

# ADSA-SAD Undergraduate Competition: Dairy Foods

**221 Chocolate milk as a sports recovery drink.** H. L. Weeks\*, D. R. Winston, and R. E. James, *Virginia Polytechnic Institute and State University, Blacksburg.*

Exercise depletes muscle tissue of energy and the body of fluids and nutrients. Athletes constantly seek the best recovery drink following exercise. However, which is best? Milk, nature's most nearly perfect food, must be included in the debate. Water replaces fluids lost during exercise, but lacks protein, vitamins, and other nutrients that chocolate milk offers. Sports drinks, like Gatorade and Powerade, replace fluid losses from sweat and are a source of electrolytes and energy such as glucose. However, excess sugar in sports drinks is not easily digested immediately after exercise. Fortunately, casein protein in milk is easily digested. Milk also contains vitamins A, B2, B12, D and E. Tryptophan in milk helps produce serotonin to reduce stress and relax muscles. Calcium strengthens bones and helps to build muscle, useful after exercise when muscles are depleted of energy. Reduced-fat chocolate milk is superior to plain milk after exercise because it includes other factors, such as caffeine and sugars. Caffeine decreases fatigue and sugar is a source of energy. Two similar studies conducted with 9 trained cyclists show that endurance athletes, like long distance runners and cyclists, were able to exercise longer before feeling fatigued. Both studies analyzed cyclists who worked until exhaustion, received one of 3 beverages during a 4-h rest period, and cycled again until exhaustion. Three cyclists were assigned to each beverage. Both studies used a fluid replacement drink (Gatorade) and a carbohydrate replacement drink (Endurox R4). One study used low-fat chocolate milk and the other whole chocolate milk, containing 2% and 3.5% fat respectively. Cyclists consuming low-fat chocolate milk became fatigued at the same time as cyclists consuming Gatorade. However, cyclists drinking chocolate milk in the second study easily exceeded the cycling time for athletes drinking Gatorade by 9 min and Endurox R4 by 11 min. Consuming reduced-fat chocolate milk after exercise is the best way to replenish fluids, carbohydrates and protein. Chocolate milk restores muscle tissue in endurance athletes better than water, sports drinks or plain milk.

**Key Words:** sports recovery, chocolate milk

**222 Dairy foods and the prevention of childhood obesity.** J. E. Anderson\* and C. C. Williams, *Louisiana State University, Baton Rouge.*

For the past decade, overweight and obesity have been on the rise, with the most significant increase occurring in children and adolescents. Overweight and obesity are defined as body mass indexes (BMI) of  $\geq 25$  and  $\geq 30$ , respectively. BMI is calculated using the equation  $\text{weight}/\text{height}^2$ , and the equation differs slightly for children. Overweight and obesity have also been shown to increase the possibility of certain diseases and health problems. The National Health and Nutrition Examination Surveys (NHANES; 1976–1980 and 2003–2006) show that for children aged 2–5 years, prevalence increased from 5.0% to 12.4%; for those aged 6–11 years, prevalence increased from 6.5% to 17.0%; and for those aged 12–19 years, prevalence increased from 5.0% to 17.6%. As a result, the National Dairy Council has partnered with the National Football League to start the Fuel Up and Play 60 program. This program incorporates good nutrition and physical activity to help children develop better lifelong habits. Studies have shown that inadequate consumption of nutrient-rich foods, specifically low-fat and fat-free dairy foods, fruits, and vegetables and whole grains, can contribute to obesity in young

adults. Three to 4 servings of dairy products per day not only promote healthy bone development but may also aid in weight loss. So, stocking the refrigerator with milk, yogurt, and cheese may make it easier to lose weight without forfeiting calories necessary for proper growth and development in children and adolescents.

**Key Words:** dairy foods, childhood obesity

**223 Understanding the ropy milk test.** R. A. Russell\* and C. D. Thompson, *University of Kentucky, Lexington.*

Ropy milk is a stringy or slimy condition of milk that is caused by bacteria that contaminate milk after leaving the udder. It also represents a source of much debate and controversy within the dairy industry with regard to the appropriateness of the test. The 2 most common bacteria believed to cause ropiness are *Alcaligenes viscolactis* and *Enterobacter aerogenes*. These bacteria are able to contaminate the milk because of improperly cleaned or sanitized areas. The bacteria can originate from both the farm and the plant. Ropiness in milk became a problem before 1920 and was resolved, but the problem has risen again in recent years. A trend to larger dairy farms is reported as one possible reason for ropiness because it takes more care and precaution to keep facilities clean. Another potential reason ropiness has reappeared is because of transporting milk longer distances. Ropiness appears in the milk about 12 h after it is removed from the cow. It normally occurs in pasteurized milk but is sometimes not observed because it is consumed before sufficient bacterial growth has taken place. While the milk may be thicker than usual, flavor does not differ. Another reason it may not be detected is that many of the organisms that cause ropiness grow slowly at refrigerated temperatures. Testing of milk for ropiness can be done by incubating a small sample of the milk at temperatures of 15 to 22°C for 24 to 36 h. After the allotted time, to test for ropiness, a wooden stick can be inserted into the milk looking for a stringy condition. Instead of using the wooden stick, the milk could also be slowly poured from the vial looking for strands of rope or slime. Bacteria that cause ropy milk have been found in bedding, cooling tanks, barnyards, pastures, pipe lines, and milk cans. These bacteria may originate from farms or milk plants. Thus, the key to keeping ropy milk from becoming a problem is proper cleaning and sanitizing of facilities. Controversy around the ropy milk test centers on concerns that the repeatability of the test, using clean equipment, has been low.

