SUSTAINABLE PROTEIN PROCESSING WITH THE HELP OF ENZYMES

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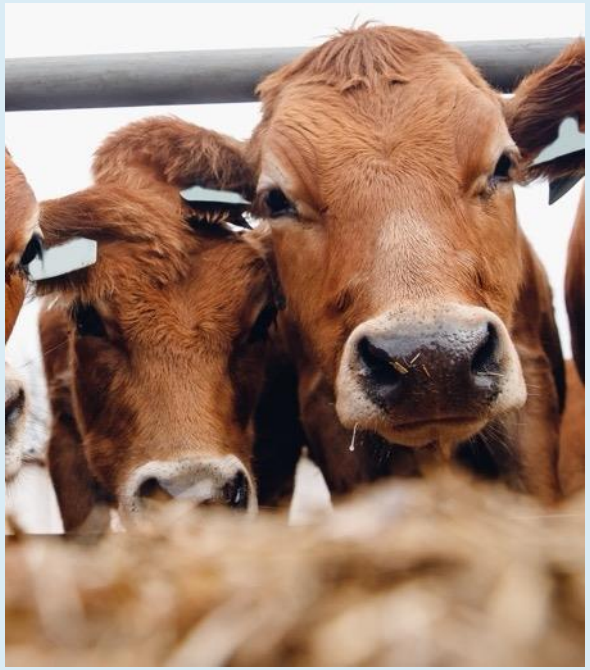
Innovators in nutrition, health and beauty

Perfumery
& Beauty

Taste, Texture
& Health

Health, Nutrition
& Care



Animal Nutrition
& Health

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Our global food system challenge

Our food systems are NOT sustainable

People

- (Hidden) Hunger and malnutrition
- Diet-related illnesses
- Vitamin and mineral deficiencies
- Anti-microbial resistance

Planet

- Emissions
- Loss of biodiversity and ecosystem, deforestation
- Food loss & waste

