HDOA agenda. The HDOA's Chair at that time, Mr. Y. Kitagawa, urged for a simpler method of administering quota to be developed. He expressed desire for a solution that would not consume 70% or more of the board's time and reduce the contentiousness of the issue. In early 1990s, a modified redistribution of quota was adopted in the rules. Producers who were not producing 90% of quota would not be awarded additional quota. All quota forfeited would be placed in reserved within the state which had the authority to award it as it sees fit or back to the producer when he improved in his production. Although it was not perfect, it took away the speculative nature of quota, erased any hoarding practices by producers under the old system, eliminated the need of the HDOA board to address milk issues frequently (some times every other month) and did away with unjust profiteering by anyone. The change basically strengthened the issue that milk quota belonged to the state for a said purpose; to ensure a consistent supply of fresh fluid milk at a given price. Hence, today, the state has more than 1,600 cans in reserved for Oahu milk shed. The amount of quota available remained to be defined by milk shed. Producers/producer-distributor within a milk shed can petition for quota increases to the HDOA, especially when the shed imports milk since quota reflects the fluid milk needs. Quota is important to a producer for it provides a basis of payment for fluid milk; a parameter that provides some assurance of return to investments in the industry and a tool for the state to ensure a supply of a food item deemed important in our diet.

Milk Sheds

There are basically two milk sheds in the state; Oahu and Big Island. Kauai and Maui opted not be governed by the Milk Act when it was enacted. Maui had Haleakala Dairy Inc. which was vertically integrated. This was sold to Meadow Gold Dairy Hawaii, Inc. in the late 1990s. Likewise Kauai was vertically integrated and owned by Meadow Gold Dairy Hawaii Inc. until it was shut down in 2001.

Since the inception of Milk Act, 1967 to 1998, both milk sheds had the same rules for milk pricing i.e. via the cost of production study. However, in 1997, Oahu was "forced" to change to a different pricing mechanism. The producers had petitioned for a milk price increase since feed prices were at an all time high in 1997. The previous price increase was 6 year ago, 1991. While the cost of production performed in house by the staff at the HDOA suggested a $4.00 per hundred weight increase was warranted and approved by the Board of Agriculture, little movement occurred unless the producers agreed to a "more competitive pricing system". Hence Oahu milk shed went from a cost of production study to California Class I price + shipping + some premium. The "settlement" was crafted with the help of the chair of the House Committee on Agriculture during the summer of 1997 and the Milk Act was later amended to reflect

this change in 1998. Had this not occurred, producers faced with high feed prices throughout 1997 were prepared to shut down their operations.

Meanwhile, Big Island producers chose not to request for a price increase. They had felt that the state economy was weak and the community was facing the difficulties of the closure of sugarcane plantations. Two years later, 1999, the erosion of all margins of return in their operations motivated them to pursue a price adjustment which they did not receive until 2004. Their system of pricing remained as the cost of production study. Hence, today, there remains to be two milk sheds and two different pricing systems.

It must be pointed out here that price increases to the producers is a long and arduous process as reflected in the two examples above. This system remains in place although recent requests took about 4-7 months to implement even with an additional step of the need to go through the Small Business Advisory Board. Prices at retail are free to response to market changes without cumbersome bureaucracy.

An issue at hand is whether the milk shed should be merged? At this writing, there are 5 dairies in the state: 2 on Oahu and 3 on the Big Island. On the surface, it would seem that the simplest answer to the question is yes. However, there are issues that would need to be addressed. These issues are:

a) Should the Milk Act be examined, revised and up dated with the flexibility to address potential issues in the future? It has been 40 years since it enactment.
b) If the milk sheds were merged, what would happen to pricing, quota and excess supply or shortages within a county?
c) The above issues must be addressed with diligence as there are issues of processing plant's capacity within a location and shipping and handling logistics. Fluid milk is best supplied by dairy operations within proximity of large population/demand.
d) Once the issue of milk shed is examined, should the opportunity also be used to update all other regulatory issues within the act and the administrative rules and regulation?

While there is no single silver bullet that would resolve the challenging issues, 40 years is a long time in a dynamic world of business. The market place and resources had change. Not seizing the opportunity is also an action. At the same time, if nothing is done, there is the potential that there will only be one functional milk shed – Big Island; as producers on Oahu begin shutting down their respective operations. It is possible that there will be no commercial dairy farms on Oahu by the end of 2007. There remains a glimmer of hope as there some who still wants to dairy on Oahu, if this is at all possible. National events can also disrupt local environment. An example is the event of 9/11 which took placed over 4,500 miles away but it disrupted and shut down local air travel. Similarly this could be expected of shipping routes, including inter-island shipping if something disastrous likened to the above nature occurs in one of the US ports. Oahu remains the most captive market for fluid milk and thus she would be very vulnerable where there is catastrophe. Ocean freight is the route that transports more than 98.6% of our food.

Milk Pricing

Milk pricing is a complex issue. In states where there are processing of cheeses and non fat dry milk, milk components come into play. California was the first state to recognize the value of components (fat, solid non-fat, and proteins) and structured its milk pricing to reflect this with the primary focus to ensure that there is amber supply of fluid milk.

Nationwide, there are 10 Federal Milk Marketing Orders (FMMO) (6). The primary goal of the FMMO is to stabilize milk price, to ensure producers and consumers have a stable market for milk and to ensure an amber supply of fluid milk in the market place. California however is not part of the FMMO but maintains its own marketing order.

