Creating Health Conscious Cheese
Attempting to Capture Original Flavor of Full-Fat Cheese

Introduction

Many Americans have cut back to eating only reduced-fat and fat-free foods, including cheese. “The amount and type of fat consumed is important to the etiology of several chronic diseases such as obesity, cardiovascular disease and cancer. As a result, consumers more readily adhere to nutritional guidelines concerning fat consumption” (Küçüköner & Haque, 2006, p. 166). But fat-free and reduced-fat products do not have the equivalent taste as full-fat products. Banks (2004) stated that “First-generation low-fat cheeses, especially low moisture ripened varieties, were generally characterized as having texture and flavour notes that were atypical of the equivalent full-fat cheese” (p. 200). To please consumers, dairy researchers devised new methods for creating healthful cheese that has comparable taste to full-fat cheese. Each innovative method creates a new possibility in the food technology field.

Purpose

The intent of this brief is to explain four methods of creating healthful cheese while maintaining original full-fat flavor. Results and benefits from each method are discussed.

Four Methods

Four methods have been created to manufacture reduced-fat cheese that has comparable taste and texture to full-fat cheese. Whetstine Carunchia, Drake, Nelson, and Barbano created the Novel Fat Removal Method in 2006. The Ultrafiltration Method was reviewed by Agrawal and Hassan. The Fat Mimetics Method was reviewed by Banks in 2004. Dabour, Kheadr, Benhamou, Fliss, and LaPointe created the Exopolysaccharide Method in 2006. The following paragraphs will discuss the methods in further detail.

Novel Fat Removal Method

Whetstine et al. (2006) stated that the flavor release is different in the mouth with reduced-fat products than in full-fat products because hydrophobic flavor compounds have a higher sensory threshold in oil than they do in water. When fat molecules are extracted from milk before cheese is made, there are less fat molecules for the sensory compounds to bind to, resulting in a lack of flavor in reduced-fat cheese.

Nelson and Barbano (2004) preceded Whetstine et al. (2006) and designed a method that physically removed the fat content from full-fat aged cheddar cheese after it had been processed. Full-fat cheddar cheese contains the full maturity of flavor, and by extracting the fat after the cheese has aged, the researchers theorized that the non-fat cheese would retain the original flavor, thus making low-fat or fat-free cheese comparable in taste to full-fat cheese. The process was constructed as follows: For the extraction method, the researchers selected three samples of palatable full-fat cheddar cheese. The cheese was grated, weighed, and placed in separate bottles with a combination of volatile compounds. Each bottle was mixed for 30 minutes by a Roto mix and centrifuged for ten minutes, which allowed the fat to separate from the cheese. The cheese, after a purification-like process,
was served to a panel of 12 to evaluate the flavor.

**Ultrafiltration Method**

The second method, conducted by Agrawal and Hassan (2007) involved the process of ultrafiltration of milk to remove the bitter taste of low-fat cheese. “Ultrafiltration is a molecular sieving, pressure-driven membrane separation process that allows molecules with molecular weights less than 10,000 to pass through the membrane along with water, while fat, protein, and insoluble salts are retained” (Agrawal & Hassan, p. 3110). The process removed extra moisture in the reduced-fat cheese and compressed the flavors to create cheese that maintained the original flavor of full-fat cheese.

**Fat Mimetics Method**

The third method focused on the criticism that reduced-fat cheese is too dry and lacks a creamy texture. Banks (2004) stated that fat mimetics, or water-dispersible fat replacers, can help solve this problem. “Fat mimetics consist mainly of microparticulated whey protein or carbohydrate-based materials. They mimic the properties of fat by entrapping water and giving a sense of lubricity and creaminess” (Banks, p. 203). Fat replacers improved the dry, low moisture cheese by creating a smooth, more pliable consistency that was more palatable to consumers.

**Exopolysaccharide Method**

The fourth method used an Exopolysaccharide-producing culture to help improve structure and texture of cheese. “Textural attributes are believed to be important criteria in determining the identity and quality of a cheese and its consumer acceptability. The texture and fracture properties of a cheese are largely determined by the nature and arrangement of its structural network” (Dabour et al., 2006). Exopolysaccharide acted comparable to a gum. It helped glue the cheese particles together. The increased Exopolysaccharide improved the pliability of the cheese.

**Results**

The four methods had a positive impact on the processing of reduced-fat and fat-free cheese. As theorized in the first method of removing fat from already processed cheese, there were only slight differences in taste between the full-fat and reduced-fat cheese. The process allowed the researchers to remove 50 percent of the fat from the full-fat cheddar cheese, while maintaining the same nutty flavor of the original block of cheese. The reduced-fat cheese made from the fat removal process was also softer and had a comparable melting profile to full-fat cheese (See Figures 1 and 2).

![Graph](image.png)

*Figure 1. Typical melting outline of fat from full-fat Cheddar cheese.*

The ultrafiltration process helped diminish the bitter and unpleasant taste from reduced-fat cheese by squeezing all of the extra tasteless liquid from the cheese contents. Fat mimetics had success in improving the dry texture of the reduced-fat cheese to a creamier, more elastic consolidation. An addition of Exopolysaccharide to cheese improved the texture by increasing the malleability and softness of the cheese composition.

Discussion

Removing fat from cheese still has one problem. Fat is the cushion in cheese. It consolidates each particle and helps emulsify the combination. According to Küçüköner and Haque (2006), “Fat influences the body and texture of cheese by filling interstitial spaces in the protein and mineral structural mesh and also contributes to the cheese’s overall flavour quality” (p. 166). Banks (2004) stated that although fat mimetics can improve the consistency of reduced-fat cheese, the process cannot fully replace fat molecules as they do not have the ability to transport flavor like fat does. Cheese that is healthful and still palatable is a great contribution to the dairy industry. But with new technologies come new expenses. Innovative technology takes time perfect in production. Special attention in procedures involving the injection of live cultures need to be monitored and consume more workers to make sure the procedures go as planned. Processing new equipment would be expensive. To offset the new costs, the price of the healthful cheese would rise to offset the overhead costs. Problems previously mentioned could prevent consumers from purchasing the product.

Conclusion

Each method was built off another idea for creating healthful and flavorful cheese. It is plausible that in the near future, all of the concerns for reduced-fat cheese will be solved with new technology like the innovative methods mentioned in this brief. Dairy research would allow consumers to enjoy their cheese without feeling guilty from the high fat content. The research would also benefit producers who value high-quality products. Sales in low-fat cheese would likely increase as well. Producers must take risks to create products that meet the consumers need.

The four methods used in the dairy industry may have an impact on other processed food producers. For example, peanut butter is commonplace in America. It is considered nutritious because of the high protein content. But the fat content is roughly 16 grams per serving, which is more than half of the average person’s suggested fat intake. Producers in the peanut butter industry might be able to expand upon the dairy industry’s research. America could soon be on the way to eating nutritious and delicious food with the onset of dairy research.

Figure 2. Typical melting outline of fat from reduced-fat Cheddar cheese produced by the fat removal process.

References