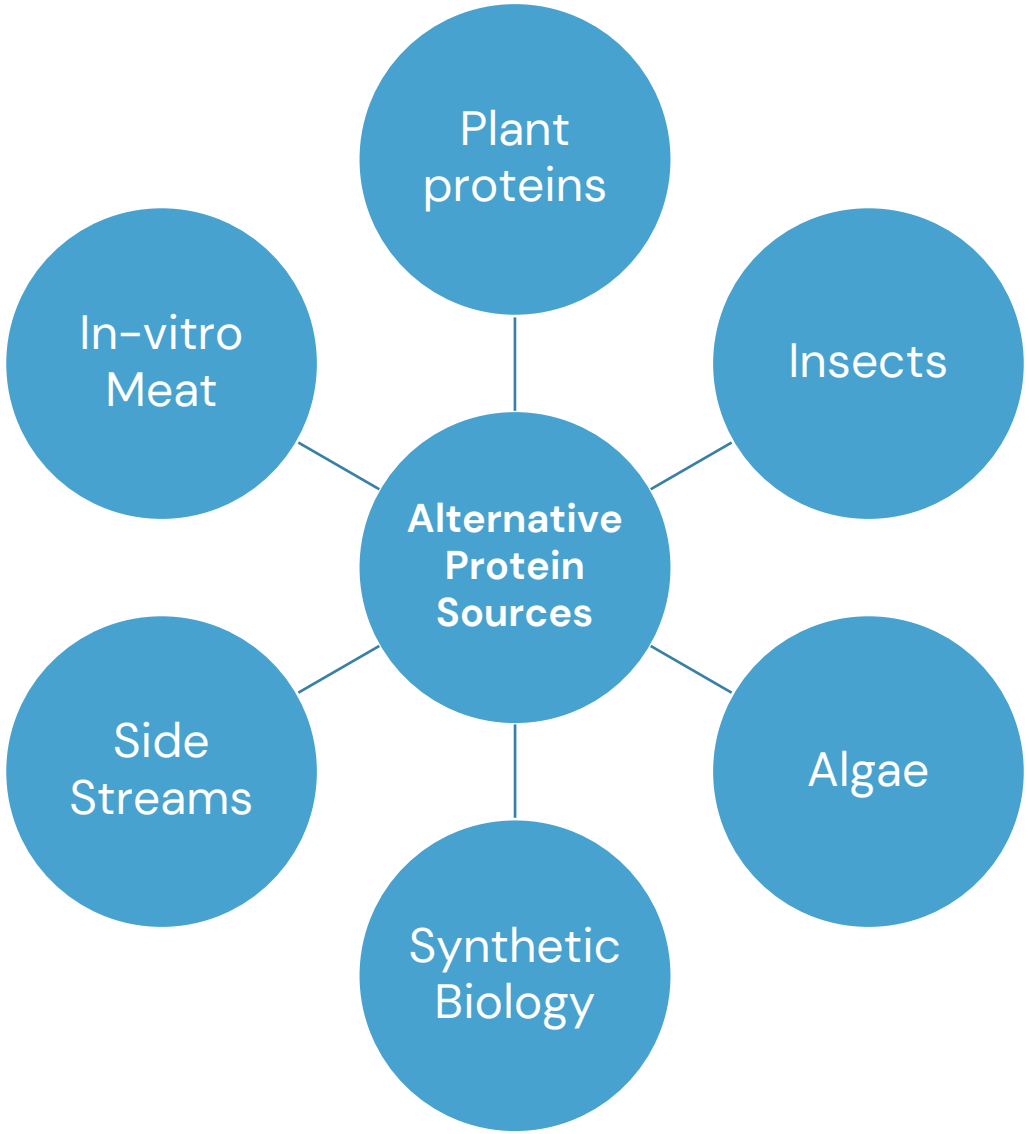
Livelihoods

- Inequality
- Fair and stable income
- Lack of basic needs

Sources & further reads: IPCC (2019), SOFI (2021,) Food and Land Use Coalition (2019, 2020)
World Resources Institute (2020), EAT-Lancet Commission (2019), FABLE (2019, 2020, 2021), IBES-Food (2019)

The conscious choice for animal alternatives

Concerns around sustainability prime the pump for alternative protein innovation



Pea is a really good source for proteins

- Pea is considered well-established
- Pea protein has a unique texture advantage
- Pea does come equipped with challenges (price, taste and functionality)
- Common applications are sports nutrition, meat alternatives and dairy alternatives.

We have developed enzyme solutions that help overcome specific protein functionality challenges, as well as improve on the processability of pea protein from its substrate.

The solutions to address needs in protein concentrate processing

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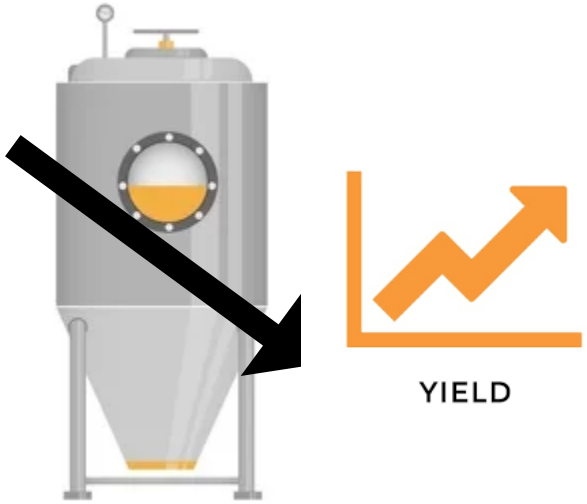
Market dynamics are changing

minimize introduction of access water



avoid double processing of raw material

ready to use for (liquid) applications

Our baseline in Pea protein extraction & Pea protein concentrate solubility

Pea flour

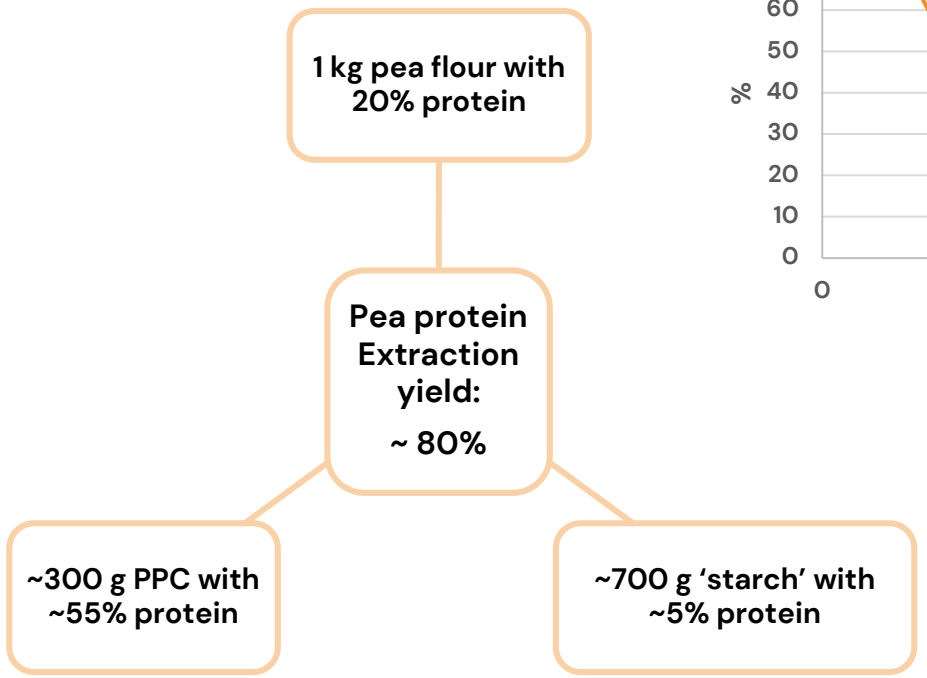
- Protein: ~ 20%
- Fiber: ~ 15%
- Carbohydrate ~ 60%
- Ash: ~ 5%

