Consumer Perception of Organic Milk

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ABSTRACT

The objective of this study was to determine the potential factors, reasons and beliefs that contribute to college aged consumers' choice to purchase organic milk. The data were from survey of students using questions that were modeled after consumer issues and concerns over conventional milk as discussed in the literature review. This study was particularly interested in exploring differences between students in agriculture classes and non-agriculture classes. The literature referenced came from a variety of sources, including scientific journals, online articles, milk advisory boards, and governmental agencies. According to the literature review, consumer concerns and reasons for purchase of organic milk included environmental, nutritional, food safety (over antibiotic residue), use of recombinant bovine somatotropin (rBST), animal welfare, and taste preference. Each reason was analyzed with available literature to determine if these concerns or reasons for purchase were valid. For the reasons that were determined to be invalid, research was done to determine what milk advisory and marketing boards were doing to further educate the public. Further recommendations were made for ways in which these organizations could continue to educate the public and improve conventional milk's image. The literature review showed that consumers could not differentiate between organic and conventional milk based on flavor, there were only slight nutritional profile differences, antibiotic residue does not end up in any conventional milk sold to consumers, rBST is safe for consumers and actually is good for the environment, animals are well cared for in both types of operations and finally conventional milk operations had lower emissions than organic. The literature review concluded that consumers were purchasing milk predominately based on their perception

of organic milk rather than reality. In cross comparison, the college students surveyed predominately purchased a type of milk based on taste, price and health as opposed to any ethical issues. When their beliefs about conventional and organic milk were analyzed, the liberal arts and the agriculture students showed polarizing differences. While the literature review showed that consumers were highly supportive of organic practices and distrusted the health and safety of conventional milk, liberal arts students tended to hold the same beliefs while the agriculture students showed the opposite. It is recommended that a repeat of this study is done with a greater sample size of liberal arts students to confirm that their opinions are a reflection of most college students. In conclusion, it is highly recommended that the agriculture students of today are utilized as leaders for public education efforts in the future. Public education will be essential to redefine common perceptions about conventional agriculture that are not based in reason or reality.

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I would like to dedicate my work here to my grandmother Dr. Dee Puetz, my father Christopher, my mother Suzanne and my sister Brittany. With your encouragement, dedication, inspiration and sacrifices, I have been able to attain this degree. Thank you for everything from the bottom of my heart! Jordan Petersen- thank you for never letting me give up on this and always helping me stay positive; you have been such a blessing through this process. My sincere thanks goes to my professors at Cal Poly that have developed and shaped my knowledge of the dairy industry and Rich Silacci for giving me the opportunity to apply the "Learn by Doing" philosophy by allowing me to live and work at the university dairy for the past four years. I thank the Lord for the opportunities I have been given and hope I can go on to do great things with the knowledge and skills I have been given.

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INTRODUCTION

In recent years, there has been an increase in the sale and purchase in an array of organic products. Claims of higher nutrition content, being more environmentally friendly, and being from a small family farm are all part of the neatly wrapped package presented to the consumer of what "organic" is. The sale of organic milk has been one such product that has grown in popularity. Farmers get paid more for the sale of organic fluid milk and consumers willingly pay the higher price at the grocery store. Meanwhile, conventional dairy farmers have been under media scrutiny over an array of issues such as environmental impact, human health and animal welfare concerns. The literature review presented in this paper explored the potential factors, reasons and concerns that contribute to a consumer's choice to purchase organic milk, verifying whether this choice was based on reality or merely an image of what they believed organic milk was.

Additionally, the literature review showed the growth in organic milk sales over years passed and discusses the reasons why consumers have joined the recent trend in purchasing organic milk. Each reason was analyzed for validity by looking at current scientific research available. Lastly discussed were ways in which the industry can use this information to their advantage and perhaps improve the future sales of conventional milk.

The importance of understanding the reasons behind consumers' choice to purchase organic milk over conventional milk is vital. Public opinion may have the power to greatly influence the future of the dairy industry. Conventional producers need to be aware of the public's perception of their management practices, the perception of the safety and quality of the products being sold and how that perception plays into

consumers' purchases. Knowledge is ultimately power and knowing the consumer not only impacts future marketing but shows us areas of opportunity to educate the public at large, dispelling any present misconceptions and improving the industry's overall image.

In order to understand our future market, it is important that we know our consumers wants, concerns and needs. To gain this essential insight, a survey was done at California Polytechnic State University San Luis Obispo (Cal Poly). The objective of this study was to determine the potential factors, reasons and beliefs that contribute to college aged consumers' choice to purchase organic milk. The data were from surveys of students using questions that were modeled after consumer issues and concerns over conventional milk as discussed in the literature review. This study was particularly interested in exploring differences between students in agriculture classes and non-agriculture classes.

LITERATURE REVIEW

Consumer Beliefs about Organic Milk vs. Reality

What is organic? Over the past two decades, organic products have gone from mainstream market obscurity to being the staple in a growing number of homes across America. For some, organic is not just a mere purchase of a product from the grocery store, it's an entire lifestyle all its own. A lifestyle that heavily embraces the organic food movement of our time also seems to encompass many other ideas: sustainability, environmental responsibility, healthy living, nutritional and natural foods, and lastly animal welfare. These ideas capture the essence behind one of the food industry's significantly growing sectors (Klonsky, 2000). The term organic means a great deal to an increasingly health conscious public by having a strong, emotional image attached to it. However, this image does not necessarily represent reality.

According to the United States Department of Agriculture's (USDA) Organic Food Production Act (1990), cows that produce milk that is to be certified with an organic label may not receive any type of growth promoters or hormones, may not be given antibiotics, and must be fed feed that is 100% certified organic for a full year prior to certification. In addition, according to the National Organic Program (2012_B), animals must also meet strict animal health and welfare standards, being provided with access to outdoors. Use of parasiticides is restricted to Ivermectin only in strict accordance with section 18 of the USDA's National Organic Program guidelines which are as follows, "(18) Paraciticides. Ivermectin—prohibited in slaughter stock, allowed in emergency treatment for dairy and breeder stock when organic system plan-approved preventive management does not prevent infestation. Milk or milk products from a treated animal

cannot be labeled as provided for in subpart D of this part for 90 days following treatment. In breeder stock, treatment cannot occur during the last third of gestation if the progeny will be sold as organic and must not be used during the lactation period for breeding stock." The use of synthetic substances for the treatment of animals or for any surgical procedures is highly restricted, has very specific withdrawal periods and, if necessary, requires specific orders from a licensed veterinarian for any use. Use of such substances is also clearly defined by the National Organic Program in §205.603.

