



Revolutionizing Innovation with Clean Label Chickpea Protein

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Agenda

1. Brenntag
2. Market drivers
3. What's driving the plant-based revolution
4. Challenges
5. Functionality and applications solutions
6. Q & A





Market Drivers

Topics of today – top health and nutrition trends for 2025



Nutrition forward

Consumers are becoming more engaged with the positive role of nutrition for health, seeking out different healthier eating approaches.



Weight management

The rise of Ozempic and other GLP-1 based medication brings weight loss back in focus for consumers, opening an opportunity to more natural forms of weight loss.



Nutrition for all budgets

Price is shaping the demand for nutritious food and beverage, affecting the consumer perspective on health and nutrition.



Genderized nutrition

Women are seeking nutrition designed to meet their unique dietary wants and needs, often related to their hormone cycles.



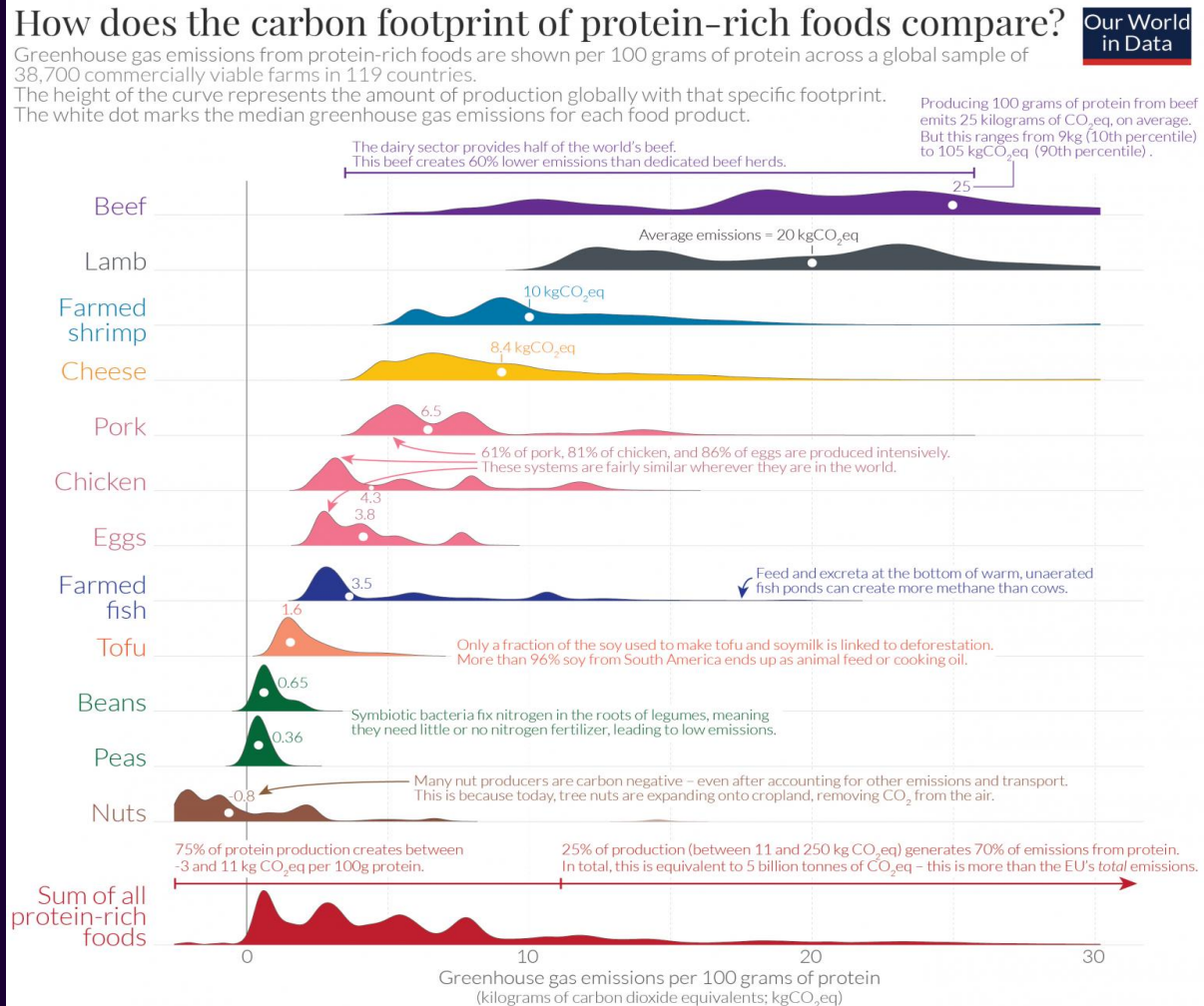
Natural well-being

Consumers are finding healthy solutions through connection with nature, affecting their stance towards ultra-processed foods.

Drivers of plant-based revolution

How does the carbon footprint of protein-rich foods compare?