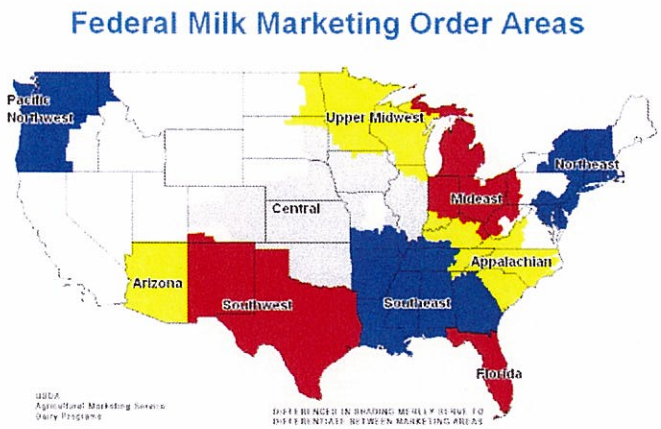

Figure 3. Federal Milk Marketing Order, USDA

Basically there are 2 grades of milk, Grade A and Grade B. Grades are determined by sanitation requirements at the site of production and bacteria count in milk. Grade A milk being of the highest quality can be utilized for fluid purposes. Grade B milk can only be used for heavy manufacturing. Since 1999, only 3% of US milk production is in the Grade B category. Within the grade, pricing is done according to utilization.

The FMMO has 4 classes: Class I, Class II, Class III and Class IV. Grade A, Class I milk is to be processed for fluid use. Grade A, Class II refers to milk that would be used in light manufacturing e.g. cottage cheese, yogurt, ice cream, sour cream, etc. These are the two classes that have an effect on Hawaii's milk market per the HRS Chapter 157. There is no processing of solid cheeses and non-fat dry milk in the state (although some had tried making cheeses to address the surplus milk in the Big Island). However, in the current national market place, cheese demand as traded in the Chicago Board of Trade for commodities can affect local milk prices given the adoption of the milk pricing formula for Oahu's milk shed. High demand in cheeses increases the fluid milk price in California therefore affecting the fluid milk price for Oahu.

Besides the FMMO, federal support for milk price also takes place via the Milk Price Support Program (MPSP). This was mandated in the 2002 Farm Bill and was carried out through the Commodity Credit Corporation in the 48 contiguous states by purchasing of cheeses, butter and nonfat dry milk. The commodities are used in USDA food assistance programs. The amount of products purchased varied from year to year. The storage of the dairy commodities is viewed as a form of food security. In Hawaii, there is processing of fluid milk only.

The FMMO, MPSP and the now defunct Northeast Dairy Compact are all programs aimed at ensuring a higher price for fluid milk. Thus one can see the similarities in the local Milk Act where Hawaii's minimum Class I price is aimed at ensuring sufficient supply of fluid milk by ensuring reasonable return to investment. Fluid milk as an agriculture product is unique and given special consideration since it is seen as an essential component of the nutrition in our diet.

Prices to the Farmer

The HDOA only regulates the minimum price paid to the producer. However, farmers can be paid a higher price if a processor is prepared to do so. There are two prices for milk paid to farmers in the state. The Oahu milk shed officially changed from a cost of production study to northern California Class I milk + $12.20 in 1998. In 1997, the massive purchasing of grain commodities by China resulted in record prices for corn, barley and other grains. This triggered the local producers to request for a price increased. When the cost of production study was completed (done in house by HDOA) and the hearing for price increased was held, the local milk processors were not willing to accept the cost of production study as a method of pricing. They had wanted a system that "better reflects" the market place for fluid milk. The leadership in HDOA was supportive of the concept. The rationale was the need to be competitive to the mainland imports. There was a stalemate on the price increase requested and approved by the board until a compromised was fashioned. This resulted in the change of cost of production study to a formula. Farmers received a higher price in 1997 with the understanding that milk pricing system would change. The formula was enacted into HRS Chapter 157 in 1998 legislative session.

As mentioned earlier, when the "formula" came into play, there was a premium set for locally produced milk (~$0.20 per gallon at farmgate). However, this was not accurately depicted in the amendment to the Milk Act. Increasing oil prices in 2005 to the present date had increased shipping cost which eroded the premium for local milk. Moreover there was a loophole in the existing Milk Act that allowed a processor to declare higher Class II utilization. Class II milk was paid at about 32% of Class I price; $9.00 vs. $27.50. Figure 4 showed that prior to 1997, Class II utilization was around 4%. This level of Class II utilization was reported earlier in review by Hugh *et al* (6). [As one who helped craft the "solution for the formula", I too had used this historic 4% cap for Class II utilization.]

