# Packing in the Protein in Baked Goods



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While it may have started as a niche market, in recent years, the high protein trend has gone decidedly mainstream. No longer limited to nutrition bars and shakes, product developers have boosted the protein levels in everything from cereal to water. Yet Americans still can't get enough.

According to the International Food Information Council (IFIC) Foundation's 2016 Food and Health Survey, 64 percent of the country's consumers say they're trying to consume more of the muscle-building nutrient.

"Protein continues to be huge, and we're seeing that interest spill into a wide range of baked goods – from breads to waffles and about anything in between," says Bill Gilbert, principal food technologist, Cargill Texturizing Solutions.

## Formulating Solutions

It sounds simple enough, but there are a few caveats. While proteins provide nutrition and satiety in snacks and bakery products, there are potential challenges in both formulation and production, mainly in texture, taste and the dough's machinability.

Managing hydration is often the first formulation hurdle. Proteins tend to hydrate and compete for water, increasing the density of puffed cereals, snacks and baked products.

"All proteins have different water absorption rates," Gilbert explains, noting that Cargill has done extensive testing with a wide range of protein types and blends. "We've learned how to keep the rheology the same, so that product developers don't have to dramatically change the amount of water in their formula."

Gilbert acknowledges potential obstacles extend beyond water management. Proteins may inhibit dough development and make it stiff and difficult to stretch and sheet, causing headaches on the production line. In addition, some proteins have unique flavors that may be difficult to mask.

While these are factors to consider when formulating with added protein, all can be addressed.

"The key to success with protein in baked goods is finding the right blend, so it doesn't impact the taste or texture of the product, or run down the production line," Gilbert emphasizes.

Consider flavor. Pea protein, an emerging favorite for bakery formulators, is often associated with a less desirable flavor profile. However, Cargill's pea protein is not processed with hexane or chemical solvents. This helps to minimize the off-flavors normally attributed to pulses. With that great base flavor profile as a starting point, Cargill's formulation experts are adept at finding the right protein blend to eliminate off-flavors in bakery applications.

"All proteins require formula adjustments," Gilbert acknowledges, "but working with an experienced ingredient supplier can speed the development process."

## Getting Started

With so many choices of protein sources and types, finding the perfect blend may seem overwhelming. As with all new product development efforts, the best place to start is with a clear definition of what you want in the end.

"We've often seen confusion from R&D on what they want for protein," says Tim Christensen, senior research scientist, Cargill. "Are they talking about total protein, for the front of the package?

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Do they want to be able to make a 'Good Source' protein claim? Part of our job is helping customers understand what the different terms mean and decide what they want to put on the label."

To make any protein content claims, the amount of protein must be calculated on the basis of its quality or complete protein content. This is an important distinction, as many plant proteins are deficient in one or more of the essential amino acids and are therefore "incomplete." To supplement for the lacking amino acids, developers often need to blend proteins to create a complete protein.

While Cargill's pea protein contains all of the essential amino acids, it is not a complete protein because two of the amino acids, methionine and cysteine, are present in insufficient amounts. In comparison, soy flour is a complete protein because it contains all of the essential amino acids at the appropriate levels. Blend the two ingredients together in just the right ratio and formulators can take advantage of the functional benefits of pea protein, and potentially enable the use of protein content claims.

"Good" or "Excellent" source of protein claims refer to the amount of complete protein in the product, 5g or 10g respectively on a per serving or RACC (Reference Amount Customarily Consumed) basis.  For example, Cargill developed a prototype of a "good source" protein bread that delivers 5g/serving of complete protein and 9g/serving of total protein by using a blend of plant proteins and other protein-containing ingredients.

"It can be a complicated calculation," admits Amanda Donohue-Hansen, Cargill's business development manager. "To help our customers navigate these protein complexities, we developed a 'Quality Protein Estimator' that helps estimate the amount of quality protein in the formulation based on the ingredients used."

## Understanding Protein Differences

It's also important to understand that differences in plant proteins extend beyond their botanical source. Within the soy protein product family, protein contents can vary. Soy isolates may contain ~90 percent protein; soy concentrates may contain ~70 percent protein; and soy flours may contain ~50 percent protein.

Like soy, there are several options for pea protein products. Pea flour, which inherently has at least 20 percent protein content, can give a nice protein boost over traditional flours used in baking and snacks. However, its functionality and sensory properties are different than traditional grain flours and need to be taken into consideration when formulating.

Next, there's mechanically concentrated pea flour with upwards of 50 percent protein content. Many in the industry will commonly refer to this concentrated pea protein flour as "pea protein."

"At Cargill, when we say 'pea protein,' we are referring to pea protein ingredients that are separated from the starches and fibers in a wet process with a minimum protein content of 80 percent on a dry basis," explains Donohue-Hansen. "Our pea protein ingredients offer considerably more protein nutrition and functionality than their dry-milled counterparts, which is especially beneficial for applications where protein claims and superior texture in bakery are desired."

### Boosting Bakery Sales with Protein

Consumers' attraction to all things protein shows no signs of abating. While they'll continue to buy traditional high-protein shakes and bars, opportunities exist for innovative bakers to capitalize on the trend too. New protein ingredient options, led by improved pea protein options, have opened the door for an increase of palate-pleasing, protein-rich baked goods. Cargill's experienced bakery application team can help product developers navigate formulation challenges, using creative protein blends to achieve nutrition goals, meet functional requirements and deliver on customers' expectations.





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