INGREDION'S PLANT PROTEIN PLATFORM

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IDEAS TO SOLUTIONS

Ingredion

More than 1,000 ingredient solutions

PLANT-BASED PROTEINS

NATURE-BASED RAW MATERIALS

Corn • Tapioca • Potato • Stevia • Rice • Pulses • Others

Starches

- Corn
- Rice
- Tapioca
- Waxy corn
- Potato
- Flours
- Functional native starches
- Modified starches
- Resistant starches
- Pre-gel
- Dextrin
- Gluten-free
- Blends
- Others

Sweeteners

- Stevia
- Glucose syrups
- Glucose solids
- HFCS
- Maltose syrups
- Maltodextrins
- Dextrose
- Polyols
- Non-GMO syrups
- Fructooligosaccharide
- Galactooligosaccharide
- Isomaltooligosaccharide
- Caramel color
- Fermentation products
- Blends
- Allulose

Proteins

- Pea
- Lentil
- Faba Bean
- Chickpea






Fruit & Vegetable Products

- Fruit juice concentrates
- Vegetable juice concentrates
- Purees and puree concentrates
- Essences
- Distillates
- Pomace
- Whole, sliced, diced strawberries

Other

- Corn gluten feed
- Corn gluten meal
- Crude corn oil
- Refined corn oil
- Hydrocolloids
- Tapioca fiber
- Prebiotic soluble fiber
- Biopolymers
- Others

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Specialties are the center of our strategy based upon consumer and technology trends

PLANT-BASED PROTEINS

CONSUMER TRENDS → **CUSTOMER BENEFIT PLATFORMS**

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Connect our value propositions to our customers' needs

SPECIALTY SOLUTIONS

Growth platforms and framework for innovation

- STARCH-BASED TEXTURIZERS
- CLEAN AND SIMPLE INGREDIENTS
- PLANT-BASED PROTEINS
- SUGAR REDUCTION AND SPECIALTY SWEETENERS
- FOOD SYSTEMS

TECHNOLOGY PLATFORMS ← **TECHNOLOGY TRENDS**

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Technologies that are platforms for sustained competitive advantage

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Driving Growth Roadmap

PLANT-BASED PROTEINS

DRIVINGROWTH

Ingredient Solutions That **Make Life Better**

Customer Co-Creation and Consumer Preferred Innovation

VALUE CREATION

Specialty Growth Platforms

STARCH-BASED TEXTURIZERS

CLEAN AND SIMPLE INGREDIENTS

PLANT-BASED PROTEINS

SUGAR REDUCTION AND SPECIALTY SWEETENERS

FOOD SYSTEMS

VALUE CREATION

Core Food and Industrial Ingredients

Supply Chain and Operational Excellence

Sustainable and Trusted Sourcing

Purpose and Performance Driven Culture

Trends show more people want more protein

Demand for protein has been on the rise for more than a decade

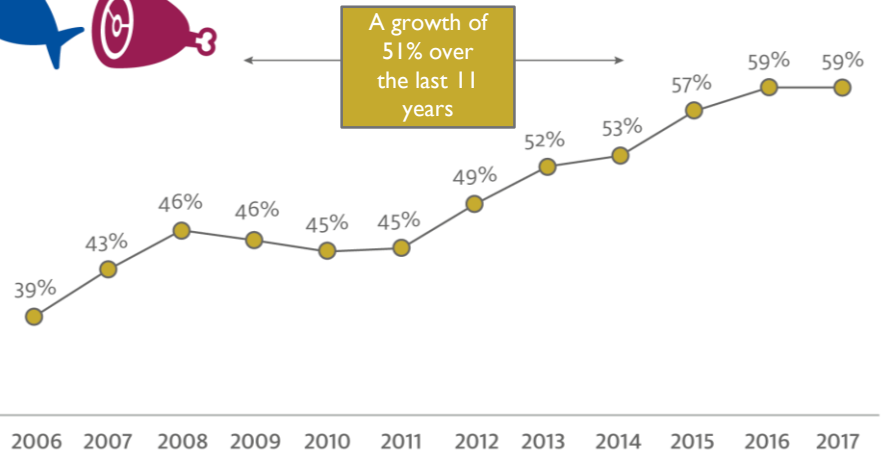
75%

OF U.S. CONSUMERS SAY PROTEIN CONTENT IS AN IMPORTANT FACTOR IN FOOD/BEVERAGE PURCHASE DECISIONS[1]

50%

OF U.S. CONSUMERS HAVE USED PLANT PROTEIN IN THE PAST YEAR[2]

Percentage of general population who completely/somewhat agree that they seek out foods that are high in protein



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Source: 1,2 and diagram- NMI Ingredion 7424 Protein Deep Dive, USA 5/18/18.

