MATTSON *Webinar*







THE FUTURE OF FOOD WILL BE FERMENTED:

INSIGHTS INTO PRODUCT DEVELOPMENT & CONSUMER COMMUNICATION OF PRECISION FERMENTATION

TODAY'S WEBINAR HOSTS



BARB STUCKEY

WELCOME

10:00 - 10:10



JUSTIN SHIMEK

PRODUCT DESIGN & DEVELOPMENT WITH PRECISION FERMENTED INGREDIENTS

10:10 - 10:30



KATIE HAGAN

PROPRIETARY RESEARCH STUDY RESULTS FOR COMMUNICATION OF PRECISION FERMENTATION

10:30 - 10:50
+ Q&A

WHO WE ARE AND WHAT WE DO FOR CLIENTS



BARB STUCKEY

CHIEF INNOVATION & MARKETING OFFICER

MATTSON

MULTI-DISCIPLINED, EXPERIENCED PROFESSIONALS







60+
employee-owners

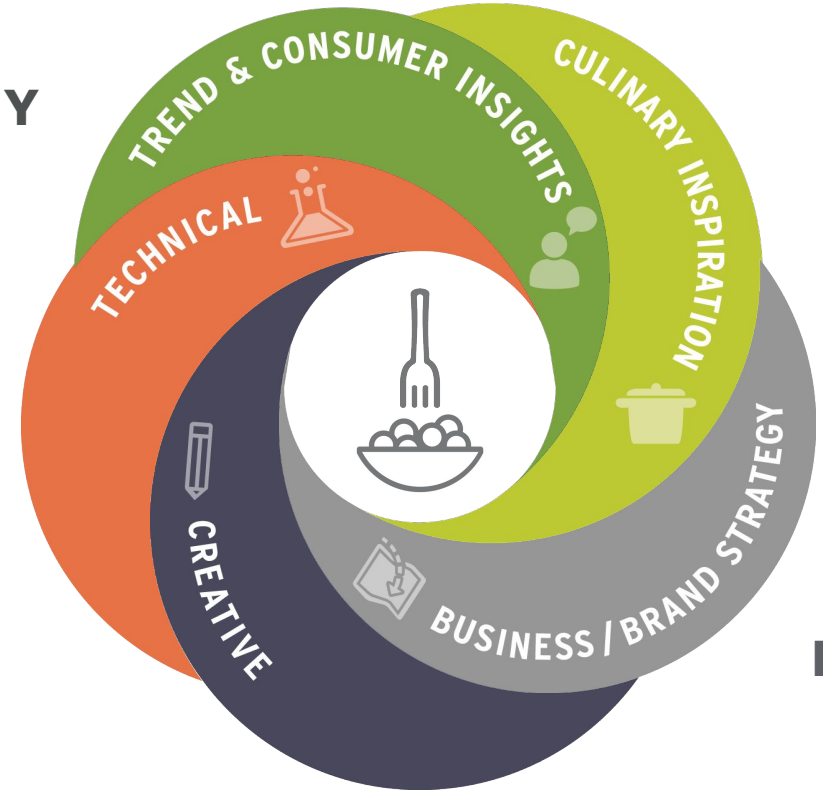
From **Strategists**
to **Scientists**
to Chefs
to **Scale-up Specialists**

Driven by a
passion for food

Focused on
Making a Difference
in the **world**
and our **community**

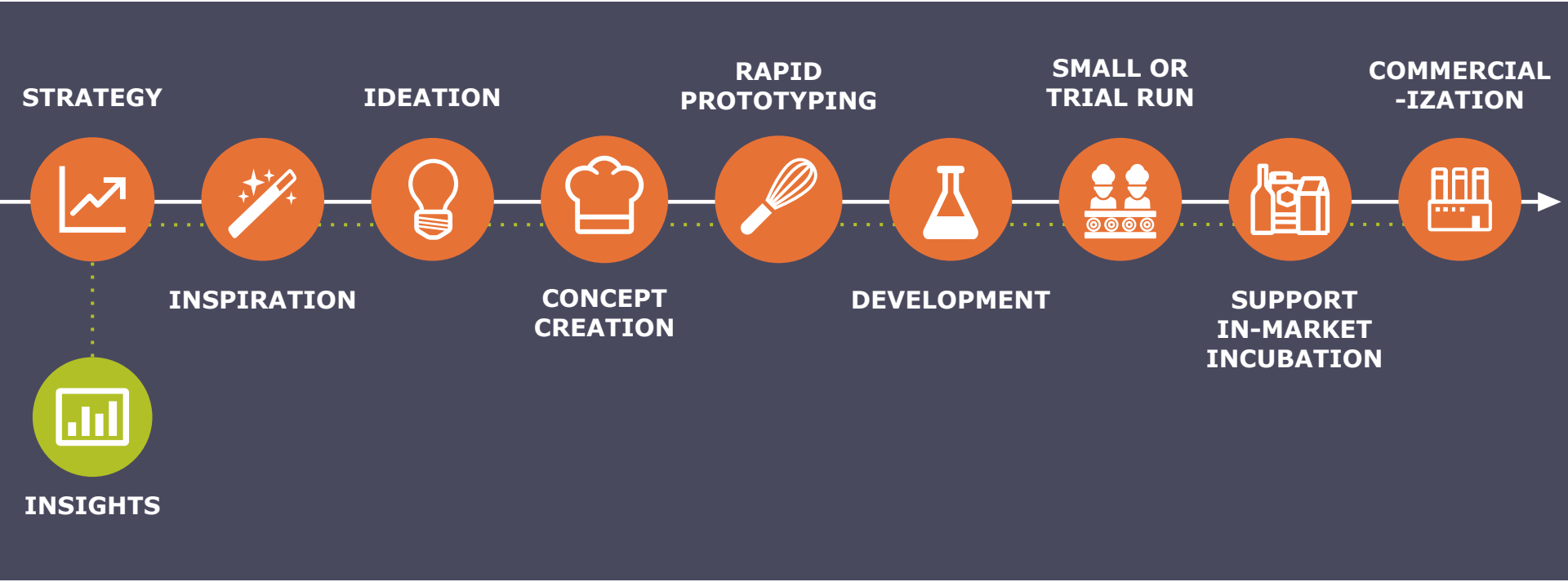
OUR SECRET SAUCE

DRIVEN
BY STRATEGY



ENABLED
BY INSIGHTS

WE TAKE YOU FROM WHERE YOU ARE NOW...
TO LAUNCH



OUR WORK: COVERS 100% SHARE OF STOMACH

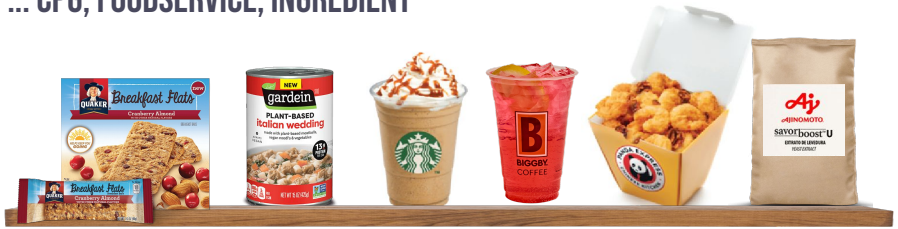
BIG COMPANIES AND START-UPS...