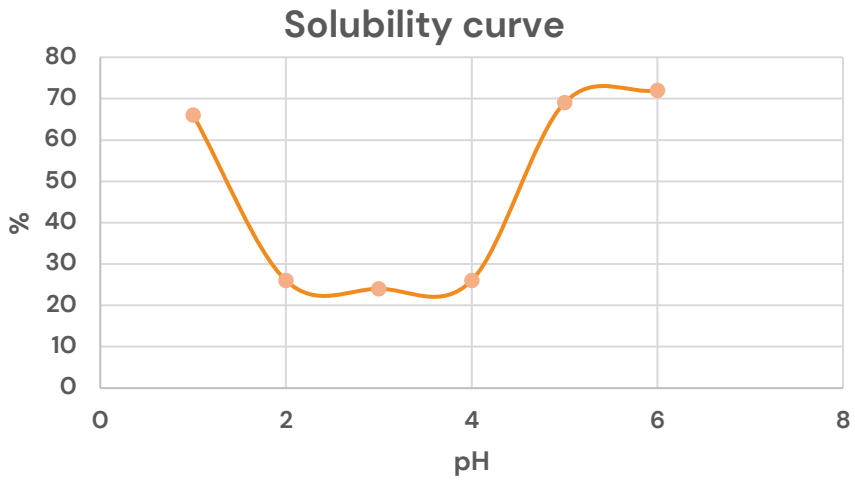
Chemical Extraction

Pea protein concentrate

- 50-60% protein
- Fiber: 20-30%
- Carbohydrate ~ 10%
- Ash: ~ 5%

Typical Extraction Yield (Mass Balance)





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Pea protein extraction assisted by enzyme