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By 2054 plant protein is expected to be 1/3 of all protein[1]

PLANT-BASED PROTEINS

Plant-based food and beverage market in the US is growing **5 times more** than total food sales (11% vs 2%) [2]

Growth of Plant-Based Alternatives by Category

Category	Dollars	Growth
Milk	$2B	5.0%
Meat	$939M	18.4%
Meals	$377M	8.3%
Ice Cream	$336M	5.7%
Creamer	$287M	34.3%
Yogurt	$283M	31.3%
Butter	$198M	8.4%
Cheese	$189M	18.3%
Tofu and Tempeh	$128M	7.8%
Ready-to-Drink Beverages	$122M	18.4%
Condiments, Dressings, and Mayo	$64M	10.9%
Spreads, Dips, Sour Cream, and Sauces	$30M	53.7%
Eggs	$10M	191.7%
TOTAL PLANT-BASED FOODS	$5.0B	11.4%

Source: 52 weeks ending December 2019. Commissioned data from SPINS.

PLANT BASED FOODS ASSOCIATION

plantbasedfoods.org

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1. PBFA, 2018 , 2. Plant-Based Foods Association (P.B.F.A.) , 12/2019

Movement to PBP is influenced by 2 main factors[1]

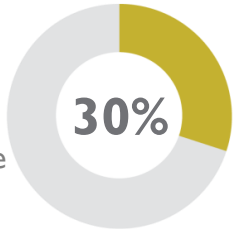
Health & Wellness

General health, disease management, weight loss

Market penetration of products with better-for-you claims* increased from 46.0% in 2014 to 51.4% in 2018[2]

*Include health claims, clean label claims (non-GMO, "natural," no additives/preservatives, organic) and free-from claims (vegan, vegetarian, allergen-free, gluten-free, lactose-free)

Thirty percent of consumers are influenced to some extent by veggie or plant based claims.[2]
Foodies, women and younger generations are pushing this 'balanced eating' forward.[3]



Mindful Consumption

Sustainability, animal welfare, environmental concern

49% of U.S. consumers prefer a product with sustainability and planet-friendly claims[2]

Younger generations (Gen Z and Millennials) are driven by a growing consciousness around how our actions affect the planet, pushing new foods through the early stages of the adoption cycle[4]

Source: 1. Ingredion Proprietary Research "Protein Study Phase 1 Qual, USA, conducted by Infiniti 2016, 2. Consumer Lifestyle Research Survey, Innova, 2018 3. Datassential, Plant + Cellular, Foodscape 2017, 4. Datassential presentation 2018

Movement to allergen-free, plant-based alternatives is underway.

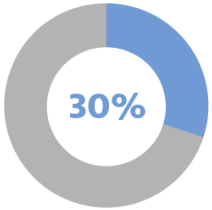
PLANT-BASED PROTEINS

Consumer considerations for alternative proteins:

- Clean-label
- Non-GMO
- Gluten-free
- Top 8 allergen concerns
- Hexane processing
- Hormonal/estrogen effects
- Health claim removal

Driving replacement of soy and wheat

Grain, vegetable, **pulse-based** are desired



In the U.S., 30% of consumers ages18 to 34 say they or someone in their household is avoiding soy.[2]

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Source: [1]GNPD, 2019, [2]APA/Mintel 2019

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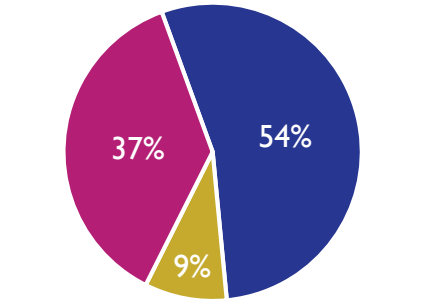
Majority of consumers see the need to increase pulse consumption

