



▲ MATTSON *Webinar*

UPCYCLED FOOD INGREDIENTS:

WHO'S USING THEM?
HOW DO I FIND THEM?
AND ARE THEY FOR MY BRAND?

Featuring



JAIME REEVES
MATTSON EVP,
PRODUCT DEVELOPMENT
& COMMERCIALIZATION



EMILY AUERBACH
MATTSON
INNOVATION MANAGER

ABOUT EMILY



EMILY AUERBACH

- **Innovation Manager** at Mattson
- Responsible for **supporting client engagements** through **data analysis, consumer insights,** and **project management**
- **About 10 years in food industry** including positions at General Mills and OCHO Candy
- **Education:**
 - **Masters of Business Administration** and **Masters of Environmental Management** from Yale University
 - **Bachelors of Science in Environmental Science** from University of North Carolina at Chapel Hill

WHAT ARE UPCYCLED INGREDIENTS AND WHY SHOULD I CARE?

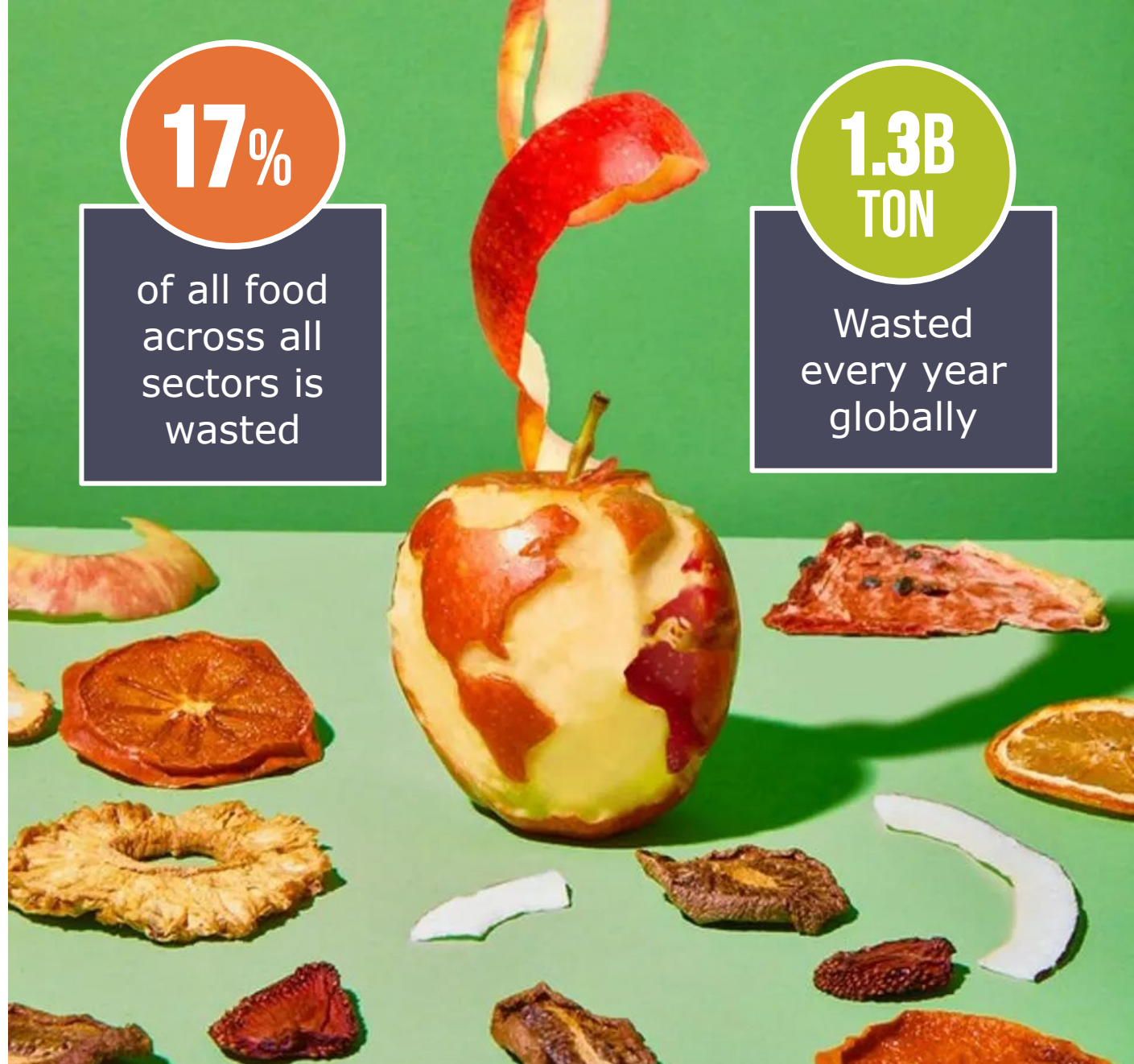
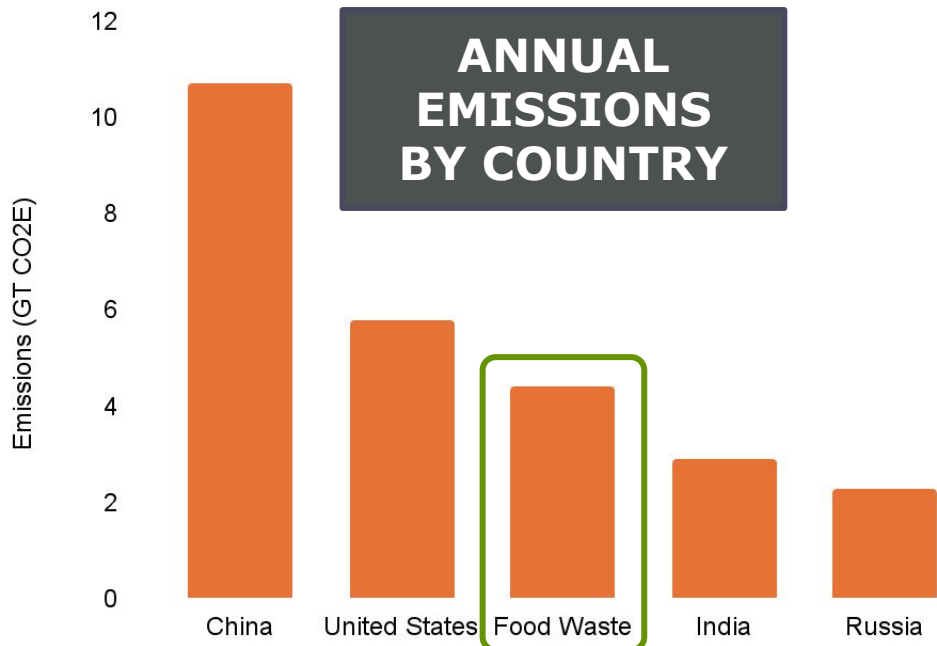
WHAT?

UPCYCLED FOOD

uses ingredients that otherwise would not have gone to human consumption, are procured and produced using verifiable supply chains, and have a positive impact on the environment.

