

profitability of AMS systems compared with PMS because of the labor saved. If the barn is equipped more like a typical parlor operation, an AMS may be similar to a PMS in profitability. Those results assume a labor reduction and a milk production increase with the AMS compared with the PMS. Surveys have shown that most farmers are happy with the decision to install AMS. Much of the satisfaction is not based on economic returns, but on improved lifestyle. Maximizing milk per robot by optimizing cow numbers and milking speed, along with improved labor efficiency and increased milk production per cow, will maximize dairy farm returns.

Key Words: automatic milking systems, profitability

ADSA-SAD (STUDENT AFFILIATE DIVISION) UNDERGRADUATE STUDENT ORAL COMPETITION: DAIRY FOODS

0037 Milk is milk, isn't it? J. M. Madigan* and S. P. Washburn, *North Carolina State University, Raleigh.*

This paper examines the differences in beverages from almonds or soybeans compared with milk from cows. There are some people that argue plant-based beverages hold the same nutritional aspects as milk and are overall better for the consumer. Through examination of multiple research papers on cow-based milk and plant-based "milk" products, discussion and analysis of potential benefits and limitations of each product is examined. One key point of analysis is that soymilk was shown to reduce cholesterol (Meyer et al., 2004), but in another study showed no effect even with increased isoflavone in samples taken (Onuegbu et al., 2011). Almond milk seemed to cause hyperoxaluria and genitourinary disorders in children due to richness in oxalate, though showed to be a good option for lactose intolerant individuals (Ellis and Lieb, 2015). Though almond based beverages can be an alternative for lactose intolerant people, NC State University's Department of Food, Bioprocessing, and Nutrition discovered that the use of *Lactobacillus acidophilus* bacteria can help make milk acceptable to lactose intolerant individuals (Sanders and Klaenhammer, 2001). A study also showed that people who consumed cow milk more than once a day had a lower likelihood to have type 2 diabetes (Morcillo et al., 2012). A key nutrient, protein, was shown to be lacking in almond milk, which has less than 1 g per cup vs. 2% milk with 8 g per cup (USDA). Milk is also a better source for essential fatty acids than either soymilk or almond milk (USDA, nutritiondata.self.com). From the data collected over multiple studies and databases, a conclusion is reached that, though plant based "milk" products such as beverages made from almonds and soybeans have some nutritional promise, they have a difficult time replacing milk from a cow.

Key Words: milk, milk substitutes, nutrition

0038 Health benefits of *Lactobacillus helveticus* in dairy foods. C. Kenny*, *Louisiana State University, Baton Rouge.*

Lactic acid bacteria (LAB) are often used as a starter culture in the production of cheeses. These LAB produce biopeptides by breaking down proteins in milk that have positive effects on the functions of the body. One specific LAB, *Lactobacillus helveticus*, which is used in the production of many Italian cheeses such as Swiss, Provolone, Mozzarella, and Parmesan, has many extremely valuable health benefits. *Lactobacillus helveticus* is able to survive after being eaten, and adheres to epithelial cells in the gastrointestinal tract. Because of this, *L. helveticus* can stimulate the digestive tract and reduce lactose intolerance, and inhibit the absorption of some pathogens while also increasing the absorption of certain nutrients. However, the two most valuable benefits of *L. helveticus* are its nontumorigenic and nonhypertensive properties. *Lactobacillus helveticus* has been shown in research studies to inhibit the growth of colon cancer cells and breast cancer cells in vivo. Because of these studies, *L. helveticus* is being considered to be a potential anticancer treatment. Further, *L. helveticus* is an angiotensin converting enzyme (ACE) Inhibitor, meaning that it prevents the release of Angiotensin II, which constricts blood vessels. This keeps blood vessels and the heart healthy, which prevents high blood pressure. From all angles of human health, *L. helveticus* has many benefits when consumed.

Key Words: lactic acid bacteria, cheese, health benefits

0039 A2 milk marketing and human health. J. Nystrom* and D. R. Winston, *Virginia Tech, Blacksburg.*

Although butter and cheese sales have been increasing over recent years, fluid milk sales have been declining in the United States since 1970. With declines in per capita milk consumption, and changes in the export market, the dairy industry has to be creative in developing products to increase milk sales. Recent products like Fairlife® ultra-filtered milk is an example of an innovative fluid milk product that demonstrates adaptability of the dairy industry to consumer preferences. In the U.K., Australia, New Zealand, and recently, California, A2 milk has been introduced as a functional dairy food. A2 milk contains a homozygous A2 β -casein protein, whereas conventional milk contains a heterozygous combination of A1 and A2 β -casein proteins. While A2 milk has been available in U.K. since 2012 and previously in New Zealand and Australia, it has just recently made its way to the U.S. markets. Research on digestibility of A2 milk is ongoing; however, the A2 Milk Company is a processor that only sells 100% A2 milk in New Zealand and also exports to the U.K., China, the United States, and Australia. In the first human trial of A2 versus A1 milk digestion, conducted by Ho et al., A2 and A1 milk was significantly higher in digestibility than A1 milk. Almost all cows have the A2 gene, but the majority have an A1/A2 combination. The

Guernsey breed naturally produces a higher percentage of A2 milk, which may create a new niche market and therefore increase demand for Guernseys nationwide. In conclusion, A2 β -casein milk is a new way to use genetics to create a niche market, potentially increasing sales of fluid milk nationwide.

