



HOT TOPIC: Plant Based Sauces

ADS TECHNICAL COMMITTEE MEETING
SALT LAKE CITY, UT | APRIL 30, 2023



2023 HOT TOPIC

DEVELOPMENT OF PLANT-BASED SAUCES,
INCLUDING CHALLENGES AND THE IMPACT ON
INGREDIENT SELECTION AND SHELF-LIFE

THE “HOT TOPIC” TEAM



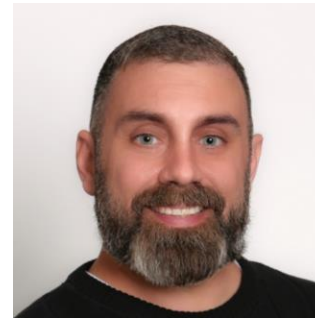
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PLANT-BASED TRENDS

Plant-based is more than a trend

48%

of global consumers are interested
in **plant-based food & drink**



42%



64%

It is a recent and ongoing societal development
in the general population
leading to a **fundamental shift** in how we are
going to eat & drink in the future.



The New York Times

***Plant-Based Foods Expand,
With Consumers Hungry for More***

TREND #2



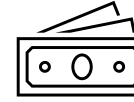
PLANT-BASED:
THE CANVAS
FOR INNOVATION



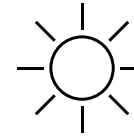
NielsenIQ

**Growing demand for
plant-based proteins**

Consumers are forced to be more sustainable



Higher living prices
forces consumers to
adopt sustainable habits



Climate change, drought &
other weather patterns
affecting supply chains



Ingredients are even harder
to come by



Formulations will be forced to
change

Base: Spain: 856 internet users aged 16+ who choose food/drink products with sustainability claims for at least a few of the products they buy

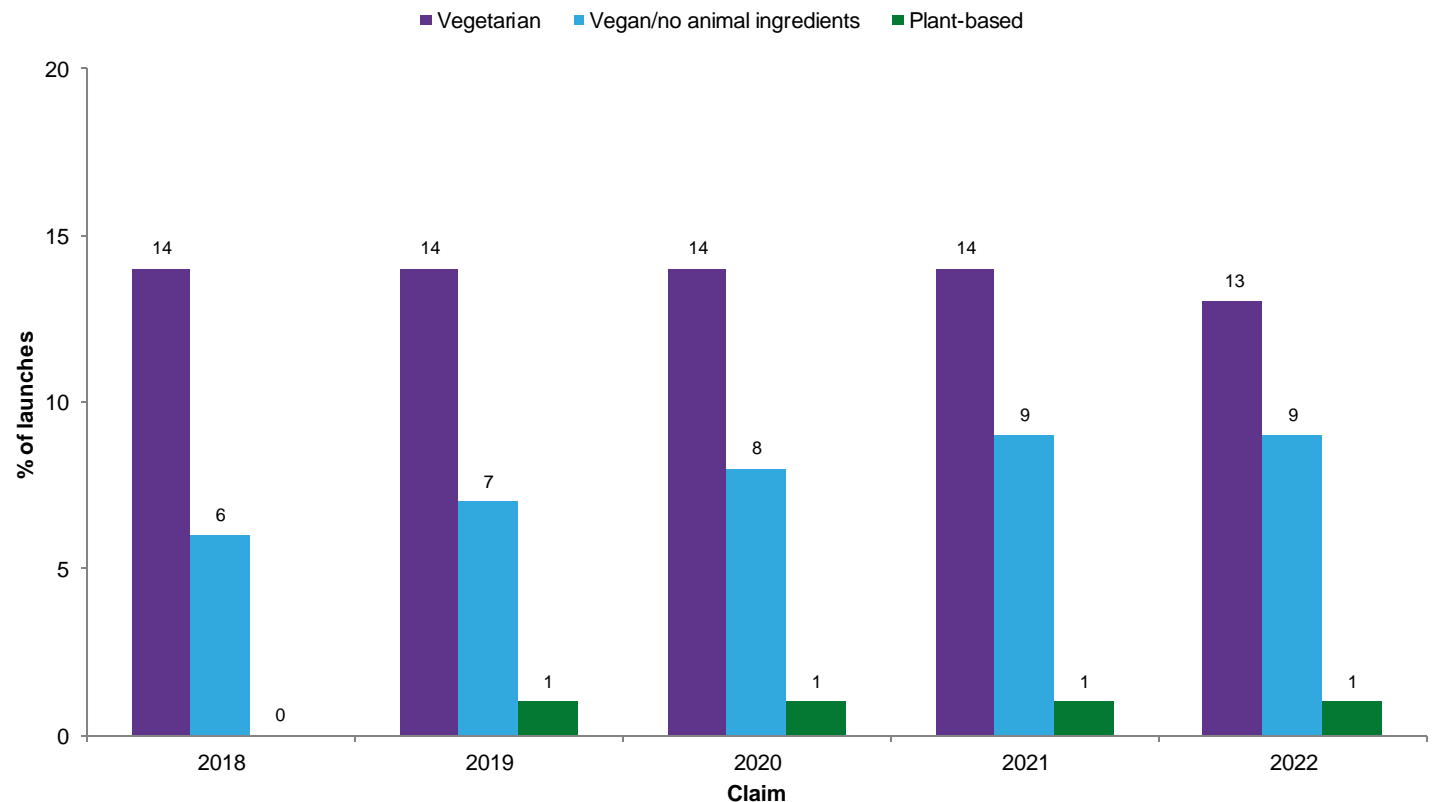
Source: Kantar Profiles/Mintel, Oct 2022; Mintel.com,

Vegan offerings account for a bigger share of NPD activity

Vegan claims are yet to go mainstream, but they are appearing on a growing share of launches, especially in [Europe](#). More companies appear to be keen to **leverage the ethical image** of animal-ingredient-free recipes, and are making their products suitable for a wider audience.

