DAIRY FOODS SYMPOSIUM: MILK PROTEIN-HYDROCOLLOID INTERACTIONS: RECENT IMPACTS

0253 Exopolysaccharides from lactic acid bacteria—A world of opportunities. A. Hassan*, *South Dakota State University, Brookings*.

Exopolysaccharides (EPS) are polysaccharides secreted outside the cell wall of microorganisms. Exopolysaccharide-producing lactic acid bacteria are used to modify the textural and functional properties of fermented milk. The selection criteria of EPS-producing cultures depend on the desired physical properties of the fermented product. Exopolysaccharides provide functions that also benefit reduced-fat cheeses. They bind water and increase the moisture in the nonfat portion, reduce rigidity, and increase viscosity of the serum phase. Whey, the cheese byproduct, is concentrated or fractionated by membrane separation, and dried to produce a variety of products. The residual EPS in cheese whey have been demonstrated to enhance the functional properties of whey protein concentrate. On the other hand, application of EPS-producing cultures in cheese making may impact biofouling of whey filtration membranes. Exopolysaccharide can either enhance or prevent biofilm formation, depending on their characteristics and interaction with the membrane surface. Fermented milks made with some EPS-producing strains have also shown chemopreventive effects against azoxymethane-induced tumors in rats. In conclusion, EPS from lactic acid bacteria can improve body and texture of dairy products and modify functionality of whey protein concentrates. As functional foods are gaining popularity, EPS as natural chemopreventive agents become an attractive choice.

Key Words: lactic acid bacteria, exopolysaccharides, functionality, dairy

0254 A tale of in-body magnetic resonance imaging of foods and gut feelings. L. Marciani*, *University of Nottingham, Nottingham, United Kingdom.*

Assessment of the behavior and transit of food materials in the human gastrointestinal (GI) tract adds value when manipulating food design and improves the understanding of satiety mechanisms. Previous methods to assess the macroscopic, physiological impact of foods in the GI tract were invasive, used ionizing radiation and had a number of other limitations. Magnetic resonance imaging (MRI) is a non-invasive, high resolution, dynamic imaging technique that is developing rapidly in this field. MRI can provide in-body imaging of food materials and assess gastric emptying, intestinal fluid volumes and the colonic response in combination with other physiological and behavioral techniques. This paper presents an overview of the technique with specific examples from human healthy volunteers' studies using fat emulsions, hydrocolloids, milk-based products, poorly digested carbohydrates and dietary fiber supplements.

Key Words: MRI, in vivo, human

0255 Functionality and structure of hydrocolloids in dairy foods. H. D. Goff*, *University of Guelph, Guelph, ON, Canada.*

Stabilizing gums, e.g., guar or cellulose gum or modified starches, have been used in dairy products such as yogurts and ice cream mix for many years, for thickening and enhanced eating pleasure and for enhanced stability and shelf-life. Some unique gums rely on specific milk protein interactions, e.g., carrageenan in chocolate milk or pectin in acidified milk beverages. Many of the polysaccharide stabilizers are incompatible with milk proteins, particularly casein micelles, and carrageenan plays a unique role in inhibiting phase separation. While this body of knowledge regarding "traditional" usage of hydrocolloids is well established, there has been much research to expand the understanding and scope of hydrocolloid utilization in dairy products. Novel dairy products have been introduced into the markets, an example could be squeezable-tube products, and these products create unique demands for physical functionality, which leads to creative product development in the application of hydrocolloids. Novel hydrocolloids, particularly from agricultural by-products such as flaxseed gum or soy soluble polysaccharide, are continually being examined for potential applications. Hydrocolloids have been shown to form complexes with both casein and whey proteins under certain conditions of processing, and these complexes offer potential for new structures in dairy products. Hydrocolloid addition is also being viewed for health benefits, as most are soluble dietary fibers. Hydrocolloids in dairy products offering enhanced glycemic index reduction is an area of exciting research and product development potential, particularly in the light of rapidly rising Type II diabetes rates in the population. Hydrocolloids such as sodium alginate can also help to confer post-prandial satiety, which may present another opportunity for dairy product positioning in the context of rising rates of obesity in the population. Given this growing demand for more functional and nutritional foods, it is critical that opportunities from within the hydrocolloids sector continue to be exploited in dairy products.

Key Words: stabilizers, functionality, dietary fiber

0256 Impact of starch on milk protein functionality in food applications. M. E. Yildiz*, *Ingredion, Bridgewater, NJ.*

Dairy foods are increasingly formulated with several functional ingredients such as milk proteins, starch and hydrocolloids. Functional ingredients provide several key properties to dairy foods, including process robustness, texture, eating quality and shelf stability. Starch has been a very important component of dairy foods including yogurt, cheese and dairy beverages. To formulate consumer winning dairy products, it is very important to understand the mechanisms and interactions as well as true synergies between functional ingredients. However, both starch and milk proteins are very complex and shedding light to the precise nature of the starch-milk protein interactions requires fundamental studies focusing on physic-chemical properties of starch and milk proteins, starch base and granular nature (intact vs. fragmented/solubilized), starch surface properties (protein content/location, etc.) to list the few key points. Additionally, it is very important to understand the processing parameters such as temperature and pressure on starch-protein interactions. In this presentation we will review the current understanding of starch-protein interactions. We will discuss the impact of starch base (waxy corn, tapioca and dent corn) on bulk properties of fermented dairy products, and relate the starch gelatinization temperature, granular integrity, process temperature and pressure on starch protein interactions and bulk properties of fermented dairy products. We will also discuss the instrumental and sensory measurements of observed behavior and propose mechanisms of starch impact on protein functionality.

Key Words: starch, dairy, yogurt, processing, protein, interactions