Key Words: A2 milk

0040 Ultrasonic separation of milk to select for fat globule size distribution. S. P. Itle* and D. R. Olver, *Pennsylvania State University, University Park.*

The size of fat globules is important in manufacturing dairy products such as cheese and butter. Smaller fat globules result in a smooth texture and mouthfeel in cheese, while butter production better utilizes larger globule sizes. Although the cream separator is most commonly used in dairy processing operations to separate cream from milk, centrifugal technology is not commonly used for selecting for a specific fat globule size distribution. This is due to the complexity and nearly-perfect timing needed to control g-forces. Some artisan cheese producers have opted to utilize gravity separation to isolate smaller fat globules, but this process can take many hours while imposing a food safety risk. A new technology, ultrasonic separation, promises faster separation of fat globule fractions than gravity separation. This method utilizes sound waves that can rapidly separate the fat components of milk with a high specificity in globule sizes. In a recent Australian study, ultrasonic separation by dual transducers operating at 2 MHz achieved appreciable fractionation after 20 min and resulted in a 0.9 μ m decrease in fat globule size.

Key Words: ultrasonic separation, dairy processing, fat globule fractionation

ADSA-SAD (STUDENT AFFILIATE DIVISION) UNDERGRADUATE STUDENT ORAL COMPETITION: DAIRY PRODUCTION

0041 Gene therapy and the prevention of mastitis in dairy cattle. K. Boudreaux*, *Louisiana State University, Baton Rouge.*

Mastitis in dairy cattle is an inflammation of the mammary gland and surrounding udder tissue, often an immune response to a pathogen invading the teat canal. It can also be a result of chemical, mechanical, or thermal injury to the udder. Mastitis can present clinically or subclinically, so routine testing and examinations are done to prevent the spread of infection. This infection is most often treated with antibiotics, but during antibiotic treatment, the cow's milk is not able to be consumed or sold, because it contains antibiotic residues. It is an ongoing epidemic in the dairy industry, and monetary losses are

accrued from the milk that must be disposed of due to antibiotic usage, reduction in milk yields due to permanent damage to the udder as a result of infection, labor costs to tend to infected cows, veterinary and medicinal costs, and in extreme cases, premature culling costs. Studies are being conducted to show that gene therapy may be a possible solution to prevent mastitis. Research has been done in an attempt to transfect the udders of dairy cattle with cercropin B, a lytic peptide found in *Cercropia* moths, that has broad spectrum bactericidal properties. This technology has been applied to other species through different experimental procedures and has yielded favorable outcomes and a decrease in targeted infectious diseases. The research with dairy cattle has not yet yielded favorable results, but with some experimental modifications, could be proven effective in preventing mastitis. This practice, once perfected, could be incorporated in routine dairy farm procedures, such as vaccine administration, and could reduce or eliminate antibiotic treatment of mastitis and reduce the losses of milk unable to be sold because of residual antibiotic contamination.

Key Words: gene therapy, mastitis, dairy cattle

0042 The importance of mastitis management practices in maintaining milk quality in the United States. K. Bochantin* and J. M. Bewley, *University of Kentucky, Lexington.*

Dairy producers strive to achieve optimal milk quality in an effort to provide the highest quality product possible to consumers. Milk quality is highly influenced by management practices used on farms. Poor milk quality may lead to decreased cheese yield and reduced shelf life for all dairy products. Measurements of milk quality include somatic cell count (SCC), bulk tank bacterial counts, antibiotic residues, and nutrient values. Lowered milk quality in certain regions of the United States within the past few years has caused some concerns within the industry, leading to renewed efforts toward improving milk quality. Such changes are centered on key management practices, including mastitis treatment and prevention. Mastitis is one of the most prevalent and costly diseases within the dairy industry, impacting both cows' health and milk quality. Awareness of the disease and its economic impact can increase motivations for change. Prevention of mastitis is key to management of the disease. Management of the environment (including housing and routine procedures) and cleanliness of the parlor can reduce the spread of mastitis-causing pathogens and decrease the risk of contamination. Housing and bedding should be kept clean and dry. In-parlor milking procedures, which include pre- and post-teat dip with proper germicides, can help remove existing bacteria from the udder and lower the risk of mastitis. Heifers are also at risk for mastitis and infection can lead to reduced milk yield during lactation. Prevention strategies include proper management, nutrition, and attention to prepartum udder health. Dry cows have a higher risk of mastitis infections than lactating cows.