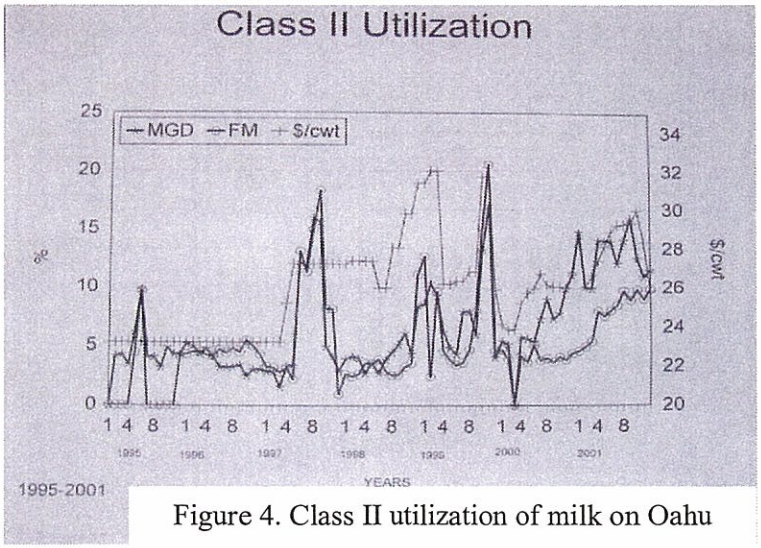

Figure 4. Class II utilization of milk on Oahu

Following the adoption of the formula for pricing milk in 1997, Class II utilization increased (Figure 4). Data from the Milk Control Branch for 1997-2001 showed that Class II utilization became erratic. At some months the utilization exceeded 15%. The issue exacerbated the payments to the farmers. In addition, the Milk Act allows for 1% shrink i.e. a producer is compensated for 99% vs. 100% of the milk s/he delivered. In real terms, from 1997-2001, a producer on Oahu could have >16% of the milk s/he delivered to a processing plant priced at \$9.00 $\pm$ \$0.50 per cwt. The real payments to producers were presented in Figure 5. At each year following the adoption of the formula, a milk producer on Oahu received lower price then the intended price for Class I milk. This is because a producer is paid a blend price for milk which included the amount utilized for Class II purposes. In years 2002 and 2003, their payment was not different from 1991 for each hundred weight of milk delivered. In short, 10 years of no price increase.

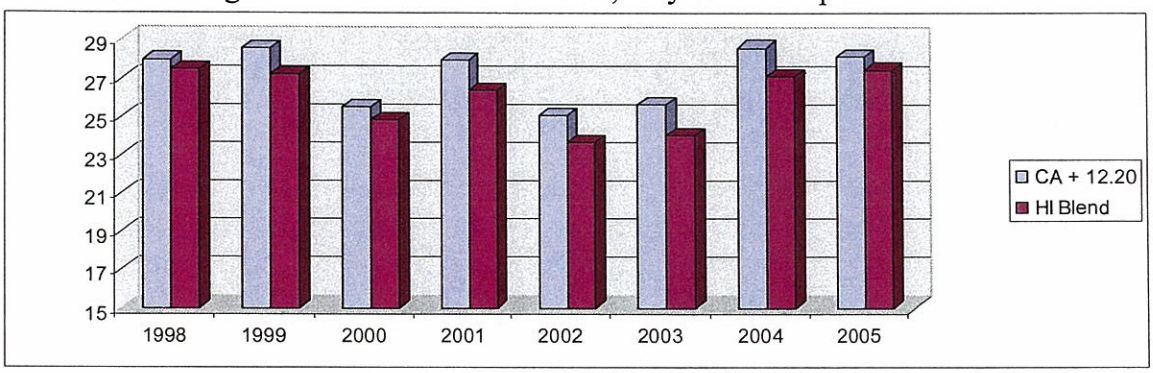

Figure 5. The blend price paid to Oahu farmers per the formula versus what would be if there was no Class II utilization.

There was no control of the amount of milk used for Class II purposes. Historic numbers were discarded (6). The opportunity costs to a producer could amount to > \$50,000.00 per month. No one in milk marketing would be able to explain why utilization could swing from 2% to 12% within one month. Milk products are generally inelastic. Studies seem to suggest that 10% increase in fluid milk at retail may only reduce consumption by 1-2% (3). Decrease in prices for milk or milk products do not mean one would purchase more of a product. Dairy products in Class I and Class II have limited shelf life. Requests for assistance to address this landed on barren grounds. Meanwhile milk imports via bulk containers increased to fill the void created as producers left the industry as many felt it was no longer profitable to operate. Essentially, Hawaii had removed a method of ensuring a reliable supply of fluid milk with a system that was more variable and dependent on external forces.

The weakness of the formula was exposed. The large utilization in Class II, the high fuel prices and the new handling charges were not anticipated. Farmers had always resisted pricing based on CA but it was necessary to ensure "relief price support" in 1997 before the bureaucratic processes for milk price increased could take place with legislative amendment in 1998. It had historically taken 7-12 months to implement any changes.

California, the nation's largest milk and cheese producer, has several advantages for milk production. Mild climate, cheap land, abundant immigrant labor, cheap water, cheaper feed costs, vast suppliers of dairy equipment and supplies and low priced electricity are just some factors that contributed to their cost of production advantages by Jesse and Jones (7). Even at the peak of the energy crisis in CA in 2002-2003, priced per kwh for electricity was merely $0.08 vs. $0.13 kwh at Waianae.

Another change in pricing on Oahu was adopted in 2006. It was driven by a new low in Class I price in California (2006) as a result of over supply. The higher fuel costs and the new shipping surcharges completely eroded the premium for locally produced milk. This new pricing system for Oahu now has a floor price of $27.50/cwt. and a cap of $31.50/cwt. Meanwhile Big Island milk remained to be priced by cost of production study.

A criticism that emerged on pricing milk based on cost of production in 1997 Oahu milk price increase hearing was that such a system did not require improvements in efficiency by the producers. While the existing law suggests an annual review of cost of production, the process is cumbersome and time consuming. This was never executed on an annual basis from 1980 to present (to my knowledge). Request for higher prices by producers had always been triggered by some drastic increases in cost e.g. 1991-drought in the grain states, 1997-China massive demand of grains due to crop failure, 2005-fuel and fuel related prices, etc. Hence, between each price increase, producers must improved efficiency to absorb annual increases in operating/variable costs. Meanwhile during the years between the hikes of milk prices for the producers, retail prices could and had gone up freely and frequently. Processors often cite increases in labor cost, fuel, utilities and other inputs for their price increases to retailers who would pass it on to consumers. The dairy producer had to go through the process with state agencies to obtain an increase. There is no perfect system in pricing milk. The fact remains that states and federal governments view milk is an import food item and unless some stable return to investment is provided, there will be no investors.