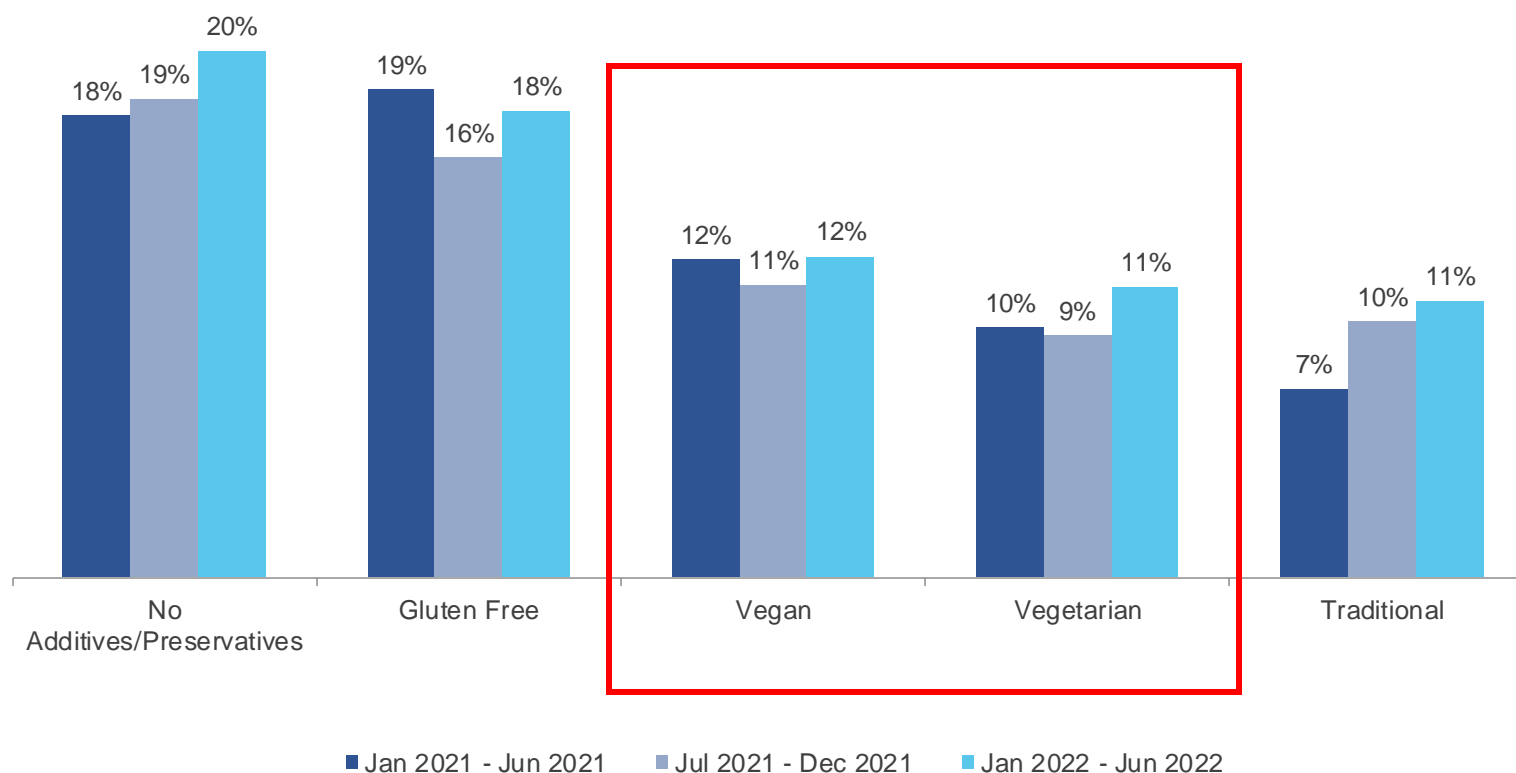
While plant-based claims are fairly niche in this sector, the claim may appeal to flexitarians. The health connotations of vegan sauces contribute to that mainstream appeal. While they may not be any more nutritious than condiments containing egg or dairy, **plant-based labels tend to convey associations with health and wellness.**

Global: launches of table sauces, oils and seasonings, by share of vegan, vegetarian and plant-based claims, 2019-22



