ADSA-SAD UNDERGRADUATE STUDENT PAPER COMPETITION: ADSA-SAD UNDERGRADUATE PRESENTATIONS—DAIRY FOODS

014 Dairy Fats: The good, the bad, and the ugly. H. Potts*, B. A. Corl, and D. R. Winston, *Virginia Tech, Blacksburg.*

Consumers have a misinformed, negative perspective of dairy products because of their fat content, specifically the "bad" saturated fats and "ugly" trans fatty acids. However, dairy fats also contain a valuable "good" fat that does not show up on a nutrient label: conjugated linoleic acids (CLA). Conjugated linoleic acids are biologically active isomers of linoleic acids, a type of trans fatty acid, which have been studied for their possible health benefits. The 2 most abundant CLA isomers are the cis-9, trans-11 isomer and trans-10, cis-12 isomer, and are found in significant concentrations in high fat dairy products, such as full-fat milk, cheese, and butter. Research began when the anti-carcinogenic properties of CLA were discovered. Then, it was looked at as a possible weight loss mechanism and more recently the research has focused on CLA's possible effects in preventing cardiovascular disease. Animal and human studies on CLA's effects related to major components of cardiovascular health, including heart disease, cholesterol levels, and high blood pressure, have shown that consumption of high levels of CLA can lead to a decrease in many cardiovascular risk factors. Pintus et al. showed that a dietary intervention of CLA-enriched cheese lowered LDL cholesterol by 7% in 42 adult volunteers. Further studies demonstrated that CLA consumption was nearly as effective in humans as taking certain hypertension drugs. However, current CLA intake in different countries shows that consumers are only eating minor amounts of CLA. Current negative consumer perspectives on dairy fats need to be changed so consumers will include these beneficial dairy fats in their diets at levels high enough to receive cardiovascular health benefits. The main way to accomplish this is through educating the American consumer on where to find these "good" dairy fats and how to get their associated health benefits. The best consumer education will be accomplished through media advertisements and including information regarding CLA on dairy product labels and packaging.

Key Words: cardiovascular health, conjugated linoleic acid, fats

0015 Differences in bovine and caprine cheese production. K. Wolf* and J. M. Bewley, *University of Kentucky, Lexington.*

The dairy goat cheese market is the primary milk-based income source for dairy goat producers. Efficient cheese production is more challenging with goat milk than cow milk. These challenges arise from structural and molecular characteristics unique to goat milk. Goat milk has a lower pH than cow milk, which results in differences in the acidification process for initializing curd formation. Another factor is the smaller fat globules of goat milk, which result in a natural homogenization effect and greater difficulty in separating smaller particles. Less particle separation results in lower cheese yields. Possibly the most significant difference is seen in the α S1-casein frequencies across the goat population when compared with the cow population. Casein is the major protein in milk and is essential for cheese production. The primary casein subclasses are α and β caseins. In cow milk, the α caseins are more prevalent than any others, whereas in goat milk β caseins are more typically observed. Alpha S1-casein, in particular, is associated with higher solids non-fat content than any other casein class, but it is among the least common goat milk proteins. This means lower cheese yield because the most important cheese protein is not the most prevalent in goat milk. Presence and frequency of α S1-casein is primarily genetic with 17 alleles identified. Further variation in α S1-casein expression exists among dairy goat breeds, with the Swiss breeds expressing the weakest α S1-casein alleles compared with African and American breeds, which have a higher α S1-casein frequency. The breed relationships to cheese proteins suggest that the first step in achieving good cheese yields is selecting goats of the correct breeds. Additional problems to be combatted are the higher SCC seen in goats compared with cows, reducing curd formation ability, and a greater variation in diet with most goat herds compared with cow herds, which can cause inconsistent yields, textures, and flavors. Cheese recipes can be modified to optimize yield from goat milk by adding more rennet, using less starter, and maintaining a lower temperature during the cheesemaking process.

Key Words: α S1-casein, cheese, goat

0016 Do current regulations for raw milk cheeses ensure consumer safety? C. T. Redding*, K. H. Ingawa, and S. P. Washburn, *North Carolina State University, Raleigh.*

Raw milk cheeses are made from milk that is not pasteurized nor homogenized, and it is currently legal in the United States to sell raw milk cheeses that have been aged for at least 60 d. In some studies, raw milk cheeses have been documented to have more intense flavor than pasteurized cheeses and variations in diets with various pasture species can also affect flavor. In a preference study, 890 consumers sampled Cheddar and Gouda cheeses made from either raw milk or pasteurized milk. A majority of the consumers preferred raw milk cheese, even though many of them either were not sure or had considered raw milk cheeses to be less safe. However, there can be situations in which pathogenic organisms or resulting toxins could survive the aging process. One study investigated 8

pathogens that were intentionally injected into raw milk that was then used to make Swiss hard or semi-hard cheeses. The study showed hard cheeses to be free of inoculated pathogens 1 wk after production. The semi-hard cheeses were free of most pathogens and toxic metabolites, except for *Listeria monocytogenes*, which had survived the manufacturing and ripening processes. A recent study that used milk spiked with various strains of *E. coli* resulted in detection of *E. coli* in almost all cheeses at the end of the 16-wk ripening period, which could be a food safety issue. In contrast to studies in which pathogens were injected into milk, most raw milk produced for small scale artisan cheesemaking in Vermont was of high microbiological quality with no detectable target pathogens in the cheese. Aging for 60 d seems effective for eliminating or reducing most pathogens, but frequent testing to ensure milk is pathogen free before making cheese is recommended.

Key Words: food safety, pathogens, raw milk cheese

0017 Applications for functional dairy starter cultures.

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Bacteria starter cultures are large numbers of cells of microorganisms that are used to initiate a fermentation process in certain foods, such as cheese, yogurt, butter, sourdough, and fermented meats. Certain bacterial strains can be selected or genetically modified to exhibit functional properties that enhance the foods they help produce. For instance, specific strains of bacteria can be used to combat the growth of *Listeria monocytogenes* and other pathogenic microbes. Maisnier-Patin et al. demonstrated that starter cultures containing nisin-producing subspecies of *Lactococcus lactis* were able to control growth of *Listeria monocytogenes* while maintaining suitable pH for Camembert cheese development. This may have importance in raw milk cheese production. Consumers often prefer the interesting flavors offered by these cheeses but have concerns about the health risks of consuming raw milk products. Additional types of functional bacteria starters have the potential to improve the sensory qualities of cheese. Guldfeldt et al. used genetically modified strains of *Lactococcus lactis* to improve flavor and reduce bitterness in Cheddar cheese. Other functional starters have been used to speed up the maturation process of cheese aging and prevent over acidification in yogurt. Functional starter cultures offer the opportunity to produce wholesome, safe products with enhanced sensory properties and probiotic qualities desired by consumers.

Key Words: cheese, functional starter culture