Although the Food and Drug Administration (FDA) has found no difference in cows that have been treated with recombinant bovine somatotropin (rBST) and those without (1994), consumers still find it absolutely unacceptable to give cows any kind of growth hormones (McEacheran and McClean, 2002). Factors that contributed to the consumer purchasing organic milk over conventional included: belief that the injection of growth hormones is considered unacceptable, that organic foods do not contain genetically modified ingredients, and that conventional dairy products were seen as less safe than organic. With these consumer attitudes towards conventional milk still being prominent, clearly the fact that rBST poses no human health threat has not effectively been disseminated to the consumer. Food safety is still a major concern of consumers and rBST is even credited with spurring the very establishment of organic milk production (DuPuis, 2000)

Cows that are producing milk that is to be labeled organic are not allowed to receive antibiotics (USDA, 2012_B). This is in direct consequence to consumers being concerned over antibiotic residues ending up in milk. The fear was mostly due to concerns over individuals with a penicillin hypersensitivity having a reaction to antibiotic

traces in milk and the possibility of microbial resistance developing in humans (Jones and Seymour, 1988). However in all milk, regardless of whether it is organic or conventional, detectable concentrations of antibiotics is illegal, the milk is not sold for human consumption, and antibiotic contaminated milk has an estimated cost of $50 million in losses annually. Knowing that farmers are legally bound to observe proper withdrawal times of antibiotics in conventional operations so that antibiotic residues will not end up in milk should assuage consumer's fears. Proper treatment of illness with antibiotics is good for cow health and will not impact the consumer. Any consumer fear over antibiotic residue is unfounded.

Consumers of organic milk firmly believe that they are receiving a more nutritious product (Hill and Lychehaun, 2002). However, according to the Wisconsin Milk Marketing Board (WMMB, 2012), organic milk and conventional milk are both simply milk- having the same basic compositions and proportions of carbohydrates, proteins, vitamins and minerals. Studies done on differences in levels of conjugated linoleic acid (CLA) have yielded mixed results based on the duration of the study and diet fed to the cows (Ellis et al., 2005). One twelve month study revealed that although there was not a difference in major CLA composition, organic milk was attributed to having higher polyunsaturated fatty acids (PUFA), n-3 fatty acid and a lower n-6:n-3 ratio (Ellis et al., 2005). Another study that compared pasture-based operations to conventional farms that fed a total mixed ration (TMR) found that pasture-fed cows had milk with higher CLA and unsaturated fatty acid (UFA) concentrations (Croissant et al., 2007). Due to conflicting evidence, a consumer has no true guarantee of receiving an

increase in CLAs drinking organic milk, but they may benefit from an increase in PUFA and UFA concentrations.

Unlike conventional farms, organic farms must offer cows access to pasture according to USDA standards (2012_B). Many organic farms are pasture-based operations but only some conventional farms are. Most modern conventional farms in California utilize a freestall barn according to the California Milk Advisory Board's (CMAB) brochure "Today's California Dairies- Care of Dairy Cows in California" (2012_B) and are fed nutritionally balanced TMRs. However, consumers have developed a "New Perception" of modern agriculture and believe that conventional farming is detrimental to animal welfare (Fraser, 2001). Conventional dairy farms with freestall barns are viewed as inhumane while organic farms with pasture-based operations are viewed as promoting animal welfare. Organic farms with cows on pasture makes for a highly marketable product because of consumer's emotional associations of animal wellbeing and a healthy image (Croissant et al., 2007). Animal welfare is a considerable factor in what makes organic an appealing choice over conventional because consumers believe organic milk is a more ethical purchasing choice (McEcheran and McClean, 2002). In fact, according to McEcheran and McClean's 2002 study, "Over half of respondents regard organic farming as being better for animal welfare (64%); conventional dairy farming as being too intensive (53.5%); and that it wasn't acceptable to give cattle hormones to produce more milk (68.5%)."

Further driving the belief that organic operations are more humane is the fact that in order to be certified organic, animal welfare standards must be met. The USDA's National Organic Program (2012_B) sections §205.238 and §205.239 have animal welfare

standards that include access to clean water, feed, and shade, have prompt treatment of any illness (herbal remedies are encouraged but antibiotics must be used and the cow designated as "non-organic" if medically necessary), and have access to outdoors or pasture. In order for conventional farms to sell milk to processors, animal welfare standards do not necessarily have to be met but a growing number of producers are getting involved in programs such as National Dairy FARM Program: Farmer's Assuring Responsible Management, a quality assurance program that certifies that producers are meeting animal welfare standards (National Milk Producers Federation, 2012). If consumers wish to verify a company's involvement in the program, they can view participants on the program's website. In addition to this program, it should be noted that in order for farmers to be successful, they need to offer their animals adequate water, feed, shade and medical treatment not only for the animal's wellbeing but for economical reasons as well. A cow that is not receiving optimum quantities of clean water and a good nutritional diet will not be producing milk at its maximum capacity. Proper care of animals is a common-sense, sound business practice for even conventional producers. It is clear that consumers are some how not receiving this message.

Environmental concern is ranked 4th in consumer's reasons to purchase organic milk behind improved taste, food safety and health reasons (McEacheran and McClean, 2002). Consumers clearly believe that organic milk is better for the environment and even packaging of organic milk products capitalizes on this as can be seen in Figure 2. Surprisingly though, recent studies have shown that organic milk production may not be as good for the environment as originally thought. Although organic production does not use fertilizers, thereby reducing the potential of nitrate and phosphate runoff, there is

actually an increase in methane emissions by changing from a conventional farm to an organic farm (de Boer, 2003). Another study found that the global warming potential (a measurement of carbon dioxide plus carbon dioxide equivalents of methane and nitrous oxide) is considerably higher for organic over conventional operations and cows treated with rBST had the lowest global warming potential (Capper et al., 2008). The same study showed that this trend continued in water quality and nitrogen and phosphorus excretion, with organic operations having the highest negative environmental impact and cows being treated with rBST having the lowest impact (Capper et al. 2008). Furthermore, dairying in general does not have as negative of impact as consumers believe, with dairy cows producing lower levels of ozone than combustion sources (Shaw et al., 2007). Recent advances in technology have also shown hope for great reductions in emissions for the industry in the future. If an anaerobic digester is used and biogas substitutes on-farm fossil fuels, a shocking 96% reduction in emissions can be made (Weiske et al., 2005). In reality, conventional milk is better for the environment than consumers give it credit for.

The final area of consumer concern explored was the issue of taste preference. Consumers of organic milk report that improved taste was the primary reason behind their purchase of organic milk over conventional milk (McEacheran and McClean, 2002). However, this study did not include an actual sensory evaluation of the differences between the two types of milks to support the claim that organic milk tasted better. Luckily, two other sensory tests were run, one comparing organic milk to conventional milk (Fillion and Arazi, 2002) and another comparing milk from a pasture-based system and milk from a conventional farm feeding a TMR (Croissant, et al., 2007). Both of

these tests showed that consumers could not find a detectable difference between the conventional milk and the organic/pasture-based system milk. In essence, although consumers claim that taste difference is the primary reason for purchasing milk, the claim could not be substantiated with sensory tests. As far as taste goes, there is no difference between organic and conventional milk.

Growth of Organics

Organic milk first found its way onto conventional supermarket shelves in 1993 (Dimitri and Greene, 2000). By 1996, sales of organic milk products totaled $15.8 million and then in 2000 had reached an astonishing $104 million. This tremendous growth in the sale of organic fluid milk continues today, with the USDA (2012_A) reporting that sales of organic milk between January and December 2011 had seen a 14.3% increase from the same period in 2010. USDA Market News also reported a 2.8% decrease in conventional fluid milk in 2011 when compared to 2010.

Figure 1. Direct comparison of the cost of a gallon of 2% milk: conventional (left), organic (right)

Due to harsh economic times in recent years the sharp increase in the purchase of organic milk, even just over the past year, may come as a surprise. Although many consumers are finding ways to save money at grocery store, a good number are still

paying the extra premium to ensure their milk is meeting organic standards, being free of growth hormones, pesticides and antibiotics. With an apparent willingness to pay a higher price, this goes to show that consumers believe that organic milk is more valuable than conventional milk. According to Figure 1, organic milk in today's supermarkets is substantially more per gallon than conventional milk, in this case with a $2.30 difference in a local Albertsons store in San Luis Obispo, California.