FOOD WASTE IS A MASSIVE PROBLEM

IF "FOOD WASTE" WERE A COUNTRY, IT WOULD BE THE **#3 GLOBAL EMITTER**



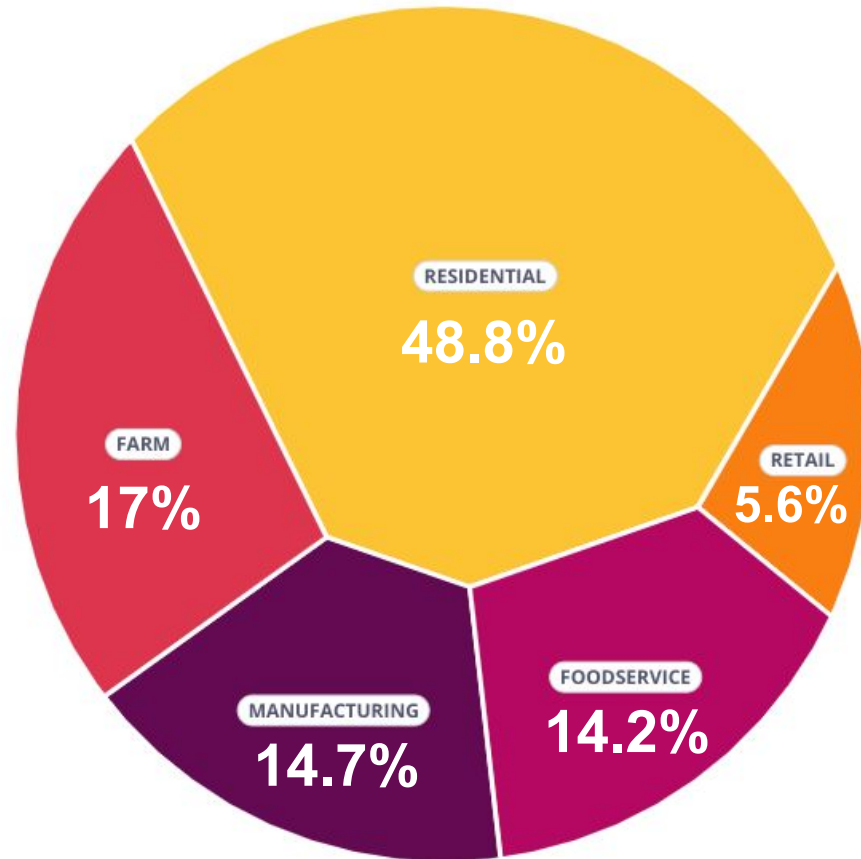
TOGETHER, FOOD PROCESSORS AND RETAILERS ACCOUNT FOR 35% OF FOOD WASTE

91 million Surplus Food Tons

were generated in All Sectors across All States in 2021

Destinations Food Types Causes Sectors

- Residential**
44.1M Tons - 48.4%
- Farm (Produce Only)**
15.5M Tons - 17%
- Manufacturing**
13.4M Tons - 14.7%
- Foodservice**
12.9M Tons - 14.2%
- Retail**
5.12M Tons - 5.6%



Data Quality i
1 2 3 4 5
Low High

DECREASING FOOD WASTE HAS MANY BENEFITS



UN Sustainable Development Goal Adherence

SDG Goal 12: By 2030, to halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses.



Climate Change Mitigation

According to the leading climate organization Project Drawdown, decreasing food waste is the most effective food and agriculture climate solution.



Broad Consumer Enthusiasm

According to Mattson's proprietary research, **95% of consumers** felt it was **important to do their part to reduce food waste in their own lives.**

THE FOOD INDUSTRY CAN HELP DECREASE FOOD WASTE THROUGH UPCYCLING

FDA NEWS RELEASE

FDA, USDA and EPA Propose National Strategy to Reduce U.S. Food Loss and Waste

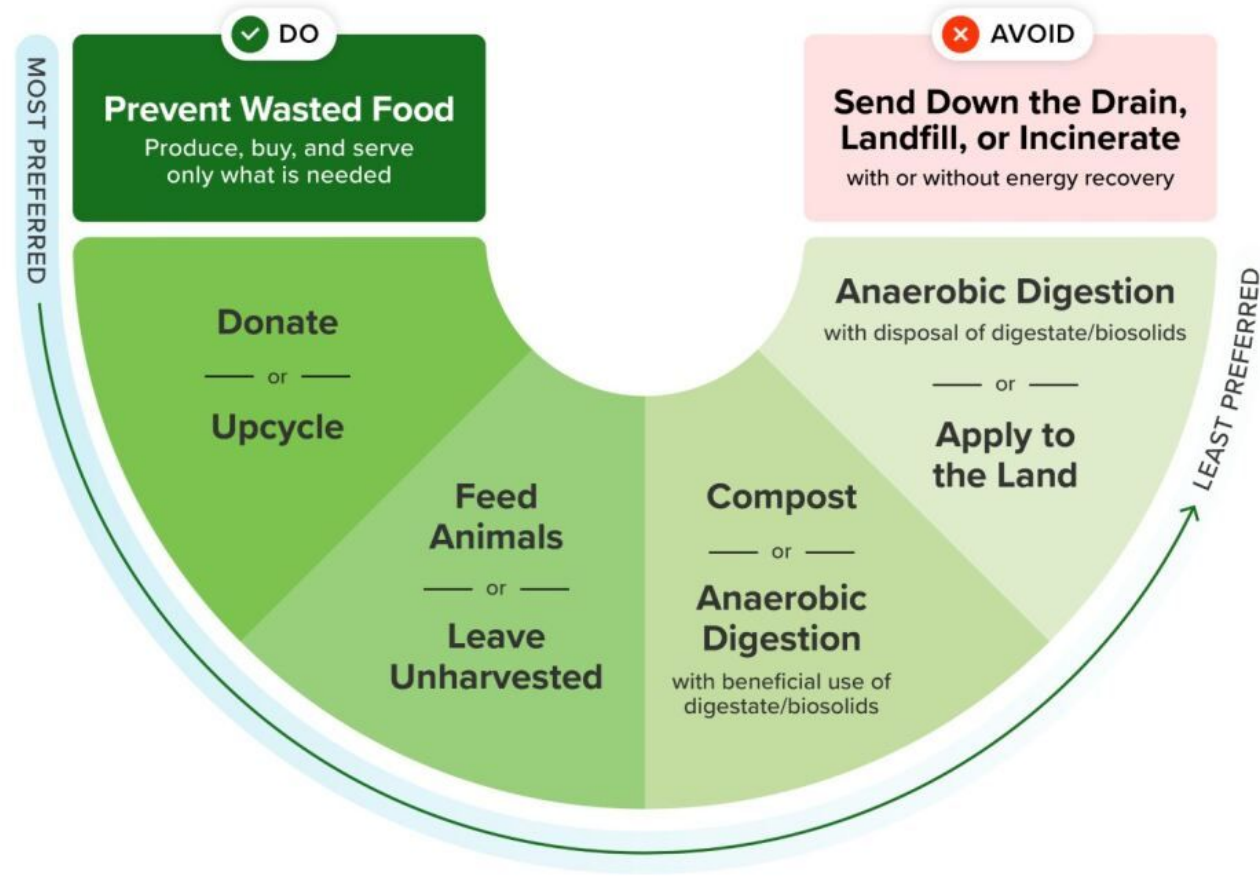
*“Preventing the loss and waste of food (i.e., source reduction) and rescuing and **upcycling** food are powerful strategies to reduce the environmental impact of feeding a rapidly growing global population while potentially improving the economic security of producers, potentially supporting emergency food assistance organizations that serve food-insecure people, and providing resources for new types of business and jobs.... prevention offers the greatest opportunity of all food loss and waste strategies to decrease GHG emissions, protect critical ecosystems and address climate change.”*

