

New Product Development at the Intersection of Clean Label, Plant Based & Nutrition

Rachel Cheatham, PhD
Foodscape Group, LLC
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Institute of Food Technologists



What We'll Cover Today

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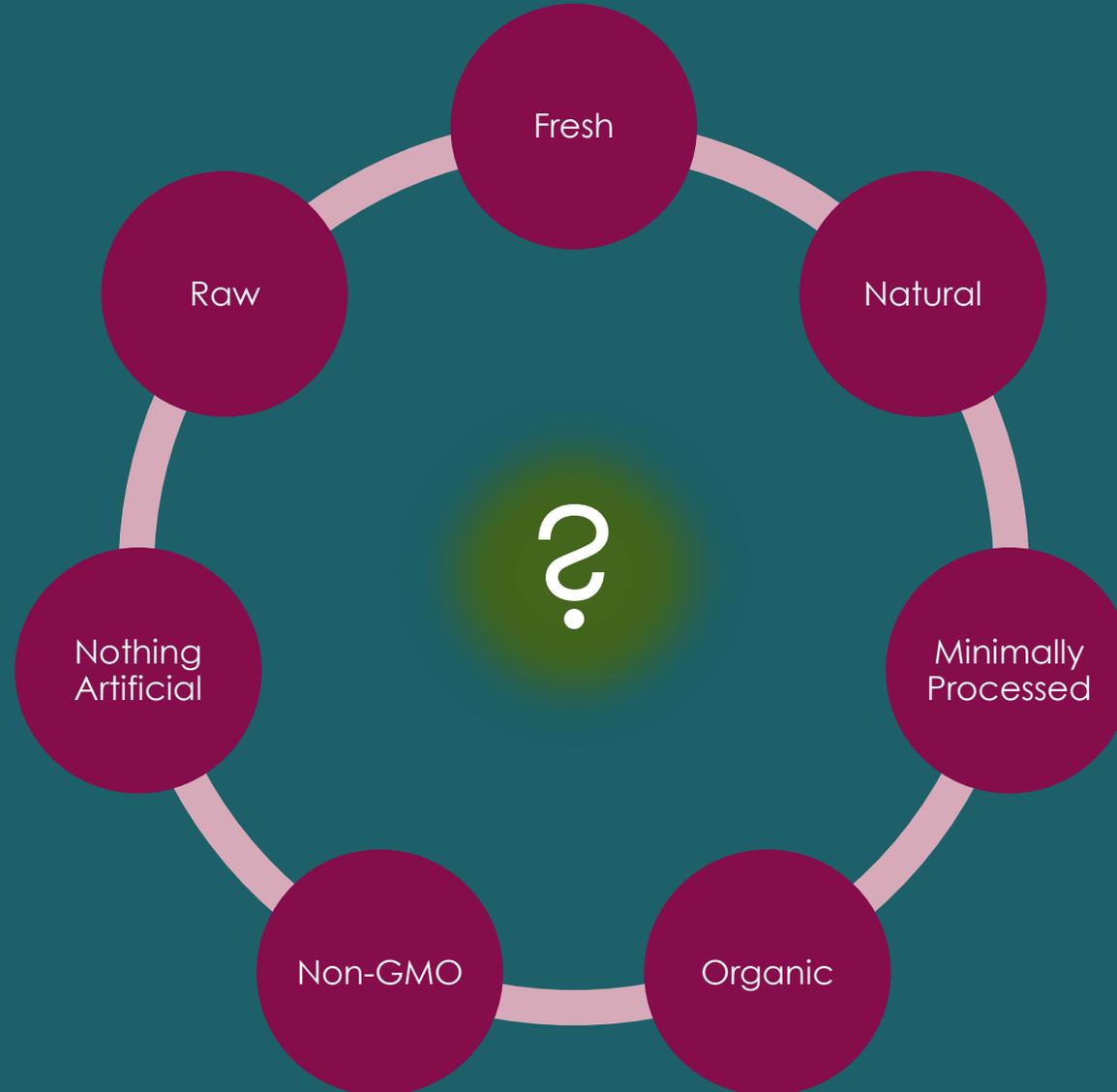
- ▶ Clean Label Definitions & The Consumer
- ▶ Plant Based Operating Context
- ▶ Marketplace Examples
- ▶ Wrapping It Up

CLEAN LABEL DEFINITIONS & THE CONSUMER

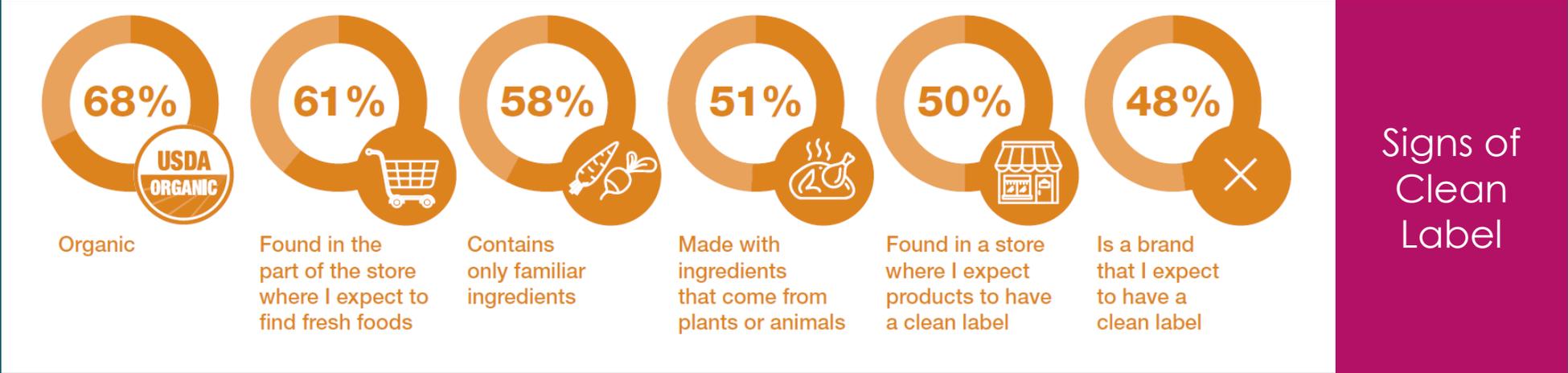


CLEAN LABEL MEANS WHAT EXACTLY?