Pea flour

- Protein: ~ 20%
- Fiber: ~ 15%
- Carbohydrate ~ 60%
- Ash: ~ 5%

Chemical Extraction

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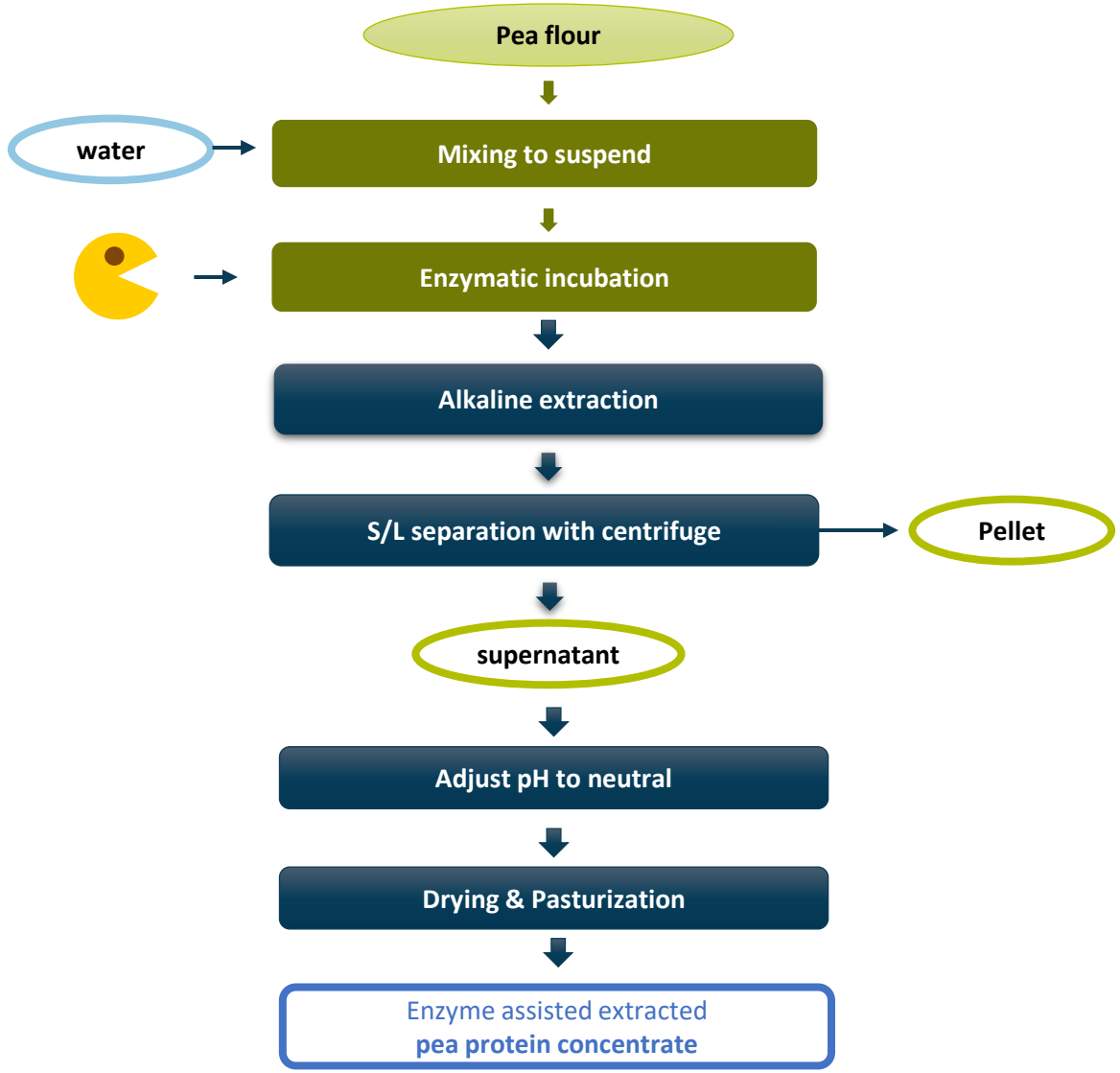

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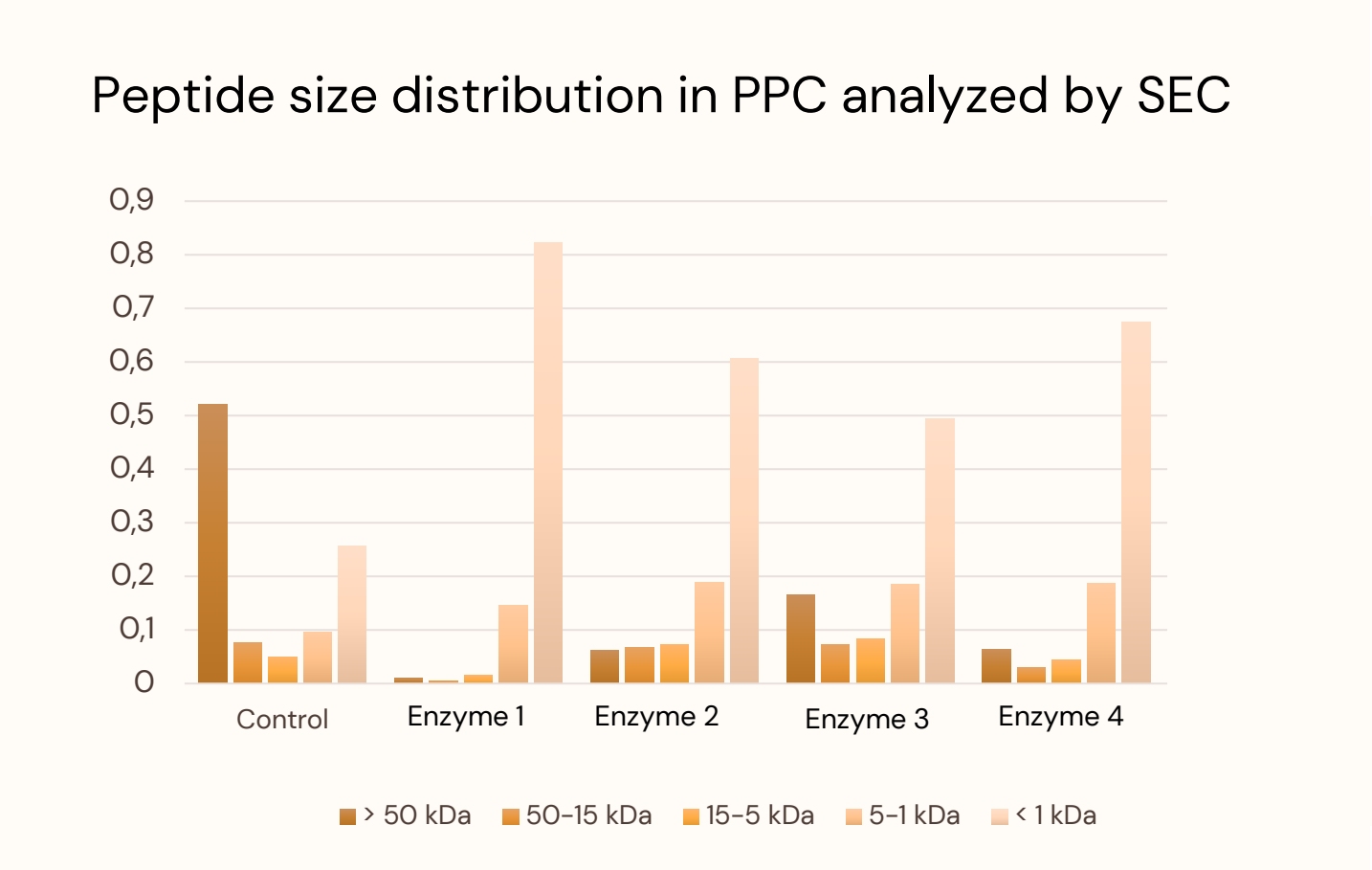
The Maxamyl enzyme range tailors the peptide profile and modifies the pea protein concentrate peptide size



