Effect of Phospholipids on Butter Texture

What is this research about?
Depending on how butter is made, fat molecules can either be in a continuous phase, dispersed freely throughout the butter, or trapped as globules within a complex framework called "milk fat globule membranes" (MFGMs). Phospholipids are molecules that have both water attracting and water repelling properties. Phospholipid concentrations within the MFGM framework affect the texture of butter. This study is designed to find the concentrations of phospholipids in an MFGM framework required to create an optimal butter product.

What did the researchers do?
The researchers spun raw milk in a centrifuge to increase the concentration of fat, creating a high fat plastic cream with a texture much like modelling clay. Anhydrous milk fat (AMF), which is milk fat that has had its water removed, was tested for phospholipid concentrations using spectrophotometry, a technique that measures light transmission through a substance. The AMF was combined with the plastic cream and skim milk in various amounts so the amount of free fats to globular fats trapped within a MFGM framework differed between samples. Milk fat crystal formation within the samples was assessed using various microscope techniques.

How can you use this research?
Food Producers can use this research to better control the texture of foods containing milk fats.

Keywords:
Phospholipids, milk fat, butter
Phospholipid concentrations affect the formation and structure of milk fat crystals, thereby changing the texture of butter.

What did the researchers find?
Mixtures containing AMF and skim milk created large, dense, spherical crystals. These large spherical crystals could be made smaller by supercoiling, a technique that lowers the sample temperature below its freezing point without it forming ice crystals. Adding globular fats increased the phospholipid concentration, and resulted in the spherical crystals breaking into finer needle-like structures. However, adding too much globular fat resulted in butter containing pockets of water and an unpleasant appearance and texture. Therefore, the amount of phospholipids within butter needs to be controlled to create butter with optimal crystal structures for product quality.

What you need to know:
Phospholipid concentrations affect the formation and structure of milk fat crystals, thereby changing the texture of butter.

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