4 of the top 5 positionings are free from and choice claims

Figure 12 | Top 5 positionings for Table Sauces



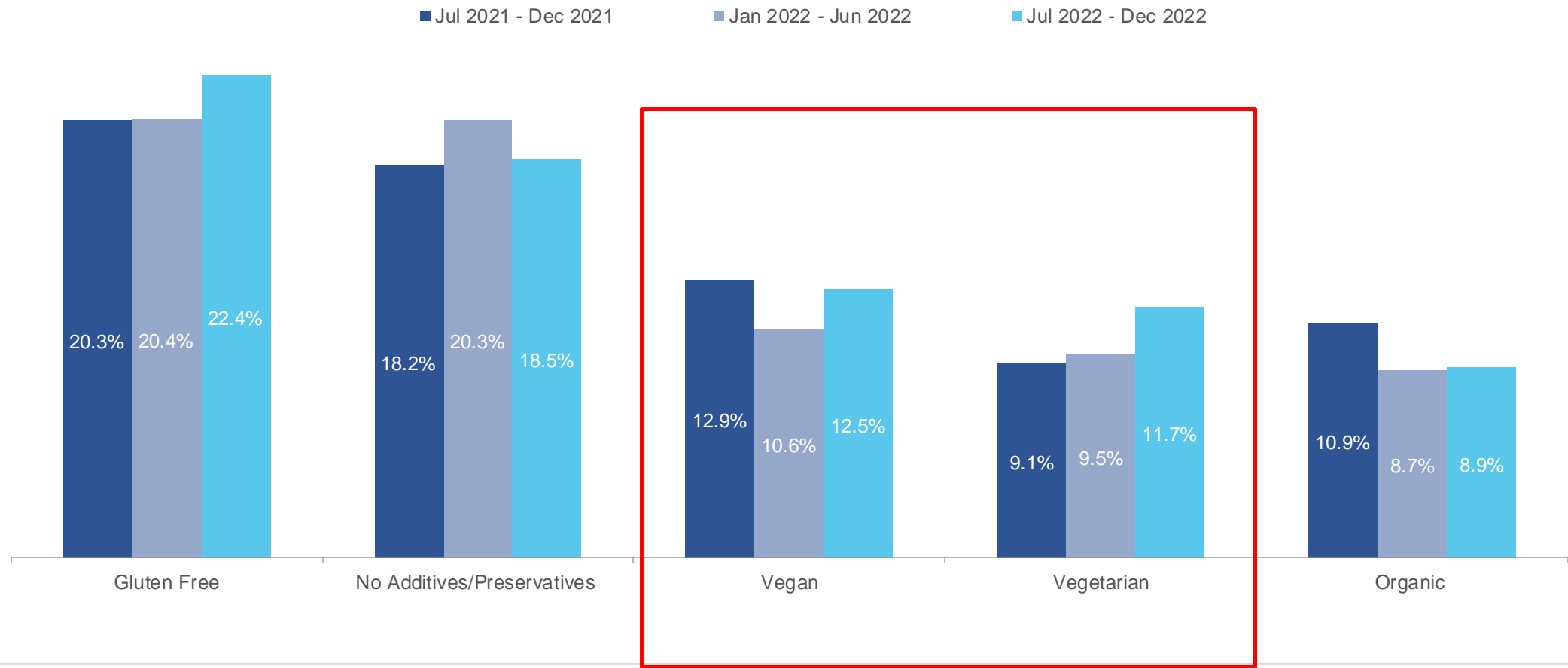
Apart from the top 5 claims, other positionings growing from Jan 22 – Jun 22 are indulgent and premium, lactose free, HFCS free, low/no/reduced carb, reduced sugar, low/no/reduced calorie, sugar free, and plant based

Percentages may be greater than 100% due to multiple positionings per product

Source: Innova Market Insights

Mayonnaise – Dressings & Vinegar

Figure 7 | Top 5 positionings for Mayonnaise – Dressings & Vinegar



Source: Innova Database

Steady presence of vegan and vegetarian claims



Rubies In The Rubble Tomato Ketchup

United Kingdom, Jun 2022 [VIEW DETAILS](#)

Description: Tomato ketchup in a 470g top-down PET bottle. Fights food waste. 100% recycled and recyclable bottle. **Suitable for vegans**. Gluten-free. Certified B Corporation. 2021 Great Taste award.



Develey Sos Czosnkowy Lagodny: Mild Garlic Sauce

Poland, Jun 2022 [VIEW DETAILS](#)

Description: Mild classic sauce with garlic and carefully selected herbs and spices, in a 410g plastic bottle. This is what quality tastes like. Gluten-free product. No added preservatives. **Suitable for vegetarians**. Source of omega-3. No added colorings. No added artificial flavors.



Pural Moutarde Au Raifort: Mustard With Horseradish

France, Jun 2022 [VIEW DETAILS](#)

Description: Organic mustard with horseradish, in a 125g glass jar. Palm oil free. **Suitable for vegan**. Demeter certified. Certified organic. From organic farming. Recyclable packaging.

