Staling: The Invisible Problem Solved by Egg Products

Formulators of baked grain-based foods such as breads, muffins and even cookies are increasing the whole grain and fiber contents of formulations to help Americans better achieve their recommended daily intakes. Many are using less refined flours, ancient grains and fiber ingredients, all of which can increase products’ susceptibility to staling, also known as drying out.

Staling has always been one of the earliest signs of deterioration in baked goods. In chemistry books, this is referred to as retrogradation, and it is an irreversible process that not only liberates water but also collapses starch molecules into insoluble moieties.

Without protective measures in place, a bakery-fresh loaf of bread will lose its desirable tender crumb and aroma in a few days. Most neighborhood and in-store bakeries avoid artificial preservatives and ingredients, as are an increasing number of commercial bakeries. Here’s where egg products can help, specifically the all-natural emulsifier lecithin that is concentrated in the yolk. Emulsifiers, which are molecules that have one end that dissolves in water and one end that dissolves in oil, are thought to interfere with the collapse of the swollen starch molecules by lodging in the spaces between the highly branched starch chains, thus preventing their collapse. This retards the onset and rate of firming that occurs with age.

And here’s an added bonus. Egg yolks have a beautiful yellow-orange hue, as they are a concentrated source of the carotenoid xanthophylls. This pigment provides richness in terms of color when added to grain-based foods…and rich color contributes to perceived quality and freshness. For example, the

Role of Egg Proteins in Meatless Formulations

Product developers are wise to understand that many health-and wellness-conscious consumers are seeking meatless, but high-quality protein, main dish options.

It’s worth noting that during the past decade scientists have discovered that high-quality protein influences numerous bodily functions, most notably prevention of muscle loss and maintenance of muscle function. High-quality protein also provides a sense of fullness, which in turn can assist with weight loss and weight management.

Egg products are an economical high-quality protein ingredient for meatless formulations. Not only do they contribute complete proteins to the formulation, they also provide a number of desirable functions.

There are more than 40 different proteins in a whole egg, some exclusive to the white and others to the yolk. Egg whites, which are mostly water and protein,
AEB Update: The Jingle is Back!

This fall, a new generation of consumers will be introduced to a jingle that was launched 35 years ago and is still widely recognized and fondly remembered by many. The American Egg Board has decided the time was right to bring back its Incredible Edible Egg jingle, with hopes of tapping into the song’s nostalgia while also reminding people to wake up to eggs.

The jingle is being re-launched with the same music but new lyrics. This includes the news that eggs are lower in cholesterol (185mg, down from 215mg) and higher in vitamin D than previously reported, as well as the fact that eggs can be conveniently cooked in the microwave. The jingle will air in 15-, 30- and 60-second spots on local and national radio, including the popular “American Top 40 with Ryan Seacrest” and ESPN Radio’s “Mike & Mike.”

Because the jingle is so popular within the egg industry, AEB is producing a video of egg farmers and their families singing the song on their farms. The video will be posted on Facebook and YouTube to showcase egg farmers and spark interest in learning more about egg production.

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egg yolks in Dunkin’ Donuts’ new Egg Bagels provide a desirable yellow hue, while contributing to a moist, soft, chewy inside.

Egg proteins, in particular those found in whites, can also assist with extending the shelf life of baked goods through foam formation. Foams entrap air, giving baked goods volume and springiness, attributes that suggest freshness. And when it comes to providing structure to baked goods, egg proteins accomplish this by the chemical process known as coagulation, which is the transformation of liquid egg into a semi-solid or solid matrix.

Essentially the same chemistry supports the functions of aeration and coagulation, with the former entrapping air and the latter binding water. Through a series of reactions, millions of egg protein molecules aggregate to form an insoluble three-dimensional network. As the proteins aggregate together, they entrap air—as in the case of a foam—and moisture—as in the case of a gel, as well as interact with gluten, thereby essentially building the baked good. In essence, they create cells where the cellular wall is composed of proteins and the cell contents are air or moisture.

Egg products, through their ability to retain moisture, slow down the staling process. This science has proven to be very useful in providing extended shelf life to gluten-free bread, as bread relies heavily on gluten for structure and palatability. Egg proteins can mimic the functional benefits of gluten.

There are many other ways egg products can assist with preventing staling. For example, an egg wash applied to the surface prior to baking can seal in moisture. Eggs are a natural source of antioxidants, which may minimize oxidation of lipids during storage.

To learn more about how egg products can assist with extending the shelf life of baked goods, please view “Baked Goods: Extending Shelf Life” at FunctionalEgg.org. This video, as well as the 11 others, can assist with understanding the 20-plus functional benefits of egg products while earning free continuing education credits.
Egg allergy affects around 2% of children younger than 5 years old. While studies show that 80% of children eventually outgrow egg allergy, and most in the general population do so by school age, there are still many children retaining egg allergy into their teenage years. It appears that the longer the egg allergy persists, the less likely tolerance develops. This makes eating a variety of foods, in particular outside the home, very challenging, as eggs are present in many prepared foods.