... FRESH, CHILLED, FROZEN, AMBIENT



... CPG, FOODSERVICE, INGREDIENT



... BREAKFAST, LUNCH, DINNER, SNACK, OR ENHANCER



... FOOD AND DRINK



... FUN AND FUNCTIONAL



WE DEVELOP AWARD-WINNING PRODUCTS FROM CONCEPT TO COMMERCIALIZATION

01

PROLIFIC PROTOTYPING

Get to a minimally-viable protocepts as fast as possible.

02

FOCUS ON CRAVEABILITY

Create or re-create craveable products to drive frequency of purchase.

03

BUILD PRODUCTS FOR SCALE

Build for success, with a line of sight to efficient production at scale, no matter how small the launch.

NEXTY AWARDS

SPECIALTY FOOD ASSOCIATION SOFI AWARDS

IRi NEW PRODUCT PACESETTERS

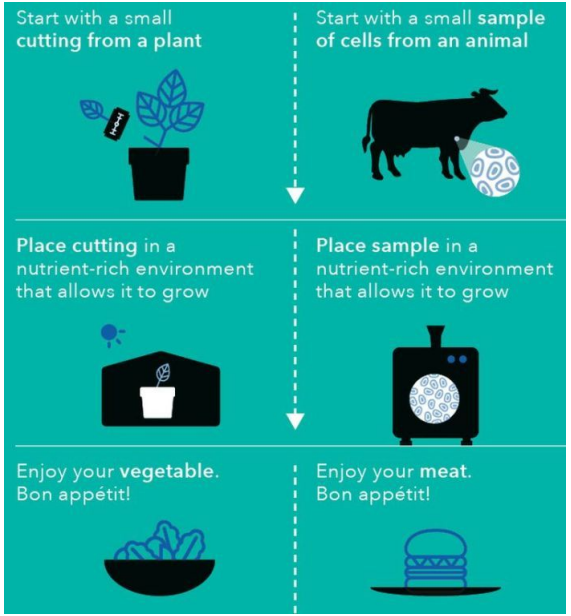
FABI FOOD & BEVERAGE INNOVATIONS AWARDS

MENU MASTERS Awards

MATTSON

OUR ROLE IN COMMUNICATION OF CULTIVATED MEATS

MATTSON



STRATEGY

CONCEPT CREATION

PRODUCT DESIGN & DEVELOPMENT WITH PRECISION FERMENTED INGREDIENTS



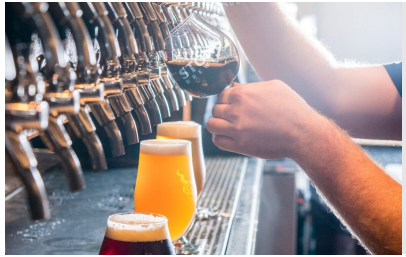
JUSTIN SHIMEK, PH.D.

CEO &
CHIEF TECHNOLOGY OFFICER

MATTSON

WHAT IS PRECISION FERMENTATION?

THERE ARE 3 TYPES OF FERMENTATION



TRADITIONAL FERMENTATION

The process of changing a food through microbial action (e.g. consuming sugars and producing acid, ethanol, etc.)



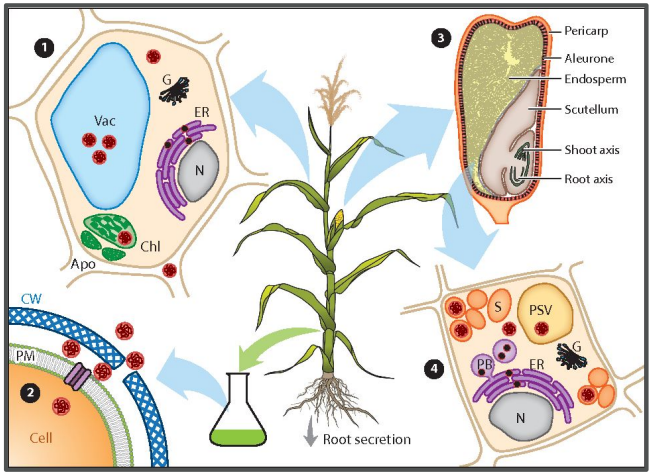
BIOMASS FERMENTATION

Uses high-protein content and rapid growth of microorganisms to efficiently make large amounts of protein-rich food, microbial biomass itself serves as the ingredient



PRECISION FERMENTATION

Uses genetically engineered microorganisms to produce specific functional ingredients

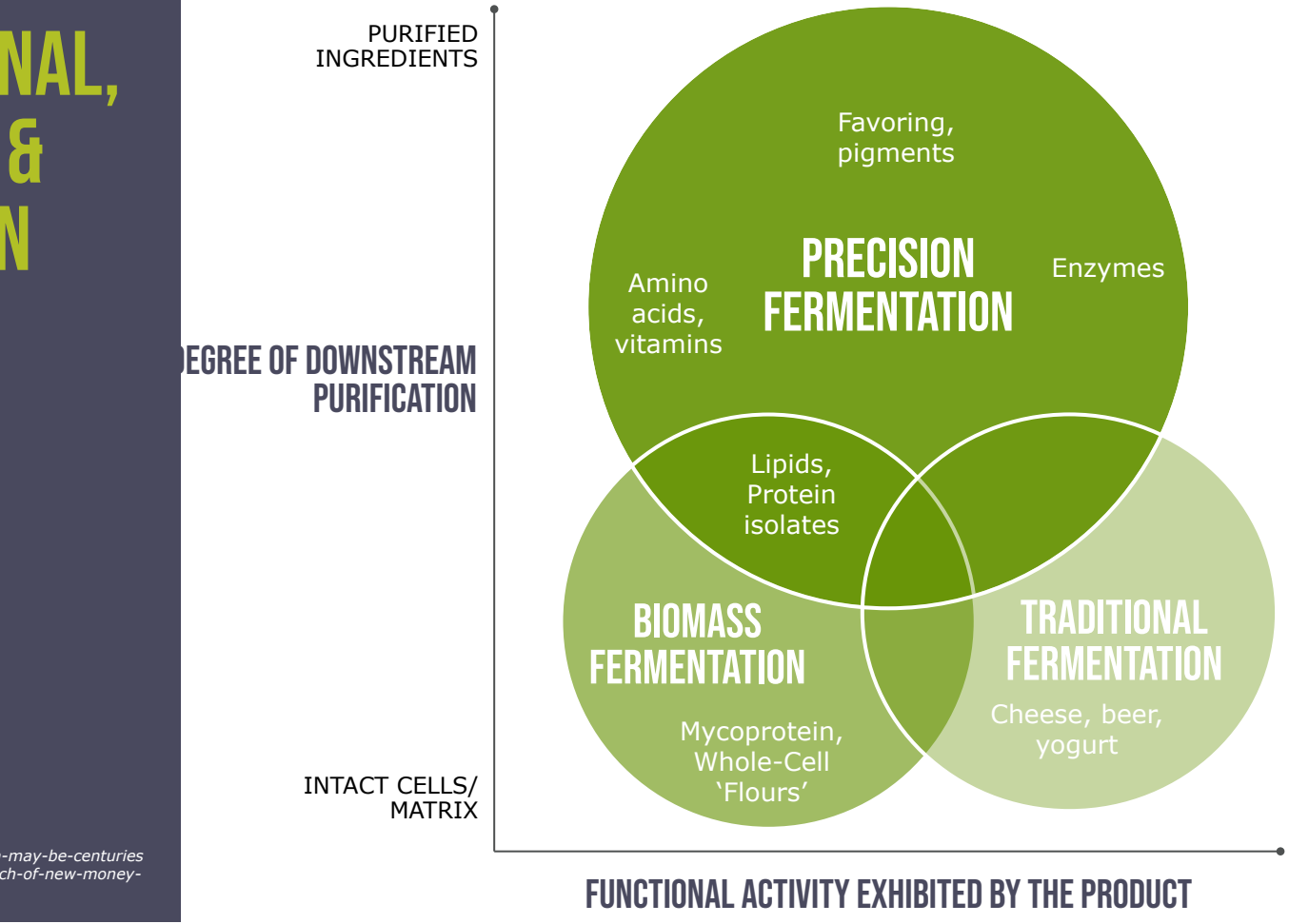


WORTHY MENTIONS FOR OTHER RELATED TECHNOLOGIES:

- Cell Cultivation
- Molecular Farming

Source: https://gfi.org/fermentation/

TRADITIONAL, BIOMASS & PRECISION



Adapted from:
https://thespoon.tech/fermentation-may-be-centuries-old-but-its-attracting-a-whole-bunch-of-new-money-1-69-billion-to-be-exact/

PRECISION FERMENTATION IS ALL AROUND US

Precision fermentation has been around for **decades** and is used in **many products we interact with daily**.



Medication:
Insulin



Supplements:
Vitamins



Cheese:
Rennet
(enzymes used in cheese production)



Foods & Beverages:
Natural Flavors

WE EVALUATE FERMENTED INGREDIENTS AND DEVELOP HIGH POTENTIAL APPLICATIONS

PROTEINS: Egg, Dairy, Yeast

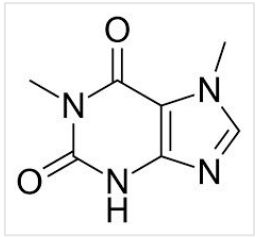




FATS: Cultured Oils, Algae Oils




ACTIVES: Caffeine Metabolites, Collagen




SWEETENERS: Brazzein, Reb M



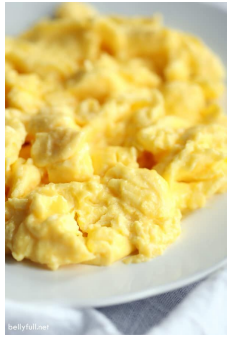

BIOMASS: Single-cell, Filamentous Fungi




WE ALSO DEVELOP CONSUMERS PRODUCTS WITH FERMENTED INGREDIENTS











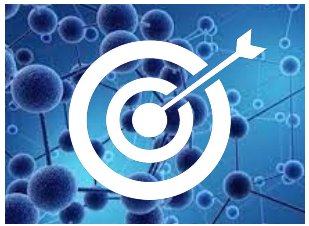


From Food to Beverage, Sweet to Savory, Functional to Indulgent
All Enabled by FERMENTATION

HOW IT WORKS: THE PRECISION FERMENTATION INNOVATION CYCLE

OUR WORK INFORMS

TARGET SELECTION & DESIGN



- Identify opportunity for targeted production of a specific ingredient(s)
- Design the target molecules to produce using the microorganisms

STRAIN DEVELOPMENT



Choose microbial strain, with unique features, e.g.:

- Enhanced growth potential
- Feedstock preferences
- Nutritional characteristics
- Flavor profiles

FEEDSTOCK OPTIMIZATION



- Identify and optimize feedstock
- Where appropriate, may leverage agricultural waste for economy of production and sustainability

BIOPROCESS DESIGN



Leverage proprietary bioprocesses for:

- Cost reduction
- Scale-up
- Sustainability for fermentation use

END-PRODUCT FORMULATION & MANUFACTURING

MATTSON EXPERTISE



- Work with Mattson to identify ways to optimize sensory of the protein/fat/other ingredient
- Leverage Mattson's expertise in formulation and manufacturing scale-up of finished products

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Source: https://gfi.org/science/the-science-of-fermentation/

