

# ADSA-SAD Undergraduate Competition: Dairy Foods

**169 Nutritive value of bovine milk as compared with alternative dairy-free beverages.** S. M. Smith\* and J. M. Bewley, *University of Kentucky, Lexington.*

In recent years, many dairy-free alternative beverages have been developed and marketed to replace traditional bovine milk. Consumers now have a large variety of alternative dairy-free beverage substitutes to choose from in the grocery store. This emerging market represents a considerable and formidable competitive threat to the dairy industry. With many of these alternative beverages branded as “milk,” confusion and frustration prevails in the dairy industry and among consumers. The dairy industry must grapple with questions as to why consumers are choosing these alternative beverages. Per-capita consumption of bovine milk decreased from 24.3 gallons per person in 1994 to 20.8 gallons in 2008. Meanwhile, the alternative beverage industry is growing at a fast pace, with almond beverage sales increasing by 79% in 2011 alone. Bovine milk contains essential nutrients in suitable quantities for human consumption and milk promotes growth and bone strength in children. Bovine milk is a wonderful source of protein, calcium, fat, carbohydrates, as well as sodium and potassium. Some consumers have a negative opinion of bovine milk without any clinical or epidemiological evidence. These negative claims include that saturated milk fat is unhealthy and that bovine milk causes cancer. Moral or ethical controversies about milk also exist with regard to animal care and well-being. Health food beverage alternatives available on the market today include coconut, rice, and soy, each of which have different nutritive properties (i.e., vitamin D, calcium, carbohydrates, and potassium). Nutritional deficiencies have been documented in toddlers as a result of being fed these alternative beverages instead of bovine milk. The parents of children most often are well-educated and conscientious, while providing regular medical care. Growing children who avoided bovine milk had smaller stature and poor bone health. Some of these children even developed diseases such as rickets or kwashiorkor. Additional education and research is needed to reflect the importance of bovine milk in human diets.

**Key Words:** human nutrition, alternative dairy beverages

**170 Milk and cognitive abilities: Can dairy products work to improve your memory?** N. L. Leckie\* and C. L. Widener, *Clemson University, Clemson, SC.*

With an aging population it becomes important to research and discover possible preventative measures for geriatric diseases, such as the loss in cognitive function. This loss in function affects not only the elderly, but their family and caregivers as well. It is a frustrating and progressive disease that has a negative effect on the individual's quality of life along with an increase in their health care costs. The disease of dementia, particularly of Alzheimer's, is not well understood and the physical, physiological and psychological changes that are caused by these diseases are still being researched. Recent research has shown a surprising and encouraging correlation between daily consumption of dairy products and scoring on a cognitive test, with the highest dairy consumers having the highest scores. Even on the low-end of the consumption spectrum, consumers who ate or drank a dairy product 2 to 4 times per week performed better than those who only ate a dairy product once a week. Taking it a step further, those who drank skim or low-fat milk performed better than those who drank whole milk. Now this correlation between

dairy consumption and cognitive function can partially be attributed to the fact that the most frequent dairy consumers also indicated that they ate the most healthfully overall. However even after factoring out risk factors for cardiovascular disease, sex, demographic, lifestyle and dietary factors the relationship between cognitive function and dairy intake remained, suggesting that some factors specific to milk must directly correlate to brain function. Obviously more research needs to be conducted to determine the specific link between dairy and cognitive function, however this new information is promising for both the consumers and the dairy industry.

**Key Words:** memory, dairy foods, cognition

**171 Milk production and pasteurization: Two opposing viewpoints.** M. Sprague\* and E. L. Karcher, *Department of Animal Science, Michigan State University, East Lansing.*

In the early 1900s a case was made for enforced sanitation of milk and milk products. Diseases, such as typhoid fever, tuberculosis, scarlet fever, and diphtheria, were widespread, and out of these issues, 2 schools of thought emerged. One advocated for the pasteurization of milk, while another for ensuring the cleanliness of the product throughout the whole process as a way to prevent contamination, resulting in a “Certified Milk” product. Because of costs associated, the Certified Milk movement eventually disintegrated. Today a similar type of debate continues between the proponents of pasteurized milk and those of raw milk. Although there are states where the sale of raw milk on farm or in retail stores is legal, there are many states that allow raw milk sales under some circumstances. Several states ban the sale of raw milk, but have legalized “herd shares” or have no laws prohibiting the sale of “herd shares,” which allows consumers to pay to own a portion of an animal. The FDA states that raw milk is not a safe product for consumption. However, several unsupported claims have been made stating that raw milk prevents disease, is more nutritious, and better tasting. Research has shown that raw milk does not have any significant nutritional advantages, so the question remains, why risk public health? Enforcing standards on raw milk, like the certified program, would not guarantee the health of consumers. Whether at a state or a national level, the best approach for the entire population should be taken into account. Pathogens, such as *Salmonella*, *Escherichia coli*, and *Listeria*, make drinking raw milk, especially among at risk populations, a dangerous and unnecessary risk. Due to these safety issues of consuming raw milk, bans should be put into place on the retail or on-site sale of raw milk. Alternative options for those who wish to consume raw milk may be pasteurization but not homogenization of milk products. In addition more emphasis on consumer education about the pasteurization process is crucial if these types of raw milk bans were put in place.