According to a study published in the August 2012 issue of the *Journal of Allergy and Clinical Immunology*, research indicates that some egg-allergic individuals can tolerate baked egg (as in a muffin), as heating decreases allergenicity by altering the protein structure responsible for triggering an allergic reaction. Recognizing this, researchers characterized the immunologic changes associated with ingestion of baked egg and evaluated the role that baked egg diets play in the development of tolerance to regular egg. Results indicated that the majority of subjects with egg allergy can tolerate baked egg. Long-term ingestion of baked egg is well tolerated and accelerates the development of tolerance to regular egg. These findings present an important shift in the treatment paradigm for egg allergy, as clinical management can improve the quality of life of egg-allergic children and, ideally promote earlier tolerance development.

Egg Ingredient Spotlight:
Baked Egg May Improve Tolerances

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**Egg Product Innovations**

**Hot Pockets Snackers**
Hot Pockets Snackers is a new line of frozen finger foods that carries the tag line: Baked Not Fried. All six varieties—Baked Mac & Cheese Bites, Fiesta Nacho Bites, Grilled Italian Style Bites, Honey BBQ Recipe Chicken Bites, Loaded Potato Skin Bites and Toasted Five Cheese Ravioli—use dried egg whites to keep the filling sealed into the outer shell crust. For extra richness, some of the varieties also include dried egg yolks in the filling.

**New Kraft Flavored Mayos**
Kraft Foods, the leader in flavored, packaged mayo products with its Sandwich Shop Mayo line, adds three new flavors. Twist of Lime is full-fat, while Steakhouse, which is made with the company’s popular A1 steak sauce, and With Olive Oil & Cracked Pepper, are both reduced-fat. Egg yolk ingredients are a required component of the formulation, per the Standard of Identity for mayonnaise.

**Eggo Wafflers**
New Eggo Wafflers are packed with flavor, so no syrup is needed. The frozen, toaster-ready waffles come in two varieties: Brown Sugar Cinnamon Roll and Strawberry Strudel. Whole egg product provides for a tender crumb and helps maintain product integrity during temperature fluctuations. It also contributes to the 4g of protein in each serving.

**Quaker Oatmeal Cookies**
Quaker Crunchy Oat Granola Cookies provide permission to indulge. These better-for-you cookies are crispy in texture, with each box featuring seven individually wrapped packages of four cookies. Each serving delivers 4 grams of fiber and 3 grams of protein, some of which comes from the inclusion of eggs. Varieties are: Apple & Cinnamon, Mixed Berry, Mixed Nuts and Raisins.

**Marie Callender Breakfast Anytime! Cheesy Eggs & Sausage Bake**
Marie Callender’s introduces Breakfast Anytime! Cheesy Eggs & Sausage Bake, a family-sized, frozen heat-and-eat breakfast entrée. The product uses a pre-cooked scrambled egg product made with eggs, nonfat milk, corn starch and citric acid.
Solutions to Commonly Asked Questions

Q In-store bakeries are starting to do more baking in house, but they are asking for some short cuts, such as pre-made fillings. What egg products work best in pre-made custard fillings?

A Bakery fillings are as varied as the baked goods in which they have application, ranging from coffee cakes to cookies to pies. The beauty of fillings is that not only do they add flavor and color; they provide an additional texture, such as creamy, which is what you get with a custard-style filling. Some bakers choose to make their own fillings; however, there’s a booming market of industrial-produced fillings that not only provide convenience but also consistency.

Most custard-style fillings rely on egg yolks, which provide richness in terms of color, as egg yolk contains xanthophyll, a carotenoid that has a yellow-orange pigment and gives the yolk its characteristic color. The yolk also contains emulsifiers that create a creamy mouthfeel that provides a sense of richness.

Q Gluten-free seems to be the buzz these days. Do egg products contain any gluten?

A No, they don’t. Indeed, formulating gluten free has become a priority for many product developers, because gluten, which is the protein found in a variety of grains, cannot be tolerated by a growing number of consumers. For those with celiac disease, consuming gluten can be deleterious. When gluten-containing flours and ingredients are removed from a formulation, they must be replaced with highly functional ingredients that mimic the structure gluten provides. In many applications, egg products are the ideal solution.

From pasta to bread, and sauce to salad dressing, egg products provide nutrition and functionality to gluten-free formulations.

Q It’s not too early to start thinking about innovative ice cream products for summer 2013. This year it seemed like many new ice creams contained bits, pieces and swirls of premium desserts, such as carrot cake, brownies and even cannoli filling. How do egg products keep these inclusions intact and from crystallizing?

A Egg products serve many functions in frozen dessert inclusions, from assisting with leavening in a brownie bite to providing richness to a creamy variegate. But most importantly, egg proteins can help control the development and growth of ice crystals, which can spiral out of control during temperature fluctuations in and out of freezer. The proteins in egg products function as an interfering agent, disrupting initial crystal formation, as well as slowing down an in-progress crystallization process.
FREE Continuing Egg-ucation

Twelve science-based application and educational videos on topics ranging from “the role of egg products in gluten-free formulations” to the “safety and handling of egg products” are available for food industry professionals to gain a better understanding of how egg products can contribute both functionality and nutrition to food product formulations.

The free videos can be used for Continuing Education credits for individuals involved in R&D and marketing. Credits are earned by visiting the site (FunctionalEgg.org), viewing an eight-to ten-minute training video and correctly answering multiple-choice questions at the end of the video.