PRECISION FERMENTATION-ENABLED BRANDS HAVE GONE TO MARKET



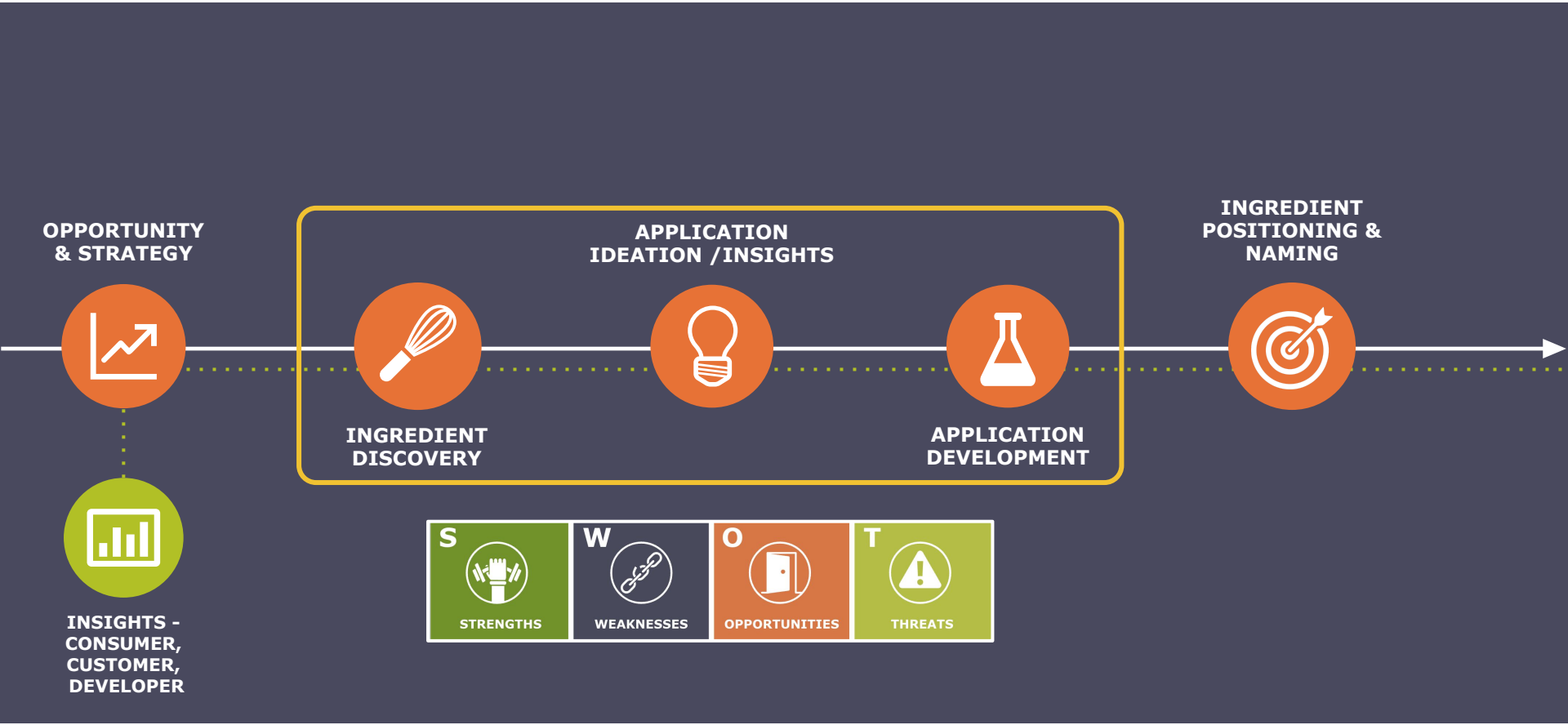




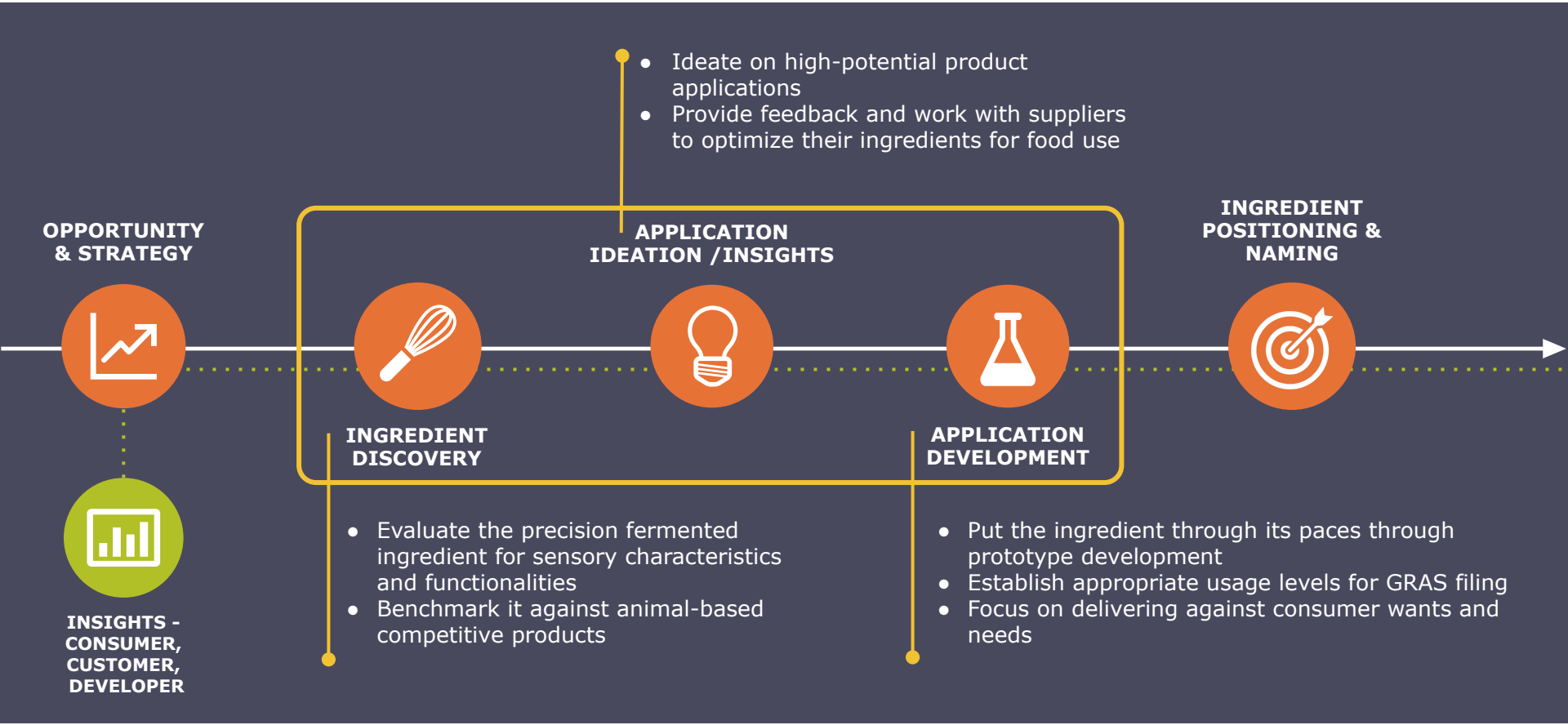


BUILDING EXCITING NEW INGREDIENTS & PRODUCTS

WORKING WITH PRECISION-FERMENTED INGREDIENTS: INNOVATION APPROACH

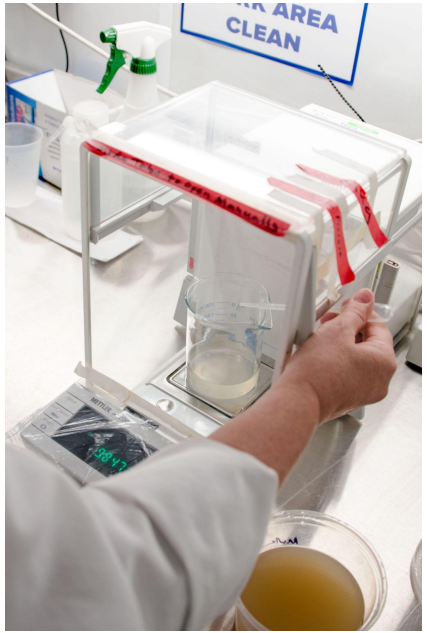


WORKING WITH PRECISION-FERMENTED INGREDIENTS: DEVELOPMENT APPROACH



STRATEGIC APPLICATION PERFORMANCE ASSESSMENT

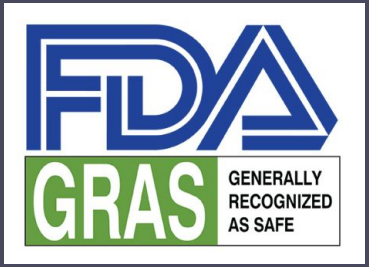
Ingredient clients can engage Mattson to **understand how their ingredients hold up against a competitive set**. The Mattson team takes the following steps to **understand client's ingredients strengths, weaknesses, opportunities, and threats** using our proprietary approach.



01.	Kick-off and Deep Technical Briefing Ingredient
02.	Mattson Professional Developer Focus Groups
03.	Chemical & Physical Measurements Ingredient
04.	Application Testing
05.	U.S. Retail Product Review vs. Client's Ingredient(s) Application Test
06.	Ingredient Performance Workshop
07.	S.W.O.T. Analysis on Client's Ingredient(s)
08.	Strategic Discussion with Client Regarding Ingredient(s)

** All projects are custom, so process may vary.*

GRAS CONSIDERATIONS



Step 1: Generate a GRAS dossier that captures the salient safety information needed to establish safe human uses in designated foods, including:

- Production Procedures, Chemistry, and Specifications
- Intended Food Uses

Informed by Mattson's Ingredient Evaluation and Application Development work

- Scientific Studies
- Historical Consumption & Known Human Food Uses
- Known Adverse Effects
- Independent Safety/Toxicology Assessments

Step 2: Contract an Expert Panel, qualified by training and experience, to evaluate the GRAS dossier

Optional Step 3: Notify the FDA of the GRAS conclusion.

WORKING WITH PRECISION-FERMENTED INGREDIENTS



Challenges

- Limited quantities
- Lot-to-lot variability during scale-up
- Downstream processing impacts
- Challenging iterative development as source material continues to evolve

OUR PROPRIETARY CONSUMER STUDY ON PRECISION FERMENTED INGREDIENTS



KATIE HAGAN

EXECUTIVE VICE PRESIDENT, INSIGHTS & INNOVATION

MATTSON


SO WHAT ARE PRECISION FERMENTED INGREDIENTS
... DO I REALLY WANT TO KNOW?
... AND DO I WANT THEM IN MY FOOD?

