

# The Scientific Art of Authentic Taste

## Making Plant-Based Delicious



# Plant-based eating has evolved from an emerging trend into the mainstream.

The numbers speak for themselves: nearly two-thirds (65%) of consumers worldwide are eating more plant-based foods.<sup>1</sup> Food and beverage manufacturers in all categories are responding to this dramatic shift in eating habits, however, the global dairy alternatives market is one of the largest in the plant-based eating space. It is expected to reach nearly \$30 billion in annual sales by 2023, at a compound annual growth rate (CAGR) of 11.4%.<sup>2</sup>



Despite the popularity of plant proteins, consumers don't want to compromise when it comes to taste. Mintel reports that "taste is the top reason U.S. adults who eat plant-based proteins do so (52%), outranking concerns over diet (10%), animal protection (11%) the environment (13%) and even health (39%)."<sup>3</sup>

## Flavors at the Forefront

The opportunity for food product developers is to provide the satisfying taste and indulgent richness consumers expect from traditional dairy applications in dairy-free formats. But maintaining taste profiles in plant-based applications is challenging. Plant-based proteins can taste beany and grainy, as well as have waxy characteristics. As a result, richness, mouthfeel and authentic taste are often lost in dairy-free formulations.

Recognizing the crucial role flavors can play in overcoming these drawbacks is essential. Developers must have an understanding of the flavor components that naturally exist in dairy in order to create flavors that can add a dairy profile when required, but more importantly perform a functional role in plant-based applications as well.

"Often developers only consider flavors at the end of the product development life-cycle process as a way to mask undesirable attributes," says Laura Enriquez, Vice President of Global R&D – Applications. "But the key is strategically working with flavors at the onset." In fact, by optimizing taste profiles throughout the entire product development process, innovation timelines can be accelerated.

## Beginning with the Base

Flavors can be added at the beginning of formulation to bring a plant-base to neutral. For example, they may be used to mask grassy or beany notes from chickpeas or fava beans and chalkiness or astringency from pea protein. Or they may be added in to enhance fatty mouthfeel without dairy, and mask waxy or greasy notes from palm or coconut oils. Non-dairy flavors can also mask cooked notes from processing, add back freshness in shelf-stable products, or rebalance flavors.

## Formulating with Flavors

Elong offers over 250 authentic, dairy-free flavors that help deliver dairy flavor, richness and mouthfeel to plant-based choices. Additionally, because flavors behave differently from application to application, we have experimented with variations of flavor compounds for different plant-based products to understand what key flavor components mask, enhance and block different undesirable taste characteristics.

Through constant research and innovation, we work to solve some of the most difficult taste challenges. The following are some formulations we have developed to demonstrate our solutions.

# Vegan Edam-Style Cheese



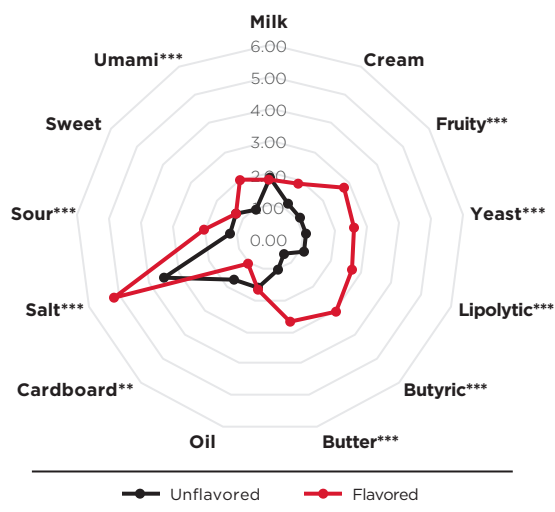
## Goal

To create a vegan cheese with the similar texture and complex, authentic taste of Edam.

## Process

We began by focusing on ingredients that would create the right texture, all while building in layers of flavor. Using plant-based fat and functional ingredients like starches combined with water, we built a base. Deciding what fat to use was crucial as texture and melting point can dictate attributes like mouthfeel and off notes. Different fats have different tastes. For example, coconut fat may have a coconut taste or canola oil may have a fishy or mushroom-type taste. The fat taste needs to be masked or mellowed depending on the desired taste profile. Functional ingredients can also impact the product's texture, meltability, shredding capabilities, and, of course, taste. In this case, we needed to mask the cardboard off note in our base and build in some depth of flavor. In order to balance, mask and create the distinctive cheesy notes of Edam, flavor layering was required. We found that a butter flavor combined with a Cheddar flavor masked the off notes of our base, added a rich buttery, creamy background, and a savory cheesiness reminiscent of the background notes of Edam. The final touch was Edam flavor which gave the overall pronounced Edam taste.

