

Undergraduate Student Competition:

ADSA-SAD Undergraduate Competition: Dairy Foods

142 Goat milk: An alternative to cow milk. C. A. Becker*, N. D. Schock, and J. M. Bewley, *University of Kentucky, Lexington*.

Goat milk is still a niche market in the United States, but in many other countries, it is preferred over cow milk. Dairy goat products are not usually marketed in mainstream grocery stores. Rather, they are more often sold at specialty food stores and farmer's markets. As the consumer health craze continues to steadily increase, dairy goat milk and other dairy goat products are starting to see slow, steady growth trends. Goat milk is used to make many products including cheese, yogurt, and ice cream. Some dairy goat producers sell their products directly to retail stores or restaurants. Restaurants use goat cheese on menu items from pizza to dessert. Consuming goat milk can be very beneficial to a person's health. Goat's milk is a good source of protein, tryptophan, vitamin A, riboflavin and potassium, which all are associated with health benefits. The vitamin A in goat's milk is in pure form so that it can be readily absorbed by the body. Contrastingly, cow milk vitamin A is in the form of carotenoids that the body has to convert before it can be absorbed. Consumers who are unable to digest cow milk are often able to tolerate goat milk. Cow milk contains a protein, α_{S1} -casein, that is known to be a major allergen. However, goat milk contains much lower values of this protein, if any, allowing people with cow milk allergies to drink goat milk. The fat globules in goat milk are significantly smaller than the fat globules found in cow milk, making goat milk easier for intestinal enzymes to digest. Goat milk contains a high amount of short-chain and medium-chain triglycerides that aid in speeding up metabolism and help lower cholesterol levels, and make goat's milk easier to digest. Although goat milk is not the only alternative to cow milk, it may be considered the best alternative due to all the potential health and consumption benefits.

Key Words: goat milk, digestion

143 Dairy options for lactose intolerant consumers. A. R. Davis*, D. R. Winston, and B. A. Corl, *Virginia Tech, Blacksburg*.

Lactose intolerance is a condition in which the small intestine does not make adequate amounts of the enzyme lactase to break down the milk sugar lactose. It is characterized by bloating, diarrhea, flatulence, nausea, and cramps. Lactose intolerance must be diagnosed by a physician, but it is commonly misunderstood and many consumers self-diagnose. Between physician diagnosis and self diagnosis, an estimated 12% of consumers are lactose intolerant. Of that 12%, most avoid dairy products all together; however, exclusion of dairy from the diet is not necessary and has many health consequences, including higher incidence of osteoporosis and increased risk of developing diabetes and hypertension. According to a study led by the American Academy of Pediatrics, clarifying lactose intolerance misconceptions at a young age is essential. The best defense against osteoporosis is to establish peak bone mass before age 27, and dairy products have been shown to provide 77% of recommended dietary calcium. In a separate study, odds of developing diabetes or hypertension were significantly reduced by increased intake of calcium from dairy foods. The dairy industry should educate lactose intolerant consumers about what lactose intolerance actually is, the health consequences of a dairy-free diet, and how they can incorporate dairy foods into their diet for their overall health. This could lead to increased per capita consumption of milk by this group of consumers.