- ▶ Clean Label has no formal or regulatory definition
- ▶ Some attributes which may track with Clean Label have regulatory definitions and some do not

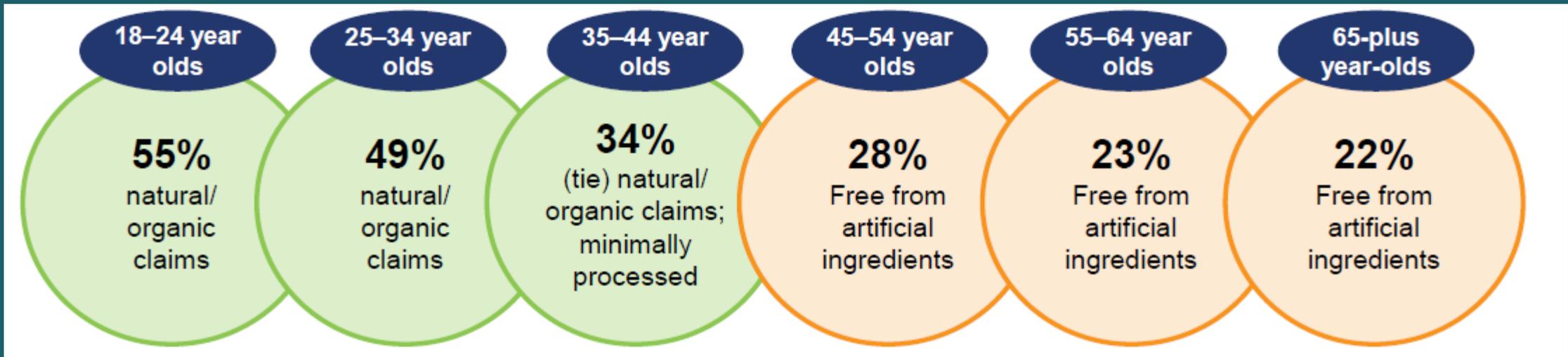


SURVEY DATA: 302 U.S. GROCERY SHOPPERS

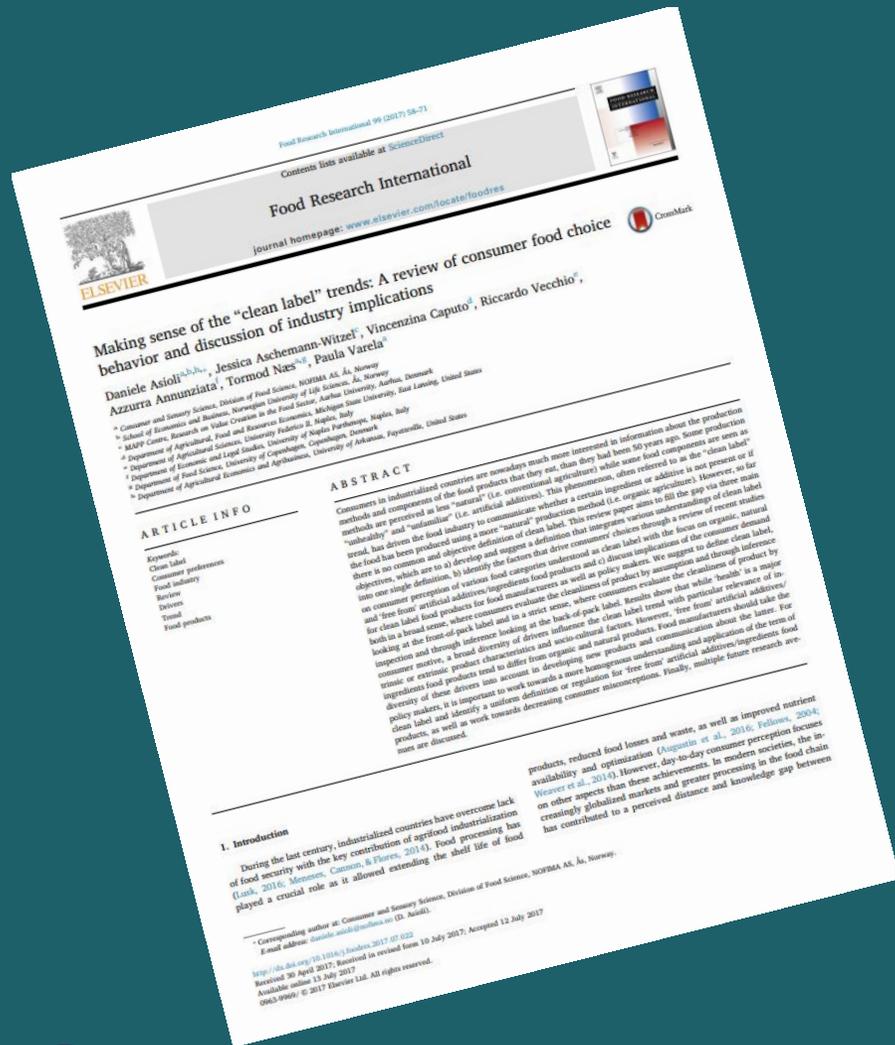


AGE OF CONSUMER MATTERS

- ▶ Free from artificial ingredients skews older, while natural/organic skews younger
- ▶ Likely reflects whether or not a given generation experienced 'big food' reformulations over time or instead sought out 'natural' foods from beginning