Farmer's Share of Retail Prices

Retail prices of milk are generally independent of farm prices. In 2002 and 2003, when farm prices decreased nationwide, retail prices did not followed similar trends. This prompted the US General Accountability Office (4, 12) to investigate the issue. The study showed that the differences between what the consumer paid for milk and what the farmer was paid had increased, Figure 6. Farm prices are affected by milk supply, demand for cheeses and fluid milk, milk futures and government and state programs. At the retail level, factors identified to affect prices are labor, energy and consolidation of processors. Interestingly, two of these factors (labor and energy) play a major role in Hawaii dairy farms. In fact, in Jesse and Jones report (7), one factor identified in WI disadvantage versus California was unpaid labor. In mid-western states family members perform many of the daily chores of farming. These efforts were generally unaccounted opportunity costs in the cost of production.

The GAO study found the farmers received 46% of the dollar spent by a consumer for 2% fat milk. The wholesale processor received 36% and retailer received 12%. The remaining 6% was paid to cooperatives since dairy cooperatives continue to market 70% of the nation's milk.

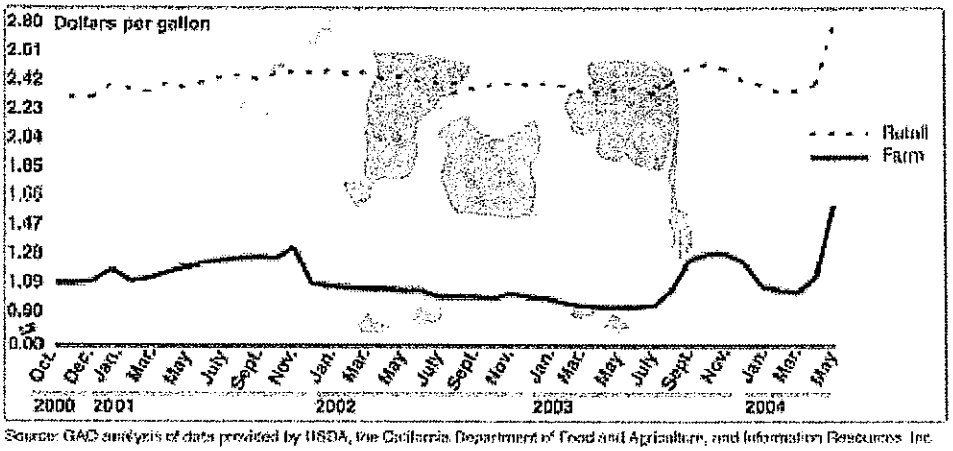

Figure 6. Farm and retail prices of milk (2%) from October 2000 – May 2004

In Hawaii, the farmer's share of the consumer's dollar varied with milk shed and brand. Local milk is designated by the "Island Fresh" logo. On Oahu, this logo is found in only one brand, Viva 1% during the past 16 months and occasionally in low fat Viva chocolate milk. The frequency of "Island Fresh" Viva brand is sparse. This brand is part of the brands (Meadow Gold, Viva 2%, Viva 1% and Viva skim) under the Meadow Gold Dairies, Hawaii. Inc. For the period December 2006 – April 2007, the 1% local milk, when available, represented 29-32% of the consumer dollar. As of May 2007, there was an increased in price for all milk. Meadow Gold changed its label for 1 gallon milk to include a small wording indicating that growth hormone is not used. Price at retail in May 2007 had also increased; hence the farmer's share of consumer's dollars could be lower.

On the Big Island, during the same period, farmgate price per gallon was $2.29. Since there is reasonable supply of locally produced milk, the "Island Fresh" logo can be found on several brands (private labels as wells processor's label). Hence, the farmer's share of the consumer dollar ranged from 35-46% depending on the label. The higher portion paid to the farmer was reflected by the KTA's Mountain Apple brand which was normally priced lower at retail.

Prices of milk at retail

Prices of milk at retail stores varied in milk sheds, stores and by brands. In general, discount stores and box retailers (Costco, Walmart, K-mart) price their milk cheaper. These stores carry only their own brand e.g. Kirkland for Costco. Costco also set a different price for different types of milk. On May 5th, Costco at Iwalei had whole milk at $4.40, 2% at $4.25 and skim milk at $4.05 per gallon. Walmart stores kept all milk at the same price, $3.95 per gallon (Hilo, April 2007).

Figure 6. KTA brand Mountain Apple.

In grocery stores on Oahu, the common theme is no differentiation in price for the types of milk. However, store brands or private label are always cheaper than processor's brand. Prices in a store can range from $3.99 - $8.29 per gallon. The higher prices are processors (include the former Foremost Dairies Inc.) labels. The difference is over $4.00 per gallon. A processor's label could also be frequently priced differently in different store. For example, Meadow Gold's brands were offered at different a price at Long's vs. Safeway at the shopping mall at Pali and Vineyard. The price differential can be as much as $2.20 per gallon (Dec. 2006).

Figure 7. KTA brand: Mountain Apple

Similarly, this pricing system rings true for stores in the Big Island. Grocery stores carried the largest array of brands even though many of the milk may be the same (local or mainland import). The KTA supermarket chain is the only group of stores that have committed a brand to local milk. A limited survey of the market by direct interview of someone who purchased milk, suggests that some consumers knew that this milk was local. [Further detail studies would be needed if more information is to be gathered. Milk was the first product that was carried by the Mountain Apple Brand, as a result of a study performed by CTAHR's CES in 1992.] Except for the Mountain Apple brand, milk with private or processor's labels can be local or imported. No difference in price within a brand was observed (Dec. 2006-April 2007). There is still a segment of consumers who associate local products with specific brands. It is unknown what the size of this segment of consumers is today.