Source: Innova Database



Replacing Animal-derived Ingredients

Technical Challenges

Texture/Mouthfeel

Clean label

Process stable

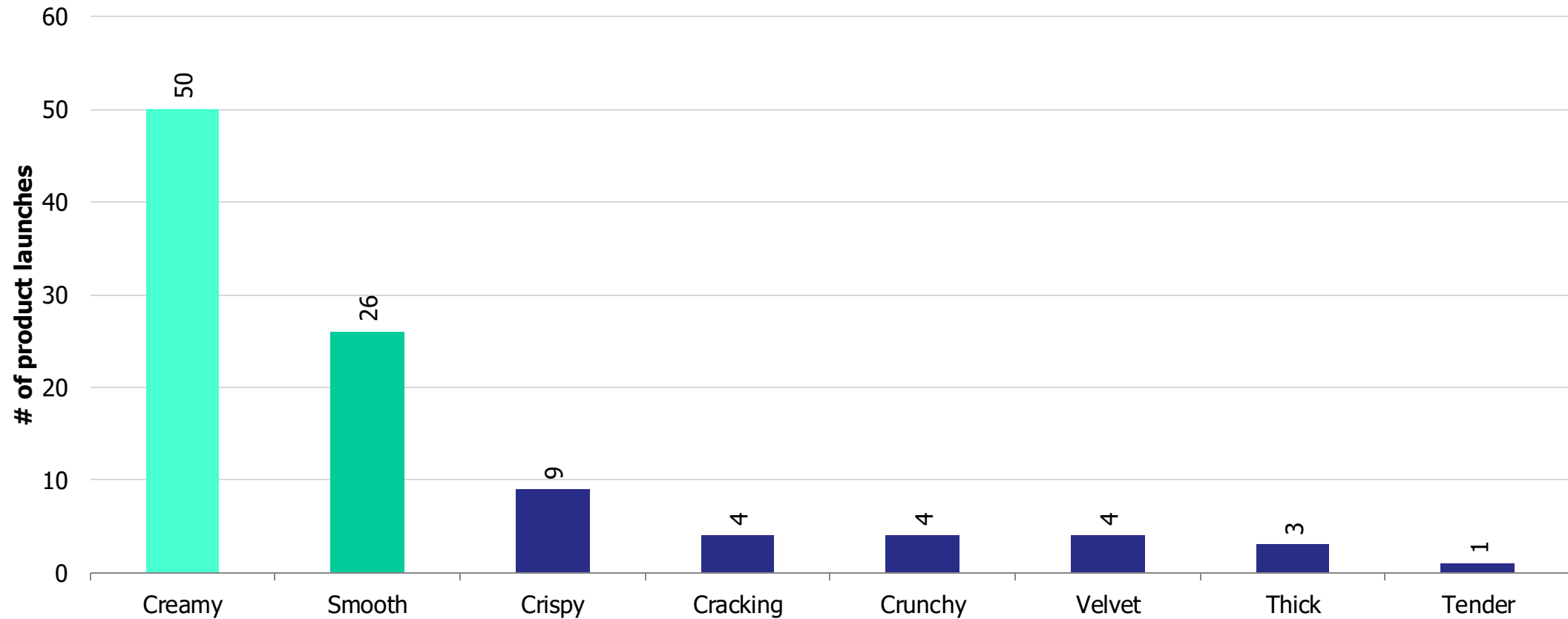


Appearance

Shelf Life Stability

Taste / Flavor

PB Dressings texture claims, No. America, 5 Yrs



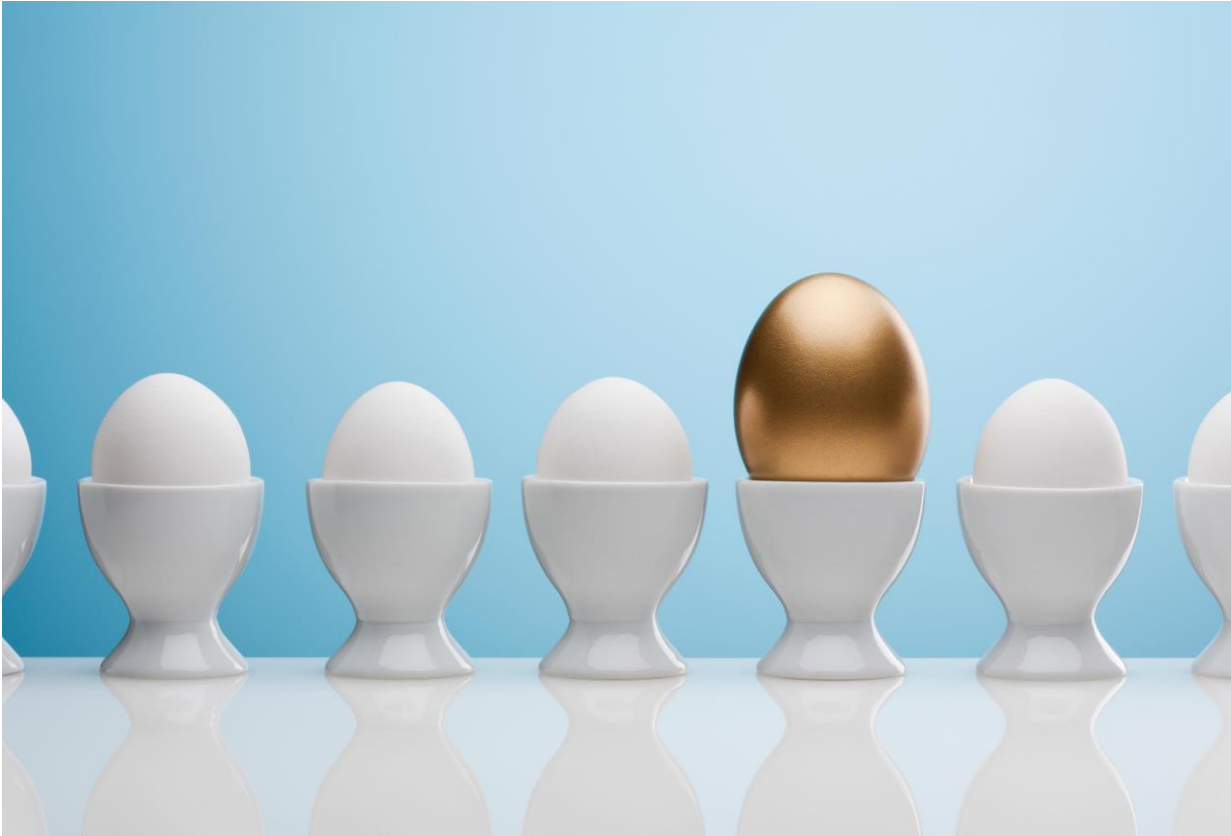
Dairy



Key Attributes

- Mouthfeel & Texture
- Functionality
- Range of Flavors
 - Butter (Rich)
 - Cultured Dairy / Buttermilk (Tangy)
 - Cheese
 - Sharp Cheddar
 - Aged Parmesan
 - Blue Cheese