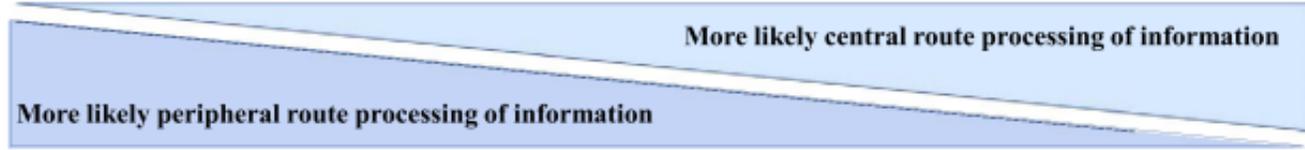


FOP & BOP RELATIONSHIP



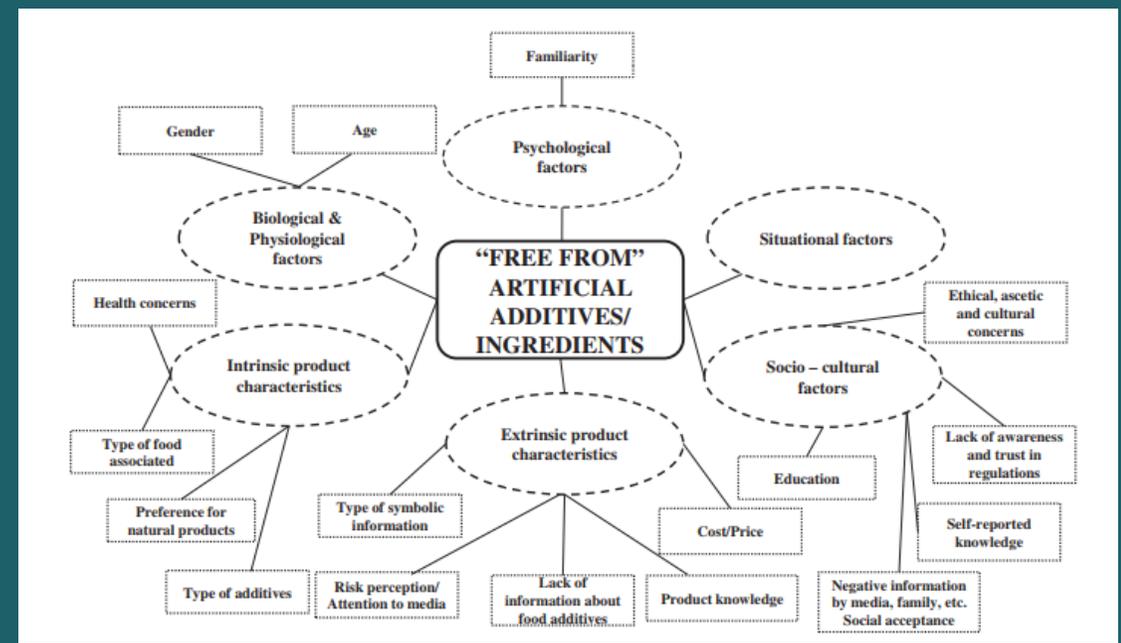
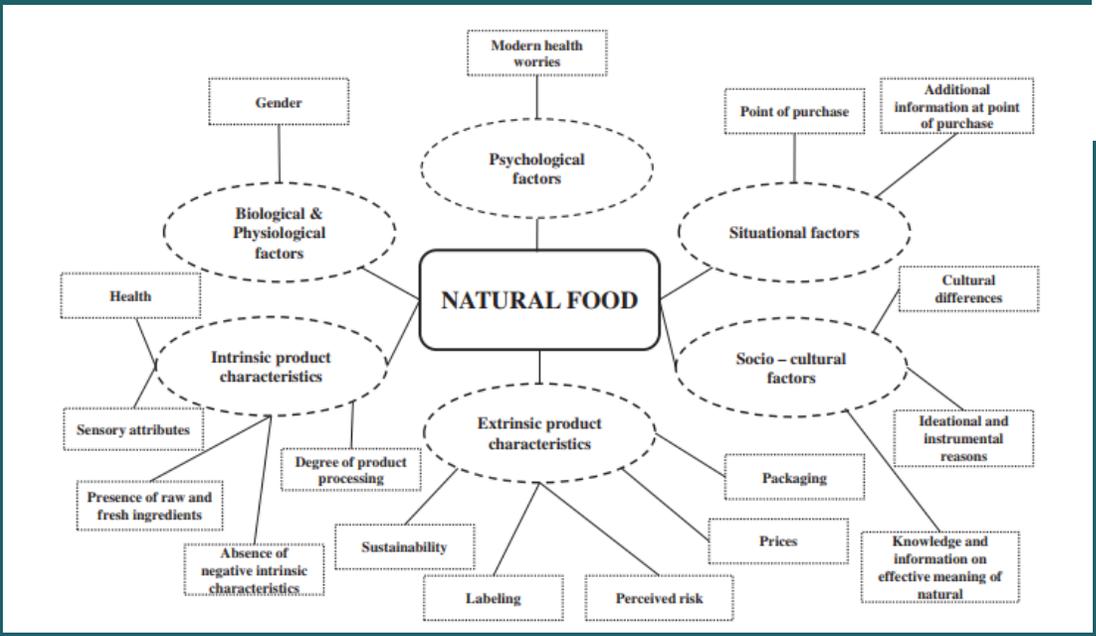
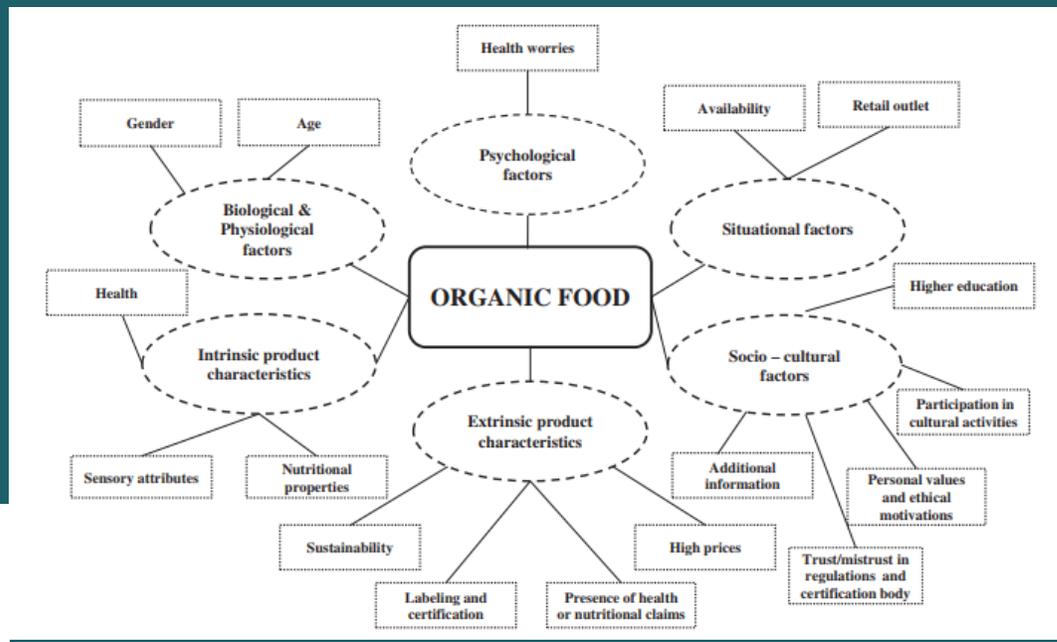
‘Clean label’ in a broad sense:
front of pack (FOP) textual or visual claims, certification logos, simple FOP labels, categories natural and organic, ‘free-from’ (e.g. preservatives / additives)
=> ‘Clean label’ (product) expected to be ‘clean’ by *assumption* and through *inference*

‘Clean label’ in a strict sense:
back of pack (BOP) ingredient list and nutrition facts panel, characterized by being short, simple, no artificial ingredients, not ‘chemical-sounding’, with ‘kitchen cupboard ingredients’ that are expected and familiar
=> ‘Clean label’ (that is: ingredient information) found ‘clean’ on *inspection*