Lower prices for private label may be due to shelf space cost, labor, advertising, etc. The recent survey did not interview any management on how milk is priced within a store. However, the brief survey suggests that there is still a lot of need for consumer's education on what local milk is and how to identify it. Many continue to associate local brands mean local contents. Consumers are loyal to their brands!

Grades, Classes and Utilization of Milk

Basically there are 2 grades of milk; Grade A and Grade B. The single most important difference between the two grades is the bacteria count in raw milk. Grade B milk generally has 3x the amount of bacteria count per ml. Grade A milk must also be produced, harvested, handled and stored with proper sanitary requirements. These are spelled out in the Pasteurized Milk Ordinance (PMO). Only Grade A milk can be used for fluid milk processing. Grade B milk is generally used for heavy manufacturing and milk powder. By 2003, US produced more than 19.7 billions pounds of fluid milk and more than 97% of it is produced at Grade A requirement (4, 12).

Figure 8. Milk within a brand, Local or imported were priced the same.

Classes in milk reflect how the milk is used. Fluid milk or market milk use is classified as Class I. Milk for fluid purposes is referred to as Grade A, Class I milk. Fluid used in soft manufacturing is Class II. This covers ice cream, yogurt, cottage cheese, sour cream, ice milk, etc. Class III and IV are heavy manufacturing with the bulk of it in cheese production. The state of California has one addition Class IVa and Class IVb or sometimes referred to as Class V milk. Anything below Class II does not affect Hawaii directly but indirectly since cheese futures and demands affect fluid milk prices in California hence affecting the prices paid to farmers on Oahu due to the formula.

Utilization is therefore the usage of milk in the respective class. When the Milk Act was enacted, Hawaii was a closed market. The local dairies provided all the milk needed to meet the state's demand. Since milk is an important component of the school lunch program, in times of school holidays, there can be a surplus of fluid milk. Hence, it was prudent to have a Class II utilization to ensure that processors had avenues to use the fluids for light manufacturing. This allows the market place to manage surpluses, especially when the schools were out.

Class II utilization may be moot today since the demand of fluid milk far exceeds the local supply. Hawaii went from a closed and self-sufficient market to importing fluid milk following the heptachlor incident. With the downsizing of the dairies and sharp reduction in milk cow numbers in the past decade, we have become more dependent on

imports. It is unlikely that we would be fully self-sufficient in the next 20 years due to changes in environmental and nutrient management requirements, greater urbanization of the state and high prices of land. In the absences of long term leases that would allow modern investment and feed production to remediate nutrients produced on farm, Hawaii will be importing milk for its needs. Hence, the issue of Class II milk in the Milk Act needs to be revisited. As mentioned in numerous occasions above, states and federal programs are aim to ensure a stable supply of milk for the fluid market. If the state is short of milk and imports huge quantity of milk from the mainland, why would locally produced milk be used for Class II? If mainland imports are cheaper than locally produced milk, and fluid milk is the highest value of milk products, then why use local milk for Class II utilization? However, if a portion of local milk is priced lower, then the blend price would be cheaper. Potentially the input cost for the ingredient to be processed would be lower. While business operates on simple economics, social-economic issues cannot be ignored. What is the quality of imported products and would Hawaii want to be totally dependent on imports? Should corporation doing business in Hawaii have a moral obligation to ensure sustainability and secure future for the community that supports them?

Imports

Hawaii was self-sufficient with fluid milk until the heptachlor incident in 1982. There is no data of fluid milk consumption available during the heptachlor period. It was likely that consumers shifted to powder milk or recombined or reconstituted milk. Both recombined and reconstituted fluid milk were found in the market place until 1992 and again for a brief period during the Oakland dock workers strike in 2002. Fluid milk import from mainland was recorded in 1985. Safeway Hawaii Inc. took the lead with their private label Lucerne. This was followed by Star Market chain with a brand called Golden Cream. However, the local processors remained true to local milk until bulk shipment was possible in the mid 1990s.

Importation of processed milk trans-ocean in gallons or ½ gallon had its share of challenges. It must be refrigerated or it would spoil over the long transit time. There was also space issue for the container to be plugged into a source of electrical supply. Once the milk is brought into the local market, there are storage and distribution issues. In addition when the expiration date drew close, a consumer would not select the milk with a short shelf-life resulting in disposing issues for this product with fat in the sewage lines. This is an additional cost the importer. During the years of the late 1980s and early 1990s, it was not uncommon to see that imported milk would be discounted by 30-50% of normal retail price to increase its "marketability" since another shipment was already on the way.

By mid 1990s, the local processors, Foremost Dairies Hawaii Inc. and Meadow Gold Dairies Hawaii Inc., began to import milk via bulk tank. AgMark containers (4,300 gallons) were used. Processors like Haleakala Dairy Inc. and Excelsior Inc. used local

supply only. Local fluid milk production was impacted by record high temperatures in the summer months. As mentioned, the Waianae district is the hottest region on Oahu. Cows decreased feed intake thus lowering production directly. The impact was huge as heat stressed also resulted in poor conception rates. If cows do not conceive and reproduce, they do not produce milk. The higher production the cows produce, the greater the impact heat had on their physiology. During that period, imported milk was the "filler" for the summer months when local production was depressed. Bulk tank importation and discount grocers in the mid-1990s began to change the dynamics of the market place.