Egg



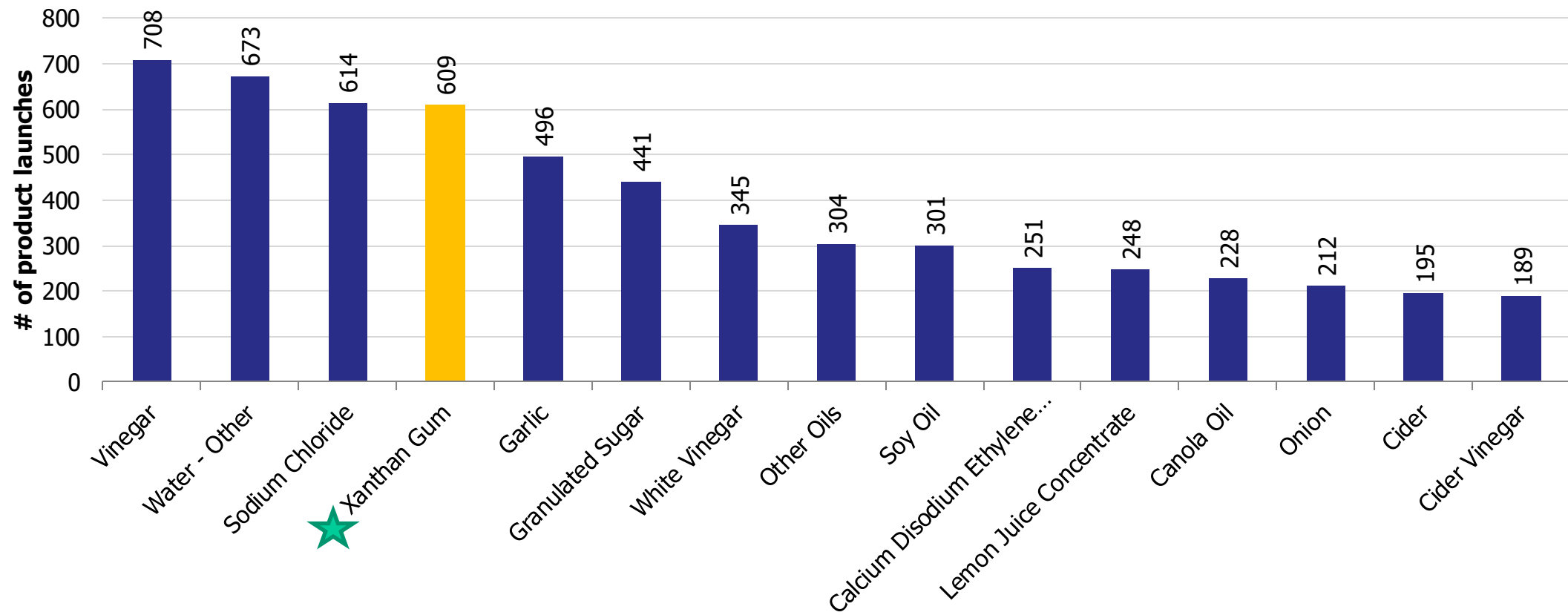
Key Attributes

- Emulsion Stability
- Nutrition
- Mouthfeel

Other Attributes

- Color
- Flavor

15 Most common ingredients in PB Dressings, 5 Yrs, No. Amer.





Prototype Development

Development process

Vegan Mayo

	MASTER	
INGREDIENTS	FORMULA	PERCENT
Water	500.0	51.9%
Garbanzo Flour	90.0	9.3%
Dijon Mustard	29.2	3.0%
Sunflower Oil	290.5	30.1%
Sea Salt	4.5	0.5%
Cayenne	0.1	0.0%
Lemon Juice	50.0	5.2%



