Natural Texturizers for Dairy Products: A Literature & Supplier Study

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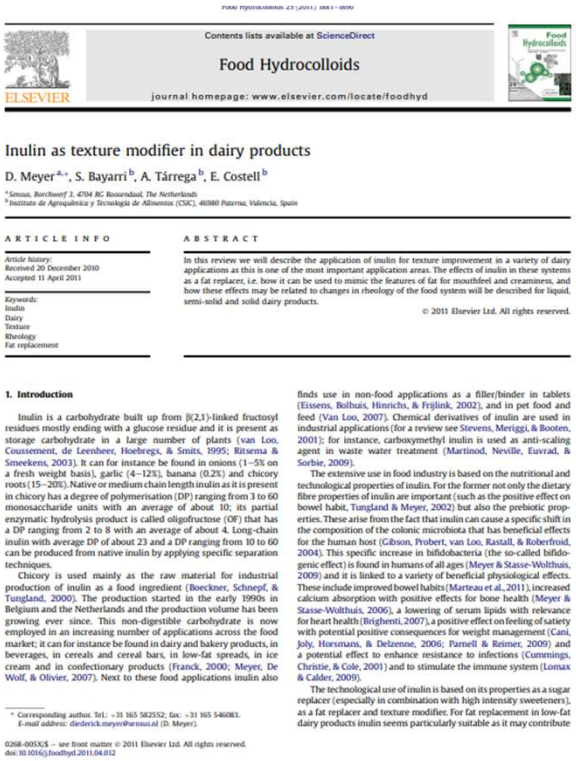
Background

Consumers increasingly demand dairy products with a creamy, indulgent texture while expecting clean-label formulations. However, traditional texture enhancers like modified starches or artificial gums are no longer acceptable to many health-conscious buyers. This has created a need for natural, multifunctional ingredients that can deliver similar performance.

Problem Statement

- To explore and identify natural, clean label ingredients to improve texture (mouthfeel, creaminess) of dairy based products (cheese, yoghurt etc) in literature studies
- To identify potential suppliers for clean label ingredients that helps in texture of dairy based products for future collaborations and partnerships

Inulin/Chicory root fiber



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Inulin as texture modifier in dairy products

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ABSTRACT

In this review we will describe the application of inulin for texture improvement in a variety of dairy applications as this is one of the most important application areas. The effects of inulin in these systems as a fat replacer, i.e. how it can be used to mimic the features of fat for mouthfeel and creaminess, and how these effects may be related to changes in rheology of the food system will be described for liquid, semi-solid and solid dairy products.

1. Introduction

Inulin is a carbohydrate built up from β(2,1)-linked fructosyl residues mostly ending with a glucose residue and it is present as storage carbohydrate in a large number of plants (van Loo, Coussement, de Leenheer, Hoebregs, & Smits, 1995; Ritsema & Smeekens, 2003). It can for instance be found in onions (1–5% on a fresh weight basis), garlic (4–12%), banana (0.2%) and chicory roots (15–20%). Native or medium chain length inulin as it is present in chicory has a degree of polymerisation (DP) ranging from 3 to 60 monosaccharide units with an average of about 10; its partial enzymatic hydrolysis product is called oligofructose (OF) that has a DP ranging from 2 to 8 with an average of about 4. Long-chain inulin with average DP of about 23 and a DP ranging from 10 to 60 can be produced from native inulin by applying specific separation techniques.

Chicory is used mainly as the raw material for industrial production of inulin as a food ingredient (Boeckner, Schnepf, & Tungland, 2000). The production started in the early 1990s in Belgium and the Netherlands and the production volume has been growing ever since. This non-digestible carbohydrate is now employed in an increasing number of applications across the food market; it can for instance be found in dairy and bakery products, in beverages, in cereals and cereal bars, in low-fat spreads, in ice cream and in confectionary products (Franck, 2000; Meyer, De Wolf, & Olivier, 2007). Next to these food applications inulin also finds use in non-food applications as a filler/binder in tablets (Eissens, Bolhuis, Hinrichs, & Frijlink, 2002), and in pet food and feed (Van Loo, 2007). Chemical derivatives of inulin are used in industrial applications (for a review see Stevens, Meriggi, & Booten, 2001); for instance, carboxymethyl inulin is used as anti-scaling agent in waste water treatment (Martinod, Neville, Euvrad, & Sorbie, 2009).