Increase pulse consumption in daily diet



N=1,076

Influencing factors	Believe in need to increase pulse consumption
Good value for the money	76%
Improves overall health	75%
Improves taste of the food	72%
It is a good source of energy	71%
Improves dietary value of food	71%
Convenient way to consume proteins	71%
High in protein content	70%
Reduces the artificial ingredients that go in the food	69%
It is a green product—better for the environment	57%

OPPOSE		NEUTRAL	BELIEVE	
1	2	3	4	5
Strongly oppose	Oppose	Neutral	Believe	Strongly believe

TOP TWO BOXES	
4	5
Influence	Highly influence

75% and above

Below 75%

N=984

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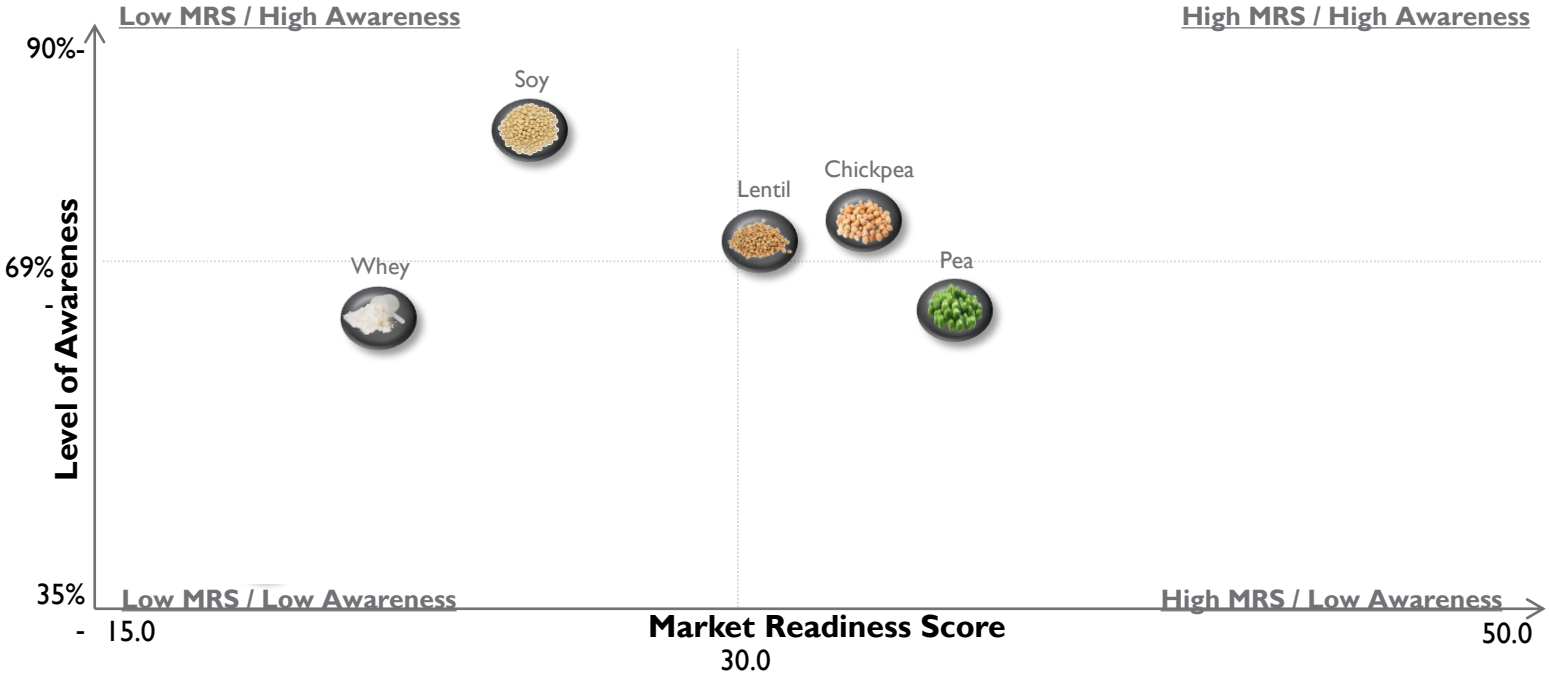
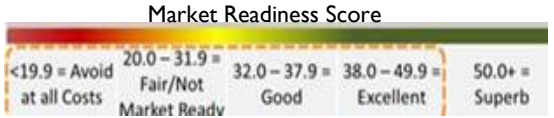
Pulses have higher market readiness than soy and whey

PLANT-BASED PROTEINS





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Good nutrition should taste good too!