Figure 9. Super cool tankers of imported milk.

In 2002, AgMark containers were replaced by "super cooled tankers" (figure 8). Milk was brought in after pasteurization, unrefrigerated in transit and re-pasteurized locally for retail. The box stored came into played with lower prices for milk and marketing shifted from ½ gallons cartons to blow mold gallons. A new era in milk marketing took hold. The grocery stores followed this change. Milk, an essential food item, was priced competitively to attract consumers. Private or store labels took root as they were always priced lowered that processors brand.

Quality

Milk quality can be measured in two broad categories: a) bacteria related issues and b) nutrient changes in milk following handling. The former results in spoilage and off flavors and can potentially cause illness e.g. food poisoning. The latter primarily changes the values of the nutrients in milk e.g. extended heating of milk can denature proteins or amino acids. At this writing, little research on this subject matter was done but it must be noted that pasteurization does alter some proteins and enzymes. The imported milk is repasteurized prior to bottling for retail. It must also be noted that California specifically prohibits the repasteurization of fluid milk for fluid purpose (CA FAC # 35832). All states allow the repasteurization of fluid milk for manufacturing purposes.

Calls complaining about spoiled milk started to come into my office in late 2002. By early 2003, it was frequent. By the end of 2005, such calls have been far in between. Does this mean that milk was spoiling in 2002-2003 and no longer since mid 2005 to present? No. Periodic (unscientific) surveys of milk buyers and even grocery check out clerks suggest that the problem exist. Most private labels were still reasonably priced and it was likely that most consumers just threw their bad milk away.

Initially, the standard answer I had provided is that the consumer must handle milk with care e.g. buy milk last, head home immediately and place it in the refrigerator; make sure the refrigerator is cold enough, etc. However as dairies on Oahu closes down and local milk becomes difficult to find at retail. I began to experienced spoilage of the imported

milk myself. By Dec. 2003 the issue was raised with the State Dept. of Health. There were no official complains and there was no study to look at bacteria counts in milk sold at the local market until 2006-2007.

Figure 9 showed the data from work published by Larsen and Jorgensen (8). The data showed that at 7^0C, rapid growth of bacteria was observed 5 days after pasteurization. The growth of the bacteria was fastest from day 5 to 8. It would take 5 days of ocean freight (minimum) plus 2 days at the dock (minimum 1 day each dock) for our imported milk to be at the local processing plant for repasteurization.

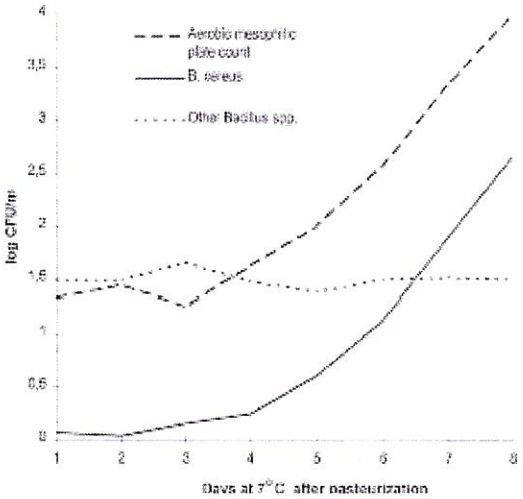

Figure 10. Bacteria growth in pasteurized milk.

Studies conducted in our laboratory (2006-2007 not presented here but presented in the oral presentation) showed that Oahu milk exceeded federal regulatory limits in bacterial counts 5 days prior to expiration. The milk samples were with the longest shelf-life (17-19 days) and were purchased from 9 different stores. They were held at 4^0C refrigeration. By day 0 (day of expiration) and 3 days after expiration, psychotropic bacteria counts were very high. Samples collected from the local farm bulk tanks (raw milk) showed the local milk met the Pasteurization Milk Ordinance (PMO) standards for Grade A milk. In fact the levels were below that for the pasteurized milk 5 days prior to expiration. Where is the source of the bacteria that caused the spoilage? We will discuss this at presentation as the final research report is being drafted. It must be noted that it would only take 1 psychrotroph to spoil milk (Table 1, 11)

Table 1. Effect of psychrotrophs on milk quality.

SHELF-LIFE OF FLUID MILK PRODUCTS
- MICROBIAL SPOILAGE -
The Evaluation of Shelf-Life

Days at 43°F	Non-psychrotrophs/ml	Psychrotrophs/ml	Total Count (SPC)/ml
Initial	500	1	501
1	500	10	510
2	500	100	600
3	500	1,000	1,500
4	500	10,000	10,500
5	500	100,000	100,500
6	500	1,000,000	1,000,500

The key to preventing spoilage and extending the shelf-life of a product is to prevent post-pasteurization contamination (PPC) through a well designed quality assurance program. Remember, it only takes one psychrotroph per container of milk to cause spoilage.

By Steven C. Murphy, Sr. Extension Associate, Cornell University.

It is also important to note that psychrotrophs grow well in cool temperatures. If the population of this bacterial is high prior to pasteurization, then it is likely that given the same efficiency in pasteurization, the starting point for bacteria growth would be higher. One frequent hears the phrase that "the output is only as good as the input". A limitation in our study is that we could not determine the actual source of or site of contamination due to the lack of access to sampling sites. It was tailored to address spoilage per consumer complains. However, the data in the published reports (8, 11) provides strong supporting evidence for our findings.

An attempt is made to estimate the duration of time the milk at retail would have left a cow if this milk was imported. This is best estimates only. It is reasonable to assume that milk is delivered daily or every other day from the dairy to the processing plant. All other time estimates (hours) involved in moving this milk over thousands of miles are provided in Table 2.