Source: Our World in Data



Note: Data refers to the greenhouse gas emissions of food products across a global sample of 38,700 commercially viable farms in 119 countries. Emissions are measured across the full supply-chain, from land use change through to the retailer and includes on-farm, processing, transport, packaging and retail emissions. Data source: Joseph Poore and Thomas Nemecek (2018). Reducing food's environmental impacts through producers and consumers. *Science*. OurWorldinData.org – Research and data to make progress against the world's largest problems. Licensed under CC-BY by the authors Joseph Poore & Hannah Ritchie.



Plant Based Proteins – Sources



Oil Seeds:

- Pumpkin Seed
- Hemp Seed
- Rape Seed
- Sunflower Seed
- Sesame Seed
- Flax Seed



Legumes:

- Soybean
- Peas
- Faba Bean
- Lentil
- Chickpea
- Lupin



Nuts:

- Almond
- Cashew
- Walnut
- Macadamia
- Pistachio
- Peanut



Tuber

- Potato

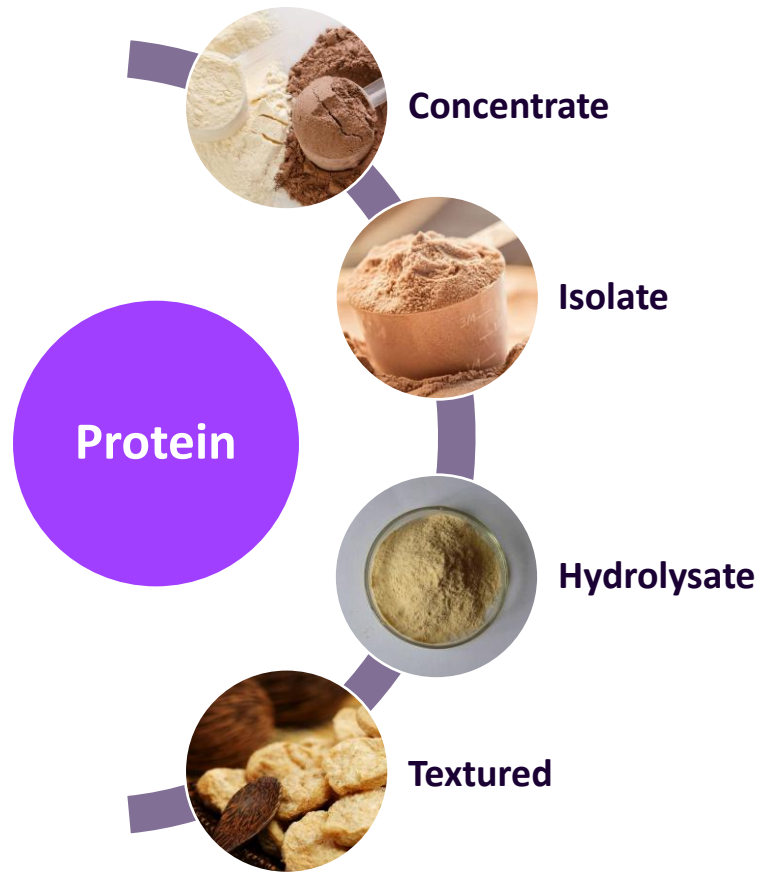


Cereals

- Rice
- Wheat
- Oat
- Sorghum
- Corn
- Barley

← More sustainable alternative, advancement in AA profile, nutritional without the carbon footprint →

Protein forms



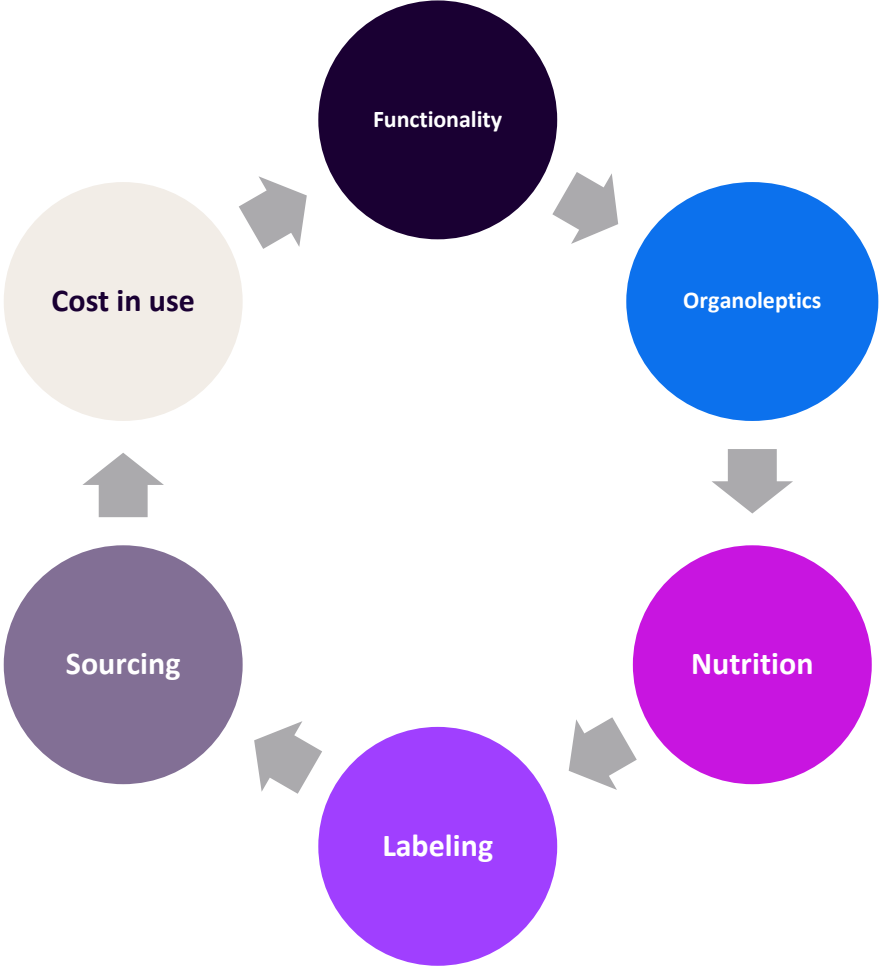
A concentration of protein by removing fat, left with some other components, such as carbohydrates and fiber.