WE SURVEYED 450+ US CONSUMERS IN 3 MAJOR AREAS

1

DEMOGRAPHICS AND PSYCHOGRAPHICS

2

KNOWLEDGE AND ATTITUDES AROUND (PRECISION) FERMENTATION

3

PURCHASE INTENT FOR 3 DIFFERENT PF CONCEPTS

WE USED COMMON INTROS/OUTROS FOR ALL 3 CONCEPTS

LOW, MEDIUM OR HIGH SCIENCE DESCRIPTION INSERTED HERE

Introducing The Future Foods Company…
changing the world by changing the way we make food.

Future Foods is a new food and beverage company that uses a revolutionary new way to make delicious versions of your favorite and most satisfying, protein-rich foods from real poultry, meat, and seafood to real eggs and dairy. All our food is animal-free and planet–friendly. We use significantly less water and land, producing significantly less carbon emissions. And for your health, everything is antibiotic-free, hormone-free, cholesterol and lactose-free, and is less susceptible to the risk of foodborne illness. Sounds impossible but it's true!

The Future Foods Co. produces a variety of delicious products such as:

- Meat, including beef, pork, and poultry to make burgers, tacos, chicken tenders, and more
- Dairy favorites like cheese, milk, ice cream, yogurt, and butter
- Popular seafood like shrimp, tuna, and fish filets
- Eggs to make your favorite breakfast scramble or omelet

Future Foods will be working to bring our sustainable products to market in 2024, so look for them early next year wherever you shop for groceries.

3 CONCEPTS TESTED: LOW, MEDIUM AND HIGH SCIENCE DESCRIPTIONS

LOW SCIENCE

Future Foods uses a **new technology** to create products with real chicken, beef, pork, dairy, and seafood proteins - but without animals

MEDIUM SCIENCE

You may be familiar with food fermentation, a traditional process used for millennia to make bread, wine, beer, and more. Future Foods is using a **new generation of fermentation that takes this proven technique to a whole new level by using yeast to create meat, dairy, egg, and seafood proteins.**

That means no animals are used, but our products contain real chicken, beef, pork, dairy, and seafood proteins…**from fermentation.**

HIGH SCIENCE

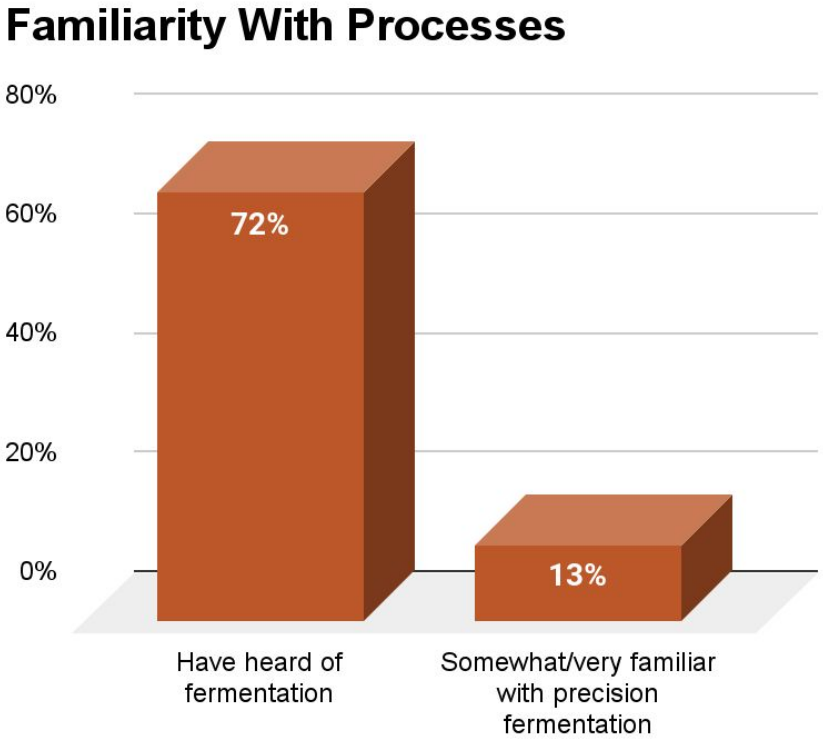
You may be familiar with food fermentation, a traditional process that uses yeast to make bread, wine, beer, and more. Future Foods is using a new generation of fermentation that takes this proven technique to a whole new level - precision fermentation.

With **precision fermentation, we copy the gene sequence responsible for producing protein in animals, and insert it into yeast or other flora. It's then fed sustainable nutrients and nature goes to work. The sequence acts like an instruction guide that tells the yeast how to produce the desired animal proteins. In stainless steel tanks, the yeast is multiplied to produce real meat, dairy, egg, and seafood proteins, identical to those that cows, chickens, and other animals provide. It's an efficient, animal-free way of creating the protein ingredients for traditional foods.**

No animals are used, but Future Foods' products contain real chicken, beef, pork, dairy, and seafood proteins… all from fermentation.

STUDY RESULTS

WHILE FERMENTATION WAS FAMILIAR, PRECISION FERMENTATION WAS NOT



? ***Please tell us what you know about the process of fermentation.***

*"Fermentation is a process that includes **bacteria** or **yeast** and there are many items that have this. Bread, beer, yogurt, etc."*

*"Fermentation allows food to change through the activity of **microorganisms**, usually undergoing favorable (**healthy**) alterations. Yogurt, kimchi, pickles, and sauerkraut are several types."*

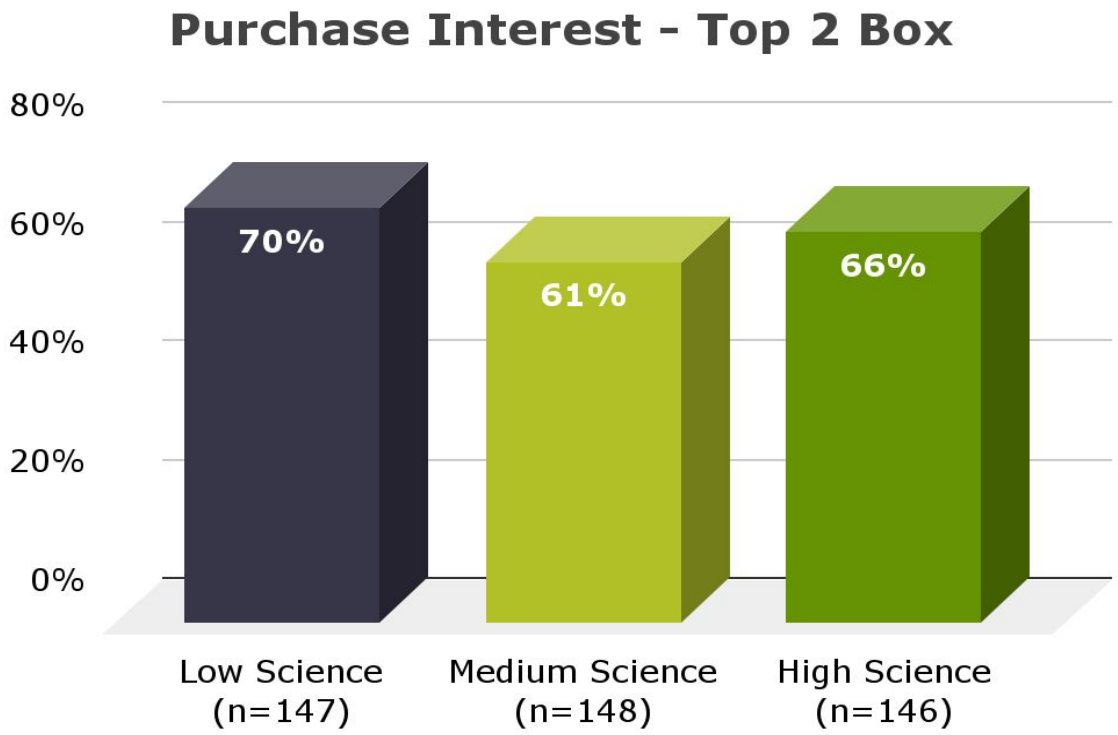
*"Fermentation is a way of **preserving** certain types of food. They are produced through the controlled growth of good **bacteria**"*

