

## Stabilization From Natural

By Donna Berry, Contributing Editor

With the new decade comes a very different consumer than the one who welcomed the 21st century. Surveys across the board show that today's consumers are eating more at home, but not necessarily preparing meals from scratch, as their lifestyles are more hectic than ever before.

They are also more frugal when it comes to food purchases, while at the same time demanding more in terms of better-for-you positioning, convenience and a cleaner label.

Luckily, all-natural stabilizers help formulators develop such meal-time masterpieces.

### Keeping labels natural

"Consumers are more interested in natural than ever before, so there is definitely a growing demand for natural stabilizers," says Diana Briceno, marketing manager, wholesome ingredients, National Starch Food Innovation, Bridgewater, NJ.

Stabilizers are polymeric carbohydrates such as gums, fibers and starches, as well as select proteins, that can—as the term suggests—stabilize a food system. "Stabilizing ingredients help minimize water migration, prevent oil from separating, improve mouthfeel, provide suspension, increase viscosity, prevent ice-crystal development and more," says Grace Wang, food scientist, TIC Gums, Belcamp, MD.

Though FDA does not label any stabilizing ingredient as being "natural," certain stabilizer manufacturing processes render them "unnatural." Some ingredients are significantly altered from their original form and, as a result, are considered artificial or synthetic. So, by default, the generally held industry consensus is: If a stabilizer is not man-made, it must be natural. Such ingredients qualify for use in foods labeled as natural, even though the descriptor natural largely remains ambiguous in today's food marketplace.

Natural-foods retail leader Whole Foods maintains a list of ingredients that cannot be present in the foods it sells. "This serves as a good guideline as to what constitutes being a natural ingredient," says Briceno. Most stabilizers are not on that list of unacceptable ingredients.

This is a good thing, as according to Briceno, most processed foods need some sort of stabilization at some point during production, transportation, storage and serving. "Making Alfredo sauce from scratch is very different than warming up one that is commercially produced, where it not only goes through many different cooking and retorting steps at the plant, but also has to be shipped, warehoused and placed on the shelf for six months. And yes, the consumer expects it to look and taste like homemade when it is served," she says. "That's when stabilizers come into play. For example, starch allows the sauce to maintain its water retention and not separate or gel. It also helps maintain the type of viscosity a consumer expects when it is warmed and served.

“The same is true for a pudding,” Briceno adds. “A non-stabilized refrigerated pudding will lose integrity pretty quickly, and become thick and cohesive with irregular particles and moisture separation. Starch keeps the pudding homogeneous and creamy throughout shelf life.”

### Carbohydrate options

Starch is just one of many carbohydrates that function to stabilize food systems. “Carbohydrate-based stabilizers are directly sourced from natural raw materials and are refined for use as a food ingredient,” says Andrew Ehiwe, senior application scientist, hydrocolloids, Danisco USA, Inc., New Century, KS. “As long as the process does not chemically modify the stabilizer or blend it with any foreign material, it is considered natural by most authorities.

“Some countries only consider stabilizers obtained via physical extraction processes as being natural,” continues Ehiwe. “Physical extraction involves physical separation processes, such as grinding, milling, sieving and dehydration. The chemical nature of the ingredient is never modified.” Examples include guar gum, locust bean gum and native starches.

“Sometimes, in order to extract the functional ingredient, the raw material must be soaked in hot water, acid or alkaline, and/or is a fermentation byproduct such as xanthan gum. This is followed by precipitation, washing, drying and grinding to required particle sizes,” Ehiwe adds. “Oftentimes, a solvent may be used in the precipitation step, and be recovered in the end. However, there is the possibility of a conformational change in structure and small quantities of precipitating solvent remaining. The hot water/acid/alkaline extraction method falls under a grey area, and authorities often debate as to whether an ingredient processed in this manner is natural or not.

“Because this process does not involve significant change in the chemical structure of the ingredient, it is still considered natural in many countries,” Ehiwe adds. “One should always check with local regulatory authorities.” Examples include agar, carrageenan, pectin and xanthan gum.

“Most gums are derived from natural sources, such as plant exudates and seaweed. They also contain no artificial ingredients and are minimally processed,” says Wang. “There are so many natural gums to choose from that product formulators are usually able to find a solution to any application. They do vary in terms of cost-in-use but, in general, the usage levels are very low, in the range of 0.5% to 1.0%.”