Vegan Ranch

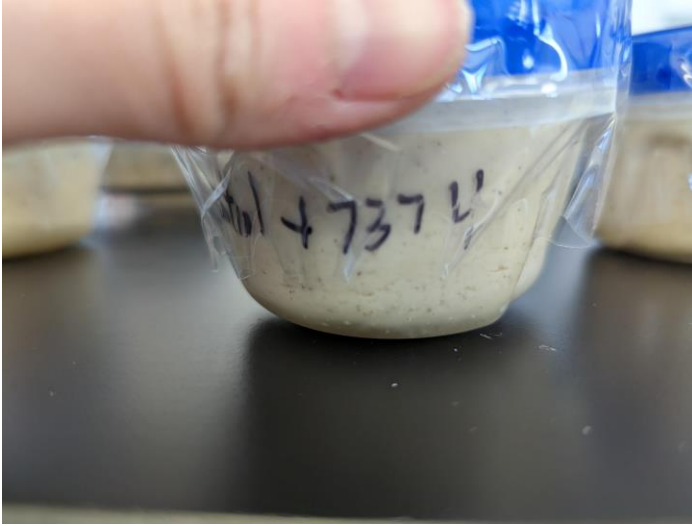
	MASTER	
INGREDIENTS	FORMULA	PERCENT
Vegan Mayo	80.000	62.5%
Water	30.000	23.5%
Apple Cider Vinegar	5.000	3.9%
Vegan Sour Cream-NP19146-2	3.000	2.3%
Rice Starch-Remypure S52P	2.500	2.0%
Granulated Garlic	2.000	1.6%
Sea Salt	1.500	1.2%
Vegan Cheez Conc-CNC0016	1.500	1.2%
Sugar	1.000	0.8%
Nutrava Citrus Fiber	0.290	0.2%
Parsley	0.100	0.1%
Onion Powder	0.400	0.3%
Rice Syrup-Remylose P32	0.250	0.2%
Black Pepper	0.200	0.2%
Dried Dill	0.100	0.1%
Dried Chive	0.080	0.1%

Development work done by Chef Shane Boling - Bluegrass Ingredients

Evaluation – Micro Results (Ambient Temp)

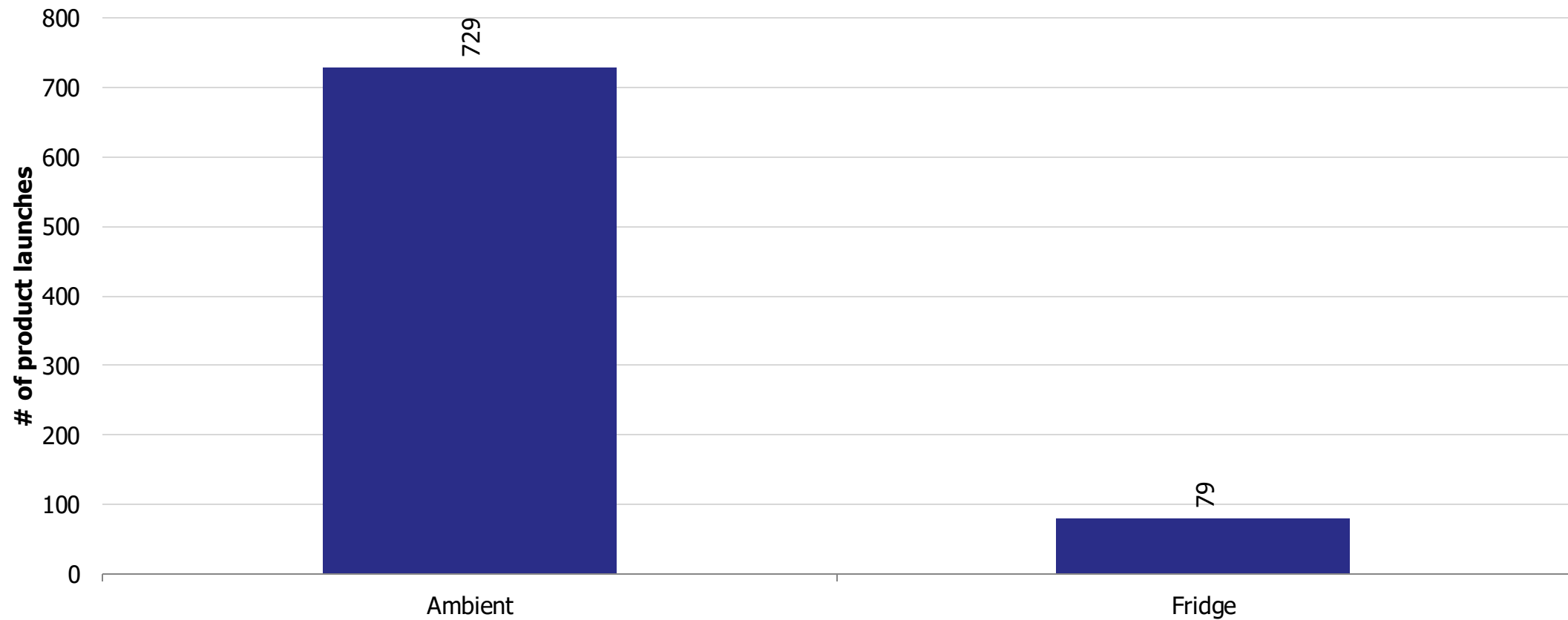


	Control				7374				7373 + E40			
Month	pH	APC	LAB	YM	pH	APC	LAB	YM	pH	APC	LAB	YM
0	4.3	353	<100	<10	4.4	283	<100	<10	4.5	289	<100	<10
1	4.3	790	<100	<10	4.3	708	<100	<10	4.3	604	<100	<10
2	4.2	270	<100	<10	4.3	635	<100	<10	4.4	577	<100	<10
3	4.2	152	<100	<10	4.3	267	<100	<10	4.4	503	<100	<10



Shelf stability (ambient temp)

PB Dressing Shelving format, 5 Yrs No. Amer.



Flavor Systems (Dairy flavor alternatives)

Vegan Sour Cream Powder:

Ingredients: Coconut Oil, Rice Syrup Solids, Pea Protein, Modified Food Starch, Lactic Acid, Citric Acid, & Natural Flavor.