Differences in Packaging

Figure 2. Example of organic milk packaging. Front of carton (left), side of carton (right)

It is worth noting that organic milk cartons seek to attract its consumers with colorful packaging. As it can be seen in Figure 2, Horizon Organic cartons use a bright red to initially capture the eye of the consumer. A fanciful and happy cartoon cow on the front of the carton is not only esthetically appealing but may increase the chances of a child asking its parents to buy this particular brand. Many cereal boxes use cartoons as well to be attractive to children; this carton of milk is no different. When viewing the side of the carton, the imagery of a seedling in the palm of a hand invokes thoughts of environmental responsibility and sustainability. The clean cow in a luscious, colorful pasture shows the kind of animal welfare the consumer wants to see. In addition the following is stated on the package: **"At Horizon Organic, we believe in producing wholesome dairy without the use of antibiotics, added growth hormones, pesticides or cloning. Synthetic colors and artificial flavors are also off the list. So what do all those "No's" add up to? A big "Yes" for your**

health and the health of the environment. We figure it's all connected. Eliminating chemicals from milk production creates a healthy environment that supports healthy cows, healthy family farms, healthy communities and a healthier planet. Above all, we think choosing organic leaves the world just a little better than how we found it. And it all starts with one creamy and delicious glass of milk."

In that brief section of writing on the Horizon Organic carton, the main concerns that drive consumers to purchase organic milk in the first place (McEcheran and McClean, 2002), are all mentioned. Horizon Organics show consumers that their concerns are Horizon's concerns, and the answer to them is purchasing Horizon Organic milk. It is an example of effective marketing- the packaging itself can sell the product.

Conventional milk cartons or plastic jugs do not have any ornamentation, creative use of imagery, or statements explaining any kind of environmental soundness, animal welfare or health benefits. A typical conventional gallon of milk can be seen in Figure 3 below.

Figure 3. A typical conventional gallon of milk from the supermarket

rBST Free Labeling on Conventional Milk

With an overwhelming consumer concern over purchasing milk from cows treated with rBST (DuPuis, 2000), many food companies began creating labels on their products' packages that indicated that the milk was free of artificial growth hormones. A footnote on the product was typically included stating that there was no difference in milk from cows treated with rBST and those without as seen in Figure 4.

Figure 4. Typical example of rBST free labeling on conventional milk products

Despite the scientific evidence provided by the FDA (1994) showing that rBST poses no threat to human health, an uninformed consumer may not believe its safety due to companies like Dean Foods and Darigold dropping any producers who have used rBST treated milk (Rosenberg, 2006). Even Vermont Agriculture Secretary Steve Kerr has pushed to get dairy farmers to drop the use of the product (Rosenberg, 2006). Yet, the consumer may not know why these companies made this move to begin with. It is very easy to make the assumption that the move was because the product is considered an unhealthy one.

In 2006, Susan Meadows (marketing director of Dean Foods) said, "consumer demand led to the action [of banning rBST milk]," and Randy Eronimous (marketing director of Darigold) stated, "I think it's going to become a competitive disadvantage if you are not rBST-free" (Dairy Foods, 2006). Agriculture Secretary Kerr himself says that banning rBST is a market move that shouldn't be missed. Although rBST free labeling is a specific response to meet marketing demands, if the consumer had no knowledge of the reasoning behind this marketing move, it would be very easy to think it was because there actually was some health hazard to be worried about. rBST free labeling has actually been a tool that has perpetuated the stigma against growth hormone use in dairy cattle by making consumers believe that by not purchasing rBST free milk, they are receiving a lower quality product (Kava, 2007). Consumer distrust of the rBST product is unfortunate because of the potential rBST has to improve efficiency in the use of resources and reduce dairying's environmental impact (Capper et al., 2008).

Public Education

Considerable steps are being taken to further educate the public on a variety of aspects on the dairy industry. The CMAB, an instrumentality of California's Department of Food and Agriculture (CDFA), has been at the forefront of promoting a good image of California's dairy farms. CMAB promotes the dairy industry as a whole (conventional as well as organic producers) and it's non-discrimination between the two practices shows the industry as a whole in a positive light.

CMAB is responsible for the "Happy Cows" commercials that can be seen across America supporting the Real California Seal on milk products (CMAB, 2012_A). A creative commercial campaign was run in October 2008, bolstering their website viewership. Anthropomorphized cows that had creative back stories encouraged commercial viewers to go on to the CMAB website and vote for them to be the next "California Cow." In 2010, a new commercial campaign began, this time featuring California dairy families. The national television spots were an opportunity to bring the consumer closer to where their food comes from and allow farmers to share their stories. According to CMAB's Vice President of Advertising, "We want to help consumers put the face on the farmer responsible for the dairy foods they enjoy. There's a family dairy farmer and personal story that comes with every glass of milk, piece of cheese, scoop of ice cream and pat of butter you purchase. These are fascinating people once you get to know them." The advertising campaign bolstered website viewership and worked to debunk a growing myth that large conventional farms were uncaring, corporate-run factory farms.

CMAB's advertising campaigns served a larger purpose- getting consumers to their informational website. The website has a plethora of information to educate the public about an array of issues that have traditionally been a concern for the consumer (2012_A). The main areas of discussion are family farms, people, sustainability, and animal care- each having their own individual page. The "Family Farms" page has a series of mini documentaries about California dairy families that, in the spirit of the commercial spots, allow farmers to share about their operations and family businesses. The "People" page offers a series of links that feature profiles on producers and processors, enabling the consumer to further familiarize themselves with individuals in the California dairy industry. These two pages again show the consumer that producers aren't so far away and they're are just hard working individuals with a passion for dairying.

The "Sustainability" page strives to work on the environmental concerns that consumers have (CMAB, 2012_A). One of the links on the page discusses how a farm in Elk Grove, California is taking waste and using it to make clean energy with a methane digester. The farm is used as an example of California's technological innovation that is working towards an industry wide goal to reduce green house gas emissions by 25% in 2020. The website also expresses that farms are under strict environmental regulations that ensure that dairying has standards it must meet legally, "California has the nation's toughest environmental regulations and a deep commitment to stewardship and innovation. So it's no surprise that the California dairy farmers are at the forefront of every major sustainability practice that has come to fruition." The page goes on to provide examples of common sustainability practices used on farms, including an

increase in the use of methane digesters to power the dairy electrically, that farms use a lot of feed grown on their own property (cutting back fuel use by not shipping in feed), how a lot of feeds that normally would be thrown out are put in cows' rations (such as bakery waste and almond hulls) and how used water is recycled for irrigation and flushing barns. In addition, the page (CMAB, 2012_A) also offers scientific data showing that according to a study done by the Applied Sustainability Center of University of Arkansas, emissions from the dairy industry is only 2% of the total U.S. emissions of greenhouse gasses. The page also states that since 1944, the diligence of the dairy industry has resulted in a 63% reduction in the production of greenhouse gasses. Since the data presented is a nationwide representation of the dairy industry as a whole, it shows consumers that collectively neither organic nor conventional farms are posing as great of a threat to the environment as may have originally been perceived, yet the industry is still making progress to minimizing their impact none the less. Although all these sustainability issues are addressed, it must be noted that nothing on CMAB's website mentioned anything about how the dairy industry is managing runoff problems or about present regulations in place to combat this issue.