It is unlikely that any state in the nation has 25-30 days old milk from a cow for consumer unless it was ultrapasteurized. However, no law is broken because none exist. No states regulate shelf-life.

Table 2. Duration of time after California milk leaves the cow and arrives to Honolulu: A best estimates of events in hours.

	Minimum	maximum
From CA Farm to plant	24	48
CA processing plant	12	24
CA plant to dock (cooled and filled into tankers)	12	24
Transit time	120	144
Honolulu dock and processing plant (includes potential waiting time for repasteurization)	12	24
Processed, cooled, stored and distributed	12	24
Retail shelf life	400	432
Age of milk after it left CA cow and at expiration date	592	720
	24.7 days	30 days

Organic milk
There is also organic milk from the mainland in the market place. There is no locally produced organic milk in the market place. The most prominent labels are Heritage, Horizon, Organic Valley and more recently "O" at Safeway stores. They are usually sold in half gallons and are ultra-pasteurized. Costco sells the organic milk in 1.5 gallons pack, 3 half gallons. They can also be easily recognized by a screwed cap outlet. More recently regular milk under the label Darigold was found in Star market. This is also ultra-pasteurized but without the screwed cap outlet for pouring milk. These milk are usually 30-45 days in shelf-life.

Market Demand for Island Fresh Milk
In the 1992 study conducted in the Big Island, three factors formed the primarily reasons for purchasing milk: brand, shelf-life (expiration date) and price. Brand and shelf-life were the major selection factors. A consumer perceived that a brand was local and would prefer to buy local since it was also perceived to fresher. Within a brand, shelf-life or expiration date determined which carton a consumer would pick. It is not uncommon to witness a consumer reaching back or searching for a carton with an expiration date that is furthers away.

Only one brand has made the commitment to be dedicated to local milk, the KTA-Mountain Apple brand. Milk was the first item sold under this label. Today there are over 200 items that have majority local components. There remains the commitment to advertise the brand as local and to buy local by this grocer. Milk sales in the KTA stores continue to increase.

Hence any promotion of local milk should not be limited to the "Island Fresh" logo but be tied to a brand. This means a grocer or a processor must make this commitment. In addition, the largest consumer is children under the age of 13. Educating this group of consumers may yield great impacts. Parents want the best for their kids and willing to buy local but they lack information. They associate what is local to brands that they are familiar with or companies that operating here locally even though the interior contents may be imported. The imported milk is labeled at pasteurized milk not re-pasteurized milk. The lack of accurate labeling further confuses the average consumer.

In the local market, the demand is for low fat milk. This is similar to trends in the mainland. Given the short duration of the execution of this study, I had interviewed individuals who were stocking the shelves. All said that they restock low fat milk more frequently. The best estimates, via allocated shelf space in some stores, suggested that whole milk garnered 21-24% of the market share. Low fat and skim milk therefore made up 76-79% of the market share. The 2% seems to garner 31-34% of the market share. Not all brands carried 1% fat milk. Further determination would be needed to valid this very rough estimates.

Today approximately 60 super cool tankers with a 6,000 gallons capacity enter the state weekly. This level of imports represents 7,000 cows at 60 pounds of milk production daily. It is an opportunity lost in jobs, rural economic development, tax revenues and increased vulnerability in food security for the state.

Summary

The study reviewed some issues within the Milk Act that were identified by the Hawaii's Dept. of Agriculture. It is noted that the Milk Act was enacted in 1967, some 40 years ago. Except for the minor alteration made in 1998 on Oahu's milk pricing mechanism, much of the document remained intact in spite of a totally changed economy and market place.

Quota, which represents the fluid milk demand in the local market, is important to ensure participating investors stability in the return to their investment and a consistent local supply of fluid milk in the state. All 48 contiguous states and the federal government have programs to ensure stable income in return for stable supply of fluid milk. However, the FMMO does not extend to Hawaii. Quota is limited to a milk shed and this raises the question whether under the current circumstance, the milk shed should be merged. Meanwhile, there is no law that compels a local processor to use locally produced milk. Hence, a producer can still be vulnerable and his return to investment rest on the goodwill of a processor.

Pricing to the farmers is complex but the common intend across the nation is to achieve sufficient fluid milk supply. In Hawaii, component pricing is primarily limited to fat differentiation set at 3.5%. There are no protein and SNF components since no cheese processing is done here. The most questionable issue on pricing to local producers is the milk used for Class II purposes. In past decade, there have been erratic swings in utilization. Higher Class II utilization resulted in lower blend prices of fluid milk to producers hence reducing their profit margins. In fact, high utilization in the Class II category at a time when large volume of fluid milk is imported for fluid use undermines the good intention of the HDOA board for a healthy local supply of milk. The report does not review what options or limitations the board has. Any attempt to revitalize the industry must also explore ways to ensure that the raw milk produced locally is of value and will be used first. Hence, a program that includes educating local consumers to ask for and to buy fresh, buy local, buy "Island Fresh" should be considered.

With the downsizing of dairy operations, more milk is imported to meet local demands. This milk is brought in with super cooled tankers following pasteurization in California. Over the trans-ocean journey, milk is unrefrigerated but remained acceptable if the temperature is below 45^0F at the plant. From time to time, one would hear of a container being dumped due to spoilage. It must be noted that the manner of transportation does not violate any existing laws or the lack of it. Milk is transported from states to state in the mainland but the transit time is short versus mainland to Hawaii. Preliminary studies at the University of Hawaii supported consumers complain that milk spoiled before the

expiration. Spoilage is due to mesophylic and psychotropic bacteria counts being higher than the PMO regulations. Milk is a highly perishable product. Details of the study will be shared in the presentation only.