**Key Words:** raw milk, pasteurization

**172 The effects of flavored milk in the cafeteria.** S. M. Vignes\* and C. C. Williams, *Louisiana State University, Baton Rouge.*

In the United States obesity has drastically increased over the past several years. The 2007–2008 National Health and Examination Survey (NHANES) states about one-third of adults are obese. Also, about 17% of children between the ages of 2 and 19 are obese. These staggering

statistics have left people searching for answers to improve the weight of Americans. One proposed answer affects the dairy foods industry because the USDA is putting forth a new rule regarding milk requirements in the school cafeteria. The new rule requires schools to serve 8 ounces of milk with lunch and breakfast. The stipulation though is that it must be low-fat or fat-free white milk or fat-free flavored milk. This rule has led some schools to consider pulling flavored milk from the menu entirely. Requiring the flavored milk to be fat free will deter some because the product will not be as satiable. The business from the chocolate milk (the most popular flavored milk) will in turn be shifted to alternative drinks such as juices or soft drinks which have more sugar and less health benefits. The fear that flavored milk is contributing to childhood obesity is misguided though. Chocolate milk contains 2–4 teaspoons of sugar which is about half of drinks that would essentially replace it. Also the benefits of flavored milk greatly outweigh the bad. Milk provides essential nutrients for a healthy body such as: calcium, phosphorous, proteins, and vitamins. A little extra sugar and fat is completely overshadowed by the benefits of continuing to serve flavored milk in the cafeteria due to the beneficial constituents of milk.

**Key Words:** flavored milk, school lunches, obesity

**173 Importance of texturants in dairy products.** H. R. Wentworth\* and D. R. Olver, *The Pennsylvania State University*.

Although most consumers recognize the importance of flavor, many do not realize the important role texture plays in determining food preferences. Poor texture can be a deal breaker, no matter how good the flavor. Different ingredients can have a significant effect on a product's texture. Texturants have a variety of functions and play an important role in the formation of dairy foods. They can assist with stability, nutritional value, and provide lower cost ingredients. Texturants function by interacting with proteins, fats, and carbohydrates. They set up a stable structure within the product to allow for easier processing and more consistency over the product's life. Commercially available texturants come in a variety of forms with specific applications, usage level and functionality. They can work together or independently to change the properties of a specific item. For example, gelatin ingredients have many functions in manufacturing dairy products. They help with the freeze-thaw stability of ice cream by changing the nature of ice crystals and also offer stability to casein in yogurt and cheeses. Acacia gum assists in mouthfeel,

stability, and added fiber. Guar gum is a hydrocolloid that can influence viscosity and enhance creamy textures in ice cream and other dairy foods. Inulin and some citrus based texturants can help reduce fat in many products without adversely affecting their sensory appeal. Processors will continue to develop products where texturants will replace more expensive and high calorie ingredients while maintaining flavor. Food scientists will discover new synergies among existing ingredients and develop additional texturants. These will provide the framework for healthier products and will allow companies to expand their market share while maintaining cost effectiveness. The continued evolution of texturant technology will benefit consumers and manufacturers through improved dairy products in the marketplace.

**Key Words:** texturants, dairy product texture

**174 Production of functional probiotic and prebiotic dairy foods.** L. Hetrick,\* D. Winston, and B. Corl, *Virginia Tech, Blacksburg*.

As people strive to lead healthy lives, more emphasis is being placed on the link between consumption of food and potential health benefits. The addition of live microorganisms to select dairy products is one way to meet this demand. Probiotics are live microorganisms that may provide health benefits when consumed including inhibition of bacterial pathogens and anti-carcinogenic effects. A symbiotic relationship with prebiotics exists; prebiotics are non-digestible food ingredients that stimulate the growth of the probiotic. In order for beneficial effects to be realized, consumption must be around  $10^6$  to  $10^9$  viable cells per day. Viability of the probiotic is affected by storage of the fortified product. These products are typically stored in plastic containers, which are highly oxygen permeable. Probiotics require low oxygen levels, creating storage challenges. The use of oxygen-removing steps or addition of oxygen-absorbing compounds are alternatives under consideration. Another factor for consideration is the appeal of the product to the consumer. Studies conducted with the addition of *Lactobacillus casei* and inulin, serving as probiotics and prebiotics, respectively, at levels of 3% inulin, found that health benefits were ensured and sensory characteristics were not altered. Consuming dairy products fortified with probiotics and prebiotics can lead to beneficial effects on intestinal microorganisms and overall health benefits.

**Key Words:** probiotics, prebiotics