UPCYCLING IS ONE OF THE EPA'S PREFERRED FOOD WASTE SOLUTIONS



Wasted Food Scale

How to reduce the environmental impacts of wasted food



October 2023

UPCYCLING CAN DRIVE UP TO \$2B IN ANNUAL NET FINANCIAL BENEFIT

Top 5 Solutions for Manufacturers

Net Financial Benefit



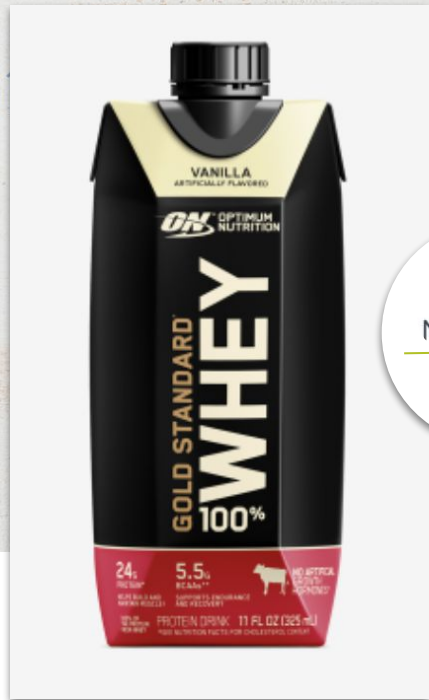
Manufacturing Byproduct Utilization (upcycling)		2B
Assisted Distressed Sales		334M
Manufacturing Line Optimization		328M
Standardized Date Labels		84M
Buyer Specification Expansion		73M

(Annual Figures)

HISTORIC TO MODERN TIMES: CHEESE-MAKING + SOYMILK WASTE

Whey

The nutritious, protein-rich liquid expelled from curds during the cheesemaking process



ABOUT JAIME



JAIME REEVES, PH.D.

- **EVP, Product Development & Commercialization, Mattson**
- Responsible for **leading product development & commercialization across Mattson's diverse R&D team** + a broad range of client relationships.
- **15+ years in food industry** including positions at Del Monte Foods, Inc and PepsiCo Frito Lay.
- **Education:**
 - **Ph.D. in Food Science** from the U of California, Davis
 - **Masters of Science in Food Science** from U of Georgia
 - **Bachelors of Science in Food Science** from California Polytechnic State University, SLO.

USING NEW UPCYCLED INGREDIENTS - IT'S CHALLENGING!

Must Solve a Problem: UPCYCLED STATUS ALONE IS NOT ENOUGH

KEY CONSIDERATIONS:

- Which waste stream/component(s) of the stream have the most promise?
- **Supply Consistency:** Regular or cyclical availability? Quality consistency? Volumes?
- **Logistics/Transportation:** Need to process quickly, best to process on-site
- **Processing/Refinement:** Process development & capital investments are needed to convert waste stream to a functional ingredient that solves a problem
- **Quality:** Customer/Consumer Acceptance
- **Cost:** Must be economical
- **Business Dev/Marketing:** Branding, how to communicate benefits/business case

NEW SOLUTION PROVIDERS ARE POPPING UP TO HELP SOLVE PROCESSING DILEMMA

TRENDI[®]

GTF

Hyfé

Bēpex

**NETZRO**[™]
REDUCE • RECOVER • REHARVEST

LOOKING INTO THE FUTURE CULTIVATING ALTERNATE PROTEINS FROM COMMODITY CROP SIDESTREAMS

TOP SIDESTREAM CANDIDATES

- ✓ High potential for economic return
- ✓ Low environmental impact
- ✓ Basic functionality for alternative protein



PROTEIN CONCENTRATES

soy meal, canola meal, wheat bran, wheat gluten, tomato pomace, corn, *distillers dried grain with solubles (DDGS)*, corn gluten meal, and brewer's spent grain



PROTEIN HYDROLYSATE

soy meal, corn DDGS, canola meal, brewer's spent grain, and corn gluten meal



LIGNOCELLULOSIC SUGARS

corn stover, soy straw, sugarcane trash/bagasse, & barley straw/husks



CHALLENGES

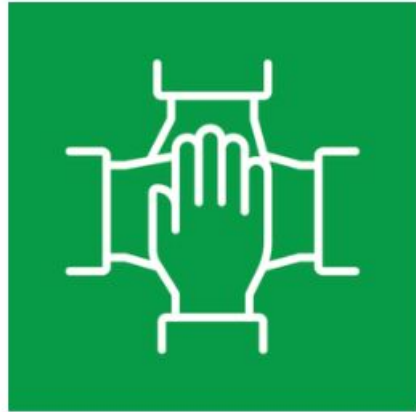
Most are **not optimized for food production**

Supply chains are not yet established to ensure preservation and transportation from harvest to processing facilities

Processing technologies, infrastructure and supply chains need to be built and optimized via public and private collaborations to allow for economic and environmental potential

CONSUMERS ARE LOOKING FOR CREDIBLE CLAIMS

The Standard for Validating Upcycled Ingredients and Foods



52

**Upcycled Certified™
Companies**



222

**Upcycled Certified™
Products**

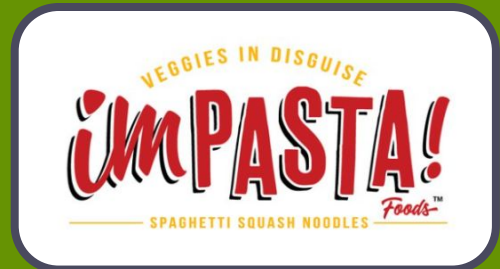


82

**Upcycled Certified™
Ingredients**

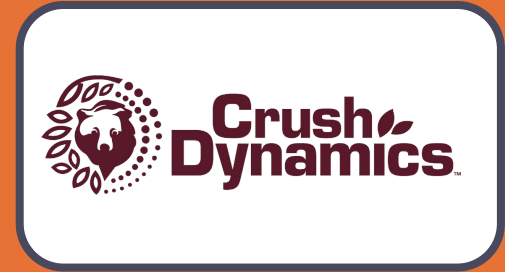


EXAMPLES OF BRANDS WITH UPCYCLED CERTIFIED PRODUCTS



...AND MORE!

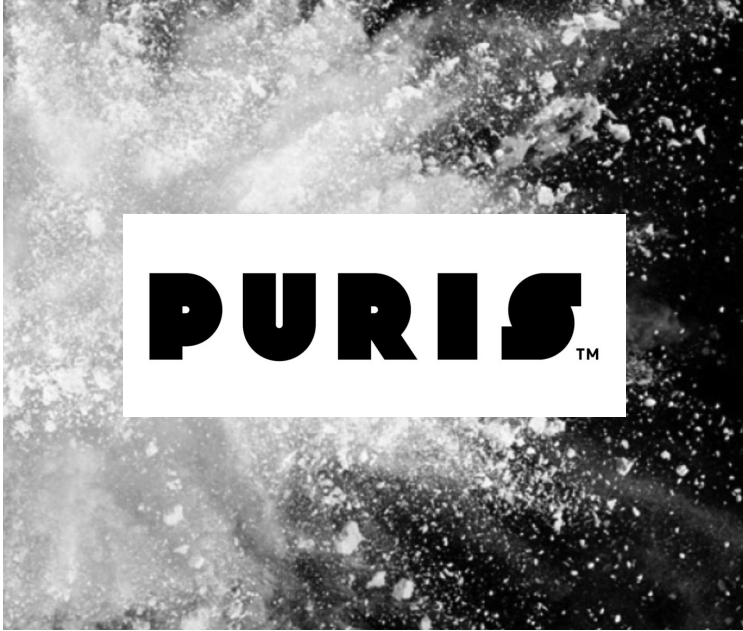
EXAMPLES OF COMPANIES WITH UFA CERTIFIED INGREDIENTS





THE TYPES OF UPCYCLED INGREDIENTS ARE EXPANDING.