All non-protein components, including carbohydrates, lactose, and fiber are removed. The resulting product is almost all protein.

- Hydrolyzed to be more readily available
- Used for taste
- For faster digestion

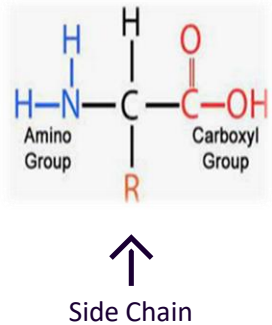
Defatted (soy)flour product, a by-product of extracting (soy)bean oil. Can be produced from any protein-rich seed meal left over from vegetable oil production.

Choosing a protein



Overcoming the challenges

Protein Characteristic



Amino acids				
Hydrophobic amino acids non-polar		Hydrophilic amino acids polar		
R = alkyl	R = aromatic group	Neutral	Acidic	Basic
Gly	Phe	Phe	Glu	Lys
Ala			Asp	His
Val	Trp	Ser		Arg
Leu		Thr		
Ile		Cys		
Met		Gln		
Pro		Asn		



Physico- Chemical

- Complex polymers, 20 AA's
- AA's linked : different sequence, type and ratio, length
- AA classification: based on interaction of side chains with water



Functionality & Nutritional

- Structure, solubility, acid base properties of AA in protein
- Different functionalities
- AA make up in protein

Functional role of proteins in food systems

Function

Solubility

Viscosity

Water binding

Gelation

Cohesion-adhesion

Elasticity

Emulsification

Foaming

Mechanism

Hydrophilicity

Water binding

Hydrogen bonding

Water entrapment & network formation

Hydrophobic, ionic and hydrogen bonding

Hydrophobic bonding, disulfide cross-links

Adsorption & film formation at interface

Interfacial adsorption and film formation

Application

Beverages

Soups, gravies, dressings, desserts

Sausages, texturized soy & pea

Meats, cakes, cheese

Processed meat, pasta, baked goods

Meats, bakery

Sausages, Deli, soup, cakes, dressings

Whipped topping, ice cream, cakes, desserts

Protein Type

Whey, soy, chickpea

Gelatin, chickpea

Muscle, egg, texturized soy or pea

Animal based, Soy, Potato, wheat proteins

Muscle proteins, egg proteins, whey proteins

Wheat, muscle proteins

Animal based, soy, potato, pea, chickpea proteins

Egg, milk, potato, chickpea proteins

Source: Kinsella, J.E. et al., Physicochemical and functional properties of oilseed proteins with emphasis on soy proteins, in : New Protein Foods, Seed Storage Proteins, Altshul, A.M and Wilcke, H.L, eds., Academic Press, London, U.K., 1985, pp.107-179

Protein characteristics and the impact on functionality

Hydration	Solubility, dispersibility, wettability, swelling, thickening, water absorption, water-holding capacity
Surface activity	Emulsification, foaming, flavor binding, pigment binding
Hydrodynamic / rheological	Elasticity, viscosity, cohesiveness, chewiness, adhesion, stickiness, gelation, dough formation, texturization