**Key Words:** ropy milk, ropiness, milk quality

**224 Conjugated linoleic acid in milk is related to the diet of lactating dairy cows.** H. L. M. Tucker\* and E. L. Karcher, *Department of Animal Science, Michigan State University, East Lansing.*

Conjugated linoleic acid (CLA) is a naturally occurring fatty acid in milk that has beneficial human health properties. Researchers are interested in increasing *cis-9, trans-11* CLA in milk. Implications to enhance *cis-9, trans-11* CLA in milk are to decrease the risk of heart disease, cancer, and diabetes in humans. Sources of CLA include mixed grains, vegetable oils, and animal products. However, concentrations of CLA are higher in dairy products and products made from other ruminant animals (Beaulieu, 1998). Manipulation of the diet of dairy cows may be one way to increase concentrations of CLA in milk. The addition of 0.5% fish oil and 2.5% oil from extruded soybeans to the diet of lactating dairy cows caused a 3.5-fold increase of *cis-9, trans-11* CLA in milk fat

(AbuGhazaleh et al., 2006). Management practices may also influence CLA concentrations. For example, pasture grazed cattle produce more CLA compared with grain fed cattle. Dairy cows grazing pasture and receiving no supplemental feed had a 500% increase of CLA in milk fat compared with cows fed typical lactating cow rations (Dhiman et al., 1999). The dairy industry can potentially market products with increased concentrations of CLA to human consumers. The products made from milk with increased CLA have similar properties when compared with non-enriched products. Butter from enriched milk has comparable spread ability and storage temperatures (Jones et al., 2005). The opportunity to enrich products with CLA without compromising on taste and texture represents an opportunity for a niche market. This market may increase revenue for the dairy industry by appealing to consumers who want healthier products and do not want to change their eating habits.

**Key Words:** conjugated linoleic acid, pasture

**225 Using microfiltration to extend milk shelf life.** E. W. Cloninger\*, *Pennsylvania State University, University Park.*

The goal of the United States dairy industry is to sell a wholesome, nutritious product. To accomplish this goal, the industry must remain economically competitive. Shelf life stability can offer a competitive advantage. Pasteurization using the ultra-high-temperature (UHT) method achieves the desired extended shelf life but has the undesirable consequence of a cooked flavor. As a result, membrane processes such as microfiltration (MF) have led to new advancements in the dairy processing world by providing a lower temperature option that allows for minimal flavor changes while extending shelf life. MF is defined as the passage of products under relatively low pressure through a semi permeable membrane with pore size ranging from 0.2 to 5  $\mu\text{m}$ . It is because of this small pore size that contaminants such as bacteria can be filtered out. According to a study conducted at Cornell University, MF was shown to significantly decrease total bacterial counts by 3.79 logs. The study also found that MF reduced the SCC in the milk permeate to undetectable levels. It also showed that microbial shelf life was extended to more than 92 d when MF was used in conjunction with HTST pasteurization. Although MF did decrease the bacterial population, the rate of proteolysis that contributes to off-flavors during refrigeration was not seen to be reduced. MF has already been commercially used by companies in Canada and the United Kingdom. These 2 companies promote the fresh taste, nutritional quality, and long-shelf life of their milk. Additional research will show more uses for MF in improving

milk quality. In summary, combining MF with current technologies can maintain a nutritious, wholesome product while extending milk's shelf life.

**Key Words:** microfiltration, shelf life

**226 Reducing milk price volatility through innovative programs at the local and global level.** W. Robinson\*, *Clemson University, Clemson, SC*

The sustainability of dairy marketing has been the primary question on the minds of dairy farmers across the globe. Record low milk prices have severely plagued the dairy industry especially during 2009. This trend of unstable marketing in the dairy industry has endangered the future of many dairy producers at an international level. Though decreased milk prices have exposed many dairy farmers to the possibility of bankruptcy, many innovative programs have been introduced to the industry to counteract these causes and therefore prolong the futures of many dairy producers. The programs created to ensure survivability of dairy marketing are comprised of both governmental and private innovations. Smaller scale, grass-roots, programs are typically constructed and operated by private producers and companies within the dairy industry. Some of the practices involved with these small scale programs focus on many aspects of niche marketing such as practicing methods of organic farming, producing products of specialized quality, processing and marketing products on-farm, as well as utilizing free-range grazing. The governmental innovations which have been discovered and are now practiced to fight the epidemic of unstable milk prices and include both single and united governmental plans which are used internationally. Single governmental plans include such programs as Cooperatives Working Together (CWT), Component Pricing, as well as the Hayvanciligi Destek program. Furthermore, the united plans regarding governmental innovations to reduce instability in milk prices include specialized marketing networks as the North American Free Trade Agreement as well as marketing techniques currently utilized by the European Union. Through active involvement in one or more of these programs dairy producers are learning how to overcome the epidemic of low priced milk and maintain their livelihood in the dairy industry. These practices also allow for a greater degree of security in milk prices and greater opportunity for the marketing of US dairy products in the future

**Key Words:** CWT, government programs, milk price