STARCHES AND FLAVOR CARRIER



Native **pea starch**
made from all parts of
the pea



Reclaimed resistant
starch from **potato**
manufacturing



Dry flavor system
using upcycled
**dehydrated citrus
peels**

PROTEINS



Upcycled **pearled chickpea flour**



A variety of flours and mixes made from **spent grain**



EverPro upcycled **barley protein**



Two **sunflower** protein ingredient options



Versatile **oat protein** made from byproducts



Oat and **okara** flours / proteins

FIBERS



Upcycled **hemp hulls** to aid in digestion



Upcycled **corn** and **oat** fiber



Plant-based antioxidant **pecan shell** fiber



Upcycled **apple**, **blueberry**, and **cranberry** fiber



Arrabina **Arabinosyloxylan** plant fiber extract



Novel dietary fiber ingredient made from **upcycled hemp hulls**

NATURAL ANTIMICROBIALS



CHINOVA
BIOWORKS



Antimicrobial from **white button mushrooms**



BIOVERITAS™



Propionic acid from upcycled **cultured vegetable oil**

MISCELLANEOUS



A variety of upcycled **extracts**



Upcycled fruit byproduct from **green coffee bean** production

WHO'S USING UPCYCLED INGREDIENTS?

EVERY SECTOR IS USING UPCYCLED INGREDIENTS...

Start-Up/Small Brands Focused on Upcycling

- TikTok creators are exploring ways to use leftover nut and oat pulp at home, and we're seeing an influx of brands begin to innovate in the space.

Large Conventional Brands

- Retail (branded and private label)
- Whole Foods top 10 2023 trend - Pulp With Purpose
- New brands and line extensions

Food Service



RECENT LAUNCHES IN THE BREAKFAST CATEGORY



**Upcycled
spent brewers
grain**



**Upcycled
acorn flour**



**Upcycled
fruit juice**



**Upcycled
meyer lemons**



**Upcycled
oat protein**

SHOWING UP IN SNACKS



**Upcycled
fruit and vegetable
pulp**



**Upcycled
fruit**



**Upcycled
trim from fresh
cheese wheels**



**Upcycled
corn germ**

PRIVATE LABEL STORE BRANDS



**Upcycled
brewers grain**



**Upcycled
okara flour**



**Upcycled
okara flour**

RESTAURANTS ARE GETTING INTO UPCYCLING

Shuggies restaurant is rescuing a huge variety of ingredients that would otherwise go to waste — irregular or surplus produce, byproducts from food manufacturing, lower-on-the-food-chain seafood, and offcuts from the meat industry — and making them the stars of our menu.



FOOD WASTE PARADISE

SHUGGIE'S TRASH PIE + NATURAL WINE

Pickled & Preserved

UGLY PICKLES
FROM YOUR FAVE FOOD WASTE CO. \$5

PRESERVED MUSSELS
LOCAL & SUPER SAVORY, EXCESS DOUGH CRUMBS, 7-YEAR OLD CITRUS \$12

FRIED PICKLE KAKIAGE
GREEN ONION ROOTS, SQUASH SCRAPS, UGLY PICKLE CO. PICKLES, SHISO RANCH \$13

SNACKS & STARTERS

SOON-TO-BE-FAMOUS GARLIC KNOTS
LEFTOVER DOUGH, RICOTTA FLUFF, WILTY GREEN CHIMI, HERBS & LEAVES \$9

GREEN QUEEN SALAD
STEMMY GREEN GODDESS, SLIVERED STALKS, CRISPY RICE \$13

SHUGGIES SEXY FRIES
OVERGROWN SWEET POTATOES, SHIITAKE-PARMESAN RIND AOLI, NORI \$9

MORE SHAREABLES

BUFFALO EVERYTHING
WE MEAN EVERYTHING! CHICKEN WINGS, CRISPY LIVERS, GIZZARDS & HEARTS \$16

STEMS, LEAVES & BUDS
CRISPY CAULI, SPICY PICKLED STEMMS, LEAFY LABNE EMULSION \$12

SPICY 'N STICKY FISH COLLAR
HOUSEMADE STICKY SAUCE, TEMPURA CRISPIES, GREEN ONION TRIM, LEAVES \$23

Trash Pie

GRANDMA STYLE THIN SQUARES

BOBO'S THE PEP, THE RONI
PEPPERONI, HONEY, CHILI 19
+ RICOTTA FLUFF \$4

THE CASINO
MUSSELS, TROTTERS, WILTY GREENS, PARMESAN FURIKAKE 23

DEAD COMBO
SALT COD, POTATO, QUAIL EGGS, WHITE SAUCE, ONION, HERBS 21

EL CAMPEON
GROUND BEEF, SERRANO, RED ONIONS, TAKIS 20
+ CRISPY TRIPE \$4

the DADDY DARIO
PISTACHIO MORTADELLA, PARMESAN, WALNUT 22

'MATER PIE
ABANDONED TUSCAN CHARD, TOMATO, CRISPY SHALLOTS, GARLIC FLUFF 19

the PICKLE LADY
UGLY PICKLE RELISH, DILLY DOUBLE CREAM, SALMON BELLY CONSERVA 21

Add On!

+ ricotta fluff \$4 + anchovy \$3

LASTLY... THEY'RE EVEN IN DESSERTS



Upcycled okara



**Upcycled okara, coffee
cherry, pulp from
oatmilk**



Upcycled bananas



**Upcycled Brewers
Grains**

AND ICE CREAM!!!

LIMITED EDITION FLAVORS

Now Scooping: The Upcycled Foods Series

Lemon Curd & Whey

Spare Food Lemon & Ginger sparkling tonic gelato

Cacao Pulp & Chocolate Stracciatella Gelato

Chocolate stracciatella gelato with sweet cacao pulp

Malted Chocolate Barley Milk (v)

Malted chocolate barley milk ice cream, candied figs, vegan and allergen-free

Salted Caramel & Okara Cupcakes (v)

Okara flour chocolate cupcakes, vegan caramel, oat milk ice cream

Day-Old Bread Pudding & Chocolate Ganache

Bread pudding, ice cream, cinnamon, chocolate ganache



ARE THEY FOR MY BRAND?
WE ASKED CONSUMERS.

Mattson longitudinal study to understand consumers' perceptions of Food Waste and Upcycled Food.