Dairy & Alternative

Meat & Alternative



Baking & Snacks

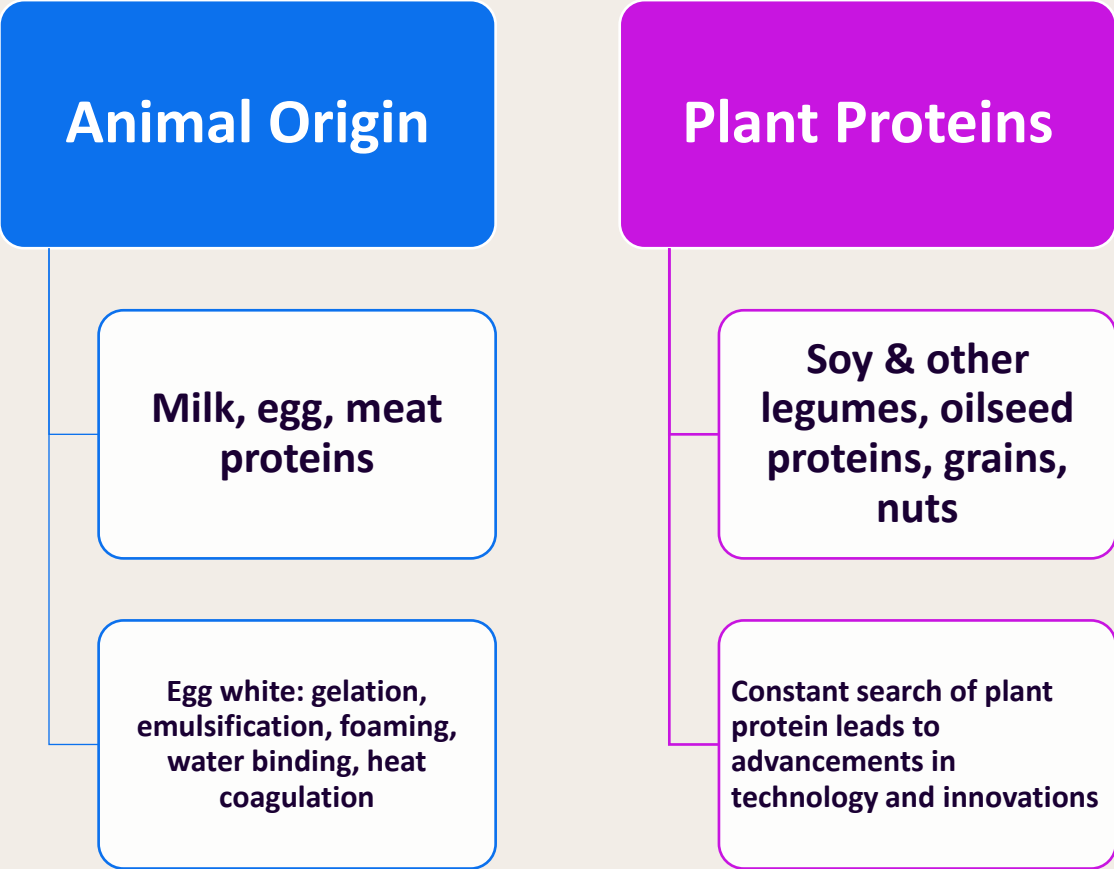
Prepared Foods



Nutra

Source: Fennema's Food Chemistry, Fifth Edition, edited by Srinivasan Damodaran, Kirk L. Parkin, CRC Press, USA, 2017 p.286

Proteins: Animal vs. Plant-Based



Bridging the Gap with ChickP Protein Isolate 90

The Challenges



- GMO
- Allergen
- Health Issue



- Texture
- Taste
- Limited Functionality

The Innovation



- No off flavor
- High Protein Content 90%
- Highly Functional
- Complete AA Profile
- Sustainability
- The first & only company to offer 90% pure Chickpea Protein Isolate

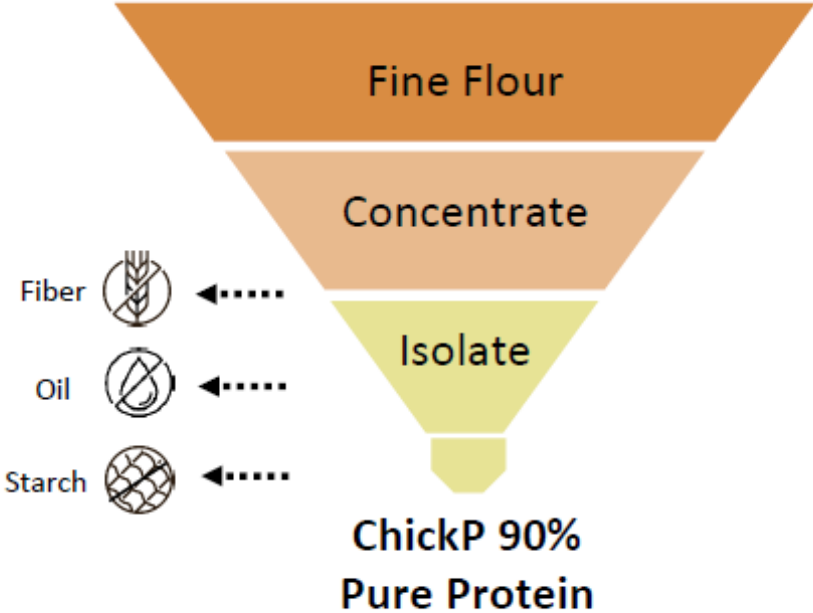


HOW – The Process

Proprietary Process for Enhancing Chickpea Protein

ChickP's 90% isolate contains the highest level of chickpea protein produced in the industry.

Our proprietary process carefully separates out the non-protein components, such as starch, fibers, and oil.