Some ingredients that might function as a stabilizer cannot do so until their powers are unlocked by chemical or physical modification. “The ingredient might not be soluble in its natural form, and modifications are necessary to improve solubility,” says Ehiwe. “In other instances, the natural form may be too weak to handle the rigors of food processing, and the ingredient would lose all functionality unless it’s modified.” Examples include cellulose gum, modified starch and propylene glycol alginates.

“A regular, or native, starch, such as the one sold at retail as corn starch, is great for cooking at home, but in itself cannot endure the tough manufacturing process most food products go through. Native starch usually breaks down immediately, causing separation, gelling or a gritty, undesirable

texture,” says Briceno. “Starches need to be treated to maintain their integrity and last throughout the production process. It can be chemically modified, and that requires an ingredient legend declaration of ‘modified corn starch,’ or similar language. Many authorities view modified starches as unnatural. Starch can also be physically treated to perform like a chemically modified food starch, with a cleaner ingredient statement, as it can be labeled simply as ‘corn starch’ or ‘potato starch,’ depending on the raw material.”

### **A source of protein, too**

Some proteins also function as natural food stabilizers, with gelatin being the most common. “Not only does gelatin bind water, it provides a smooth, creamy texture and increases the viscosity of the product while contributing an attractive surface sheen,” says Mindi McKibbin, edible technical services specialist, Gelita USA, Inc., Sioux City, IA. “It functions independently of other ingredients, but in some applications works synergistically with other stabilizers. For example, gelatin alone cannot be used to manufacture a shelf-stable gelatin dessert. But when used with gellan gum, shelf stability is possible.”

Gelatin is physically extracted from porcine skin and bovine hides that have been slaughtered and approved for human consumption. “The collagen contained in these raw materials is the actual starting material used for the manufacture of gelatin,” McKibbin says. “Most commercially available food-grade gelatin ingredients are 84% to 90% protein, 8% to 12% water, and 2% to 4% mineral salts. That’s it, just three simple components.

“While the process of converting the raw material into edible gelatin is fairly complex, it is also primarily a physical process and considered natural by authorities,” continues McKibbin. “Basically, the process converts non-water-soluble collagen into a hot-water-soluble ingredient with gelling properties. The most unique property of gelatin is that it creates a thermoreversible gel, which provides a melt-in-your-mouth sensation. These properties allow gelatin to function as a fat replacer in some applications, in particular cultured dairy products such as sour cream and yogurt.”

Kimberlee Burrington, dairy ingredient applications coordinator, Wisconsin Center for Dairy Research, Madison, says: “Both milk and whey proteins function as natural stabilizers, as they have the ability to bind water in a food application and hold it throughout heating and other processing steps. For example, many yogurts rely on stabilizers such as gelatin and modified starches to add structure and mouthfeel and reduce syneresis over time. It is possible to achieve the same benefits with added dairy proteins in the form of nonfat dry milk or whey protein concentrates.

“Further, dairy ingredients contribute nutrition to food applications in the form of protein, calcium and other nutrients,” adds Burrington. “Some companies have developed high-gelling whey protein concentrates that work well to stabilize yogurts at addition levels of 1% to 2%.”

The proteins in eggs also function as stabilizers in various food systems as a result of their ability to coagulate. “When heated or exposed to acid, egg proteins change from a liquid to a semi-solid or solid state,” says Elisa Maloberti, director of egg product marketing, American Egg Board, Park

Ridge, IL. “This transformation assists with the binding of ingredients, including water, in complex food systems, preventing products from crumbling, losing shape or simply falling apart.

“Formulators need to keep in mind that coagulation is a delicate process, influenced by time and temperature, as well as the presence of other ingredients,” Maloberti adds. “Egg-white protein coagulates between 144 and 149°F; egg-yolk protein coagulates between 149 and 158°F; and whole-egg protein coagulates between 144 and 158°F.”

Eggs are an ideal all-natural stabilizer for ice cream, as exemplified by the recently introduced Häagen-Dazs Five line, which focuses on the simplicity of five ingredients: milk, cream, sugar, eggs and one characterizing flavoring ingredient. “The phospholipids, lipoproteins and proteins found in egg yolks are surface-active agents that stabilize the ice cream system by dispersing the milkfat throughout the ice cream mix, preventing it from clumping,” says Maloberti. “Egg yolks in ice cream also help control density, hardness and texture by encouraging the formation of small ice crystals.”

Choosing the right stabilizer for a food system depends on many factors, including processing, desired textural attributes and shelf-life requirements. Often, a blend of natural stabilizers will do the job, eliminating the need to explore man-made stabilizers that prevent a product from competing in the growing natural products category.

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