- Pulses are highly desired by consumers across a broad range of products from baked goods to dairy-free cheeses[1]
- There are significant opportunities for new products with pulses, leveraging taste and nutrition as differentiators
- Ingredient solutions may provide more than one nutritional benefit (e.g. protein and potassium)
- Nutrient fortifying ingredients can also offer functional benefits, such as improved handling/processing and increase water-holding capacity

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Source: 1. Ingredion proprietary research, Infiniti Research , 1076 consumers in US/ Canada, 2017; 2.Berry, Donna, Racing Pulses, Apr. 18, 2017

It can be challenging when choosing and working with plant proteins

What's the **right protein level** for preferred protein label claims?

What **functionality** will the protein add?

How does that **differ** from the animal ingredient we typically use?

What considerations do we have for **flavor, texture, consistency** and **quality**, and **cost effectiveness**?

How do we **formulate** 100% plant-based foods and scale them up for launch?

Ingredion offers a broad range of plant protein solutions to address the challenges

Look to the first North American based manufacturer of a complete range of pulse protein flours, concentrates and isolates

HOMECRAFT® Pulse
Flours

VITESSENCE®
Protein concentrates & isolates

Investments to manufacture flours and concentrates in

- Joint venture with Verdient Foods, Inc., a Canadian company based in Vanscoy, Saskatchewan to **produce pulse flours and concentrates**
- Protein isolates facility in South Sioux City, NE to produce **protein isolates from peas** with expansion plans to include production of isolates from other pulses.
- As a **global supplier**, Ingredion also distributes products from other manufacturers

ingredion.us/plantprotein

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Ingredion Joint Venture with Verdient Foods
(Pulse flours and concentrates)

PLANT-BASED PROTEINS

Location: Vanscoy, SK, CAN
Ownership: Ingredion, James Cameron & Assoc.
Operations: Currently Operating

Strengths

- Basic in farm to factory supply chain
- High quality manufacturing asset
- Located in the heart of the pulse growing region in the Canadian prairies
- Ingredion pulse go-to-market expertise

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Ingredion South Sioux City
(Pulse Protein Isolates)

PLANT-BASED PROTEINS

Location:	South Sioux City, NE
Ownership:	Ingredion
Operational:	Estimated late 2020
Products:	Protein isolates, starch (initially yellow pea)

- Strengths
  - North American sourced and manufactured
  - Ingredion pulse go-to-market expertise
- Products will be available in late 2020
- Ingredion plans to continue to distribute pea protein products from other manufacturers
  - VITESSENCE® Pulse 1803 pea protein isolate
  - VITESSENCE® Pulse 1803 organic pea protein isolate

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Introducing quinoa flours!

Ingredion is the global exclusive distributor & development partner of NorQuin's quinoa ingredients

PLANT-BASED PROTEINS

Location: Saskatoon, SK, Canada

Announced: May 2020

Selective Pre-commercial Sampling: Late Q3 2020

Commercial Launch: Q4 2020 for US/Canada

Products:

HOMECRAFT® Quinoa 112 Golden Quinoa Flour (Q4 2020)
HOMECRAFT® Quinoa 122 Pre-gel Golden Quinoa Flour (TBD)
HOMECRAFT® Quinoa 132 Toasted Golden Quinoa Flour (TBD)

Strengths

- North American sourced and manufactured
- Proprietary quinoa varieties
- Direct grower contracts
- Stable supply
- Sustainability
- Quality control, safety & traceability
- Ingredion go-to-market expertise

- Ingredion plans to explore new higher protein ingredients, such as quinoa protein concentrates and isolates