Perhaps one of the most crucial issues addressed on the CMAB website is animal care and welfare. CMAB has been under attack by People for the Ethical Treatment of Animals (PETA) for their portrayal of California's cows as "happy" (Sherrow, 2011). According to PETA's website, their lawsuit in 2011 was to force CMAB to provide documentation that substantiated the claim that California's cows were happy and that the CDFA was not engaging in false advertising by allowing these "Happy Cow" commercials to air.

Figure 5. Illustration featured in PETA's article, "Attention, Please: California Cows are Miserable" by Logan Scherer, 2002.

CMAB has taken steps to show that animal care and welfare is a priority of producers via their website (2012_B). Their "Press Kit" page offers an informational brochure that can be downloaded online entitled, "Today's California Dairies- Care of Dairy Cows in California." The brochure goes into great detail about proper facilities and common conventional farm layouts and designs. It goes on to define and explain the decisions involved in free stall management (such as choosing a proper bedding based on sanitation, cow comfort, weather and cost) and emphasizes that free stalls are important to give a cow her own individual, comfortable resting space to protect her from injury and infection. The pamphlet states that manure is usually cleaned from the freestalls twice a day and that adjoining alleyways utilize a flush system to dispose of manure, which is then sent through a separator allowing the solids to be used for bedding or compost. Modern conventional farm facilities are further detailed by describing the use of misters and fans for controlling the temperature of the cows' environment. The importance of access to clean water troughs and feed bunks filled with nutritionally managed TMRs is emphasized as being important for a healthy, high producing animal. Furthermore, exercise lots, maternity pens, treatment pens and a milking parlor are depicted in an illustration accurately showing what a modern conventional facility looks

like. Proper veterinary care and good animal health is also discussed as being an essential part of an operation's success, as healthy animals are productive animals.

Also available on CMAB's website is an entire page devoted to the topic of animal care (2012_A). Many of the topics addressed are a more simplified version of those discussed in the brochure, "Today's California Dairies- Care of Dairy Cows in California." Links to more specific information regarding the issues of animal welfare work to emphasize that productivity is dependent on farmers ensuring cow comfort is optimized. Reuse of nutrients ensures comfortable, clean and dry bedding. Close work with veterinarians and nutritionists allow the calves to grow up healthy and strong and cows to continue to make high quality milk. The use of misters, shaded barns, and fans as apart of cooling systems during the hotter summer months is addressed, showing how heat stress is managed. The site ensures the consumer that animals always have access to food and clean water and explains that because farmers' livelihoods depend on the productivity of their cows, it is in producers' best interest to have animal welfare be a high priority. Unique to this page, however, is discussion of the use of antibiotics on conventional farms, the National Dairy FARM Program: Farmer's Assuring Responsible Management certification program (allowing farmers to be certified as meeting specific animal welfare criteria) and the availability of animal welfare classes to producers through the California Dairy Quality Assurance Program. The discussion of antibiotics describes medical treatment as being necessary for the health of the animal, preventing animal to human disease transmission and decreasing the carbon footprint. It also goes on to describe FDA mandated withdrawal times for the use of said antibiotics and

explains that every tankard of milk must test free of antibiotic residue or it will not be allowed to be sold.

CMAB is doing what they can to shed positive light on the industry and conventional farming with educating the public on a variety of areas that have traditionally been under public scrutiny. CMAB portrays the California dairy industry as being family-owned, progressive, environmentally concerned, technologically advanced, sustainable, prioritizing animal well-being and producing a safe product (2012_A). Although recent advertising campaigns have drawn an increased number of viewers to their website so that this information can be accessed, besides the family farm commercials none of these other consumer concerns are addressed on public television.

It is worth noting that the WMMB (2012) has a webpage with a series of infographics available to address, with visual aids, a limited number of consumer concerns. The infographics provided cover how nutritious milk is, how a methane digester works, the decrease in the carbon footprint of the dairy industry in recent years, and explanations of how farms make energy. The "On the Farm" tab on WMMB's main webpage offers more in-depth information with a series of articles that address topics like: dealing with cold weather, cow comfort, farm families, sustainability, bio energy and the dairy industry having a 2% carbon footprint. Although the topics covered were similar to those covered on the CMAB website (2012_A), the CMAB website is considerably easier to navigate, more creative in web design and offers more informational videos.

Recommendations for Further Public Education

Although CMAB has done extensive work to debunk common myths and dispel misconceptions about common conventional farming practices, especially explaining that animal welfare is essential to a productive operation (2012_A), most of the material is presented online. Outside of showing family-run farms in television commercials, CMAB has not used their commercials to disseminate any other vital information to consumers. The "Happy Cow" and family farm commercials have bolstered website viewership, but the effectiveness of all their online educational material has yet to be determined. According to the USDA (2012_A), organic milk purchases have continued to rise while conventional fluid milk purchases have steadily declined. Although the decline in conventional milk cannot be specifically attributed to the choice of consumers to purchase organic milk, the large growth in organic sales over the past year (a 14.3% increase in 2011 according to the USDA Market News) shows clearly that consumers are finding organic milk an appealing choice.

A worthwhile investment would be a study that can be done to test the present effectiveness CMAB's present way of disseminating information. Is the information effectively getting to the consumer? Is the information getting to a variety of regions within the United States or are most website viewers Californians? These things need to be assessed to be sure that CMAB's efforts are having a worthwhile nationwide impact.

CMAB can also begin a new commercial campaign, perhaps a series explaining animal welfare and cow comfort in a modern conventional facility, another explaining product safety with a specific target goal of letting consumers know their milk is antibiotic residue free, and lastly one showing the dairy industry as technologically

progressive- actively working towards increasing sustainability and decreasing their carbon foot print. This campaign could be run with the Real California Seal promotion in mind, flashing the seal towards the end of the television spot to further enhance brand image. The animal welfare commercials should make a point to step away from featuring pasture-run operations and show specifically a modern free stall facility, educating the public that happy cows are comfortable, high producing cows. In doing so, it could be a very public and direct challenge to PETA's attack on CMAB's prior advertising. In addition it would portray a more realistic image of modern conventional farming but it would be doing so in a positive manner. Consumers are demanding more transparency from the industry and being responsible producers, we should make good public relations a priority. Realistic advertising is a way to achieve not only greater transparency but other positive goals as well, such as educating the public and improving conventional farming's image. CMAB should also consider the use of billboards to further impact consumers with positive visual imagery.

Figure 6. Example of a possible billboard CMAB could use showing good animal welfare

Due to CMAB specifically being under attack by PETA, an extensive marketing campaign like the one described above may not be as beneficial for WMMB. However, taking a proactive approach and at least addressing these consumer concerns with national commercials about animal welfare and environmental impact would be a very positive move for public relations. Addressing these two topics alone would still be effective in promoting a good conventional farming image while still saving money by not running a food safety commercial or any billboard campaigns.