WHY – Health & Environmental Advantages

Chickpeas for Healthy and Environmentally Sustainable Products

We source our products from the humble chickpeas, which boast a lighter footprint than wheat, corn, and other major crops. At ChickP, our proprietary innovation, production processes, and work model are dedicated to maximizing the already impressive environmental and health advantages of this mighty legume



Health Advantages

- ✓ Complete protein source
- ✓ Non-allergenic*
- ✓ Non-GMO
- ✓ Hormone-free
- ✓ Highly functional properties minimize the need for additives to support clean labels

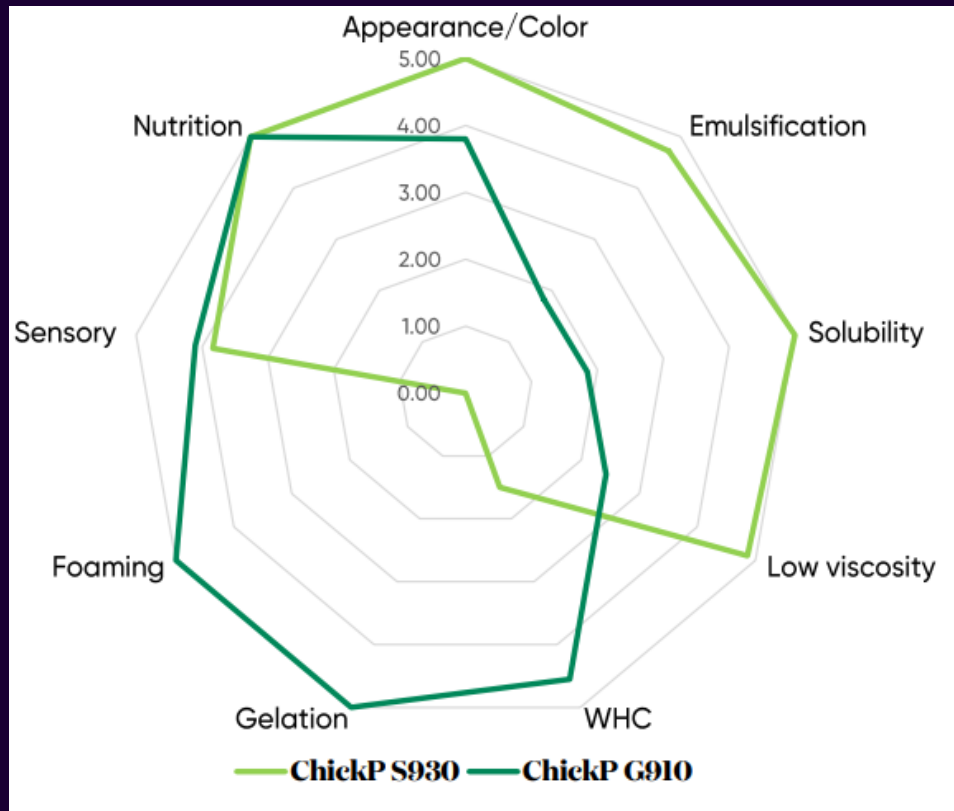


Environmental Advantages

- ✓ Chickpeas utilizes up to 90% less fertilizers than alternative crops
- ✓ Zero waste production process
- ✓ Less water usage
- ✓ Hybrid work model that reduces transport-based emissions



WHAT : The 2 grades S930 & G910



S930

- Excellent solubility, high emulsification, low viscosity, high dispersibility
- Applications: Beverage, Vegan Cheese, Dressing, Frozen Dessert



G910

- Emulsion stability, gel formation, strong texture, high viscosity
- Applications: Meat analogue, bakery, whipped cream, pasta

Applications

Plant-based milk



Plant-based cheese



**Indulgence: Yogurt,
frozen dessert, whipped
cream, meringue**



Sports nutrition

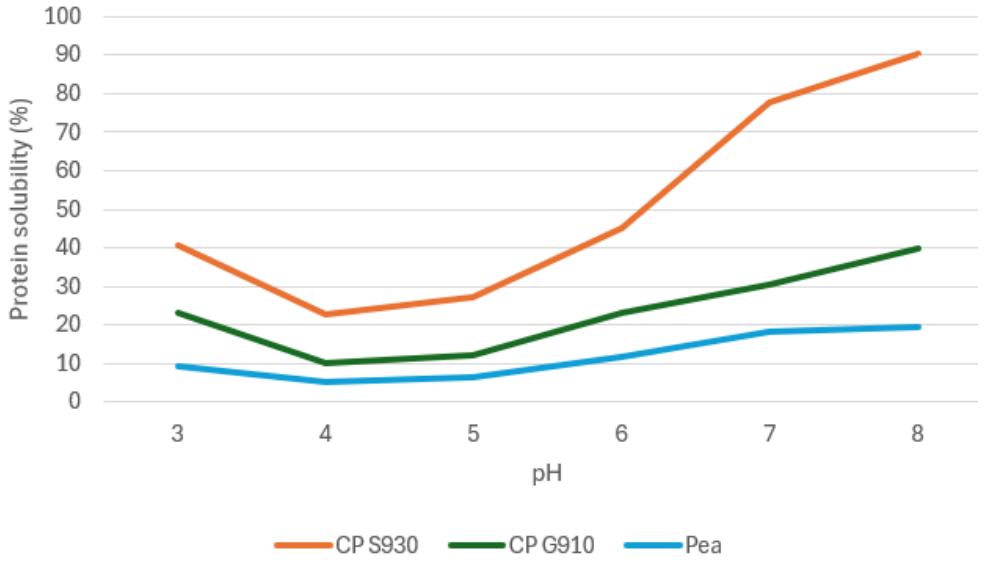
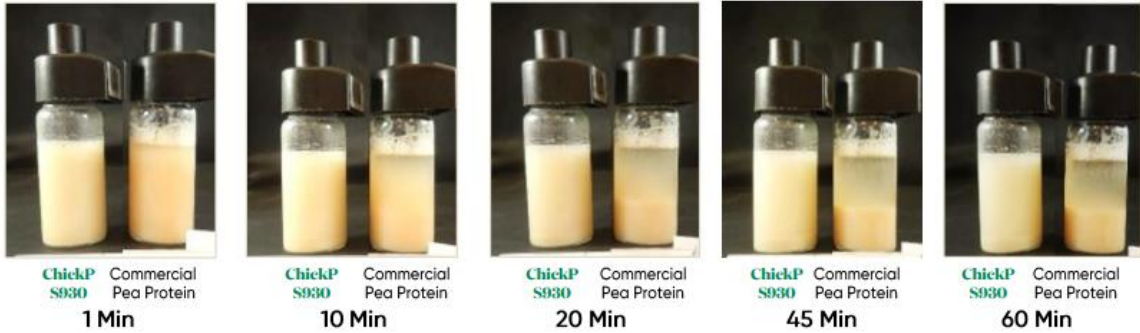