Quinoa is a plant-based nutrition powerhouse

PLANT-BASED PROTEINS

Quinoa is an edible seed that has many benefits that are attractive to consumers

- High in protein (16.3%); higher protein than cereals
  - Wheat (14.8%), sorghum (12.4%), rye (11.6%) barley (11.0%), corn (10.5%) and rice (8.8%) – USDA, 2011
- Contains all essential amino acids, making it a more protein complete food than most vegetables (estimated PDCAAS of 0.9)
- Quinoa proteins are highly digestible
- Rich in essential fatty acids, vitamins, minerals and micronutrients
- Gluten-free
- Not a major allergen
- Sustainably grown

Source: Quinoa: Nutritional, functional, and antinutritional aspects. (2017). Critical Reviews in Food Science and Nutrition, 57(8), 1618–1630.

Experience the Ingredion difference

$200MM investment in plant protein manufacturing

Protein pilot plant

Consumer insights on plant-based protein and lifestyles

Ingredion Idea Labs® center with dedicated protein team

Proprietary sensory lexicon

PLANT-BASED PROTEINS

Plant/crop science expertise

Nutritional science and clinical research expertise

Protein characterization expertise

Applications Insight

Proteins of the future R&D

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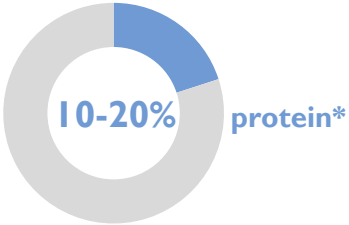
Find the right plant protein solution for your specific need

Pulse flours

Lentil, pea, chickpea and faba bean



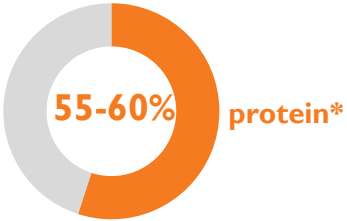
Clean label, gluten-free replacement for flours and starches

Great in pastas and savory snacks

HOMECRAFT® Pulse flours

Pulse concentrates

Lentil, pea and faba bean



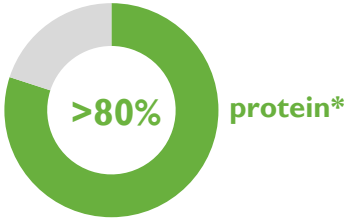
Balanced nutrition with protein, fiber and micronutrients

Great in baked goods and bars

VITESSENCE* Pulse protein concentrates

Pulse isolates

Pea protein isolate **(also available in Organic)**



Highest protein levels that enable "excellent source of protein" claims

Great in nutrition bars, drink mixes, and meat and dairy alternatives

VITESSENCE* Pulse protein isolates

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* Dry basis

HOMECRAFT® Pulse flours

PLANT-BASED PROTEINS

Minimum 10% protein
Dehulled, split, milled, air-classified pulse flours

Yellow pea
Clean taste yellow pea
Yellow lentil
Clean taste yellow lentil
Faba bean
Clean taste faba bean

- A rich source of starch (≥%70)
- Improves crispness in batters & breadings and baked goods
- Contributes to increased volume and expansion in extruded products
- Good acid, retort and shear stable

Clean Taste (CT) flours

- Undergone proprietary physical treatment to reduce beany and bitter flavor
  - Ease of use with cleaner taste profile
  - Lower microbiological counts compared to conventional products
  - Can be safely utilized in products with minimal heat treatment

Baked goods

Crackers

Extruded snacks

Pastas & noodles

Soups, sauces, dressings

Minimum 20% protein
Dehulled, split, milled pulse flours

Yellow pea
Yellow lentil
Clean taste yellow lentil
Faba bean
Chickpea
Clean taste chickpea
Red lentil
Green pea

- Gluten-free flour for meats, meals, dips, sauces, batters & breadings
- Gluten-free, high protein flour for snacks and breakfast cereals with good expansion properties
- Multiple granulation sizes available

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Pulse flours provide labeling, functional and nutritional benefits