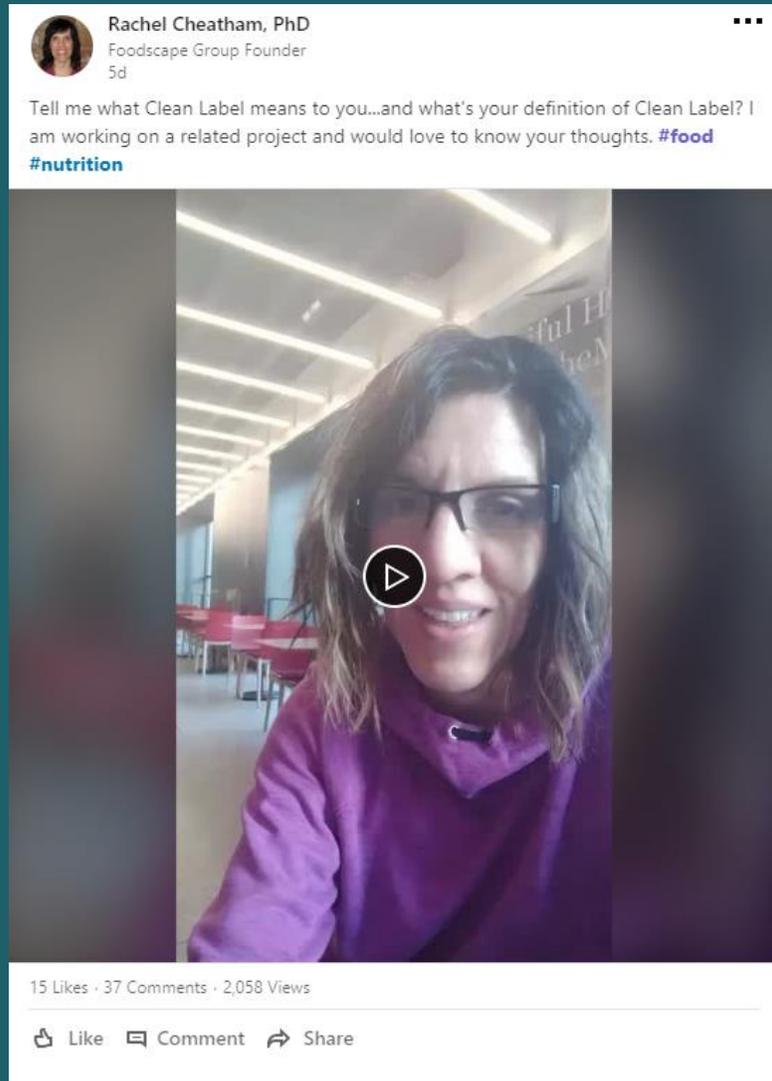
CONSIDER SPECIFIC FACTORS

- ▶ Consider extrinsic & intrinsic product characteristics across potential descriptor – natural, organic, free from
- ▶ Then, also consider psychological, situational and socio-cultural factors



LET'S ASK LINKEDIN FOLLOWERS...

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- ▶ *Real, recognizable ingredients. No junk. No ingredients disguised with **tricky names like "natural flavors"** ...Minimal number of ingredients.*
 - ▶ *A short ingredient deck **free from artificial colors and preservatives** - The definition is fluid and has been creating a headache for commercial baking. There is no FDA definition unlike organic or gluten- free.*
- ▶ ***No fillers, no salt, no sugar, no maltodextrine, no sorbitol, no polypropylene glycol, No MSG, DSG, I+G.... I can go on...***

AND MORE COMMENTARY...

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- ▶ **Gums** are lab formulated and come hidden in compound ingredients. Even a manufacturer doesn't know of them.
- ▶ **Nothing artificial.**
- ▶ I am over the marketing jargon on the front where they can claim **no HFCS** but then have an equally harmful ingredient like an **artificial sweetener** or **chemical dye** listed on the back.
- ▶ ...clean labels are often used to cynically whitewash junk food that may be high in added sugar, sodium, and/or fat. A truly clean label **shouldn't be misleading** in the sense that it shouldn't be used for a product that is heavily processed or objectively unhealthy.
- ▶ Personally **I don't care** if a label is clean or not because most of the food I buy has no label.



YIELDING SOME LIKELY TARGETS

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- ▶ Artificial colors
- ▶ Artificial sweeteners
- ▶ Preservatives
- ▶ Gums
- ▶ Dough conditioners
- ▶ Natural Flavors



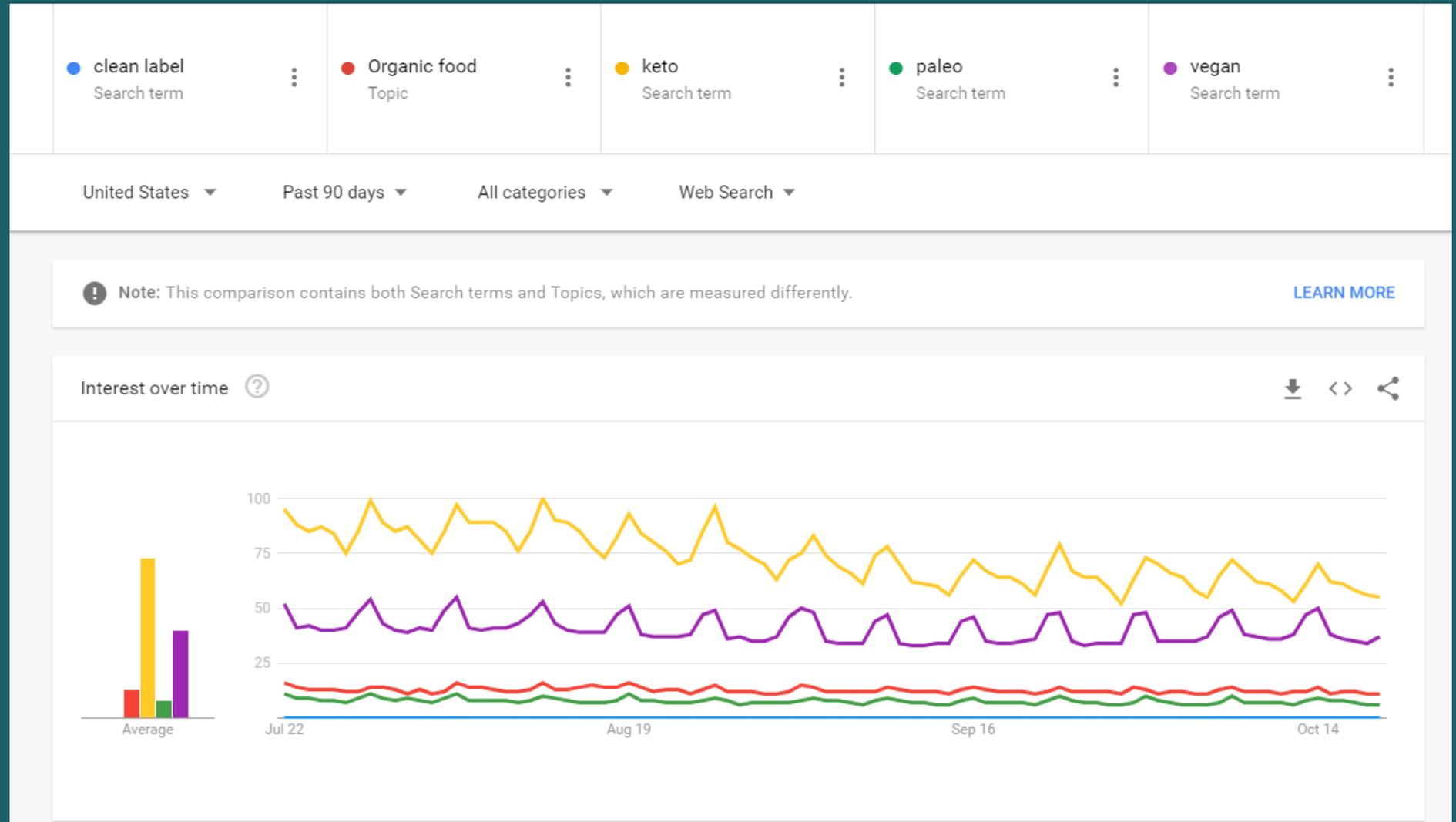
- ▶ **Honest labels** that consumers can trust.

