# Cracking Open New Egg Ideas

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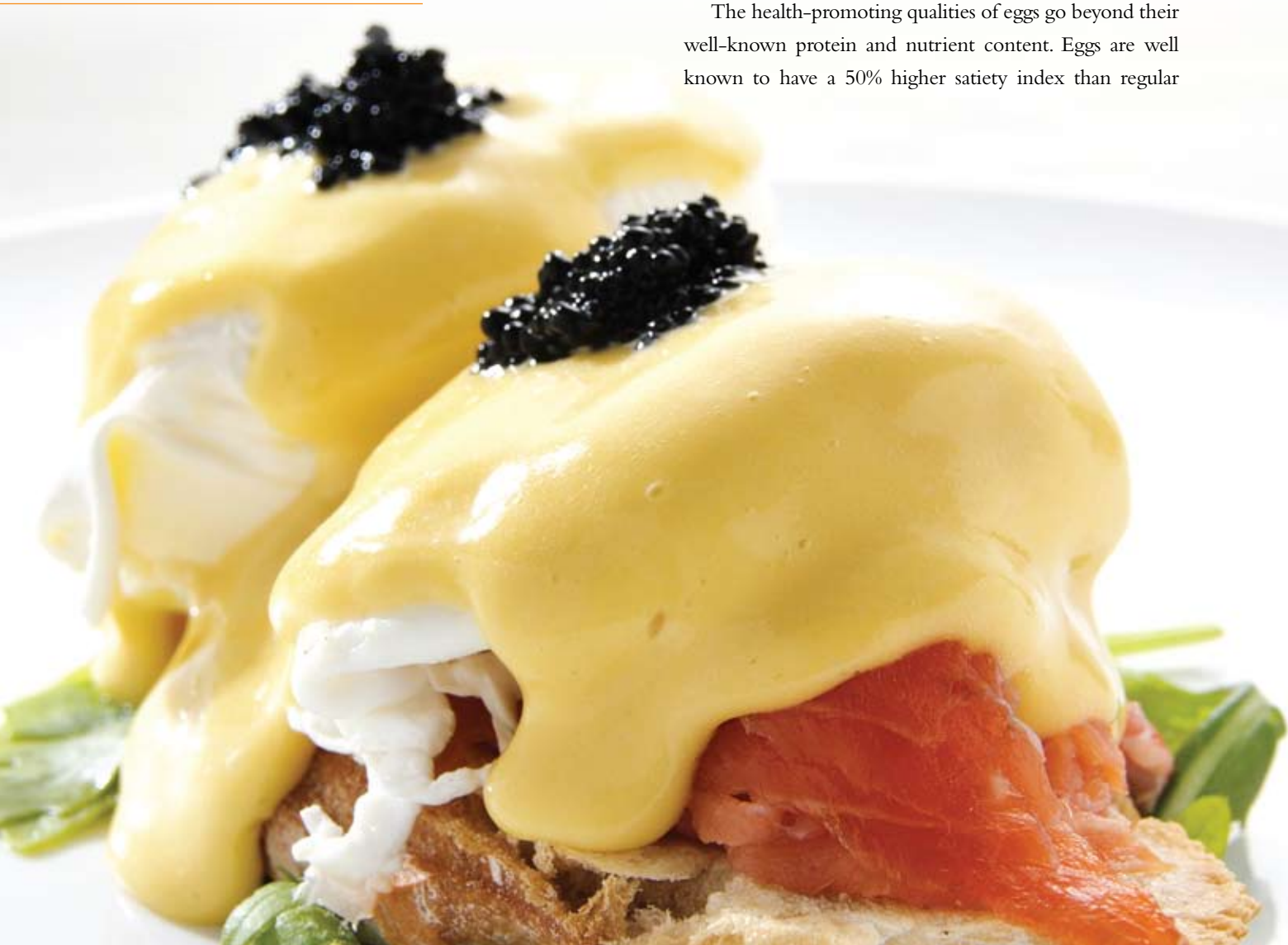
The egg might seem ordinary, but it is in fact a remarkably multifunctional and versatile ingredient. It is a seemingly simple ingredient that plays a surprisingly complex role in food products.