Labelling Benefits

Clean & simple labelling

Non-gmo

Gluten-free

Grain-free

Not a major allergen

Sustainably sourced

Vegetarian

Functional Benefits

Texture enhancement

Gelation

Water-holding

Adhesion

Film forming

Soy flour replacement

Wheat flour replacement

Nut replacement

Nutritional Benefits

Added protein

Added dietary fiber

Added micronutrients:

Potassium

Folate

Copper

Thiamin

Manganese

Iron

Riboflavin

Magnesium

Zinc

Low glycemic index value (GI=40-55)

VITESSENCE® Pulse concentrates

PLANT-BASED PROTEINS

VITESSENCE® Pulse 1550
Pea protein with 55% protein*

VITESSENCE™ Pulse CT 1552
Clean Taste Pea protein with 55% protein

VITESSENCE® Pulse 2550
Lentil protein with 55% protein*

VITESSENCE® Pulse 3600
Faba bean protein with 60% protein*

VITESSENCE® Pulse CT 3602
Clean Taste Faba bean protein with 60% protein*

Balanced nutrition with protein, fiber and micronutrients

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*Dry basis

VITESSENCE® Pulse concentrates: Key features

PLANT-BASED PROTEINS

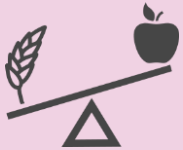
NUTRIENT DENSITY: Protein, fiber & micronutrients	CLEAN-TASTE	LOW MICROBIOLOGICAL COUNT (CT products)
• Inherent micro-nutrients remain intact due to gentle processing • Shrinks ingredient lists: Eliminates or lessens the need for additional fiber, vitamins and minerals • A tasty way to achieve the fiber and micronutrients lacking in some diets	• Proprietary physical treatment to reduce beany and bitter flavor • Ease of use through cleaner taste profile	• Clean-taste process results in lower microbiological counts • Can be safely utilized in products with minimal heat treatment

VITESSENCE® Pulse 1803 pea protein isolate and organic pea protein isolate

PLANT-BASED PROTEINS

Free From

- Not a major allergen
- Replaces dairy, soy & animal proteins
- Non-GMO
- Gluten-free
- Lactose-free
- Clean label: *pea protein* and *organic pea protein*
- No solvents



Taste

- Smooth, pleasant mouthfeel
- Mild buttery, nut-like notes
- Cooked beany & sweet aromatic notes
- Lower in overall raw & green flavor

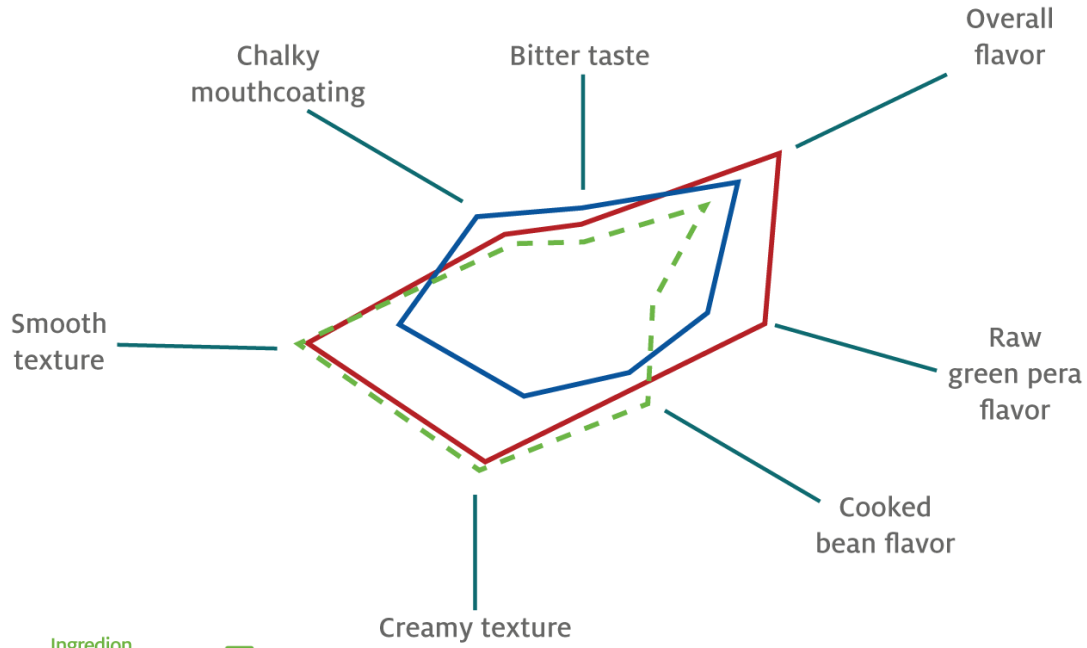
Functionality

- 80% protein (db)
- High solubility over the full pH range of food and beverage applications
- Offers good emulsion stability, water holding and oil holding capacity