PUTTING 'CLEAN LABEL' IN CONTEXT

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▶ Understand which terms matter most in hearts and minds of your core consumer

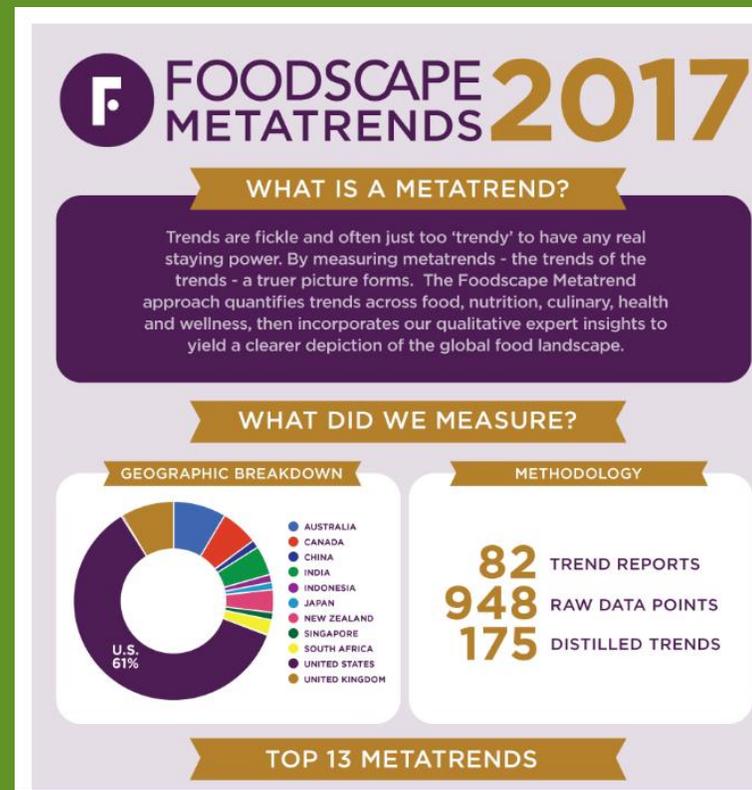
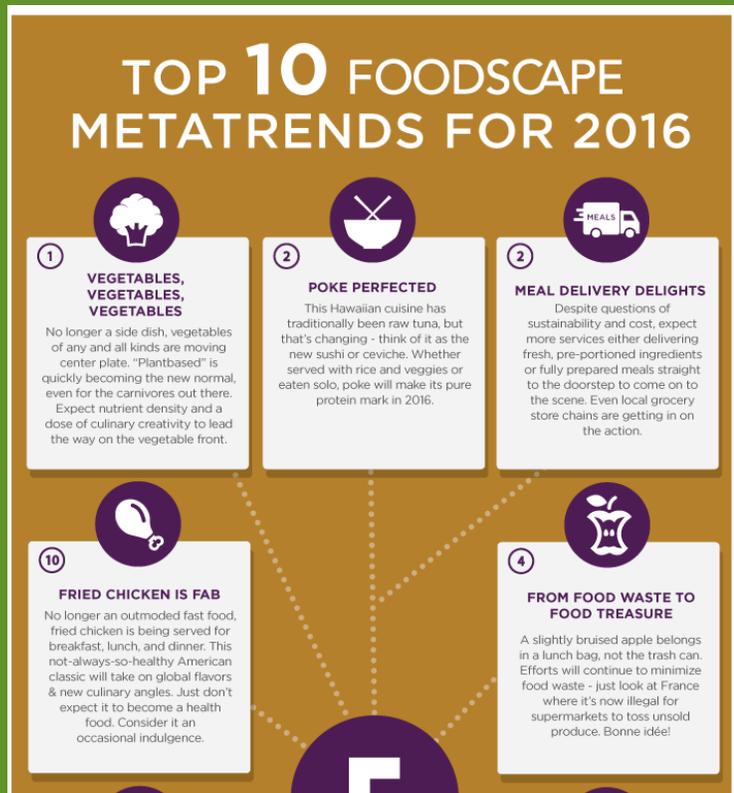
▶ Best consider 'clean label' more of an industry umbrella term



PLANT BASED OPERATING CONTEXT



FOODSCAPE METATRENDS: PLANT BASED LEADS 3 YEARS RUNNING!



PLANT POWER

- ▶ Plant based is increasingly the baseline entry point for new product development
- ▶ Plant based is best seen as a *continuum* emphasizing whole grains, legumes, vegetables, fruits while minimizing (though not necessarily eliminating) meat/dairy/eggs



Omnivore	Pescatarian	Lacto Ovo Vegetarian	Lacto Vegetarian	Vegan
Eats animal and plant foods	Eats animal and plant foods, but chooses fish and seafood over meat or poultry	Eats dairy and eggs, but no other animal products	Eats dairy, but no eggs or other animal products	No animal products whatsoever, including an avoidance of honey



PLANT BASED: EATING EVIDENCE

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- ▶ “Consistent evidence indicates that, in general, a dietary pattern that **is higher in plant-based foods**, such as vegetables, fruits, whole grains, legumes, nuts, and seeds, **and lower in animal-based foods** is more health promoting and is associated with lesser environment impact than is the current average U.S. diet. A diet more environmentally sustainable than the average U.S. diet can be achieved without excluding any food groups.”



Alignment of Healthy Dietary Patterns and Environmental Sustainability: A Systematic Review^{1,2}

Miriam E Nelson,^{3,4*} Michael W Hamm,⁵ Frank B Hu,⁶ Steven A Abrams,⁷ and Timothy S Griffin⁴

³Sustainability Institute, University of New Hampshire, Durham, NH; ⁴Friedman School of Nutrition Science and Policy, Tufts University, Boston, MA; ⁵Department of Community Sustainability, Michigan State University, East Lansing, MI; ⁶Departments of Nutrition and Epidemiology, Harvard T.H. Chan School of Public Health, Boston, MA; ⁷Deil Medical School at the University of Texas, Austin, TX

ABSTRACT

To support food security for current and future generations, there is a need to understand the relation between sustainable diets and the health of a population. In recent years, a number of studies have investigated and compared different dietary patterns to better understand which foods and eating patterns have less of an environmental impact while meeting nutritional needs and promoting health. This systematic review (SR) of population-level dietary patterns and food sustainability extends and updates the SR that was conducted by the 2015 US Dietary Guidelines Advisory Committee, an expert committee commissioned by the federal government to inform dietary guidance as it relates to the committee's original conclusions. In the original SR, 15 studies met the criteria for inclusion; since then, an additional 8 studies have been identified and included. The relations between dietary intake patterns and both health and environmental outcomes were compared across studies, with methodologies that included modeling, life cycle assessment, and land use analysis. Across studies, consistent evidence indicated that a dietary pattern higher in plant-based foods (e.g., vegetables, fruits, legumes, seeds, nuts, whole grains) and lower in animal-based foods (especially red meat), as well as lower in total energy, is both healthier and associated with a lesser impact on the environment. This dietary pattern differs from current average consumption patterns in the United States. Our updated SR confirms and strengthens the conclusions of the original US Dietary Guidelines Advisory Committee SR, which found that adherence to several well-characterized dietary patterns, including vegetarian (with variations) diets, dietary guidelines–related diets, Mediterranean-style diets, the Dietary Approaches to Stop Hypertension (DASH) diet, and other sustainable diet scenarios, promotes greater health and has a less negative impact on the environment than current average dietary intakes. *Adv Nutr* 2016;7:1005–25.