Vegan Cheez Concentrate- similar flavor and aroma to cheese.

Ingredients: Water, Coconut Oil, Salt, Modified Food Starch, Yeast Extract, Natural Flavor, Lactic Acid, Xanthan Gum, and Citric Acid.



Micro Control and Flavor Enhancer- Cultured Dextrose

Natural Preservatives:

- The fermentation of non-GMO corn sugar by select GRAS bacteria generates metabolic compounds that **inhibit the growth of other microorganisms**.
- These GRAS bacteria differ in terms of which microorganisms their metabolites will inhibit.
- These fermentation products (or, “fermentates”) are viewed as *fermented foods* and are **labeled as “cultured dextrose” or “cultured corn sugar”**.
- The addition of these fermentates to food formulations allows manufacturers to extend the shelf life and improve the safety of perishable foods.
- The **“cultured dextrose” used in this study provides for broad spectrum control**, meaning it functions to hold back the growth of a broad range of microorganisms, including Gram(+) bacteria, Yeast/Mold, and select Gram(-) bacteria.

Natural Flavor Enhancers:

- The fermentation of non-GMO corn sugar (dextrose) by *select GRAS bacteria* produces metabolic compounds that **function to enhance savory, umami, salty, sour, meaty, or cheesy flavors and reduce Sodium**.
- Bacteria-derived flavor enhancers are clean label alternatives to *Yeast extracts, MSG, HVP, Disodium Inosinate and Guanylate*.
- The product can be **labeled “natural flavor”** (or, “cultured dextrose”, if preferred).
- The specific “natural flavor”/ (“cultured dextrose”) used in this study functions to **enhance cheesy/dairy/grassy flavors and minimizes off notes**.

Citrus Fiber

The Formulator's Secret for Condiments



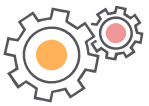
Why It's Different

- Smoother texture than other citrus fibers
- Black specks and off-flavor mitigation
- Better functionality
- Unique food ingredient solution
- Addresses clean label megatrend



Formulations for

- Basic emulsions
- Low-fat mayonnaise, ranch and French dressings
- Ketchup with reduced-sugar content
- Low-fat Béarnaise sauce



Functional Benefits

- Activation similar to cMCC
- Emulsion stability at different oil contents
- Use level related to activation methods
- Storage stability
- Enzyme stability

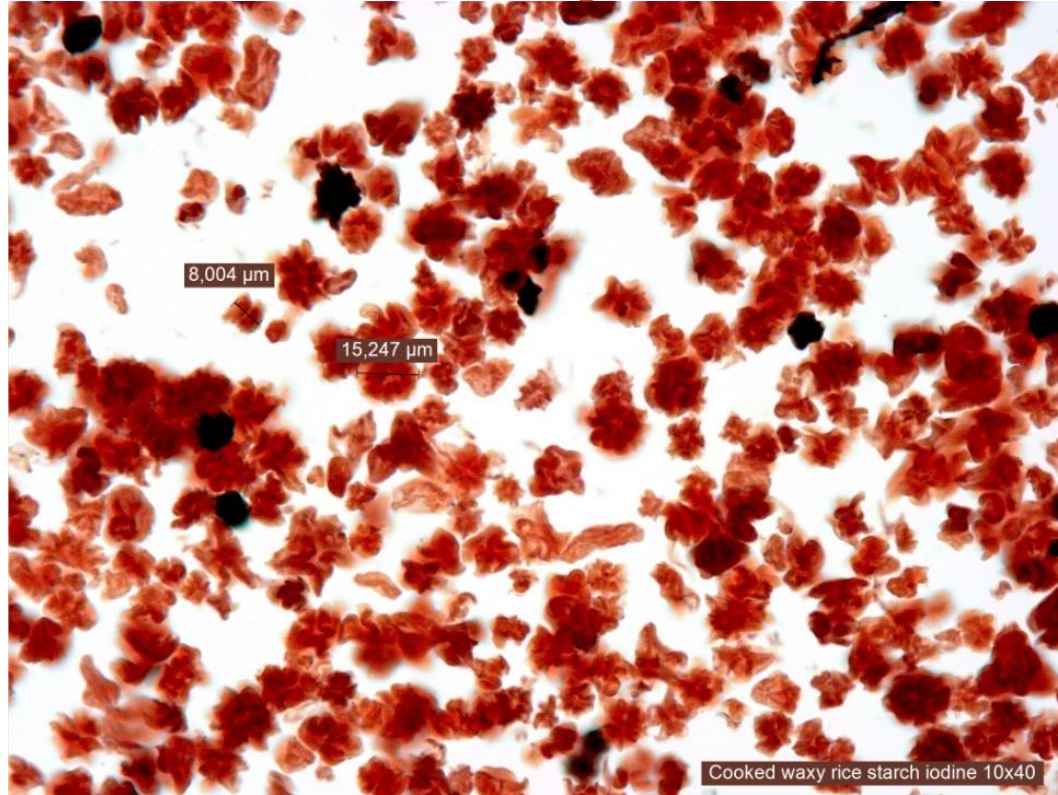


** In some countries, the composition of mayonnaise is defined by a standard of identity. Please refer to country-specific guidelines for relevant details.*