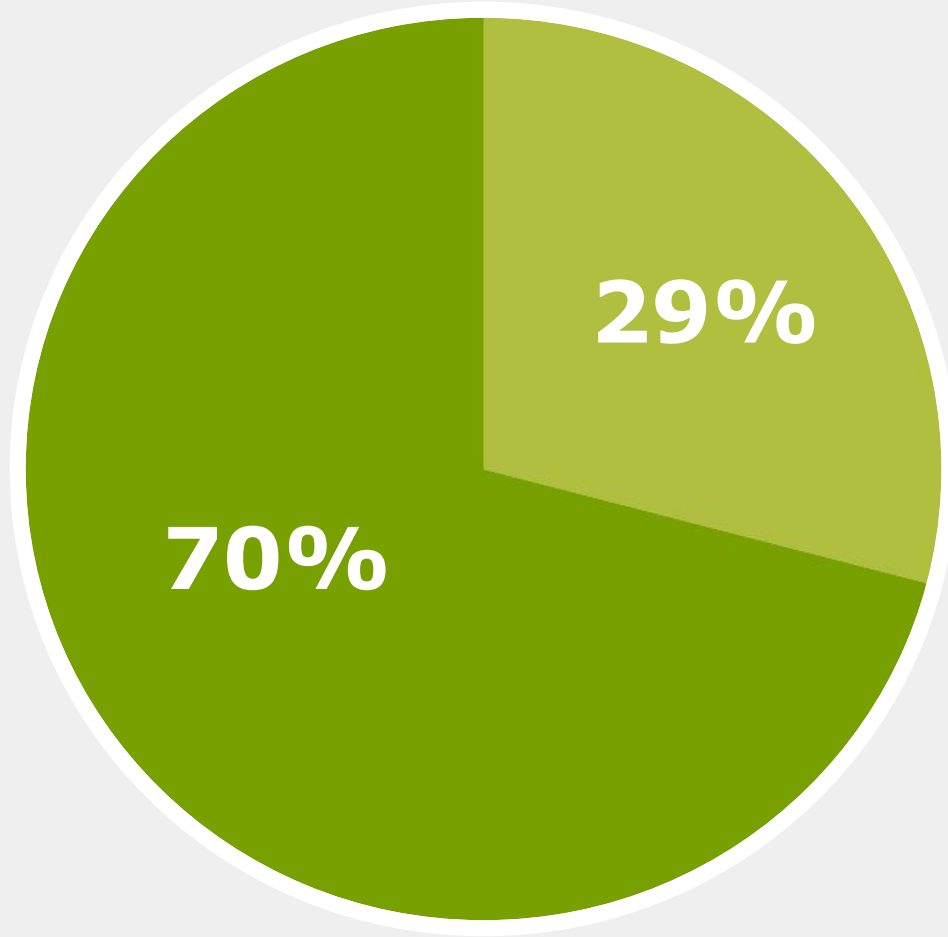


**Online Survey completed by
a "gen pop" national panel**

Respondents N=507

Fielded in 2019 and 2021

Q: FOOD WASTE AS AN ISSUE IN THE UNITED STATES IS...



- Extremely big issue
- Somewhat of an issue
- Not really an issue
- No issue at all



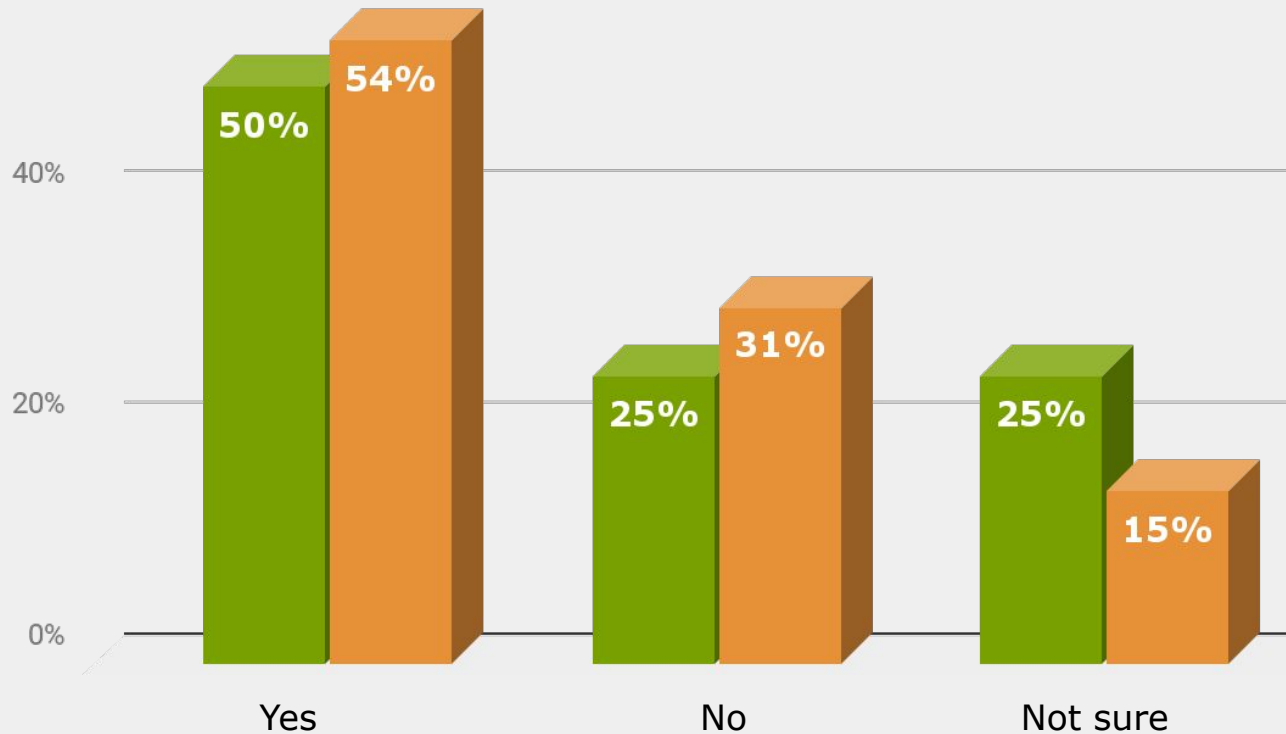
99% of consumers **saw food waste as an issue!**

Almost **ZERO** people who **feel food waste isn't important**

CONSUMER AWARENESS

Are you familiar with the....

