

# SYMPOSIUM: METHODS OF ALTERING MILK COMPOSITION

## Altering Milk Composition – An Introduction

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Recent trends in milk production and consumption clearly indicate 1) consumer concern about health implications of animal fat and an increased demand for "light" or low fat products, 2) more milk is used for manufacturing cheese and other dairy products, 3) strong interest for standards of identity with higher nonfat solids in fluid milk products, and 4) multicomponent milk pricing systems, depending on how milk is utilized. It is well-recognized that composition, yield, and quality of cheese are dependent on milk composition. Consequently, there is increased interest in manipulating milk composition by a variety of means, ranging from selective feeding to mechanical partitioning of a particular milk component as in ultrafiltration.

The objective of this symposium is to review the current knowledge of various methods of altering the composition of milk, which includes on-farm management of several factors as well as milk processing. Therefore, expertise from both production and dairy foods areas is involved. Producers need economic incentives to alter milk composition on the farm. They are receiving these incentives in increasing numbers from processors, thus creating a real interest in methods of managing components on the farm. However, altering composition at the processing stage may have advantages in cost efficiency and flexibility of product usage. In addition, current work on development of pharmaceutical uses of milk may lead to new uses of the dairy cow. This symposium gives us an opportunity to bring together current knowledge from several disciplines to crossfertilize

and assess the efficiencies of the methods available to alter milk composition for the benefit of the consumer, dairy producer, and processor.

D. H. Hettinga, Land O'Lakes, Inc., Minneapolis, identifies and discusses a variety of factors influencing the composition of milk. He examines economic, regulatory, and consumer aspects of need for altering milk composition. Efficient use of milk as raw material in processing, particularly cheese making, depends on its fat and protein composition.

It has been recognized for many years that milk composition and yield are influenced by nutritional manipulation. J. D. Sutton, AFRC Institute for Grassland and Animal Production, Hurley, England, identifies a number of nutritional factors including energy, protein, fiber, and fat sources that influence milk composition. Altering diet is one of the most controllable and quickest on-farm methods available for altering milk fat and protein.

The long-term, permanent way to alter milk composition is by genetic selection. In discussing altering milk composition through genetic selection, J. P. Gibson, University of Guelph, Ontario, Canada, indicates that "genetic alteration of milk composition is likely only if economic incentives for such change exist". Selection indexes of dairy cattle for altering milk composition should include costs of production and the reduction of animals needed due to increased production per animal.

R. D. Bremel, University of Wisconsin, Madison, discusses the molecular genetics approach for altering milk composition. He indicates that "through genetic engineering it is now possible to make substantial changes either in the composition of milk or to produce entirely new products in milk".

Several new technologies for processing milk and whey to alter their composition have been introduced in the dairy industry. Mem-

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brane processes, such as reverse osmosis and ultrafiltration, are pressure-driven separation techniques that use semipermeable membranes of selective permeability. These methods are based on the principle that certain components will be capable of passing through the membranes while others will not be capable of doing so, depending upon the size of the molecule and permeability of membrane. Recent applications of membrane processing include 1) on-farm filtration of milk for concentrating solids, 2) removal of lactose from milk and cheese whey, and 3) concentrating protein from whey in the manufacture of whey protein concentrates.

Another technology, supercritical extraction of cholesterol from milk fat deals with removal of cholesterol from milk fat. R. L. Bradley, Jr., University of Wisconsin, Madison, reviews this technology and discusses its potential applica-

tions of manufacturing low cholesterol butter.

The composition of milk, particularly fat, protein, and casein, vary considerably due to genetic, environmental, and physiological factors. Quantitative methodology for breeding and selection, nutritional manipulation, and genetic engineering techniques are applicable to alter the milk composition to a certain degree. The question is not why milk composition should be altered, but rather how to alter which component in an efficient and economical manner. Through this symposium, participants hope they have been able to provide a basic review and a current update on various aspects of altering milk composition.

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