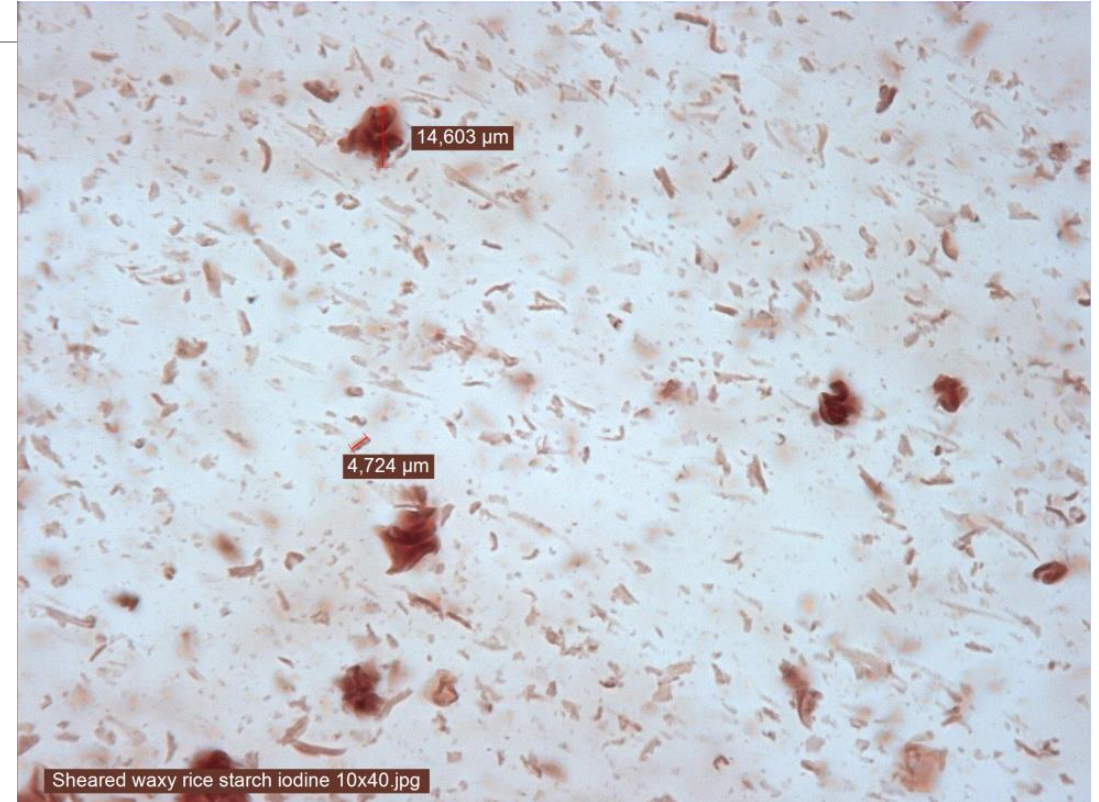
Starches

Process Stability is **Essential**. Starch is impacted by: Heat | Shear | Low pH

Intact starch granules



Damaged starch



Native Starch

No modification = cleaner label
Lower process tolerance

Modified Starch

Chemical modifications improve
process tolerance

Functional Native Starch

non-chemical modification of starches
process tolerance and clean label

Challenges / Learnings



Target attributes of texture/flavor achieved



Stability could be improved



Savory & Culinary Sauces

Meat/Fish



Other animal products may need to be replaced in sauces, dressings, and culinary applications:

- Anchovy – typical in Caesar dressing -
- Ground Meat
 - Bolognese or other meat sauce
 - Textured Plant Based Protein
- Bacon Bits- plant based available

Vegetarian pasta sauce

INGREDIENTS	(%w/w)
Water	43.70
Tomato passata	15.90
Tomato pieces in juice	15.90
<u>Textured Wheat Protein</u>	10.00
Tomato paste concentrate	7.50
Italian spices	2.90
<u>Functional Native Starch</u>	1.40
Olive oil	0.90
Sugar	0.90
Salt	0.60
Dried onions	0.20
White pepper	0.10
TOTAL	100.00

Textured Plant Protein:

- Hydration Time
- Desired Size (Chunk/Flake/Fine)
- Allergen Considerations
- Bite / Mouthfeel



Grand Sauces - Grand Challenges

❖ Demi-Glace: *rich roasted meat flavor. deep brown color*

- ✓ Umami via plant-based flavor enhancers,
- ✓ Rich vegetable stock
- ✓ Caramel color, hydrocolloid system for sheen/gloss.

❖ Bechamel: *thick & creamy*

- ✓ Roux – plant based fats (refined coconut oil)
- ✓ Cream/Milk – substitute plant based milk
- ✓ Vegan dairy flavor
- ✓ Addl texture/protein may be needed

❖ Hollandaise: *butter & egg galore!*

- ✓ Plant based fats
- ✓ Protein source (soy, nut, et al)
- ✓ Color, stability, depth of flavor



Performance of Citrus Fiber peak in Béarnaise Sauce

Comparing to a reference containing egg yolk, modified starch and various stabilizers

Reference: (Silverson)



2.5% Citrus Fiber peak (Silverson)



1.5% Citrus Fiber peak (homogenizer)



Citrus Fiber peak Benefits:

- Can replace stabilizers, maltodextrin, modified starch and egg yolk
- Comparable appearance, texture and mouthfeel to the reference sample
- Use level can be adjusted to compensate for lower degree of activation





Any Questions?