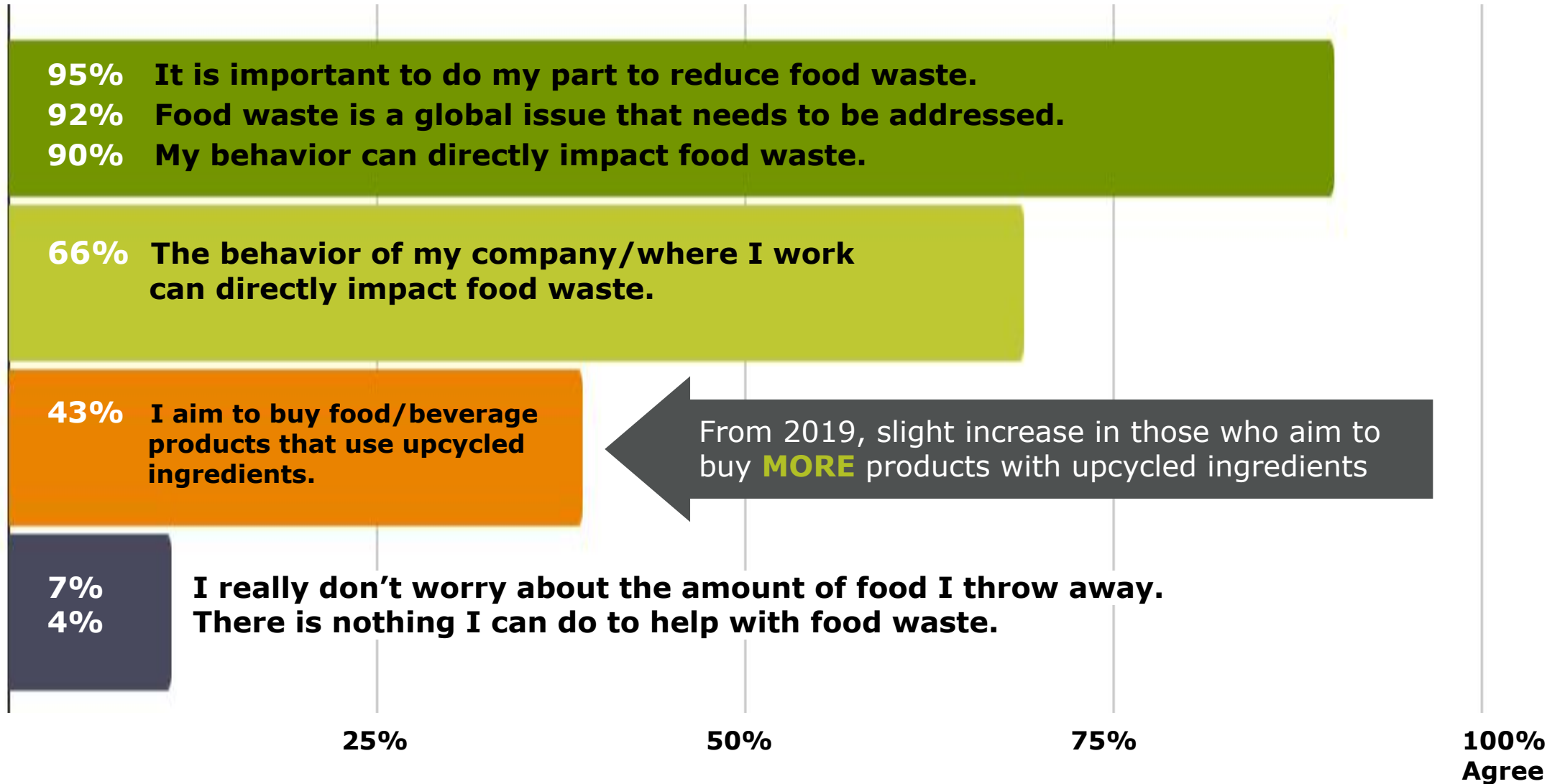
- food waste prevention movement
- term "upcycling"



Versus 2019, **slight uptick** in the number of consumers who **recognize the term UPCYCLING.**

Also **slight uptick** in those who are **aware of the food waste prevention movement**

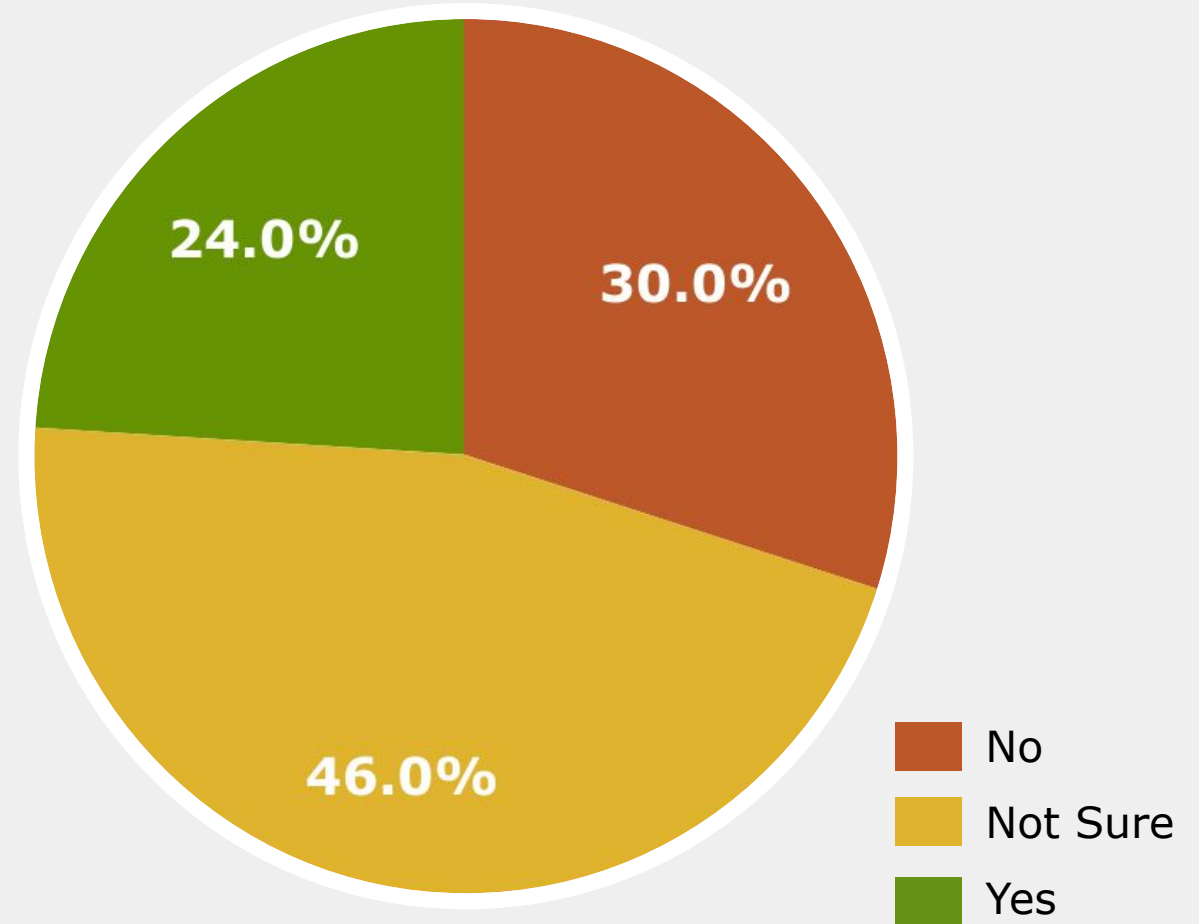
Q: HOW MUCH DO YOU AGREE WITH THESE STATEMENTS...