MATERIALS AND METHODS

In order to obtain a current assessment of college-aged consumers' perception of organic and conventional milk, a survey was formulated during September of 2012. Using the Statistical Consulting Service offered by California Polytechnic State University San Luis Obispo (Cal Poly), Dr. Heather Smith and I were able to put together a survey and plan on ways to get statistically significant data. The finalized version of the survey began with instructions and respective definitions of conventional and organic milk. Next, questions asked of the students were comprised of three distinct sections: demographics, consumption patterns, and beliefs about milk. The questions about consumption patterns were used to identify how many times the student drank milk in a week, if they purchased organic milk and with what regularity, what factors contribute to the type of milk they purchase and what type of milk they personally prefer. The section about beliefs was a series of statements that students were to respond to on a Likert rating scale as to what degree they agreed or disagreed with a statement. The survey was 14 questions long, and brief enough to be able to be completed within 10 minutes. The survey in its entirety may be viewed in the appendix.

The target sample size of students was 50 total. The goal was to obtain data from diverse undergraduate classes at Cal Poly to get an accurate representation of an average college-aged consumer. Emails requesting access to students in various classes were sent out to different professors. Of the emails sent out, Dr. Kenneth Brown, Dr. Ann De Lay, and Dr. Bruce Golden responded and granted me access to their classes to conduct my survey. On September 28, 2012, Dr. Golden's Dairy Science (DSCI) 123 class was surveyed and yielded 16 usable respondents. On October 1, 2012, Dr. Kenneth Brown's

Philosophy (PHIL) 313 class was surveyed and 16 of those were usable. On January 29th and 31st, 2013, Dr. Ann De Lay's Agriculture (Ag) 220 and Agriculture Communication (AgC) 426 classes were surveyed, yielding a combined total of 33 usable responses. With all four classes combined, the total sample size for this study was n=65.

Using the Statistical Analysis System (SAS, 1989.) respondents were clustered by their class and then for some data analysis, respondents were then either further grouped by their indicated background (rural, suburban, urban) or by what college that class was in (Liberal Arts or Agriculture). Milk preference, factors affecting purchase, and beliefs regarding milk were analyzed. For questions of interest, frequency averages within a group were then graphed to visually represent this study's findings. For an overall understanding of all students surveyed, averages were analyzed on a total frequency basis regardless of clustering.

RESULTS AND DISCUSSION

Type of Milk Most Likely to Purchase

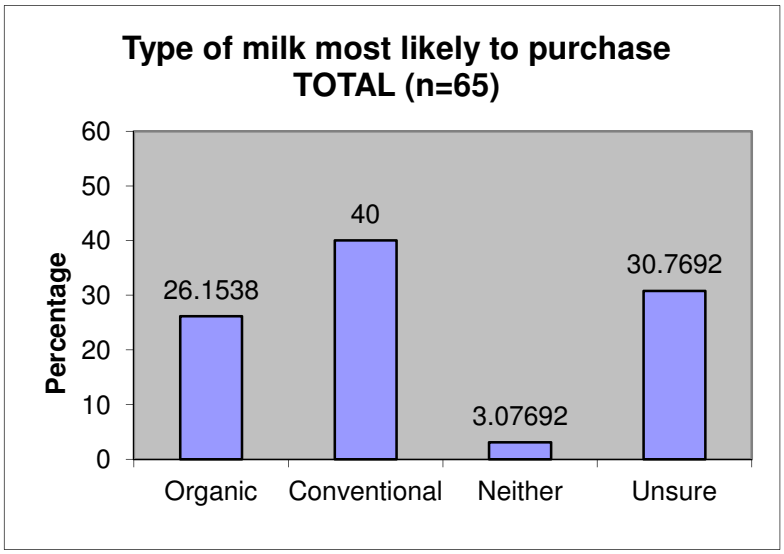

Figure 7. Type of milk most likely to be purchased by all students

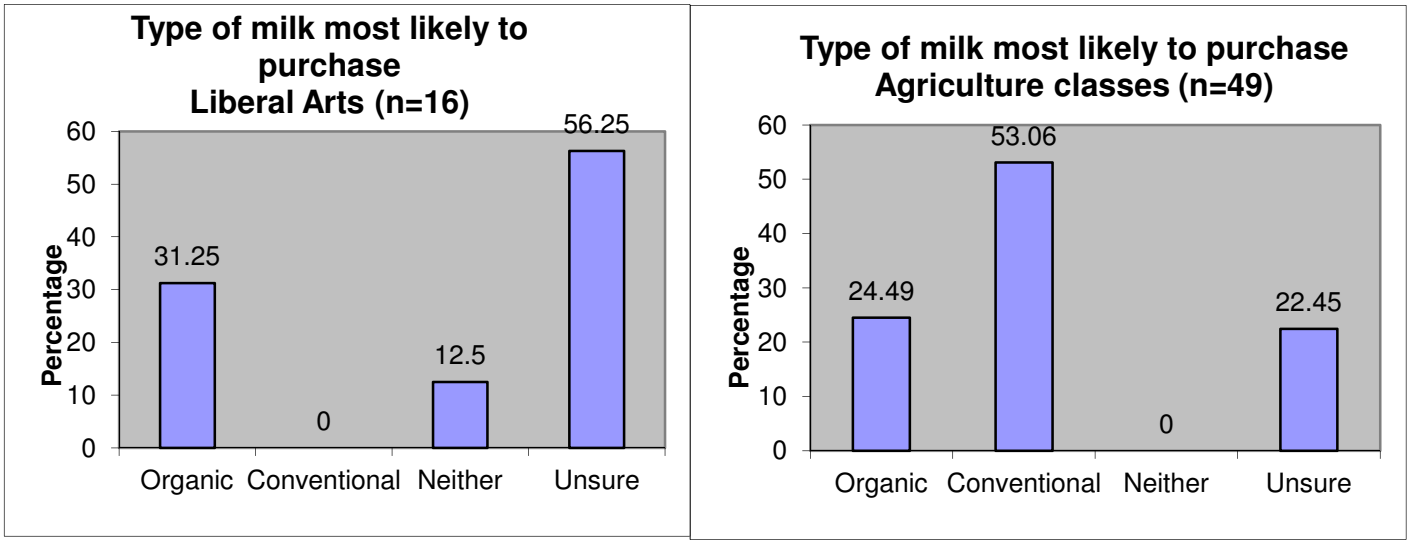

Figure 8. Type of milk most likely to be purchased, liberal arts vs. agriculture students

Analyzing the total survey respondents (Figure 7), it was found that regardless of price 40% of students would purchase conventional milk (SE=15.38), 31% were unsure (SE=8.48), 26% would purchase organic (SE=7.08) and 3% responded neither (SE=3.10). However, breaking up the student respondents and clustering the data via the type of

class the student was surveyed in (liberal arts versus agriculture), the results showed some differences (Figure 8). In the liberal arts class (n=16) 56.25% of the class was unsure, 31.25% would purchase organic, 12.5% neither, and 0% would purchase conventional (SE=24.84). This was quite different from the agriculture classes (n=49) where an astounding 53.06% would purchase conventional milk, 24.49% organic, 22.45% unsure and 0% neither (SE=24.84).

In the agriculture classes over half of the respondents were in support of purchasing conventional milk while the remaining respondents were evenly distributed over organic and unsure. Such a strong support of conventional milk may be due to a variety of reasons. Perhaps the agriculture students were more educated about conventional farming practices due to the college courses they have taken. The agriculture students may also be personally from a conventional farming background as well. With having a much lower percentage of students that were unsure about which milk to choose, the agriculture students may have had more exposure or access to information about these practices in order to feel confident in making a decision.