PURCHASE INTENT WAS CONSISTENTLY STRONG ACROSS CONCEPTS



2/3

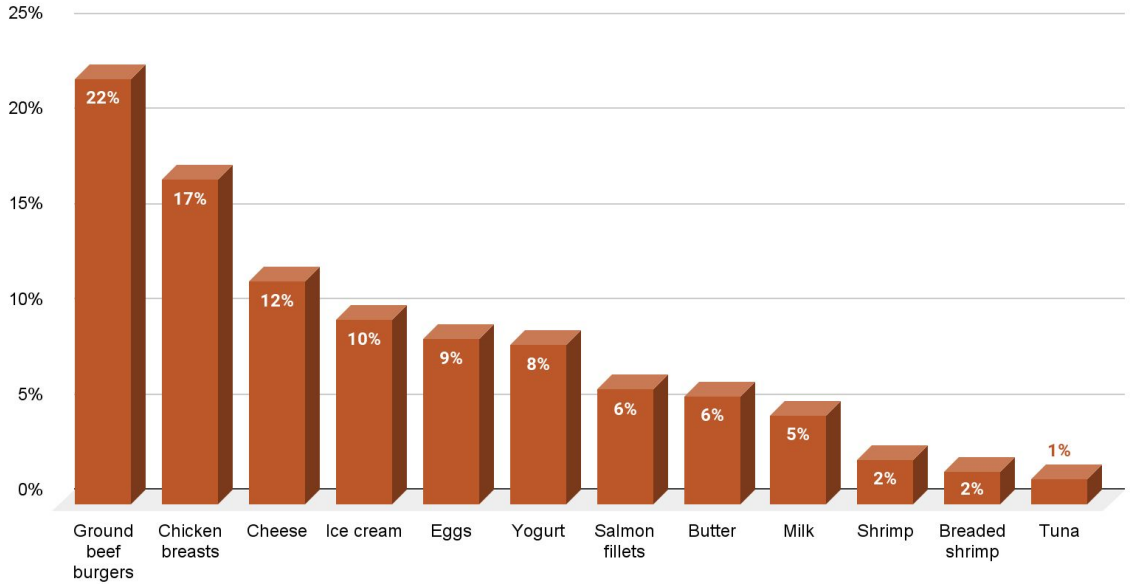
respondents on average across all 3 concepts were interested in trying a precision fermented product



PARTICIPANTS WANT TO TRY PF BEEF OR CHICKEN - IDEALLY AT HOME

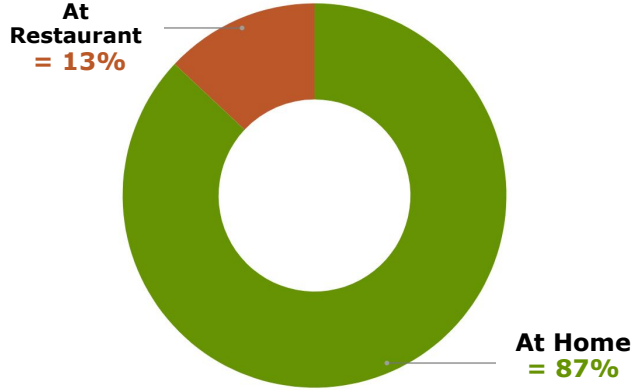
DESIRED TRIAL FOOD

Q: Which type of food would you be most interested in trying first?



DESIRED TRIAL LOCATION







WE IDEATED TO CREATE AND TEST 32 POTENTIAL NAMES FOR THIS PROCESS

1. Bio
2. Biocrafted
3. Bio-fermented
4. Bio-grown
5. BioAg
6. Brewed
7. Cultivated
8. Cultured
9. Fermaculture
10. Fermentation-derived
11. Flora-enabled
12. Flora-grown
13. FlorAg
14. Floraculture
15. Floramentation
16. Flora fermented
17. Focus fermented
18. Micro-Ag
19. Micro-grown
20. Micromentation
21. Nano-grown
22. New-gen fermented
23. Precision fermented
24. Modern fermentation
25. Precision-grown
26. Select fermentation
27. Vision fermented
28. Yeast-derived
29. Yeast-enabled
30. Yeast-generated
31. Yeast-grown
32. Yeast-powered