## Mean Scores for Flavored vs. Unflavored Vegan Cheese—All Attributes



\*\*\* Attribute significantly different at the 99% Confidence Level

\*\* Attribute significantly different at the 95% Confidence Level

\* Attribute marginally different at the 90% Confidence Level

## Results

The result was a great-tasting product with the layers of depth and complexity of real dairy. The graph to the left illustrates the differences picked up between the unflavored base which still contained acids and yeast extract and the flavored product which had the butter flavor, Cheddar flavor and Edam flavors added.

# Plant-Based Beverage



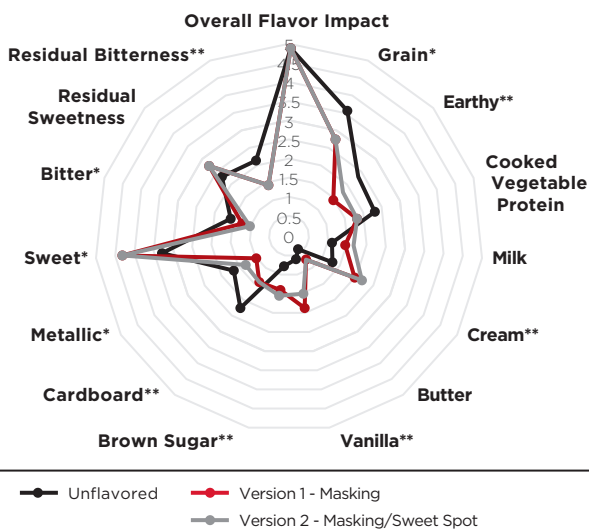
## Goal

To research effective ways to mask off notes in plant-based beverages, typically bitterness, metallic and cardboard notes.

## Process

We've worked on many plant-based beverages and have found several options for overcoming the masking and mouthfeel obstacles they present. Recently, we conducted two different sensory evaluations of a plant-based beverage. The first version was designed to mask off notes, and a second version not only masked the plant proteins, but added additional notes like vanilla to increase the overall perception of sweetness.

**Mean Scores for Pea Protein and Rice Milk Demo—All Attributes**



## Results

The graph below illustrates that the unflavored product was found to have earthy, cardboard and residual bitterness with evident cooked vegetable protein notes. Using a combination of milk and sweet dairy flavors we were able to make a significant impact to the cream and vanilla notes as well as masking many of the off notes of the finished application. These findings in plant-based beverages demonstrate how developers can expand product range with the addition of a natural flavor, even at typically low levels. With flavors, developers can adapt their products to meet consumer preferences and adjust those products to match regional tastes.

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 \*\* Attribute significantly different at the 95% Confidence Level  
 \* Attribute marginally different at the 90% Confidence Level

# Vegan Cashew Dips



## Goal

To create a fully-satisfying, plant-based dip that could be adapted for a wide variety of products.

## Process

We started with a cashew base that was created in our innovation research lab. To that we added a mild tabasco chili powder, garlic, onion and other spices. A natural sour cream and a natural milk flavor are added at low usage levels to not only mask any off notes from the plant protein, but also to add the expected creamy and balanced characteristics to this vegan dip.