In the liberal arts class, a strong majority of students were unsure as to what type of milk to buy. Again, this may be due to the lack of greater exposure or access to information about these respective practices to begin with. It is unclear what kind of knowledge base these liberal arts students had about conventional or organic practices. An astounding 0% of students would purchase conventional milk while 31.25% would purchase organic. The lack of students willing to purchase conventional milk is worrisome. Between the high number of unsure respondents and the complete lack of students willing to purchase conventional milk, this may be a sign that students not

involved in agriculture may not have enough of a direct access to the right information to enable them to trust conventional practices. Perhaps the only knowledge they have available to them shows conventional practices in a negative light, such as PETA's attack on CMAB (Sherrow, 2001). Perhaps they have only seen that conventional practices are negative and not to be trusted (Fraser, 2001). A lack of support for conventional milk by non-agriculture students was what was expected based on the literature review.

Factors affecting type of milk purchased by students

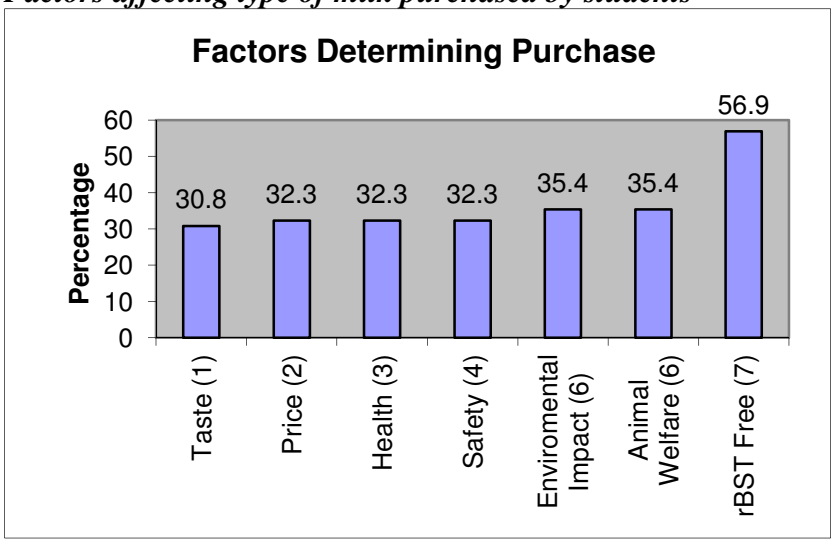

Figure 9. Ranking of factors determining student's milk purchase

When students were asked to rank the factors that determined the type of milk they purchased, with 1 being the most important and 7 being the least important, the results were very consistent across the different classes. For the 65 students surveyed, taste (SE=7.95), price (SE= 4.94), health (SE=2.74), and safety (SE=4.96) took precedence over the environment (SE=10.41) or ethical factors such as animal welfare (SE=8.98) or rBST free (SE=6.51). These results were fairly consistent with what was found in McEacheran and McClean's 2002 study where the factors that determined the purchasing of organic milk over conventional were ranked as follows: taste, food safety, health, environment, rBST free and animal welfare. The consistency between the two studies

shows that consumers generally value the same things when they purchase milk, regardless of which type of milk they purchase. With consumers having consistent values, it may just be that those students who purchased organic milk believed that organic is the superior product in each of these categories.

Beliefs about Milk

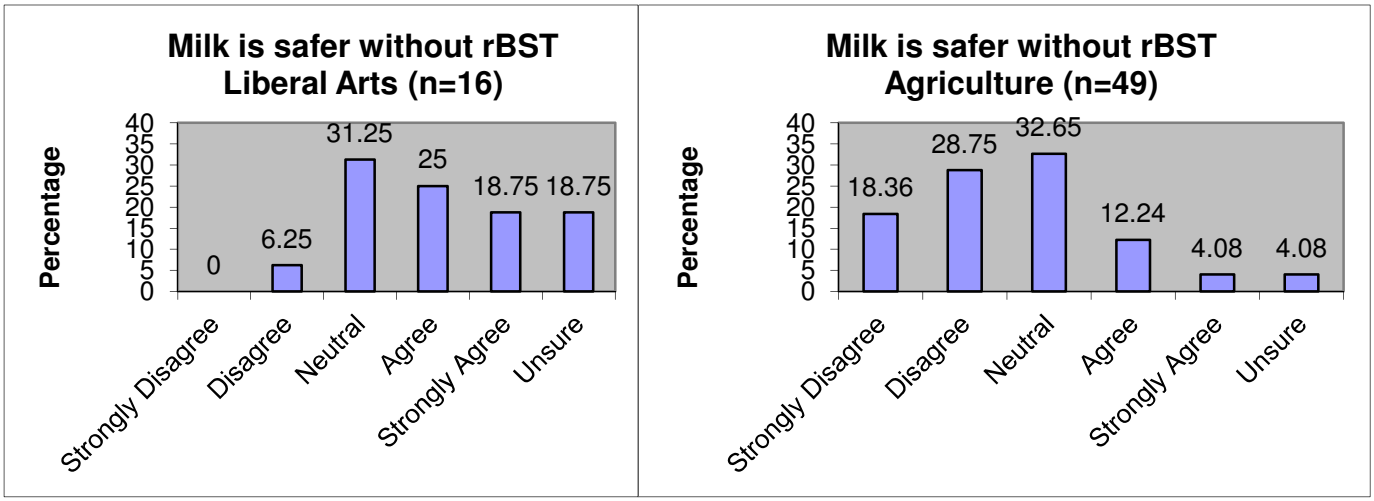

Figure 10. Belief statement- milk is safer without rBST, liberal arts vs. agriculture classes

For the belief that milk produced without the use of rBST was safer, there were some insightful differences seen between the students in the liberal arts and the agriculture classes. Both groups had a majority of students vote for the neutral category. However, the agriculture students had 18.36% of respondents strongly disagree with the statement and 28.75% simply disagree with the statement and slim percentages for agree and strongly agree (SE=24.84). Conversely, the liberal arts students showed the opposite by having 0% of students strongly disagree, only 6.25% disagree, an astounding 25% of the students agreeing with the statement and 18.75% of them strongly agreeing (SE=24.84). This goes to show that a far greater proportion of agriculture students believed rBST to be safe. In addition, liberal arts students more frequently believed the

opposite- that milk is safer without the use of rBST. This again could be a reflection of a continued distrust of rBST that was identified in the literature review (DuPuis, 2000).