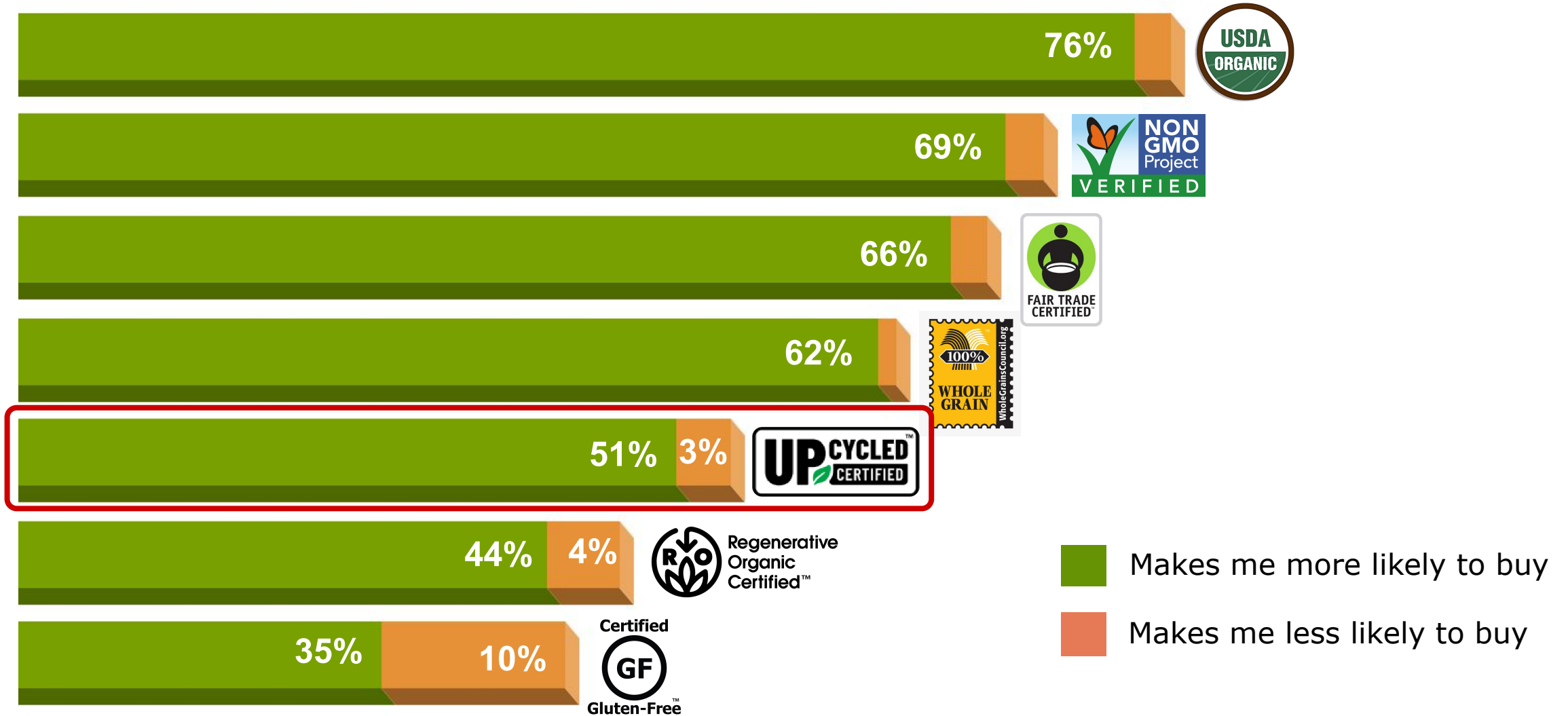
THERE IS STILL A LOT OF CONSUMER CONFUSION AROUND UPCYCLING



Q. Have you ever purchased or tried an "upcycled" food product?

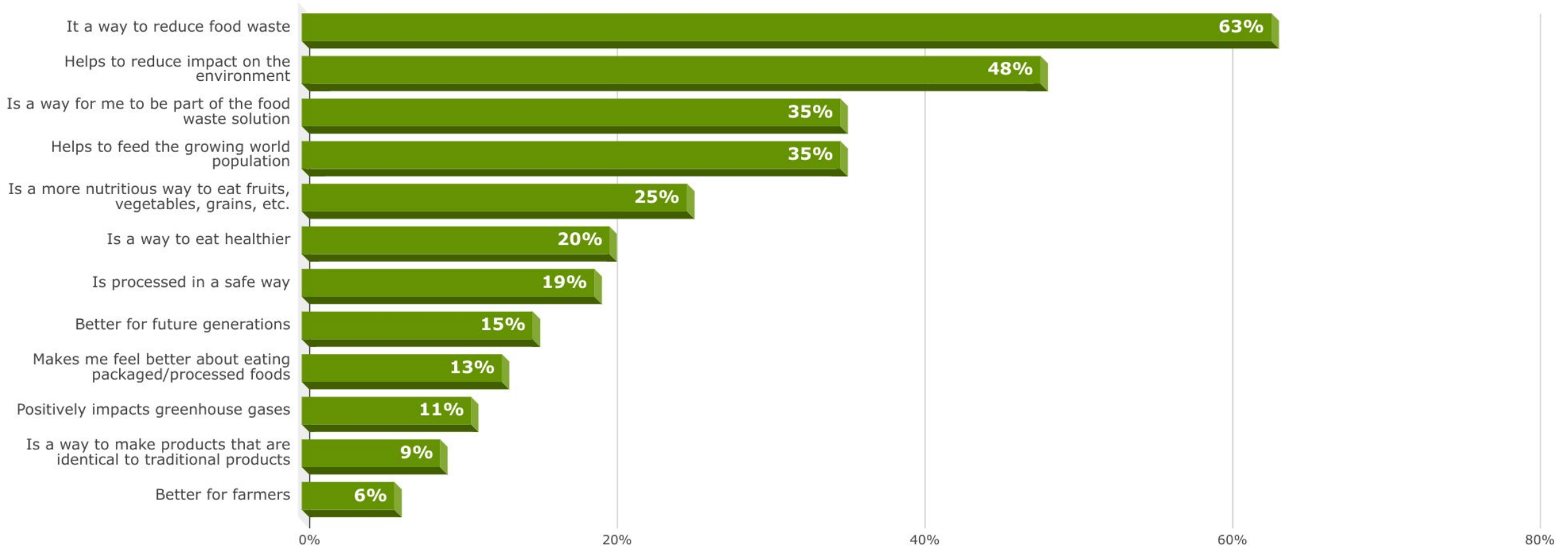


Q: HOW DOES [X] CERTIFICATION IMPACT YOUR LIKELIHOOD OF BUYING?