1. Making of ChickP Milk



Functionality – Solubility of S930

ChickP S930 Solubility



ChickP Milk advantages



Suspension

The right ratio of S930 and G910 creates a stable emulsion, reduction of other stabilizers



Taste

Removal of oil provides a long-lasting clean taste

Foaming

Stable foaming in art latte



Color

The natural whiteness of the ChickP does not alter the color of the emulsions.

ChickP
Cheddar

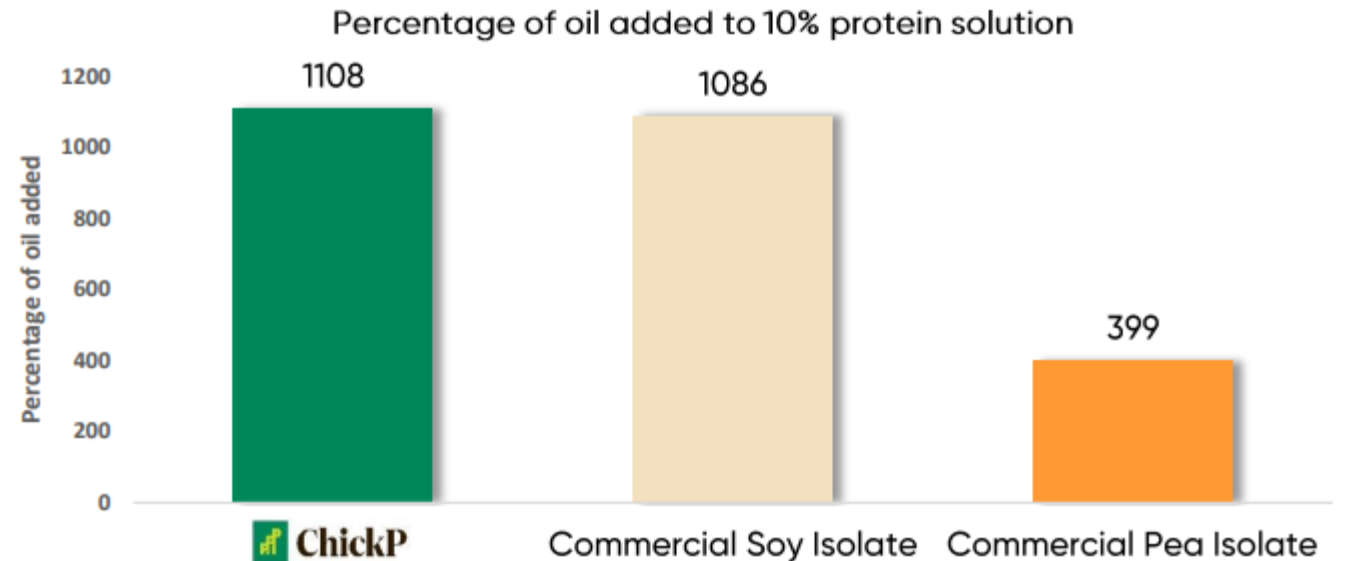
2. Making of plant-based cheese



Functionality: Emulsification of S930

ChickP S930 Emulsification Capability

- Excellent water and fat binding
- Stable for a long time



Melting capabilities of ChickP S930 – Test results



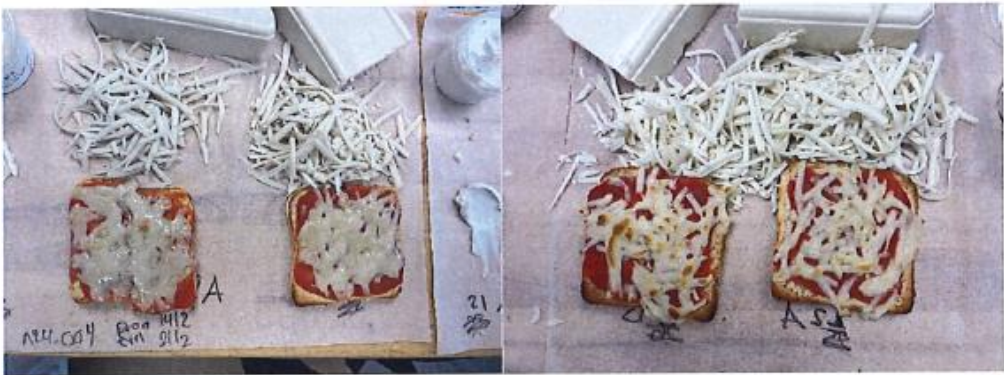
Sample 1 (Pea isolate) Sample 2 (pea isolate) Sample 3 (Pea concentrate)



Sample 4 (potato concentrate) Sample 5 (potato concentrate) Sample 6 (chickpea isolate ChickP S 930)



Sample 7 ChickP isolate G910 Sample 8 (Chickpea concentrate) Sample 9 (chickpea isolate)



Sample 10 (Faba isolate) Sample 11 (Faba concentrate)