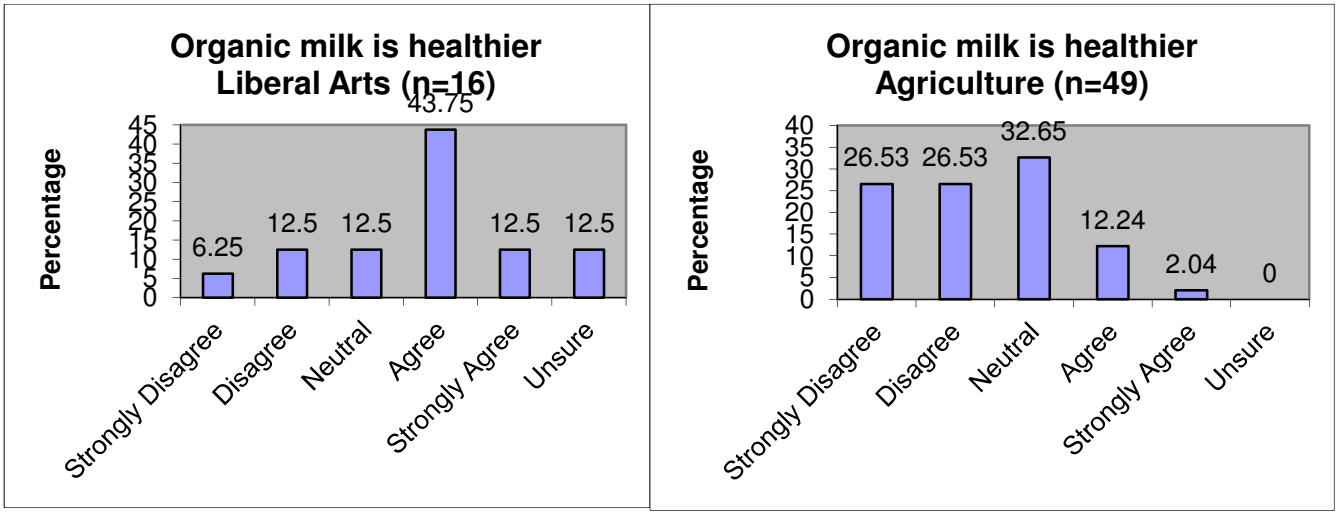

Figure 11. Belief statement- organic milk is healthier, liberal arts vs. agriculture classes

The belief statement that organic milk is healthier had some very distinct differences between the classes. Liberal arts had a striking 43.75% of students agree with the statement while the agriculture students tended to either strongly disagree at 26.53% or disagree at 26.53% (SE=24.84). It is worth noting that the agriculture students were predominately neutral at 32.65%. However the difference in the percentages of students that disagreed or agreed with this statement continue the trend of polarization between the two classes- where liberal arts students continue to express views that lead to the conclusion that they believe organic milk is the superior product. The liberal arts students' belief that organic milk was healthier falls in line with Hill and Lychehaun's 2002 study that shows consumers tend to believe that organic milk is more nutritious.

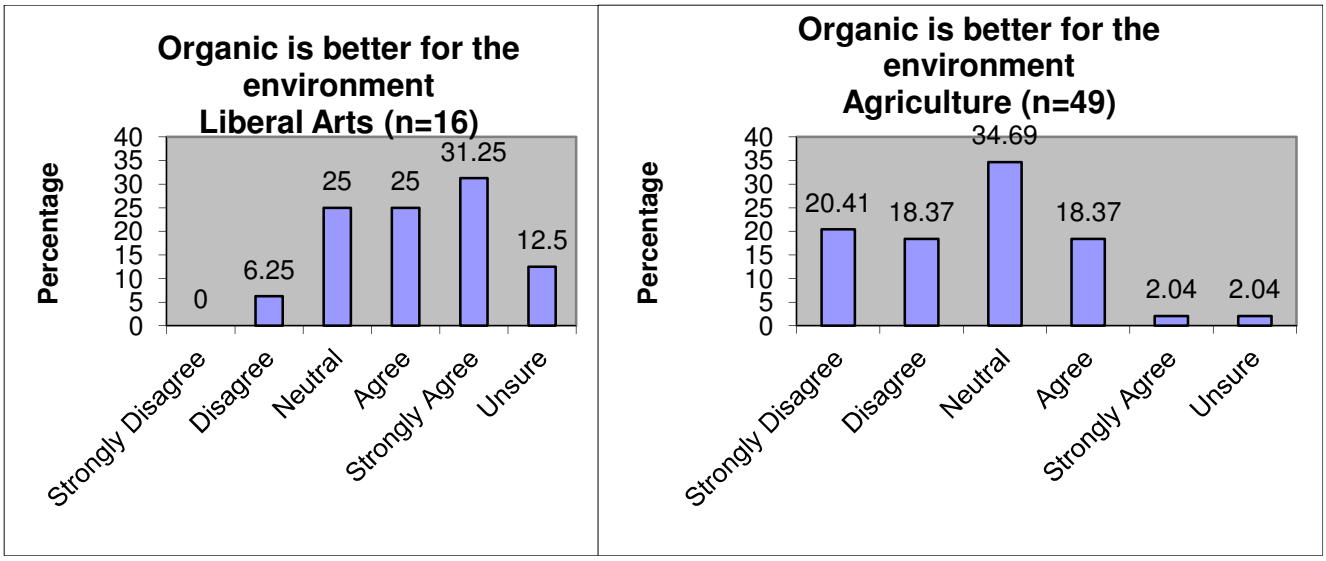

Figure 12. Belief statement- organic milk is better for the environment, liberal arts vs. agriculture classes

Organic milk is better for the environment belief statement results showed that the liberal arts class had an astounding 31.25% of respondents strongly agree, 25% just agree and 25% remained neutral (SE=24.84). For the agriculture classes, the opinions were more evenly distributed with 34.69% of respondents remaining neutral, 18.37% agreed, 18.37% disagreed and 20.41% strongly disagreed (SE=24.84). The liberal arts students agreeing or strongly agreeing 56.25% of the time shows results that are in line with the literature that concludes consumers generally feel that organic is more environmentally friendly (McEacheran and McClean, 2002). Again, this may be due to lack of readily available information for the non-agriculture students. Although 38.78% of the agriculture students generally disagree with the belief statement, a good 34.69% remained neutral on the issue. This may show that even within our agriculture classes at Cal Poly, curriculum may not be targeting these tough issues enough.

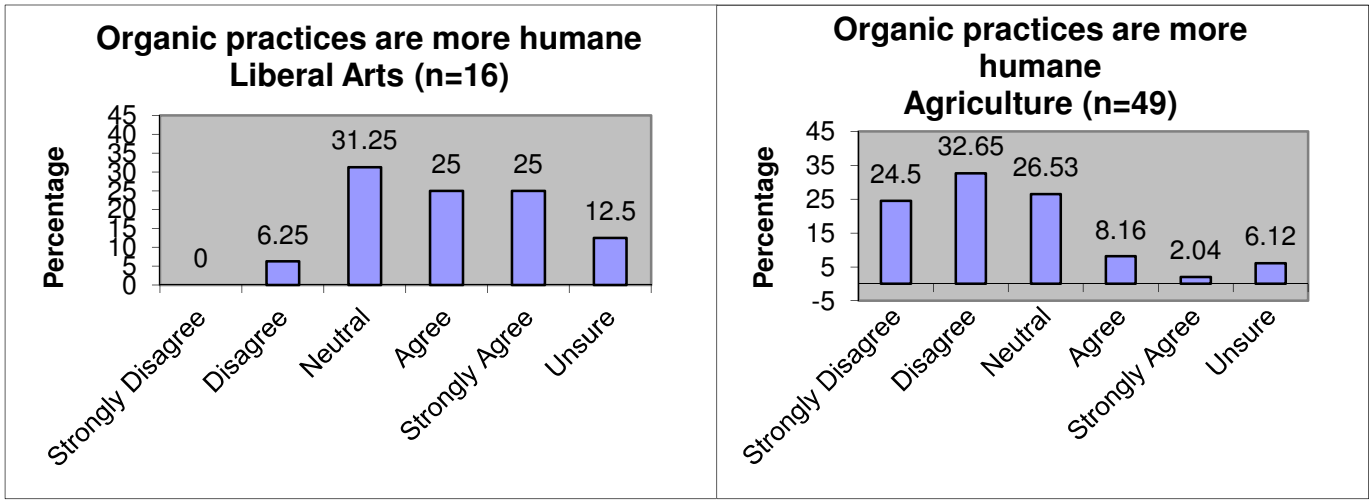

Figure 13. : Belief statement- organic practices are more humane, liberal arts vs. agriculture classes