33. None of the above are appealing to me

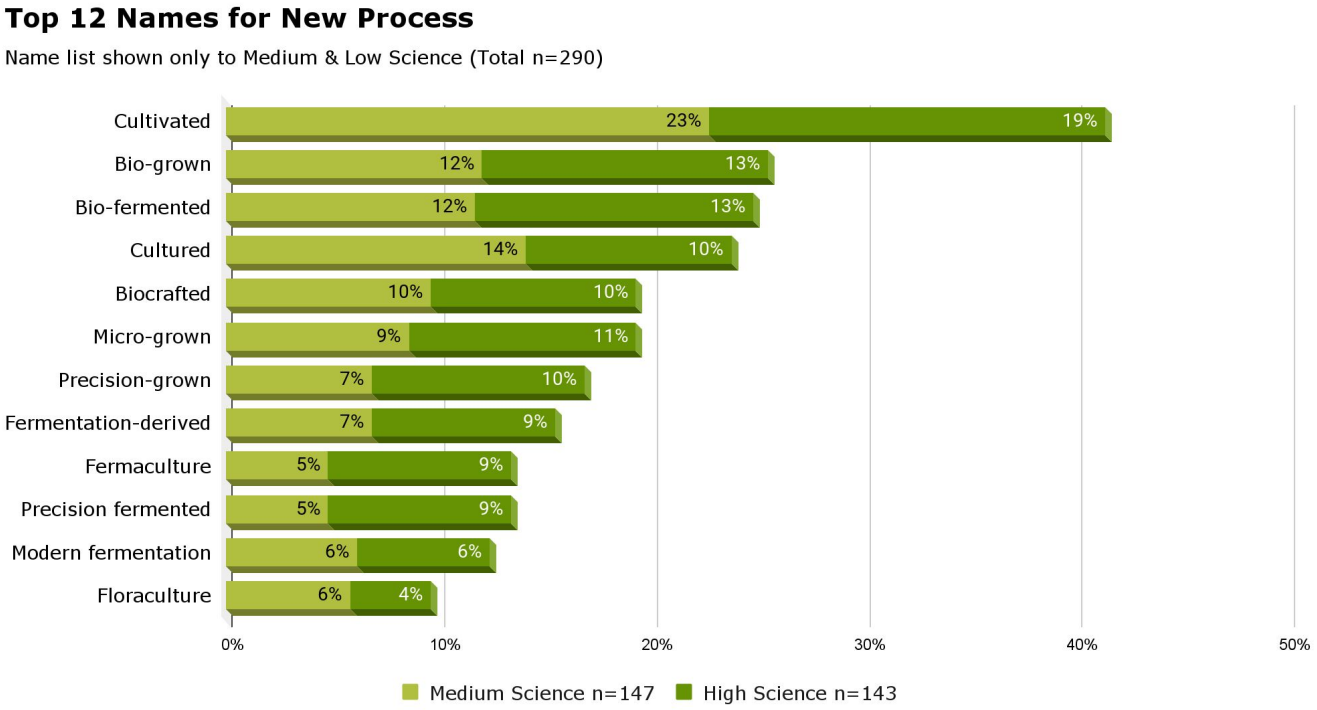


Note: Respondents shown the Low Science concept were not asked about names

CULTIVATED WAS THE PREFERRED NOMENCLATURE

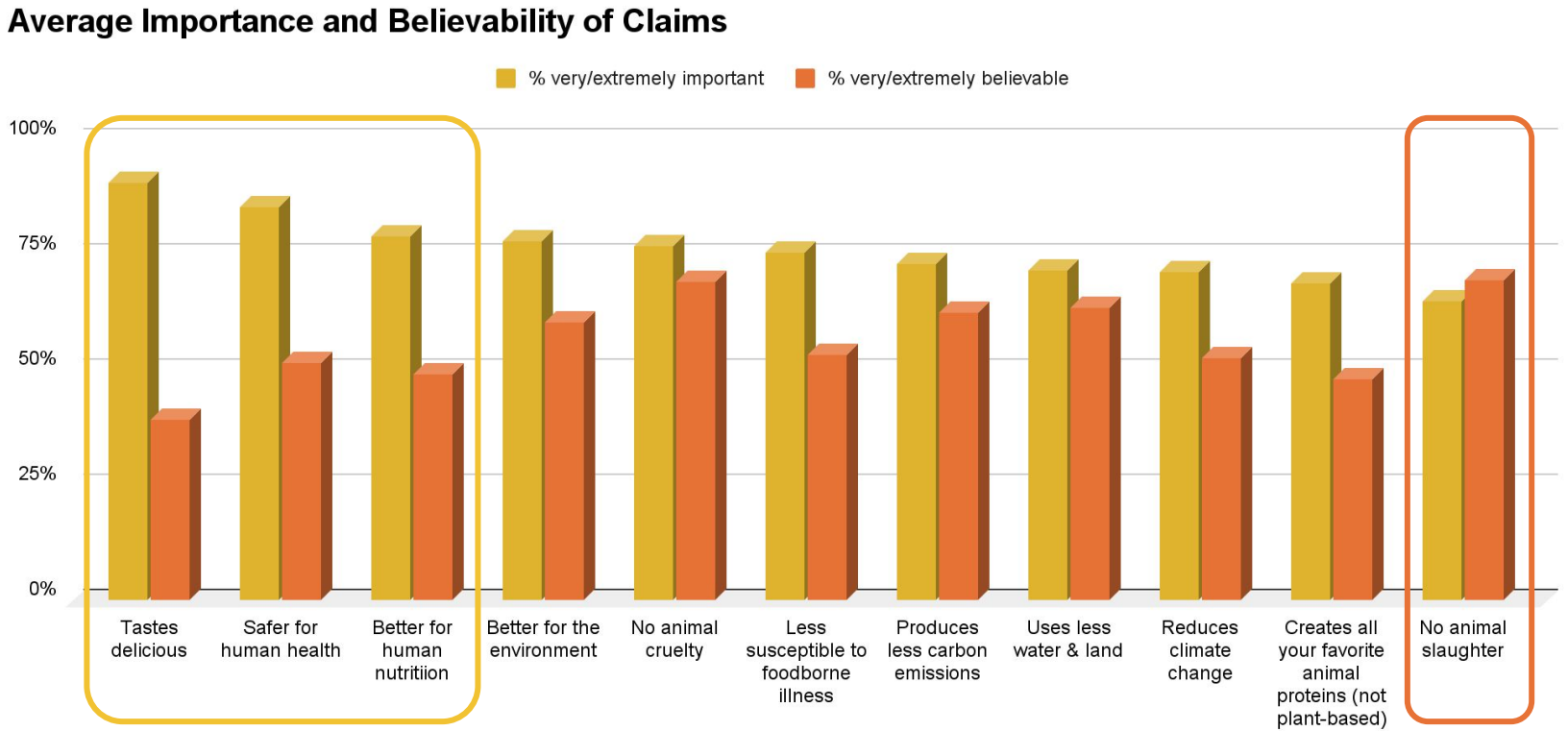
Could CULTIVATED serve as the umbrella term for the next generation of food?

- Biomass Fermentation
- Cell Cultivation
- Molecular Farming
- And whatever's next…



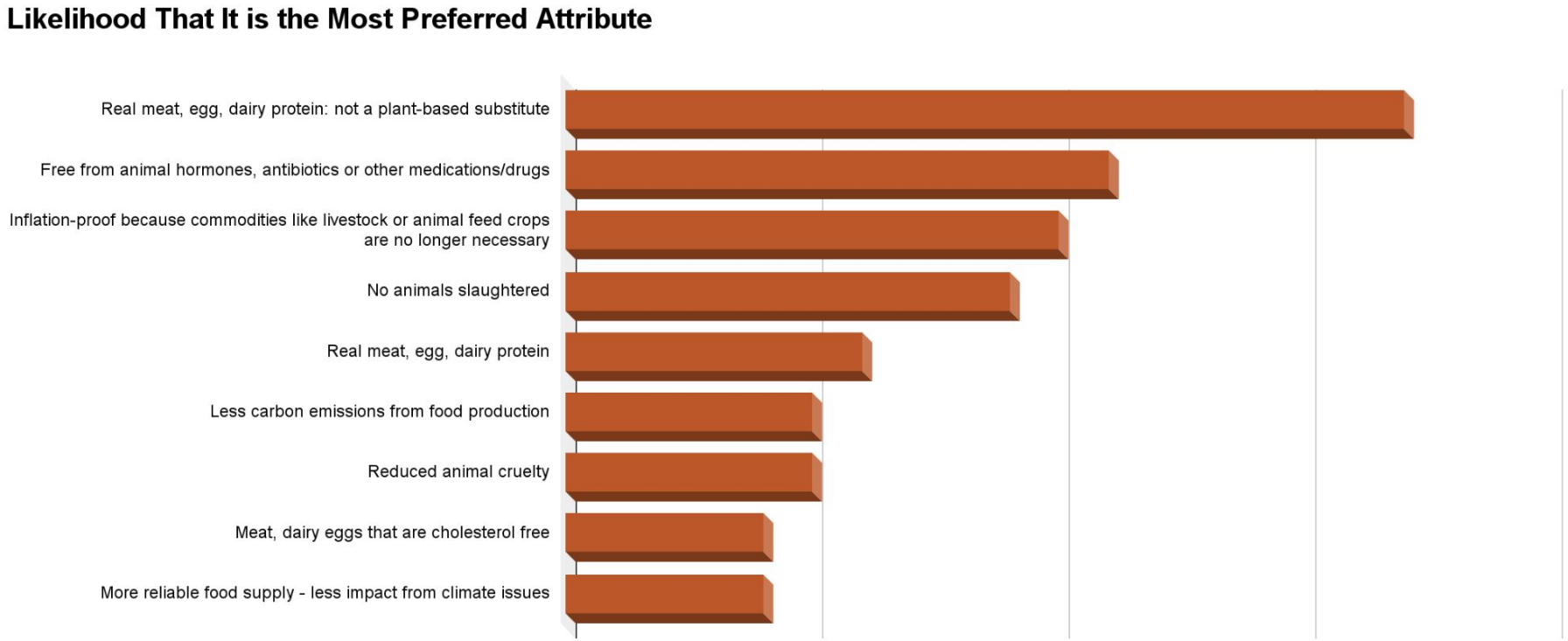
Note: Respondents shown the Low Science concept were not asked about names. We asked respondents to select up to 5 descriptions that were appealing to them.