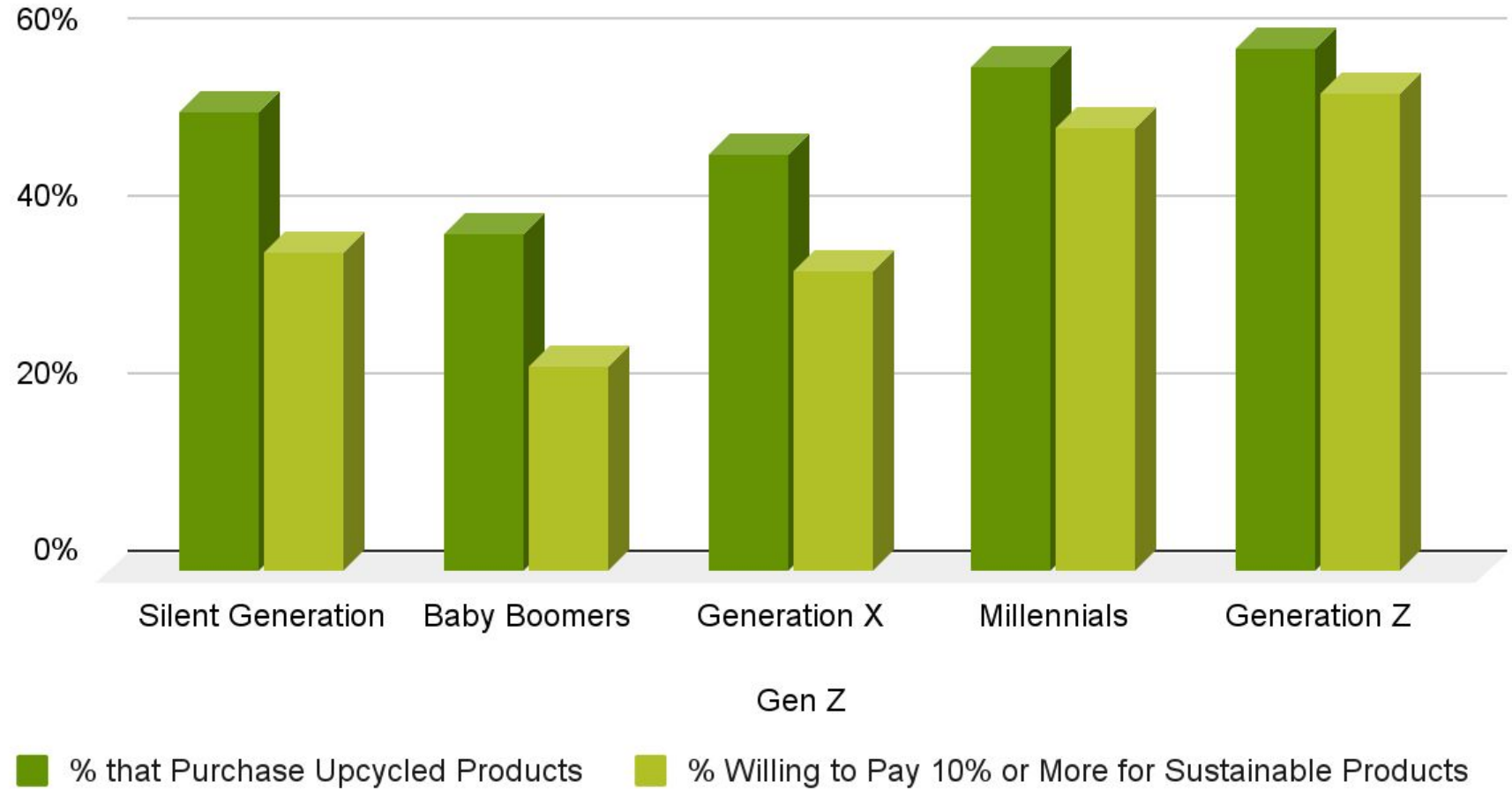
FOOD WASTE REDUCTION IS UPCYCLED'S MOST POWERFUL MESSAGE

Based on what you know about upcycled products from the above definition, what are the top 3 elements of upcycled products that are most important to you?



**YOUNGER
CONSUMERS
ARE STRONG
ADVOCATES
FOR
UPCYCLED
PRODUCTS**

Sustainable Product Engagement by Generation



Over half of those we surveyed plan to **buy more** upcycled food/beverage products **in the next year.**

57% BUY MORE

37% BUY ABOUT THE SAME

0% BUY FEWER

6% DO NOT PLAN TO BUY

Between 2019-2021, **MORE** people say they will **buy MORE upcycled products in the next year.**

Source: Mattson 2021 Study on Food Waste



**SO ARE UPCYCLED INGREDIENTS
FOR YOUR BRAND?**

ABSOLUTELY!

HOW DO I FIND UPCYCLED INGREDIENTS?

A FEW UPCYCLED INGREDIENT MARKETPLACES



01.

**Upcycled Food
Association Supplier
Directory**
Upcycledfood.org



02.

**Upcycled Foods
Incorporated**
Upcycledfoods.com



03.

Hubcycle
Hubcycled.com

A FEW UPCYCLED INGREDIENT MARKETPLACES



04.

Full Harvest
Full Harvest.com



05.

**ReFed Insights
Engine**
ReFed.org



06.

**How Good Material
Directory**
Howgood.com

IN SUMMARY

GAINING STEAM

- Seeing growth of upcycled ingredient availability
- Launches of new products

HOWEVER STILL A LONG WAY TO GO

- Consumer awareness is still low
- Ingredient solutions to turn waste streams into usable ingredients is still in its infancy and need time and \$ to advance.



OUR MISSION
WE INVENT THE FUTURE OF FOOD,
ONE PRODUCT AT A TIME

MULTI-DISCIPLINED, EXPERIENCED PROFESSIONALS



60+
employee-owners

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

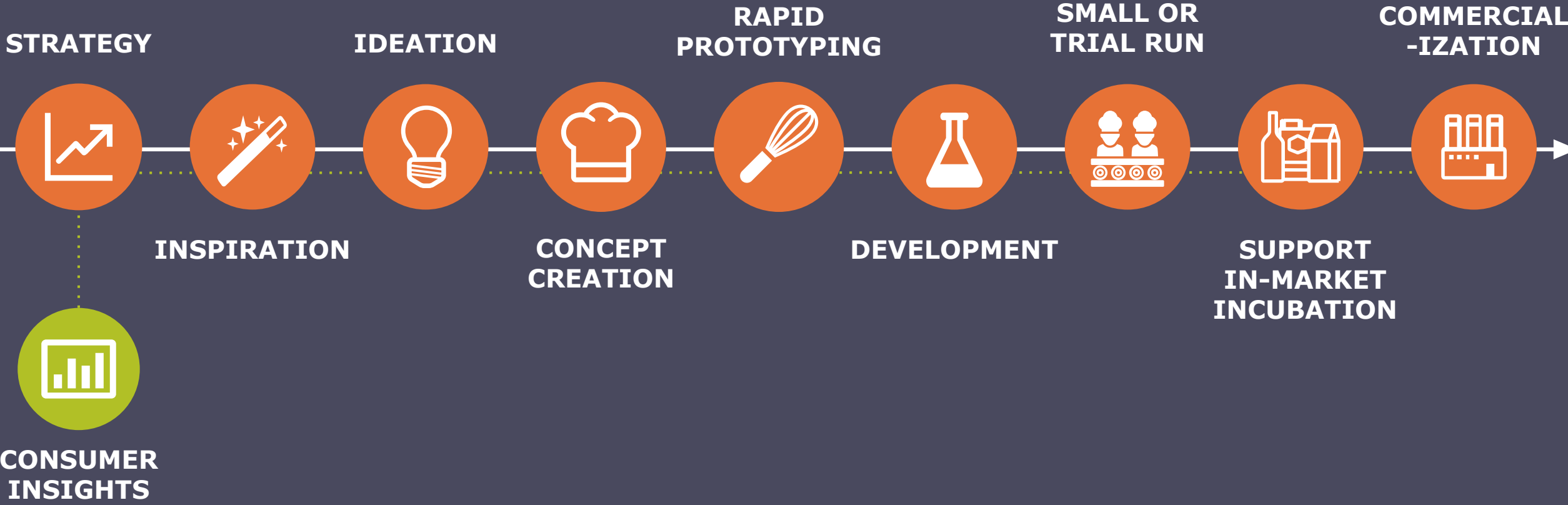
Driven by a
passion for food

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

ALL CHANNELS, TECHNOLOGIES, AND BUSINESS MODELS



MATTSON TAKES YOU FROM WHERE YOU ARE NOW... TO LAUNCH





Q&A



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