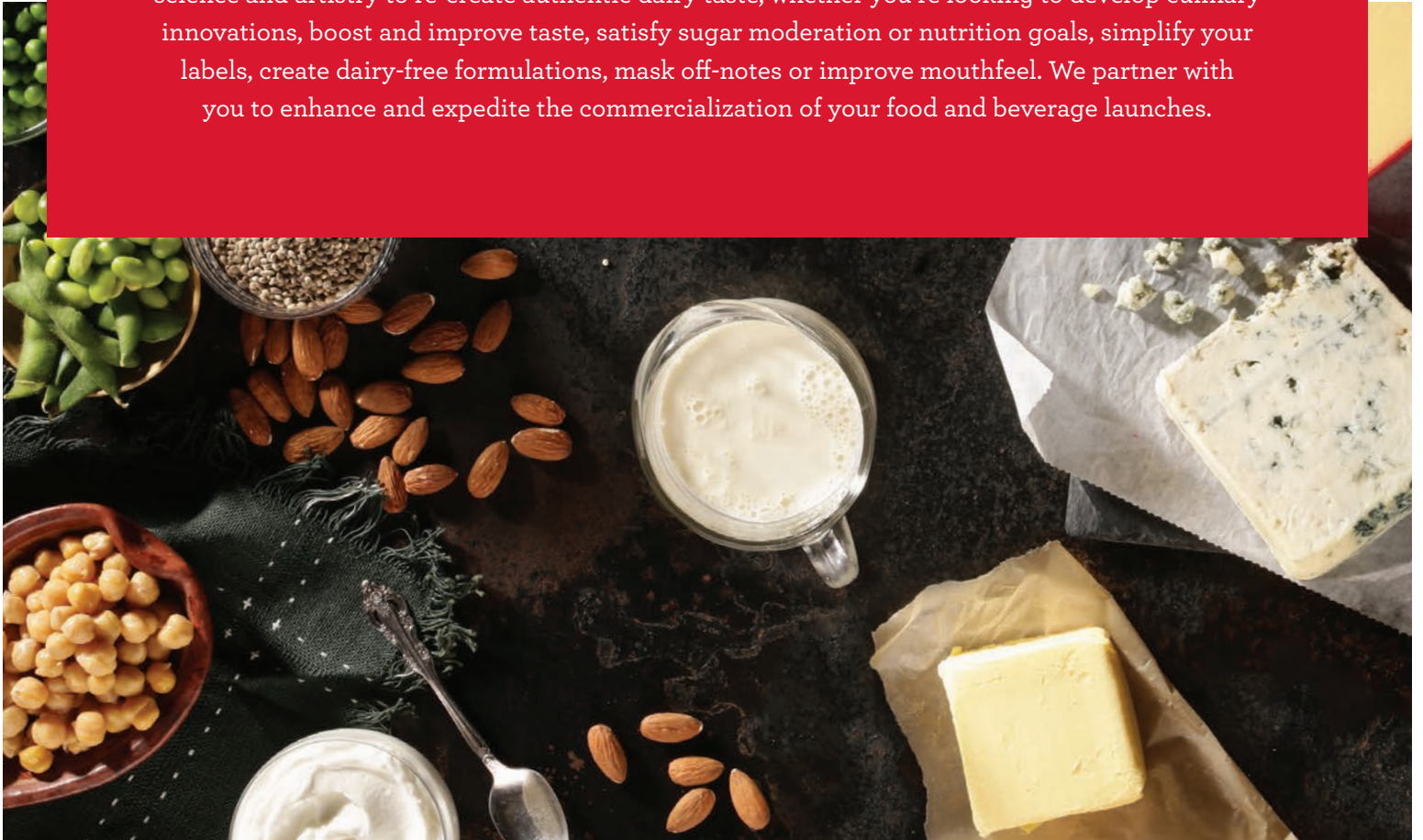
## Conclusion

Creating dairy-free products that deliver the right taste and texture can be challenging, and product developers that rise to this challenge have a competitive edge in today's expanding plant-based market. Edlong has long mastered both the science and art required to develop innovative flavors that enhance functionality and taste, so developers can expand their product lines.



# The Scientific Art of Authentic Taste®

At Edlong, we're reinventing the taste of dairy. We capture the richness, creaminess and indulgence of dairy, even in applications without dairy. We are experts in balancing flavor science and artistry to re-create authentic dairy taste, whether you're looking to develop culinary innovations, boost and improve taste, satisfy sugar moderation or nutrition goals, simplify your labels, create dairy-free formulations, mask off-notes or improve mouthfeel. We partner with you to enhance and expedite the commercialization of your food and beverage launches.



We provide product developers and marketers across the globe with over a century of expertise and personal, responsive, reliable service. Our promise: to do what it takes to solve your formulation challenges.

## Breadth of Categories

- Butter
- Cheese
- Cream
- Cultured Dairy
- Milk
- Sweet Dairy
- Masking
- Mouthfeel
- Edlong® Simply Dairy
- Edlong® Sweet Spot

## Meeting Consumer Needs

- Clean Label
- Dairy & Dairy-Free
- Gluten-Free
- Health & Wellness
- Kosher & Halal
- Natural
- Non-Allergenic & Non-GMO
- Organic & Whole Foods® Compliant
- Vegetarian & Vegan



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