Plant-based cheese possibilities

Hard Cheese Style



- S930 & G910
- Nat Flavor & Color
- 2 types of oils

Mozzarella Style




- S930
- Potato Protein & starch
- Oil

Sliced/Shredded



- S930
- Potato protein & starch
- Phosphate salt

Cheddar Style



- S930
- Potato Starch
- Oils

Parmesan Style



- S930
- Mod starch
- Coconut oil
- Nat Flavor & Color

Feta Style



- S930
- Potato Starch
- Fibers
- Oil

Cottage Style



- S930 & G910
- Mod Starch
- Fibers
- Oil

Halloumi Style



- G910
- Starch
- Oils



ChickP
Yogurt

3. Making of plant-based yogurt, frozen dessert, meringue

Indulgence: Plant-based yogurt, frozen dessert, whipped cream, meringue



Yogurt



Cream cheese



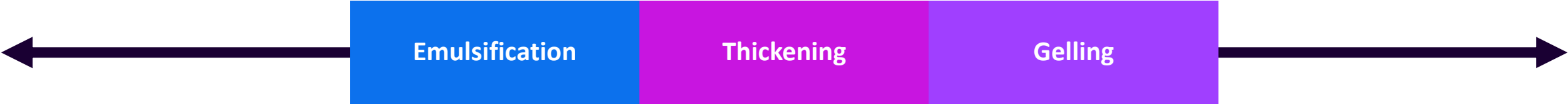
Frozen dessert



Whipped cream



Meringue



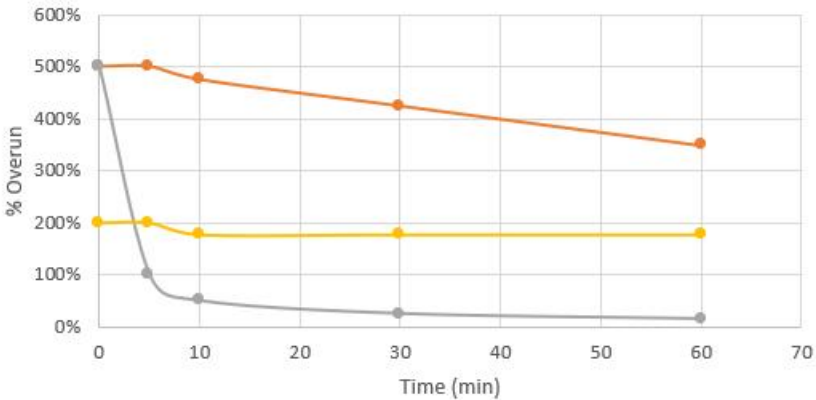
Functionality: Foaming capability

	C8474 chickP G910	C8604 Commercial chickpea concentrate	C2911 Commercial pea protein
Foam capacity	500%	500%	200%
Overrun	4	4	1
FS0	100%	100%	100%
FS5	100%	20%	100%
FS10	95%	10%	88%
FS30	85%	5%	88%
FS60	70%	3%	