The extensive use in food industry is based on the nutritional and technological properties of inulin. For the former not only the dietary fibre properties of inulin are important (such as the positive effect on bowel habit, Tungland & Meyer, 2002) but also the prebiotic properties. These arise from the fact that inulin can cause a specific shift in the composition of the colonic microbiota that has beneficial effects for the human host (Gibson, Probert, van Loo, Rastall, & Roberfroid, 2004). This specific increase in bifidobacteria (the so-called bifidogenic effect) is found in humans of all ages (Meyer & Stasse-Wolthuis, 2009) and it is linked to a variety of beneficial physiological effects. These include improved bowel habits (Marteau et al., 2011), increased calcium absorption with positive effects for bone health (Meyer & Stasse-Wolthuis, 2006), a lowering of serum lipids with relevance for heart health (Brighenti, 2007), a positive effect on feeling of satiety with potential positive consequences for weight management (Cani, Joly, Horsmans, & Delzenne, 2006; Parnell & Reimer, 2009) and a potential effect to enhance resistance to infections (Cummings, Christie, & Cole, 2001) and to stimulate the immune system (Lomax & Calder, 2009).

The technological use of inulin is based on its properties as a sugar replacer (especially in combination with high intensity sweeteners), as a fat replacer and texture modifier. For fat replacement in low-fat dairy products inulin seems particularly suitable as it may contribute

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Link

> Inulin can act as a good fat replacer in different dairy products. The ability of inulin as fat replacer is not only related to the modification of rheological behaviour or the thickness or hardness of the product but also to changes of other mouthfeel attributes as creaminess or smoothness. It seems that, in general, to obtain low-fat products with rheology and thickness close to those of full-fat products, higher concentrations of inulin are needed than those necessary to mimic the creaminess or smoothness. Understanding the underlying mechanisms inducing the behaviour of inulin as fat replacer is important to design and develop low-fat inulin-enriched products with good sensory quality.

Guar gum, Carrageenan, Xanthan gum, Lecithin (L1, L2)

This study showed that Guar gum can be used as fat replacer for decreasing of energy content of Iranian White Cheese, and improving of textural and rheological properties of it, up to 0.75 g per each kilogram of skim milk. Using Guar gum was helped to increase desirability of produced cheeses. It can be concluded that using fat replacer in certain amount, led to texture improve and digestibility of Iranian Low Fat White Cheese.

A combination of micro crystalized cellulose with carrageenan and dry milk without fat was used for making cheddar cheese with 11% of fat [6]. Cheese structure was softened by interference of interaction of casein – casein by carrageenan and micro crystalized cellulose particles, similarly plays fat globule role in clotted matrix.

The effect Xanthan gum on texture and rheological of Iranian white cheese was investigated by Ghanbari Shendi and his co-workers [7]. They reported that texture and rheological features of Iranian white cheese improved by using Xanthan gum.

low fat feta cheese have been surveyed [5]. Results showed that cheese produced with decreased fat, prepared with tapioca starch, had highest moisture and lowest protein and were harder, too. A mixture of starch and lecithin improved taste, texture, and general acceptance of low fat feta cheese and reduced fat cheese.

and strength [10]. Locust bean gum is suitable for many food applications as it provides a creamy mouthfeel. It is typically added in cream-cheese spreads to impart richness and spreadability. It is especially useful in preventing syneresis in various food products. LBG also create a smooth mouthfeel in sauces. LBG's ability to bind water makes it an excellent choice for frozen applications, such as ice cream as it will slow down and reduces the size of ice-crystal formation as the moisture is retained within the ice cream. LBG

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Application Challenges and Label-Friendly Solutions