Whether dried, refrigerated or frozen, egg products can serve both culinary and functional roles in many formulations and add protein and other nutrients. And eggs are natural, a plus for some label-reading consumers.

With the myriad uses for eggs—and the wide variety of egg ingredients available to product designers—they can't help but find their way into many formulating decisions, especially given the push for cleaner, natural ingredient labels. Whether for a functional outcome, flavor or textural attributes, eggs can be a unique and cost-effective addition to almost any meal.

## Healthy eggs

The health-promoting qualities of eggs go beyond their well-known protein and nutrient content. Eggs are well known to have a 50% higher satiety index than regular



breakfast cereals, which is generally believed to be due to the high protein content of the eggs.

All protein is not created equal, and eggs set the standard against which all other proteins are measured. High-quality protein, such as that found in eggs, helps build muscle strength and increase satiety. The satiety factor is an important consideration when formulating products for weight loss or maintenance plans.

Eggs are a naturally nutrient-dense food, which means they have a high proportion of nutrients to calories. Eggs contain 13 essential nutrients in varying amounts, which make them important to the entire population, with select nutrients attractive to specific demographics. Research continues to uncover eggs' health benefits. Although eggs do contain cholesterol, a growing body of evidence suggests that dietary cholesterol has little effect on raising blood cholesterol levels and, thus, the risk for heart disease.

## Whipping up new ideas

Chain restaurants have seen the breakfast daypart explode of late and breakfast sandwiches are a lead choice of A.M. diners. In a drive to spice things up a bit, chains are offering savory, sweet and spicy sauces and/or breakfast items. Denny's serves its Grand Slamwich with eggs, sausage, bacon, ham, American cheese, mayo and a spiced-maple spread on potato bread. IHOP menus a small handful of savory crêpes. Its Garden Stuffed Crêpes combine Swiss cheese, eggs, spinach, mushrooms and onions, topped with Hollandaise and diced tomatoes. Wendy's hops on the breakfast bandwagon with the Bacon Fire-Roasted Burrito, with applewood bacon, roasted poblano chiles, red peppers and onions wrapped with scrambled eggs and pepper Jack and Cheddar cheeses in a multigrain tortilla and served with hot sauce. Breakfast is hot, and there remains great opportunity to increase this category with further development of hand-held breakfast creations.

Eggs aren't disappearing come lunch and dinner, either. Kuma's Corner in Chicago puts a fried egg, bacon and Cheddar on its signature Kuma Burger (all burgers served on a pretzel roll). Seattle's Smith serves up a Brisket & Fried Egg sandwich (accented with fried green tomatoes and Gruyère). At the chain level, Red Robin tops its Royal Red Robin Burger with a fried egg, three strips of hickory-smoked bacon and American cheese.

## Finding functionality

With their 20-plus functions, egg offer incredible diversity to facilitate the following outcomes: adhesion, aeration, antimicrobial, binding, browning, clarification, coagulation, coating, color, crystallization control, drying, edible packaging film, emulsification, finishing, flavor, foaming, fortification, freezability, gloss, humectancy, insulation, moisturizing, mouthfeel, pH stability, protein enrichment, richness, shelf-life extension, structure, tenderization, texture, thickening and whipping ability. With all of these functional options, formulators have a library of choices to incorporate and deliver great culinary integrity and ideal functionality.

Egg ingredients improve the texture and acceptability of products that often encounter freeze/thaw cycles. Eggs also work as a dough conditioner in frozen doughs and batters where the yolk lipids contribute to a softer structure and deliver improved storage stability. They improve moisture retention in foods that tend to dry out, such as reduced-fat or low-fat baked goods. Eggs act as effective humectants, a function of the proteins' water-binding property and lecithin's ability to reduce moisture loss. In addition to supplying a stable, smooth mouthfeel in many products, eggs can reduce the need for, replace and/or work in conjunction synergistically with starches or gums. The protein content in eggs helps thicken sauces and gravies while adding body to improve product texture.