Neighbor island consumers prefer to buy local as can be attested by the growing sales of Mountain Apple brand in the big island. However, many consumers still associate local brands with local content even though this may not be true. Only one brand is dedicated to local products, Mountain Apple Brand of the KTA stores. Sales for this brand remain strong.

This study is by no way definitive in resolving all the issues related to the dairy industry but it is a good start to gain common understanding of complicated issues and set the stage for discussion what needs to be done. The dairy industry once supplied all the fluid milk needed in the state. Today it supplies less than 30% of the fluid needs. The industry's future lies in collaborative efforts to address pressing issues. Its existence is a social-economic policy issue for the state for once lost, the cost to re-establish the industry would be insurmountable. After the event of 9-11, many states saw the value of food security in event of catastrophic events and have enacted laws to secure their food security, especially laws to ensure a decent supply of highly perish food item like milk. Hawaii's dairies future is at a crossroads and its future is a social-economic issue for the state.

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Appendix 1

The Pasteurized Milk Ordinance: Section 1 – 7
Source: http://www.cfsan.fda.gov/~ear/pmo03-2.html
[This table showed the regulatory standards governing milk per the Us FDA/CFSAN. Look at the second column for Grade pasteurized milk and milk products.]

Chemical, Physical, Bacteriological, and Temperature Standards

GRADE "A" RAW MILK AND MILK PRODUCTS FOR PASTEURIZATION, ULTRA-PASTEURIZATION OR ASEPTIC PROCESSING	Temperature.....	Cooled to 10°C (50°F) or less within four (4) hours or less, of the commencement of the first milking, and to 7°C (45°F) or less within two (2) hours after the completion of milking. Provided, that the blend temperature after the first milking and subsequent milkings does not exceed 10°C (50°F).
	Bacterial Limits.....	Individual producer milk not to exceed 100,000 per mL prior to commingling with other producer milk. Not to exceed 300,000 per mL as commingled milk prior to pasteurization.
	Drugs.....	No positive results on drug residue detection methods as referenced in Section 6 - Laboratory
	Somatic Cell Count*...	Individual producer milk not to exceed 750,000 per mL.
GRADE "A" PASTEURIZED MILK AND MILK PRODUCTS AND BULK SHIPPED HEAT-TREATED MILK PRODUCTS	Temperature.....	Cooled to 7°C (45°F) or less and maintained thereat.
	Bacterial Limits**.....	20,000 per mL, or gm.***
	Coliform****.....	Not to exceed 10 per mL. Provided, that in the case of bulk milk transport tank shipments, shall not exceed 100 per mL.
	Phosphatase*****.....	Less than 350 milliunits/L for fluid products and other milk products by the Fluorometer or Charm ALP or equivalent.
	Drugs**.....	No positive results on drug

		residue detection methods as referenced in Section 6 - Laboratory Techniques which have been found to be acceptable for use with pasteurized and heat-treated milk and milk products
GRADE "A" PASTEURIZED CONCENTRATED (CONDENSED) MILK AND MILK PRODUCTS	Temperature.....	Cooled to 7°C (45°F) or less and maintained thereat unless drying is commenced immediately after condensing.
	Coliform.....	Not to exceed 10 per gram. *Provided,* that in the case of bulk milk transport tank shipments shall not exceed 100 per ml.
GRADE "A" ASEPTICALLY PROCESSED MILK AND MILK PRODUCTS	Temperature.....	None.
	Bacterial Limits.....	Refer to 21 CFR 113. 3(e)(1)******
	Drugs**.....	No positive results on drug residue detection methods as referenced in Section 6 - Laboratory Techniques that have been found to be acceptable for use with aseptically processed milk and milk products.
GRADE "A" NONFAT DRY MILK		No More Than:
	Butterfat.....	1.25%
	Moisture.....	4.00%
	Titratable Acidity.....	0.15%
	Solubility Index.....	1.25mL.
	Bacterial Estimate.....	30,000 per gram
	Coliform.....	10 per gram
	Scorched Particles disc B.....	15.0 per gram
GRADE "A" WHEY FOR CONDENSING	Temperature.....	Maintained at a temperature of 45°F (7°C) or less, or 63°C (145°F) or greater, except for acid-type whey with a titratable

		acidity of 0.40% or above, or a pH of 4.6 or below.
GRADE "A" PASTEURIZED CONDENSED WHEY AND WHEY PRODUCTS	Temperature.....	Cooled to 7°C (45°F) or less during crystallization, within 48 hours of condensing.
	Coliform Limit.....	Not to exceed 10 per gram
GRADE "A" DRY WHEY, GRADE "A" DRY WHEY PRODUCTS, GRADE "A" DRY BUTTERMILK, AND GRADE "A" DRY BUTTERMILK PRODUCTS	Coliform Limit.....	Not to exceed 10 per gram

* Goat Milk 1,000,000 per mL
** Not applicable to acidified or cultured products.
*** Results of the analysis of dairy products which are weighed in order to be analyzed will be reported in # per gm. (Refer to the current edition of the *SMEDP*)
**** Not applicable to bulk shipped heat-treated milk products.
***** Not applicable to bulk shipped heat-treated milk products; UP products that have been thermally processed at or above 138°C (280°F) for at least two (2) seconds to produce a product which has an extended shelf life (ESL) under refrigerated conditions; and condensed products.
****** 21 CFR 113.3(e)(1) contains the definition of "COMMERCIAL STERILITY".