High overrun, stable foam volume, some coalescence of air bubbles

High initial overrun, unstable foam

Low overrun, stable over time



— chickP G910 — Commercial chickpea concentrate — Commercial pea protein

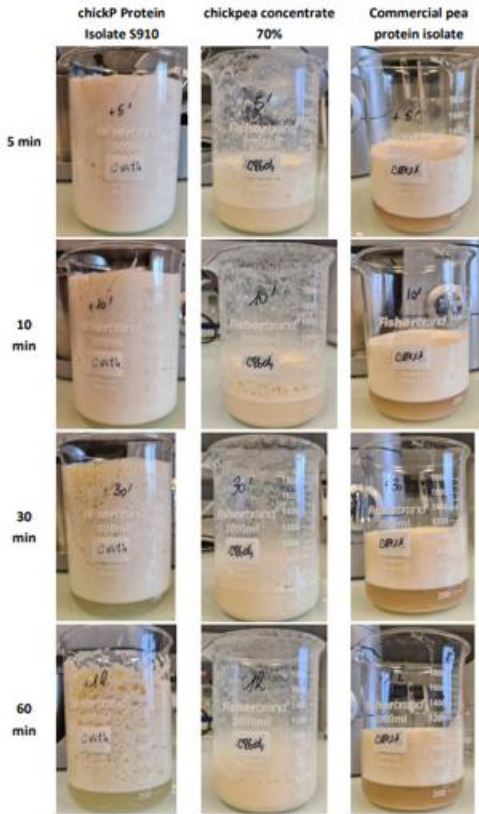


Figure 8. Aspects of foams during storage



Plant-based meat & bakery

Gelation & Emulsification

ChickP G910 Gelation Capability

Minimum gelling concentration (g protein / 100g)

ChickP G910	Commercial Pea Protein
10%	14% - 16%



ChickP G910

Commercial Pea Protein

	ChickP G910	Commercial Pea Protein	Commercial Soy Protein
20% protein Gel strength (gF)	1077	516	1155
1:5:5 Ratio Emulsion Gel strength (gF)	1283	628	1430



ChickP



Pea



Soy





PDCAAS and Amino Acid Profile

ChickP PDCAAS ≥ 1

$$\text{PDCAAS} = \text{Digestibility (0.88)} \times \text{Limiting AA (Valine) score} \left(\frac{50}{40} \right)$$

Amino Acid Scores of Plant- & Animal-Based Proteins

Amino acid	ChickP Isolate	Soy	Pea	Rice	Wheat	Corn	Oat	Lupin	Whey	Casein	Milk
His	167.2	166.1	150.7	132.6	132.6	150.9	166.7	184	108.3	168.3	176.2
Lys	139.9	122.6	152.6	62.5	52.9	48.3	87.2	97.8	189.6	164.2	151.7
Phe+Tyr	243.3	199.3	199.4	232.1	181.3	244.2	217	166.6	146.4	255.3	251.3
Leu	134.2	116.2	122.2	124.2	115.9	203.6	128.3	108.3	165.9	150.2	166.5
Iso	167.3	142.1	140.3	123.2	136.3	117.4	133.2	122.9	181.3	167.1	182.9
Val	127.8	108.9	114.5	128.4	109.7	115.3	173.2	89.1	134.1	156.3	162.7
Thr	142.1	144.6	147.9	131.8	118.8	137.3	132.9	129.5	264.6	166.8	175.1
Met+Cys	111.6	106.2	78.0	171.8	173.1	148.4	219.7	82.5	157	115.6	158.8
Trp	124.7	203.3	137.1	184.1	177.3	114.5	241.3	120.6	292	185.6	224.9

Notes: The amino acid score parameter is based on comparison of the mean amino acid requirements with milk protein as a reference. "Goldstein, N et al., The potential of legume-derived proteins in the food industry, 2023".

ENT



More application possibilities

ChickP Protein Got Better

Vegan whipping Cream

Plant-based, white color, smooth whipping cream

Challenge

Traditional cuisine makes extensive use of cream. The most significant ingredients in this type of dish are the smooth and rich texture of the cream, its stability during cooking, and of course its rich taste. Plant-based substitutes have difficulty addressing these three components.

Solution

Our ChickP 5930 provides an excellent solution for plant-based cooking cream without using stabilizers and emulsifiers.



Dairy Alternative

- Barista
- Yogurt
- Frozen Dessert
- Whipped cream
- Cooking cream



ChickP Protein Got Better

Plant-based Cottage Cheese

Non-dairy cottage cheese with great texture and flavor

Challenge

Creating plant-based cottage cheese requires innovative methods to replicate its creamy texture and tangy flavor without using dairy. By carefully selecting ingredients and using precise fermentation techniques, the result is a vegan, allergen-free product that captures the essence of traditional cottage cheese.



Vegan Cheese

- Cheddar style
- Parmesan style
- Cream Cheese
- Feta Cheese



ChickP Protein Got Better

Egg-Free Chocolate Muffin

Plant-based, light, fluffy muffins without eggs

Challenge

The protein structure and properties in egg whites give muffins and other baked goods a light, airy structure. However, there are significant challenges in creating the right texture and shelf-life when using plant-based products.



Bakery

- Egg free muffin
- Gluten free muffin
- Meringue
- Cheesecake
- Vegan donut
- Crème brule
- Bun glaze

ChickP Protein Got Better

Boiled Egg White

smooth, slightly firm texture and mild savory taste

Challenge

Achieving the unique texture of egg whites, which is smooth and slightly firm, requires careful formulation using plant-based proteins. Additionally, the flavor profile of egg whites, which is mild and slightly savory, needs to be replicated without off flavors. Balancing the protein composition, texture modifiers, and flavorings is crucial to achieving an authentic plant-based alternative that closely resembles the experience of boiling egg whites, meeting both sensory and nutritional requirements.



Others

- Protein Shake
- Meat Analogue
- Vegan hard-boiled egg
- Hi Protein Choc Bar

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Thank you – Q&A