Keywords: food security, sustainable diets, dietary guidelines, dietary patterns, life cycle assessment, systematic review

Introduction

Nutrition and food policy experts in the United States have long been concerned with the food security of the public. These concerns typically have been framed in the here and now; however, as a greater understanding of the human impact on the biosphere emerges, we recognize that actions taken now affect or constrain future choices. Hence, it is important to understand how our actions (dietary patterns and choices) in 2016 affect the potential for food security in the future. Long-term food security can be ensured only if we consider the sustainability of our food supply now.

Two established definitions from the FAO are relevant to this work (1, 2). *Food security* exists when all people at all times have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active, healthy life. *Sustainable diets* are those diets that have low environmental impact and contribute to food and nutrition security and a healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems; culturally acceptable; accessible; economically fair; affordable; and nutritionally adequate, safe, and healthy while optimizing natural and human resources.

Dietary patterns are defined as the quantities, proportions, variety, or combinations of different foods and beverages in diets and the frequency with which they are habitually consumed (3). The current emphasis on healthy eating patterns,

¹ Portions of this systematic review were originally published by these authors in the Scientific Report of the 2015 US Dietary Guidelines Advisory Committee.

² Author disclosures: ME Nelson, MW Hamm, FB Hu, SA Abrams, and TS Griffin, no conflicts of interest.

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THE MAINSTREAMING OF PLANT BASED



WHO EATS PLANT BASED?

VEGETARIAN	VEGAN
Estimated that from 2 to 10% of a 'developed country's population' is vegetarian	Estimated that 0.5% of global population is vegan

BUT - Don't Be Fooled –
83% of consumers are adding more plant based foods into their regular diets



MARKETPLACE EXAMPLES

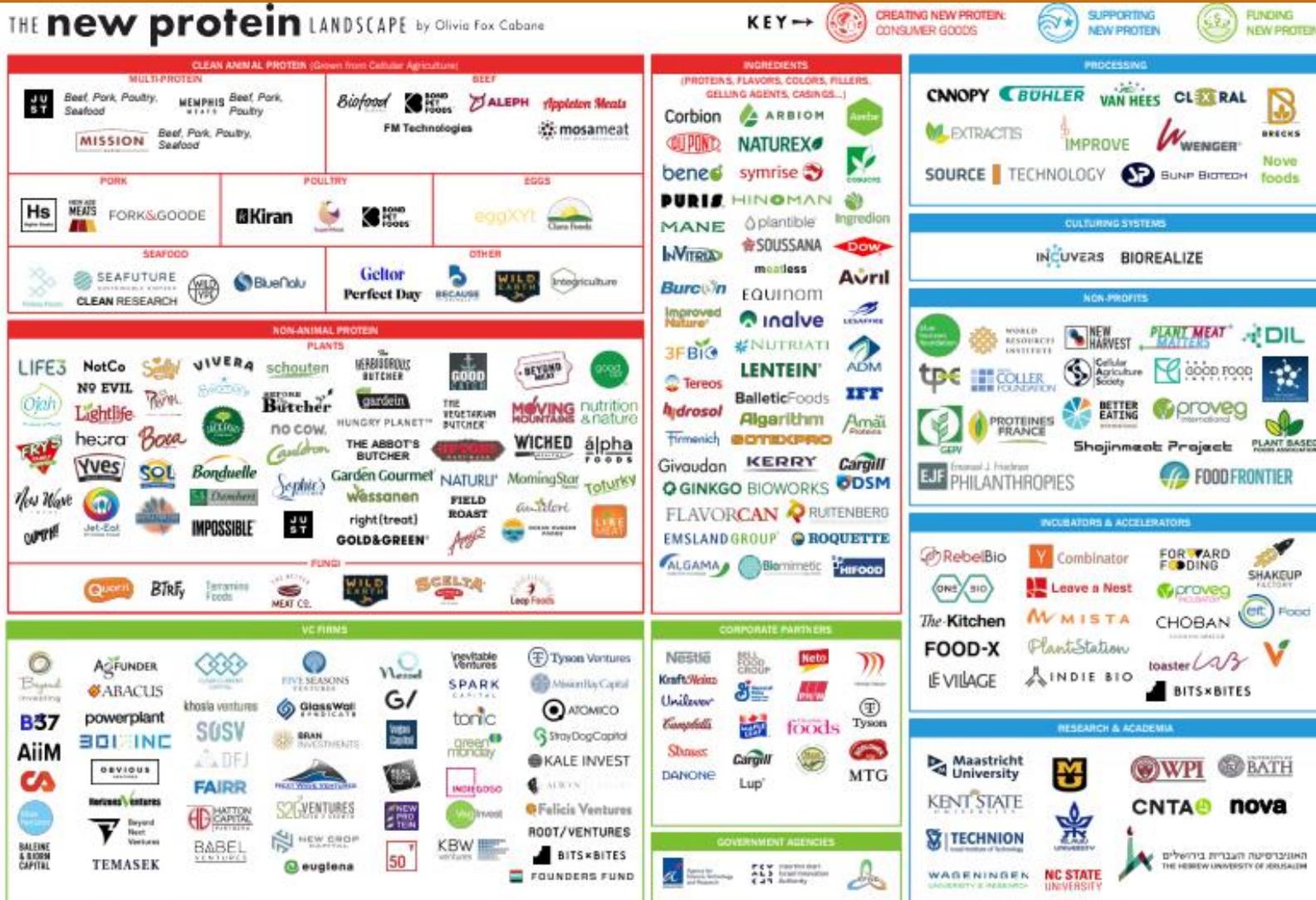


A Closer Look Based on the Transitioning Omnivore...

- ▶ MEAT/SEAFOOD
- ▶ DAIRY
- ▶ WATER
- ▶ GUT HEALTH



'NEW PROTEIN' LANDSCAPE



Forecasters predict global market for alternative meats such as tofu, tempeh, textured vegetable protein, seitan, quorn and other plant based sources will reach \$5.2 billion by 2020...noting a CAGR of 8.4% during the period 2015-2020



PRODUCT EXAMPLES: MEAT



PRODUCT EXAMPLES: 'MEAT'

INGREDIENTS

Water, Pea Protein Isolate, Expeller-Pressed Canola Oil, Refined Coconut Oil, **Contains 2% or less of the following:** Cellulose from Bamboo, Methylcellulose, Potato Starch, Natural Flavor, Maltodextrin, Yeast Extract, Salt, Sunflower Oil, Vegetable Glycerin, Dried Yeast, Gum Arabic, Citrus Extract (to protect quality), Ascorbic Acid (to maintain color), Beet Juice Extract (for color), Acetic Acid, Succinic Acid, Modified Food Starch, Annatto (for color).

All ingredients from Non-GMO sources



Original Brat

Water, Pea Protein Isolate, Refined Coconut Oil, Sunflower Oil, **Contains 2% or less of:** Rice Protein, Faba Bean Protein, Natural Flavor, Potato Starch, Salt, Fruit Juice (For Color), Vegetable Juice (For Color), Apple Fiber, Methylcellulose, Citrus Extract (To Protect Quality), Calcium Alginate Casing.



