

Tackling formulation challenges: It's complicated



Changing only what you want to change in your product formulation takes expert knowledge of the complex interactions of food matrix components.

In 1926, an effort to eradicate wolves from Yellowstone National Park was complete. Less than 10 years later, scientists were concerned about the exploding elk population, the overgrazing of young brush and trees, and subsequent erosion and loss of willow, aspen and cottonwood plants. Beavers, for whom those plants are a vital resource, dwindled in numbers. An idea that seemed to be in everyone's best interest in the beginning proved harmful by creating imbalance in the natural ecosystem.

Food formulations behave much like interconnected ecosystems — change or remove one element and you shift the balance of the system, often leading to unintended, undesirable results.

Here's an example: A meat processor wants to create a reduced-sodium formulation in response to consumer health concerns; but lowering salt content makes microbial inhibition more difficult because it increases water activity — creating conditions more favorable to microorganisms, so spoilage and pathogen risks go up. Reducing sodium also reduces solubilization and extraction of proteins, which, in turn, decreases water-binding, sacrificing cook yield and compromising product texture and sliceability. All of this is on top of the inevitable loss of flavor that comes with reducing the amount of a single component in the food system.

Quality requires balance

Given the multifunctional role of salt, the sodium reduction paradigm might be a rather dramatic case in point, but the interdependencies it illustrates are common to virtually all food product formulations. The fact is, when you change one feature of a food matrix, you've changed the matrix. The trick is knowing how to offset that change with others so that, in the end, you

upgrade the product qualities you wanted to improve while retaining those you already liked.

That is a complicated task, considering the sheer number of factors and variables that shape your meat product's many attributes, such as flavor, texture, color stability, moisture content, nutritional content, cook yield, sliceability, shelf life, water activity, pH, storage temperature, and of course, pathogenic plate counts.

Even simple flavor adjustments can cause a shift in pH that can open the door to unwelcome microbial outgrowth and other structural changes.

"Reformulating is a balancing act," says David Charest, Vice President-Meat Industry at ingredient solutions leader Corbion. Although the company is best known in the industry for its prowess in preservation and safety, Charest says Corbion experts focus on all aspects of product quality and performance.

"When we collaborate with processors on new formulations, we start by talking about the features and properties they want to achieve in the end product, then use a combination of knowledge, experience, modeling tools, and state-of-the-art pilot plants to find the solution that can deliver all those attributes in balance with each other."

Finding the right solution

With so many variables in play across numerous meat, poultry and seafood applications, it's not surprising that Corbion's portfolio of ingredient solutions is both broad and deep. But the company frequently develops new variations customized to address something unique about a manufacturer's challenge.

"Off the shelf can work," Charest says, "but no two formulations are exactly alike, so we make our determination based purely on the results a solution actually delivers."



The iterative nature of the formulation process — tweaking dosages, ingredient composition and other factors — can be time-consuming, to say the least. Corbion speeds that process using proprietary modeling tools that quickly estimate the effectiveness of a preservative solution in a given food system based on key variables. The Corbion Protection Comparator projects the difference in shelf life of a product given specific pH, temperature, water activity and moisture levels. The Corbion *Listeria* Control Model leverages data from more than a decade of clinical and customer validation studies to assess pathogen control solutions, considering moisture level, pH, water activity, and levels of sodium, potassium and nitrite. The tools save both money and time by reducing the number of testing iterations required.

Pressures driving reformulation

In any industry, innovation is an essential element of competitiveness. In many food companies, reformulation is driven by the aim of responding to consumers' mistrust of ingredients they don't understand. For meat producers, those ingredient names often end in *-ate* or *-ite*. Creating new formulations with "simpler" labels means foregoing traditional, synthetic ingredients that the industry has relied on for years.

At the same time, efficacy is not optional; in fact, the Food Safety Modernization Act is holding processors to increasingly stringent performance standards in raw meats.

Not all manufacturers have the expertise in-house to successfully create solutions that are natural and effective, and that can deliver all required product attributes; some have reduced their number of technical employees, or lost the more experienced, higher-paid members of their R&D staff. Collaborating with an ingredient supplier prepared to bring research-backed solutions, advanced tools and food science mastery to your reformulating efforts is key to bridging any gaps, according to Charest.

"The trial-and-error approach can get you there eventually, but it often takes much more time and R&D investment than necessary, and can slow down your response to a fast-moving market," Charest says. "And if you're not successful in achieving all the product attributes you want, the result can be too little, too late. Having top-shelf ingredient expertise and application capabilities to help you navigate food system complexities in the reformulation of your products can be the difference maker." 🌍



Everything you want,
and nothing less

Reformulating comes with trade-offs, unless you partner with us.

Change just one aspect of a formulation and you change the whole food matrix, often losing positive qualities in the process. It takes a deep knowledge of food systems and advanced formulation skills to deliver all the attributes you want in your product. Let's work together and create the perfect balance you had in mind to begin with.

Partner with Corbion to make your product reality match your vision.

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