



Production of Milk Protein Concentrate with Energy and Environmental Savings and Reduced Equipment Needs

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improved method for producing milk protein concentrate that requires less equipment, reduces energy use and environmental impact and offers labeling advantages as compared to convention processes.

Overview

Skim milk powder, which consists of lactose, protein and other small nutrients, provides a means for storing and moving surplus skim milk. It conventionally has been used for protein fortification of formulated food products. However, the use of skim milk powder in many food applications is limited because its high lactose content can potentially jeopardize the quality of the final product through lactose crystallization.

Milk protein concentrate provides an alternative dried milk protein product. As compared to skim milk powder, milk protein concentrate contains reduced amounts of lactose but a similar ratio of casein and whey proteins. Its manufacture is similar to that of skim milk powder, with the addition of methods such as ultrafiltration to reduce the content of lactose, minerals, small molecules and water prior to evaporation. These additional processing steps require additional equipment, increase use of water and energy, produce more wastewater and increase operating expense.

The Invention

UW-Madison researchers have developed a novel approach for removing lactose from skim milk and other dried milk-derived products that reduces energy use and environmental impact. First, milk is concentrated under conditions that encourage the growth of large lactose crystals. The mixture is spray dried to form a powder, which contains small aggregates of proteins mixed with small molecules and large lactose crystals. The mixture then is sorted by particle size in a high speed air classifier, which uses an air stream and centrifugal forces to separate particles by shape, size and density. This method will produce a product with the same chemical and physical characteristics as moderately fortified milk protein concentrate, as well as a co-product with increased lactose content.

Applications

- Production of dried, protein-fortified milk products with reduced lactose content that can be used as protein fortifiers in various food applications where increased milk protein is desired, including natural mozzarella cheese and processed cheese
- Production of a second product with high lactose concentration where increased lactose is desired, including infant formula and export sale of skim milk powder to international markets

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- Utilizes existing skim milk powder drying equipment without requiring ultrafiltration, diafiltration or additional drying equipment



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- Provides a dried milk protein concentrate product with altered hydration rates, which is of increasing usefulness
- Produces dried, protein-fortified milk products that are physically and chemically similar to dried milk protein concentrates
- Produces a milk protein concentrate with Class I (superior) nutrient retention and Third Group (inferior) nutrient reduction such that the use of the phrase "Protein-Fortified Skim Milk Powder" may be allowed by the FDA for labeling of CFR defined foods made with this product

Tech Fields

- [Animals, Agriculture & Food : Food ingredients & additives](#)
- [Animals, Agriculture & Food : Food processing](#)

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