Application	Application Challenges	Desired Outcome	Products
Yogurt	Viscosity/Body	Remove Modified Food Starch (MFS)*	Vitex® AYS 08 (WPC, Pectin) Vitex® AYS 10 (Agar, Pectin) Vitex® XN AYS 80 (Corn Starch, Gelatin) Oliggo-Fiber® Chicory Root Fiber
Organic Yogurt	Organic compliant – Non-GMO	QAI** approved ingredients	Vitex® AYS-0-19 (Organic Tapioca Starch, Organic Locust Bean Gum, Pectin, Carrageenan) Vitex® AYS-0-25 (Organic Corn Starch, Organic Locust Bean Gum, Gellan Gum, Pectin) Vitex® AYS-0-39 (Organic Tapioca Starch, Agar, Pectin) Vitex® AYS-0-40 (Organic Tapioca Starch, Agar, Gellan Gum)
Drinkable Yogurt	Stability during shelf-life	Remove MFS**	Vitex® XN AYD (Corn Starch, Pectin) Oliggo-Fiber® Chicory Root Fiber
Sour Cream	Body & texture	Remove MFS* & Mono & Diglycerides	Vitex® XN ASC 348 (Corn Starch, Xanthan Gum)
Sour Dressings	Trans fat removal & texture matching	Remove trans-fats	Vitex® XN ASD 48 (Corn Starch, Guar Gum, Sunflower Lecithin, Locust Bean Gum)
Cream Cheese	Texture & syneresis control	Label-friendly gums	Vitex® AKC 25 (Salt, Guar Gum, Locust Bean Gum, Xanthan Gum)
Buttermilk	Stability during shelf-life	Remove MFS* & Mono & Diglycerides	Vitex® XN ABA 30 (Corn Starch, Locust Bean Gum, Carrageenan)
Ice Cream	Creamy textures & heat shock control	Remove Mono & Diglycerides & Polysorbate 80	Vitex® XN FN 120 (Locust Bean Gum, Guar Gum, Sunflower Lecithin, Carrageenan) Oliggo-Fiber® Chicory Root Fiber
Multiple Applications	Stability/body/ texture	Label-friendly ingredients	Vitex® XN AMP 725 (Corn Starch Blend)
Chocolate/ Flavored Milk	Stability/body Cocoa suspension	Label-friendly ingredients	Texturizing systems based on Gellan Gum, Corn Starch, Guar Gum
Dairy Alternatives (Yogurt, Beverages, Desserts)	Stability/body/ texture	Label-friendly ingredients	Texturizing systems based on Gellan Gum, Locust Bean Gum, Guar Gum, Corn Starch, Sunflower or Canola Lecithin, Chicory Root Fiber, PURIS™ Pea Protein, Soy Protein, Xanthan Gum

Etenia™ multifunctional texturizer for natural dairy

Rich and creamy dairy

Etenia™ potato starch is the first choice for (new) products that aim for low-fat or low-protein, while ensuring and enhancing a rich and creamy mouthfeel. Create with our product guilt-free indulgent products and save costs at the same time. **Etenia™** is the perfect fit for clean label consumer demands, like no E-numbers or creating allergen-free dairy products.

Rich, soft spreadable cream cheese

A good cream cheese is rich, soft, mild, and spreadable. It's right there in the name: cream cheese is creamy. **Etenia™** is a highly efficient clean label texturizer for your cream cheese and friendly cost-in-use. Besides, the product has great solubility properties and is easy to process.

nexira

Locust bean gum

naltive

locust bean gum

Create the perfect sensory experience

- White color, low speck
- High viscosity
- 100% natural texturizers for clean label products

Sourced from carefully selected carob trees (*Ceratonia siliqua* L.) grown in the Mediterranean area, locust bean gum is a **natural texturizer**. Once picked, the carob pods are separated from the seeds, which are then transformed to locust bean gum, using purely physical and natural processes.

Tara gum

naltive

tara gum

Create the perfect sensory experience

- Efficient for cold and hot processes
- Syneresis control
- 100% natural texturizer for clean label products

naltive tara provides **thickness** and **mouthfeel** for many food applications. Specifically in ice cream, naltive tara **prevents the growth of ice crystals**, improves resistance to heat-shock, and provides a smooth meltdown.

Ingredion

NOVATION® functional native starches

Our portfolio of more than 35 **clean label** **NOVATION® functional native starches** made from **waxy maize, waxy rice, tapioca and potato** enables you to:

- Dairy, yoghurts, desserts
- Soups, sauces and dressings
- Frozen/Refrigerated ready meals and sides
- Fillings, fruit and vegetable preps
- Alternative meat and dairy products
- Baby food and meals
- Bakery and snacks
- Pet food
- Beverages