For the last belief statement, that organic practices are more humane, the liberal arts class had the highest percentage of respondents take a neutral position at 31.25% (SE=24.84). The data continued to show that liberal arts students had a greater tendency to agree or strongly agree with the belief statement than the agriculture students. The agriculture students on the other hand had a tremendous 32.65% of respondents disagree with the statement, 24.5% strongly disagree, and 26.53% of the students remained neutral (SE=24.84). Liberal arts students had a greater tendency to agree that organic practices were more humane. This tendency is in agreement with previous findings about consumer ideology as it was discussed in the literature review (Fraser, 2001).

CONCLUSIONS

In reviewing the literature, it was concluded that the purchase of organic milk was primarily due to consumers' perception of what organic milk was. Consumers believed organic milk to be a better decision ethically- through being better for the environment and promoting better animal welfare, a healthier choice- being free of pesticides, a safer product due to the concern over rBST and antibiotic residues, and lastly a belief in having a better taste when compared with conventional milk (McEcheran and McClean, 2002). However, when consumer's assertion of organic milk having a better taste was actually challenged in a blind sensory test, there was no evidence to prove that the consumer could actually taste the difference between the two products (Croissant et al., 2007; Fillion and Arazi, 2002). This shows that consumers' purchase of organic milk is based completely on their perception and image of organic milk rather than reality.

Considering that the FDA has found no difference between cows treated with rBST and those not treated with rBST (1994), consumer fear of the adverse affects of conventional milk is irrational. Every tankard of milk gets tested for antibiotic residues so consumers need not fear on this matter as well. In regards to animal welfare, in terms of management practices there are many ways in which conventional farming methods, including the use of free stalls (ensuring cow comfort and allowing for closer observation) and promptly treating sick animals with rigorous antibiotics, is actually better for cows. Although consumers have environmental concerns about conventional farming, there have been recent technological advances to combat these problems, such as methane digesters, and studies have shown that organic farms have higher emissions than conventional farms (de Boer, 2003; Capper et al., 2008). Furthermore, as studies

have shown, although consumers believe there is a taste difference between organic and conventional milk, there is in fact no detectable difference between the two (Croissant et al., 2007).

In summary, many of the reasons that consumers purchase organic milk are in fact invalid. The only claim that can be substantiated slightly is health, with slight nutritional profile differences between organic and conventional milk having been detected (Croissant et al., 2007). Although many brands of milk are now labeling the fact that the FDA has found no difference between milk from cows treated or not treated with rBST, there are still no labels or advertising invalidating the fear consumers have over antibiotic residues.

The survey of students at Cal Poly generally showed that liberal arts students have a greater tendency to be the atypical consumer that fears and distrusts conventional milk and farming practices and prefers organic milk due to a perceived superiority of physical and ethical qualities. The liberal arts students' beliefs are very comparable to the organic supporting consumers whose views and opinions were characterized across the various studies shown in the literature review. In summary, they generally prefer organic over conventional milk and believe organic is healthier, more humane in its treatment of animals and better for the environment than conventional practices. Although the sample size was small (n=16) and further testing of college students is recommended for future study, the strong opinions of these students cannot be ignored. Liberal arts students may very well have the potential to be the voice of the average consumer- one who does not come from any kind of agricultural background or who has access to accurate information regarding modern farming practices. Their positive perception of organic is

built on a backbone of misinformation or lack of information about what conventional farming practices entail. As we can see from the literature review, these perceptions are not grounded in reality. That is why public education is so vital. These perceptions need to be changed with facts.

Where we have hope and opportunity is within the future leaders of our industry. The agriculture students surveyed showed that oftentimes they boldly and strongly supported the purchase of conventional milk, and had a positive perception of conventional practices. This can be an incredible tool for the future of the dairy industry if these students can find creative ways to radically improve public education. Educating non-agriculture students about conventional practices will be key to the future success of our industry. If we can educate the greater public we can maybe begin to build better bridges of trust between producers and consumers. Creative ways to begin this process need to start now.

Although the CMAB has begun to show commercials showing happy and healthy cows on family farms across the state, no television advertising has given specific detail as to the possible better living conditions free stall cows have over those in pasture-based or organic operations. A short commercial discussing free stalls and their importance to cow comfort as well as how treating sick cows with antibiotics promptly is a positive thing for cows' wellbeing would be a very positive public educational tool to improve conventional farming's image. Furthermore, any national television advertising campaigns aimed at showing how the dairy industry is working towards more sustainable practices with technology, such as methane digesters, will work to show the industry as being progressively minded. With these public education devices in effect, consumers

can make a more informed choices about their fluid milk purchases- one based more in reality than a mere perceived image.

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APPENDIX

Perception survey as it appeared to students that were tested:

Perception Survey

Thank you for your contribution to my senior project! This survey will be divided into three sections to collect information pertaining to your personal demographics, milk consumption habits, and beliefs about milk. Please answer the questions below to the best of your abilities. Here is some relevant background information about milk to start:

Conventional- all non-organic milk; usually the standard milk carried at grocery stores. Conventional milk may be produced with or without the use of artificial bovine growth hormones. "rBST free" labeling indicates that the conventional milk is free of artificial bovine growth hormones.

Organic- milk produced without the use of antibiotics, pesticides or artificial growth hormones.

Section 1: Demographics

Course Name: _____

1. What is your major?_____
2. Circle your grade level: Freshman Sophomore Junior Senior
3. What is your age? _____
4. What is your gender? Male Female
5. Your hometown can be primarily described as what type of area:
   urban suburban rural

Section 2: Consumption patterns

6. In a typical week, how many times do you consume fluid cow's milk (ex. in cereal, lattes, etc.)?
   0-1 2-4 5-7 8-10 11+
7. Have you ever purchased organic milk? Yes No
8. If you answered yes to the question above, when you purchase milk about what percent of the time is it organic milk?
   ≤10% 20% 40% 50% 60% 80% ≥90%
9. When deciding which type of milk to purchase, rank the following factors in order of importance (with 1 being the most important and 7 being least important):
   __Price
   __Taste
   __Health
   __Food Safety
   __Environmental impact
   __Animal Welfare
   __rBST free
10. If price were no issue, which kind of milk would your purchase:
    Organic Conventional Neither Unsure

Section 3: Beliefs about Milk

For each underlined statement, circle the answer that most reflects your personal beliefs.

11. Drinking milk produced without rBST is more safe:
    Strongly disagree Disagree Neutral Agree Strongly Agree Unsure
12. Organic milk is healthier for you:
    Strongly disagree Disagree Neutral Agree Strongly Agree Unsure
13. Organic milk is better for the environment:
    Strongly disagree Disagree Neutral Agree Strongly Agree Unsure
14. Organic farming practices are more humane to animals:
    Strongly disagree Disagree Neutral Agree Strongly Agree Unsure