Eggs play a major role in cooking and baking, and are processed into three main forms that provide advantages over shell eggs: refrigerated, dried and frozen. Perhaps most importantly, "the USDA-approved pasteurization (heat treatment) methods assure food manufacturers that they're using high-quality, safe egg products. The companies involved in producing egg products conduct thousands of quality assurance tests to be sure harmful bacteria are destroyed during the pasteurization process," says Patricia Curtis, Ph.D., professor, Department of Poultry Science, Auburn University, and director, National Egg Processing Center, Auburn, AL.

## New "eggsperiences"

My role as the "EGGSolutions Chef" for the American Egg Board (AEB), Park Ridge, IL, has presented several different challenges. For instance, most culinary experiences with eggs tend to involve liquid egg products or shell eggs. But dry egg products can offer much to menu and product developers. AEB challenged me to perform some parallel comparisons using liquid and dry egg products, highlighting the functional capabilities of egg ingredients and showing how product and menu designers could potentially go either route, using liquid eggs or dry—without any appreciable changes in performance, flavor or functionality.

Egg-ingredient processors offer dry egg products for food products and menu items that display similar characteristics as those made with liquid egg products, such as pastas, soufflés, Hollandaise sauce, soups, ice cream, cookies, brownies, pumpkin pie, custard pie, cheesecake and more. Using dry egg products in the plant can provide storage advantages (they require 80% less space than shell or liquid eggs, and they don't require refrigeration), lower shipping costs (not shipping the water) and more flexibility in the amount of water in the formulation.

We worked to identify six functionalities that we could demonstrate great results with the use of dry and or liquid ingredients:

- Emulsification—grilled salmon with sauce *glaçage* (a Hollandaise-based sauce with heavy cream folded in to finish it) brushed onto it and caramelized to a golden-brown under a salamander;
- Aeration—sponge cake Napoleon with a variety of fillings, such as fruit mousse, pastry cream and/or chocolate;
- Texture—Italian parsley layered cheese ravioli with a tomato-herb cream sauce;
- Crystallization—crispy fried ginger vanilla coconut ice cream with chocolate cream sauce;
- Coagulation—Italian flan with olives, sun-dried tomatoes, Romano cheese and pesto;
- Protein—a four-egg omelet sandwich with spinach, roasted pepper and Asiago in a garlic flatbread.

These product and menu concepts offer different challenges to illustrate their targeted functionality. All dry egg products are not necessarily equal in terms of performance in a given formula.

**Dry egg-white solids**. Dry egg-white solids come in whipping and non-whipping types, to produce the functional outcome desired. To create a classic sponge

cake—which requires whipping air into the egg whites—I chose the high-whip, which contains a whipping aid, sodium lauryl sulfate. When a higher-protein label claim or gelling is the goal, as in a high-protein energy bar, high-gel egg white solids, which are pasteurized at a higher temperature for increased gel-strength, are a good option. Several other dry egg white products are available, and the specific product depends on your application and targeted outcome.

**Dry egg-yolk solids**. I worked with two dry egg yolk solids on this project. The Hollandaise required an egg-yolk solid that would emulsify over 40% of the fat. While I started with a standard dry egg yolk and a 6:1 or 7:1 ratio of water, it clearly didn't work in this application; my Hollandaise failed. Egg-yolk spray-drying is, for the most part, all he same, and includes no added ingredients that affect function. For emulsification, enzyme-modified (with phospholipase and lecithin converted to lysolecithin) egg-yolk solid is ideal. This dry egg-yolk product gave superior emulsification properties, and had great heat tolerance in the formula, which allowed me to heat and cool the Hollandaise sauce.

Retail and foodservice product manufacturers also certainly turn to liquid egg products, available in whole eggs, yolks and whites, refrigerated or frozen, in addition to customized ingredients. Some frozen egg products are blended with corn syrup, sugar or salt to customize their characteristics, such as reverting to a liquid (vs. gelatinized) state upon thawing.

Market demands are constantly changing, which makes meeting diverse product development requirements challenging. In whichever focus your projects make take, eggs—in their many ingredient formats—can help meet your challenges.

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