THE BEYOND BURGER®

THE REVOLUTIONARY PLANT-BASED BURGER THAT LOOKS, COOKS, AND SATISFIES LIKE BEEF.



20G PLANT PROTEIN



NO SOY OR GLUTEN



NO GMOS



YES WAY!



PRODUCT EXAMPLES: 'MEAT'

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Full Ingredient List:

Water, Textured Wheat Protein, Coconut Oil, Potato Protein, Natural Flavors, 2% or less of: Leghemoglobin (Soy), Yeast Extract, Salt, Konjac Gum, Xanthan Gum, Soy Protein Isolate, Vitamin E, Vitamin C, Thiamin (Vitamin B1), Zinc, Niacin, Vitamin B6, Riboflavin (Vitamin B2), Vitamin B12

DO YOU PRODUCE HEME BY GENETIC MODIFICATION?

Yes. We genetically engineer yeast to make a key ingredient: heme. The process allows us to produce the Impossible Burger at scale with the lowest achievable environmental impact.

We start with the gene for a protein called leghemoglobin, a heme protein that is naturally found in the root nodules of soy plants. Leghemoglobin is similar to myoglobin, the heme protein that is exceptionally abundant in animal muscles, binds oxygen and gives meat its unique flavor and aroma.

We add the soy leghemoglobin gene to a yeast strain, and grow the yeast via fermentation. Then we isolate the leghemoglobin, or heme, from the yeast. We add heme to the Impossible Burger to give it the intense, meaty flavor, aroma and cooking properties of animal meat.

By producing our heme in yeast, we avoid digging up soy plants to harvest the root nodules, which would promote erosion and release carbon stored in the soil. This enables us to produce heme sustainably at high volume and make plant-based meat for millions of people, offsetting the environmental impact of animal agriculture.

SOY LEGHEMOGLOBIN DETAILS

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[Int J Toxicol](#). 2018 May/June;37(3):241-262. doi: 10.1177/1091581818766318. Epub 2018 Apr 11.

Safety Evaluation of Soy Leghemoglobin Protein Preparation Derived From *Pichia pastoris*, Intended for Use as a Flavor Catalyst in Plant-Based Meat.

Fraser RZ¹, Shitut M², Agrawal P¹, Mendes O², Klapholz S¹.

Author information

Abstract

The leghemoglobin protein (LegH) from soy (*Glycine max*) expressed in *Pichia pastoris* (LegH preparation, LegH Prep) imparts a meat-like flavor profile onto plant-based food products. The safety of LegH Prep was evaluated through a series of in vitro and in vivo tests. The genotoxic potential of LegH Prep was assessed using the bacterial reverse mutation assay (Ames test) and the in vitro chromosome aberration test. LegH Prep was nonmutagenic and nonclastogenic in each test, respectively. Systemic toxicity was assessed in a 28-day dietary study in male and female Sprague Dawley rats. There were no mortalities associated with the administration of LegH Prep. There were no clinical observations, body weight, ophthalmological, clinical pathology, or histopathological changes attributable to LegH Prep administration. There were no observed effects on male reproduction in this study, but the suggestion of a potential estrous cycle distribution effect in female rats prompted a second comprehensive 28-day dietary study in female Sprague Dawley rats. This study demonstrated that female reproductive parameters were comparable between rats treated with LegH Prep and concurrent control rats. These studies establish a no observed adverse effect level of 750 mg/kg/d LegH, which is over 100 times greater than the 90th percentile estimated daily intake. Collectively, the results of the studies presented raise no issues of toxicological concern with regard to LegH Prep under the conditions tested.



Forbes

It's right for there to be controversy about this, in my opinion. But it has a lot more to do with the FDA than it does Impossible Foods. The Impossible Burger is one of many examples of food that is available in the United States that didn't undergo regulatory scrutiny, and that is bound to make a lot of consumers anxious. That's where the controversy comes from. The FDA didn't approve the key ingredient of the Impossible Burger, the approval didn't need to be sought in the first place, they sold the Impossible Burger anyway, and it's completely legal.



PRODUCT EXAMPLES: 'SEAFOOD'

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Ahimi® is made from fresh tomatoes, non-GMO soy sauce, filtered water, sugar and sesame oil.

"This is not an extruded protein isolate; we start with fresh Roma tomatoes. There's a complex mechanical proprietary process we use with all our vegetables to eliminate the flavor - the acidity in tomatoes, the sweetness of carrots and the bitterness of the eggplant - and create a firmer texture that mimics the experience of biting into raw fish, and from there we can layer on any flavor we want. We sell it frozen and chefs can thaw and cut it the same way they would raw fish."

"Our products are also attractive from a cost perspective [tomatoes and carrots are significantly cheaper than tuna and salmon] and restaurants can make significant cost savings and show their commitment to sustainability and innovation."

PRODUCT EXAMPLES: 'DAIRY'

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Ingredients

ALMONDMILK (FILTERED WATER, ALMONDS), COCONUTMILK (FILTERED WATER, COCONUT CREAM), CALCIUM CARBONATE, NATURAL FLAVORS, POTASSIUM CITRATE, SEA SALT, SUNFLOWER LECITHIN, GELLAN GUM, VITAMIN A PALMITATE, VITAMIN D2, D-ALPHA-TOCOPHEROL (NATURAL VITAMIN E).



Ingredients: ORGANIC ALMONDMILK (FILTERED WATER, ORGANIC ALMONDS), ORGANIC CASHEWS, SEA SALT, GELLAN GUM, NATURAL FLAVOR.



Ingredients: Organic almonds, Himalayan salt, filtered water



PRODUCT EXAMPLES: 'DAIRY'



Dairy Without Compromise



Delicious



High-Protein



Lactose-Free



Hormone, Antibiotic,
and Steroid-Free



Cholesterol-Free



More Food Safe



Longer Shelf Life



Earth-Friendly

How do you make animal-free dairy proteins?

We've developed a type of yeast that can produce dairy proteins (casein and whey). Using biotechnology, we give this yeast a "blueprint" that allows it to ferment sugar and create real dairy proteins. This is the very same blueprint, in the form of DNA, which cows use every day.

Our proteins are made in a process akin to craft brewing, using fermentation similar to how vegetarian rennet, vanilla, insulin, and many other everyday products are made.

Our process is much cleaner and more resource-efficient than animal farming, and it's the cornerstone of our new approach to dairy.

Does your milk contain GMOs?

We relied on genetic engineering to create a type of yeast that produces dairy proteins. This is how vegetarian rennet, vanilla, insulin, and many other everyday products are made. We carefully filter and purify our dairy proteins to ensure they're free of any yeast before adding them to our food products.



PRODUCT EXAMPLES: WATER

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NATURAL FLAVOR

Natural flavors are flavors obtained from essences or extracts of substances found in nature such as spices, fruits, fruit juices, vegetables, or herbs.



INGREDIENTS
CARBONATED WATER, NATURAL FLAVORS.



What ingredients make up the 'Natural Flavors' in the LaCroix flavors?

The flavors are derived from the natural essence oils extracted from the named fruit used in each of our LaCroix flavors. There are no sugars or artificial ingredients contained in, nor added to, these extracted flavors.