VITESSENCE® Pulse 1803 pea protein and organic pea protein

PLANT-BASED PROTEINS

Pea Protein Characterization in Water



Characterized by:

- creamy & smooth texture
- lower in overall raw & green flavor

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FLOUR, CONCENTRATE OR ISOLATE?
Choose the right protein for the right need

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Right Protein, Right Need: Protein functionality by application

Application	Functional need	Consumer benefit	Recommended protein
Baked goods 	Water holding, Gelation, foaming	Wheat flour replacement	*Conventional or clean-taste* HOMECRAFT® Pulse flours (01 or 03 series)
	Nutritional balance	Increased protein, fiber & micronutrients	*Conventional or clean-taste* VITESSENCE® Pulse protein concentrates
	Protein enhancement	Increased protein	VITESSENCE® Pulse 1803
Bars 	Protein enhancement	Increased protein	VITESSENCE® Pulse 1803
Beverages 	Solubility, heat & process stability, Reduced micro count for instant beverages	Increased protein, fiber & micronutrients; *Low to medium protein*	VITESSENCE® Pulse CT protein concentrates; VITESSENCE® Pulse 1803
		Increased protein; *Medium to high protein*	VITESSENCE® Pulse 1803
Confectionery 	Nutritional enhancement, Water holding, emulsification	Nutritional enhancement; Allergen replacement	VITESSENCE® Pulse CT protein concentrates
Dairy alternatives 	Water holding, gelation, Protein enhancement	Animal protein & allergen replacement; increased protein	VITESSENCE® Pulse CT 3602 VITESSENCE® Pulse 1803
Extruded crisps & snacks 	Controlled expansion, Nutritional balance	Increased protein, fiber, or micronutrients; Texture differentiation	*Conventional or clean-taste* HOMECRAFT® Pulse flours (01 or 35 series); VITESSENCE® Pulse protein concentrates
Meat emulsions & analogs 	Emulsification, water binding Gelation, adhesion/cohesion, protein enhancement	Animal protein & gluten replacement; increased protein	*Conventional or clean-taste* VITESSENCE® Pulse protein concentrates; VITESSENCE® Pulse 1803
Pasta 	Gelation	Egg replacement	VITESSENCE® Pulse CT 3602; VITESSENCE® Pulse 1803
		Wheat flour replacement	HOMECRAFT® Pulse flours (01 or 35 series)
Soups, sauces, & dressings 	Viscosity, emulsification, water holding, Reduced micro count for cold processes	Egg replacement; Wheat flour replacement	VITESSENCE® Pulse CT 3602; VITESSENCE® Pulse 1803; *Conventional or clean-taste* HOMECRAFT® Pulse flours (03 series)

Ingredion

HEALTH & NUTRITION i2s

Introducing PURITY® P 1002 pea starch

A versatile trend-connected pea-based texturizer

Key performance and functionality

- PURITY® P 1002 pea starch is a flowable powder that offers important functional benefits including:
  - Quick setting and firm gels
  - Low viscosity
  - High water holding capacity
  - Good film forming properties
  - Low dusting

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PURITY® P 1002 native pea starch
A versatile clean label texturizer

- Supports "better-for-you" claims: non-GMO, gluten-free, grain-free, non-allergenic, and clean label
- 54% of consumers perceive pea starch as healthier than other starches[1]
- Has minimal flavor impact and provides appealing texture
- Provides good volume, crumb firmness and freeze/thaw stability in gluten-free bakery items
- Controls expansion and adds crispiness to extruded snacks and batters & breadings
- Achieve up to 50% gelatin replacement in gummy and jelly confections and improve production efficiency with reduced drying time