THERE IS SKEPTICISM ABOUT PF'S ABILITY TO DELIVER ON IMPORTANT CLAIMS



Note: Data is for total respondent base; no meaningful differences found across concepts

THE MOST APPEALING ATTRIBUTE OF THIS CONCEPT? NOT PLANT-BASED



Note: Data is for total respondent base; no meaningful differences found across concepts
Note: Scale not shown as relative popularity is the meaningful metric for MaxDiff

ALL 3 CONCEPTS EVOKED SIMILAR THEMES FOR PURCHASE DRIVERS

? ***What, if anything, about the description makes you likely to purchase their products?***

Low Science	Medium Science	High Science
Sustainability	Sustainability	Sustainability
Animal Welfare	Animal Welfare	Animal Welfare
Health / Nutrition	Health / Nutrition	Health / Nutrition
Curiosity / Novelty	Innovation / Cutting-Edge	Innovation / Cutting-Edge
Taste	Taste	Taste
Animal-free Protein	Real Meat Protein	Real Meat Protein
Affordability	Affordability	Affordability

Table Source: Open-ended responses analyzed by Claude 2.0 (AI)

LOW Science:
*"It sounds like a more **sustainable** way to get the same food I already love. I also love trying new things and am **curious** how this would be."*

MEDIUM Science:
*"I would like to try these foods because they don't kill any **animals** to make the food."*

HIGH Science:
*"For me it's the **sustainability** of the process and reducing our need for **animal farming**. It sounds like the process could create an industry where we can better feed the world."*

HOWEVER, CLAIMED SCIENTIFIC KNOWLEDGE VARIED ACROSS CONCEPTS

LOW SCIENCE

Strongest Characteristic:
Rely on convenience foods

% Familiar with Precision Fermentation:
7%

% Belief that Climate Change is Real:
81%

MEDIUM SCIENCE

Strongest Characteristic:
Want to stand out

% Familiar with Precision Fermentation:
17%

% Belief that Climate Change is Real:
84%

HIGH SCIENCE

Strongest Characteristic:
Low concern about tech

% Familiar with Precision Fermentation:
18%

% Belief that Climate Change is Real:
91%

Note: Profiles pulled for respondents with top 2 box purchase interest for each concept

RESPONDENTS WHO LIKED HIGH SCIENCE HAVE EARLY ADOPTER PROFILES

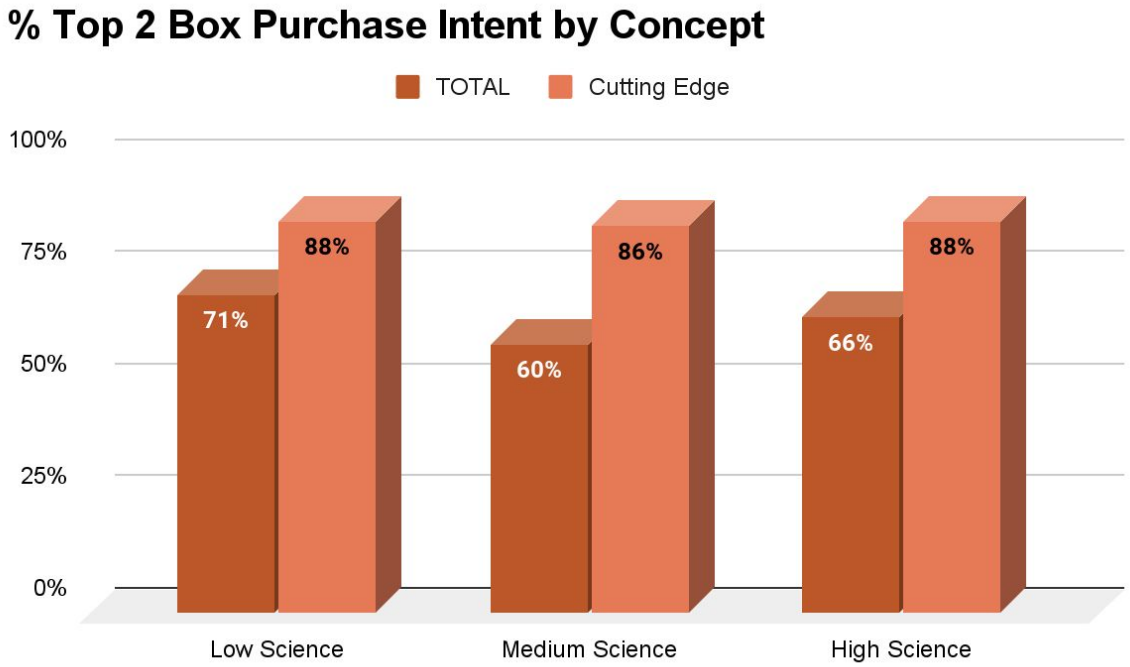
? *Variation from total sample for % that somewhat/strongly agree with statement*

	 Rely on convenience foods	 Spend more for planet	 Budgetary constraints for food	 Concerned about tech in food
LOW SCIENCE	+15%	+11%	-4%	-3%
MEDIUM SCIENCE	+21%	+14%	+22%	+21%
HIGH SCIENCE	-20%	+22%	-32%	-39%

Note: Profiles pulled for respondents with top 2 box purchase interest for each concept

SEEKING CUTTING EDGE INGREDIENTS IS A POWERFUL PREDICTOR OF PI

? *(Agree/disagree) I enjoy looking for foods and beverages that have cutting edge ingredients*



33%

more likely on average to **show high purchase intent for a precision fermentation concept if looking for cutting edge ingredients**

RECOMMENDATIONS

OUR TOPLINE RECOMMENDATIONS

1. Enter the market through **familiar, broadly appealing food or drink**
2. Consider **Cultivated** as an umbrella term for the next gen of food tech
3. Emphasize that the product is **real "X," not plant-based**
4. Make sure the product is **delicious or don't launch** (see plant-based!)*
5. Find early adopters via **openness to cutting-edge ingredients & strong concern for sustainability**
6. Focus marketing on building **trust & credibility that your product is delicious, safe and better for the planet** (with product design to back it up!)

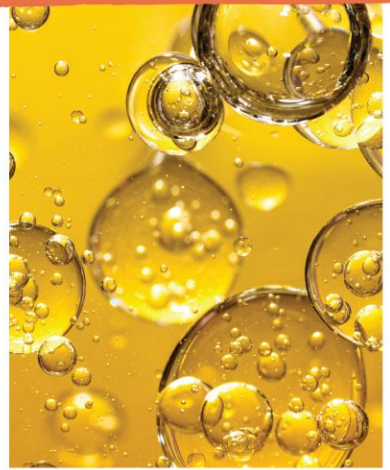
Q&A

Thanks to all involved behind the scenes, WHO MADE THIS webinar happen:
Danikka Semana, Janine Magyar, Emily Auerbach, and Erin McGlothlin.

THANK YOU FOR ATTENDING!

LOOK FOR AN EMAIL WITH A SURVEY AND LINK TO DOWNLOAD THIS WEBINAR.




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