Key Words: lactose intolerance

144 Addition of Fiber to dairy foods. R. E. Brown* and C. C. Williams, *Louisiana State University, Baton Rouge*.

Many Americans do not meet the required amount of fiber needed in the diet, with women needing 25 g and men needing 38 g per day. According to the International Food Information Council Foundation's "2010 Food & Health Survey," only 5% of Americans meet the required intake of fiber with the average person consuming about 15 g of fiber. Fiber offers a variety of health benefits including, lowering body weight, preventing diverticulitis, and preventing type 2 diabetes. These statistics are important to the dairy foods industry, because processors have now found a way to incorporate fiber into dairy products to allow more consumers to meet their daily requirements. This is possible by adding isolated fibers such as inulin to ice cream, yogurt, and milk. Inulin is a low-caloric fructo-oligosaccharide that offers a blend of short-chained and longer-chained oligosaccharides that are soluble prebiotic fibers. The addition of fiber to dairy products has been met with some opposition. Some scientists believe that fortified fibers are not beneficial to the health of consumers, and can even cause harm if too much fiber is consumed. Although, most food consumed today has been processed research shows that isolated fibers can be added to dairy food products without changing the texture or taste. Therefore, giving consumers the fiber needed to meet their daily requirements without giving up the taste of dairy products would provide an additional health benefit to those already provided by milk and dairy foods.

Key Words: dairy food, fiber, diet

145 Pulsed electric field: A novel method of dairy product processing. C. Widener* and J. Fain, *Clemson University, Clemson, SC*.

Most Americans consume some type of heat-pasteurized dairy product daily. These traditional methods require a large energy input that is difficult to reclaim or recycle. With the movement toward sustainable agricultural production systems, food processing systems will need to follow suit. As consumers become more aware of the energy costs associated with dairy product processing, the industry needs to look toward alternatives that both lower energy costs and inputs. One of these alternatives is known as pulsed electric field (PEF). Traditionally, PEF works by using small bursts of electricity to inoculate microorganisms in liquid and semi-liquid foods. PEF has been applied commercially in fruit juices, and researchers across the country and internationally have begun to study its use in dairy products. Combination of this system with thermal methods allow processors to use lower temperatures and keep a shorter time frame, around 149°F for a total of 10 s, than traditional pasteurization, and thus a lower energy input. Additionally, PEF products have experienced a longer shelf life, in some cases as high as 24 additional days, with less of a "cooked milk" flavor associated with ultra-pasteurization methods. Raw milk processed through this method also maintained larger protein micelles and fat globules than milk processed with thermal methods while also successfully degrading the enzymes that cause off flavors. Before this method could be implemented commercially, there would need to be a streamlining of parameters for both the temperature and the intensity of PEF. While there is still work and research to be done before commercial use, PEF

mixed with heat offers an energy efficient and nutritious option for the future of dairy processing.

Key Words: pasteurization, pulse electric, processing milk

146 Innovations in milk packaging. L. M. Kapanick* and D. R. Olver, *Pennsylvania State University, University Park.*

The first major development in fluid milk packaging was established at the end of the last century when the glass bottle became the most widely used container for distribution and storage. The glass bottle was the main method of milk packaging until 1933 when the first milk carton was introduced. This carton was made of wax paper and was widely used until the plastic bottle was developed in 1940. Together the plastic milk bottle and paper carton have created a wide range of containers suitable for milk packaging. Today consumers are offered more beverage alternatives, and fluid milk is being passed by in favor of other options such as bottled water. This can be seen in fluid milk consumption data. US fluid milk consumption declined 33% per capita from 1970 to 2011. New

innovations in milk packaging are being developed to help reverse this trend. Factors such as convenience, environmental impact, and product quality are at the forefront of these new packages. Manufacturers have begun to rise to meet the challenge by producing smaller milk bottles in the shapes of animals for children and offering single-serve milk bottles for on-the-go adults. New designs have been launched in Israel that are capable of keeping milk fresh for 30 d. This packaging has a specific set of coatings that creates an electrical charge that kills bacteria. As the majority of consumer economic spending power shifts from “Baby Boomers” to “Millennials,” it is crucial for the milk packaging industry to change and use methods that are appealing for the next generation. For example, a study commissioned by Tetra Pak concluded that 77% of their respondents would purchase one product over another because “the packaging would be better for the environment.” As a result, manufacturers are constructing packages made of more easily recycled materials. Factors such as attractiveness, convenience, and increased shelf life are also important to these consumers, and milk packaging manufacturers are changing their products to meet these market needs.

Key Words: milk packaging, fluid milk