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[1] Ingredion proprietary Research, Food Advisory Council, August 2019

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PURITY® P Pea Starch 1002 : Functionality by application

Applications	Usage level	Functional benefits		Consumer benefits
Baked Goods: Gluten-free bread 	10-35% of bulk flour	• Can be used as a component of a system for bulk replacement of wheat flour • Volume	• Crumb firmness • Shelf-life stability / freeze-thaw stability • Cost savings	• Aligned with plant-based market trend • Aligned with increased demand for better-for-you options • Free-from: Allergen-free, grain-free, gluten-free, and vegan • Low in fat • Clean label • Clean taste • Non-GMO
Snacks: Extruded (direct expanded, pellets), baked & fried snacks 	10-30%	• Can be used as a component of a system for added extrusion expansion • Controlled expansion	• Minimal flavor impact • Added crispiness • Cost savings	
Confectionery 	5%-7%	• Achieve up to 50% gelatin replacement • Rapid gelling • Reduced drying time, improved efficiencies • Lower hot viscosity than other native starches • Cost savings	• Lower gelatinization temperature than high amylose containing products • Improve thermal stability with partial gelatin replacement (increases shelf-life)	
Shredded cheese (anti-caking) 		• Good flowability of shredded cheese with minimal clumping • Reduce blistering versus cellulose powder • Clean flavor and less powdery mouthfeel		
Noodles 		• Simple formulation; cellophane noodles can be made with just 2 ingredients (pea starch and water) • Provides gelling and film forming properties		
Batter & Breaded Products		• Can be incorporated into gluten-free coatings • Appealing crispy and crunchy texture	• Good adhesion performance in coated poultry products, particularly in non-enhanced meat substrates • Clean tasting/ no off-flavors	
Meat emulsions & analogs	1%-3%	• Improved yield and texture		
Tumble Marinated Poultry 	1% - 2%	• Improved yield and texture • Increased tenderness	• Succulence / Juiciness	

Validated applications

PLANT-BASED PROTEINS


Bread


Dressings


Gravy


Eggless custard


Soups


Dips


Crackers


Dairy-alternative yogurt


Bars


Ice cream


Vegan cheese


Cookies


Tortillas


Confectionery spread


Extruded snacks


Confectionery


Batters & breadings


Beverages


Pasta


Pizza crust


Muffins


Pudding


Cream cheese


Meat emulsions & analogs

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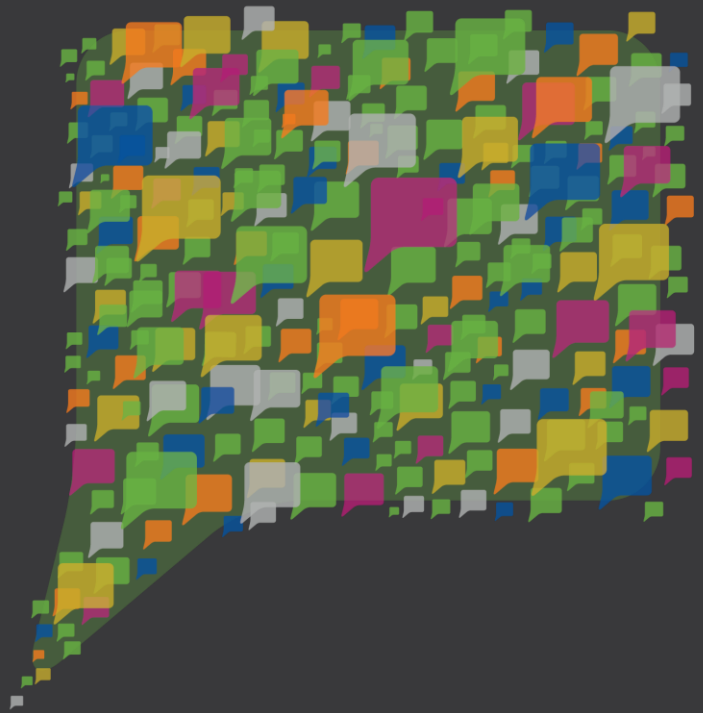

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