'Please stand with us': LaCroix slams 'misleading' lawsuit that links the sparkling water to insecticides

Kate Taylor Oct 8, 2018, 10:39 AM



PRODUCT EXAMPLES: WATER

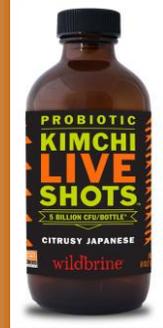
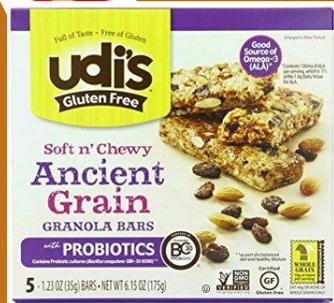
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- ▶ In other news...some shoppers seeking out 'raw, live and unprocessed' water
- ▶ \$37 for a glass jug of 2.5 gallons in San Francisco
- ▶ Potential for major pathogen issues in untreated water
- ▶ And let's not confuse pseudomonas with probiotics!



PRODUCT EXAMPLES: GUT HEALTH



GUT HEALTH: FORK IN THE ROAD?

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▶ Probiotic Fortification

- ▶ Precision
- ▶ Microbes not killed off during pasteurization
- ▶ Often documented health benefits via peer studies

▶ Fermented Foods/Beverages

- ▶ Authentic
- ▶ Traditional
- ▶ Naturally functional



“Consumers want authenticity and nutrition that comes from a traditional fermentation process and they are seeking out fermented foods and beverages – yogurts, kefir, kombuchas, sauerkraut and kimchi – for improved digestion....They want foods with inherent functionality and not ‘lab-created’ functionality, but at the same time they are also becoming more precise about the kinds of probiotics they want.”
Dr. Balanko, Hartman Group

WRAPPING IT UP

REMEMBER, ALWAYS BELOVED EXCEPTIONS

INGREDIENTS: ENRICHED BLEACHED WHEAT FLOUR [FLOUR, REDUCED IRON, "B" VITAMINS (NIACIN, THIAMINE MONONITRATE (B1), RIBOFLAVIN (B2), FOLIC ACID)], WATER, SUGAR, CORN SYRUP, HIGH FRUCTOSE CORN SYRUP, PARTIALLY HYDROGENATED VEGETABLE AND/OR ANIMAL SHORTENING (SOYBEAN, COTTONSEED AND/OR CANOLA OIL, BEEF FAT), WHOLE EGGS, DEXTROSE. CONTAINS 2% OR LESS OF: SOY LECITHIN, LEAVENINGS (SODIUM ACID PYROPHOSPHATE, BAKING SODA, CORNSTARCH, AND MONOCALCIUM PHOSPHATE), MODIFIED CORN STARCH, GLUCOSE, WHEY, GLYCERIN, SOYBEAN OIL, SALT, MONO AND DIGLYCERIDES, POLYSORBATE 60, CORN STARCH, SODIUM STEAROYL LACTYLATE, NATURAL AND ARTIFICIAL FLAVOR, SORBIC ACID (TO RETAIN FRESHNESS), POTASSIUM SORBATE, XANTHAN GUM, CELLULOSE GUM, ENZYME, WHEAT FLOUR, YELLOW 5, RED 40. 520752
CONTAINS WHEAT, EGG, MILK AND SOY.



AND SOMETIMES...BEST TO NOT TINKER

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🙄 😡

@GenMillsCereal Trix cereal isn't the same! You've guys have ruin one of my favorite childhood cereals. Bring the old Trix cereal back!!!!

100K views 0:19 / 0:28

General Mills Cereal @HelloCereal

Trix fans! Finding your mornings are duller? We've got something special coming with a little color!

12:26 PM - Sep 21, 2017

1,262 573 people are talking about this

Hey **TRIX** fans!
We heard you!

General Mills Cereal @HelloCereal

Trix fans! Finding your mornings are dull something special coming with a little color!

12:26 PM - Sep 21, 2017

1,262 574 people are talking about this

Ingredients: Whole Grain Corn, Sugar, Corn Meal, Corn Syrup, Canola Oil, Salt, Trisodium Phosphate, Natural and Artificial Flavor, Red 40, Yellow 6, Blue 1 and Other Color Added, Citric Acid, Malic Acid.

Vitamins and Minerals: Calcium Carbonate, Tricalcium Phosphate, Zinc and Iron (mineral nutrients), Vitamin C (sodium ascorbate), A B Vitamin (niacinamide), Vitamin B₆ (pyridoxine hydrochloride), Vitamin B₂ (riboflavin), Vitamin B₁ (thiamin mononitrate), Vitamin A (palmitate), A B Vitamin (folic acid), Vitamin B₁₂, Vitamin D₃.

DISTRIBUTED BY GENERAL MILLS SALES, INC., MINNEAPOLIS, MN 55440 USA

© General Mills Patent: generalmills.com/pat

Exchange: 1 1/4 Starch
Based on Academy of Nutrition and Dietetics and American Diabetes Association criteria

This package is sold by weight, not by volume. You can be assured of proper weight even though some settling of contents normally occurs during shipment and handling.

F 3557071617 SSG 3590505617

Produced with Genetic Engineering
Learn more at Ask.GeneralMills.com



Ingredients: Whole Grain Corn, Corn Meal, Sugar, Canola Oil, Salt, Brown Sugar Syrup, Tricalcium Phosphate, Vegetable and Fruit Juice Color, Trisodium Phosphate, Citric Acid, Natural Flavor. Vitamin E (mixed tocopherols) Added to Preserve Freshness.

Vitamins and Minerals: Calcium Carbonate, Iron and Zinc (mineral nutrients), Vitamin C (sodium ascorbate), A B Vitamin (niacinamide), Vitamin B₆ (pyridoxine hydrochloride), Vitamin B₁ (thiamin mononitrate), Vitamin A (palmitate), Vitamin B₂ (riboflavin), A B Vitamin (folic acid), Vitamin B₁₂, Vitamin D₃.



SEE CLEAN LABEL AS OPPORTUNITY

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- ▶ Best view Clean Label as an umbrella term encompassing other more 'trending' terms like natural (which also lacks definition)
 - ▶ Consider relying heavily (or even entirely!) on formally defined terms like organic, gluten-free, etc
- ▶ Recognize that Clean Label efforts present an opportunity for greater internal alignment between Innovation/R&D and Marketing/Communications
 - ▶ In other words, Clean Label efforts are best done on the enterprise level, not tidying up a single SKU!



BE PROACTIVE & USE INTEGRATED APPROACH

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INNOVATION/R&D

- Examine all ingredients...and then, re-examine all ingredients
- Be able to articulate the from where, what, how and why for each ingredient....know what you've consciously excluded too
- Consider product category differences – dairy/meat alternatives may have more leeway
- Have a clear position on fortification



MARKETING/COMMUNICATIONS

- Proactively create your Health & Wellness POV on the portfolio level that aligns with ingredient choices – *this includes agreement on what Clean Label means for your brand and your consumer*
- Share your POV consistently across content platforms in a style, tone and detail level appropriate for your core consumer

THANK YOU & QUESTIONS

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Chicago Section
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