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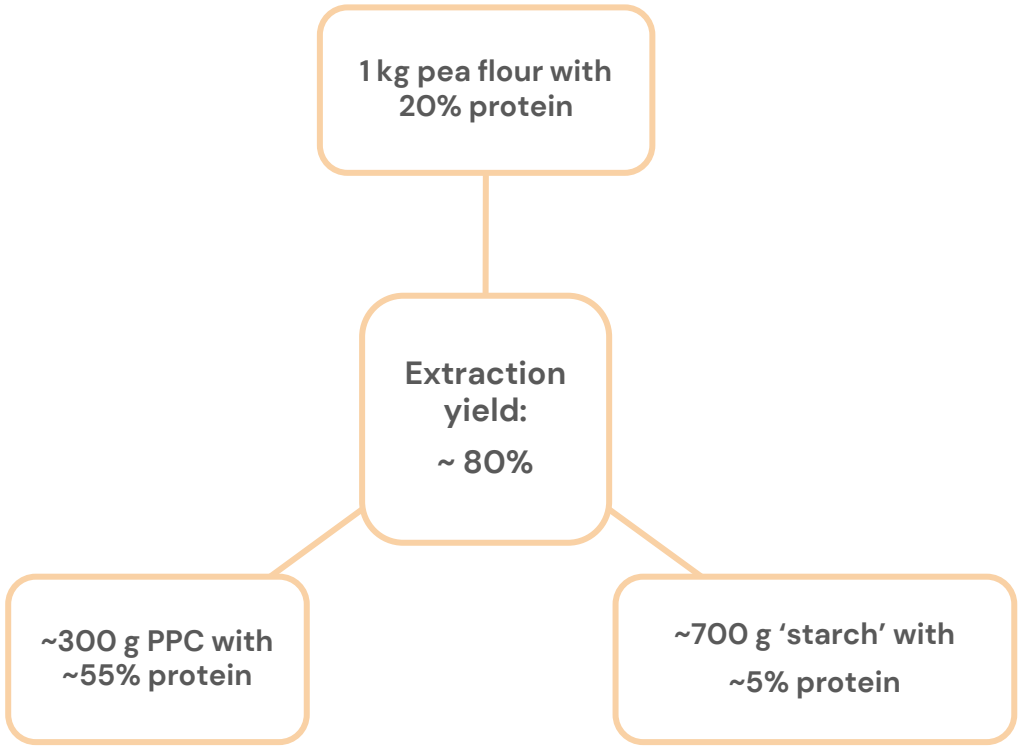
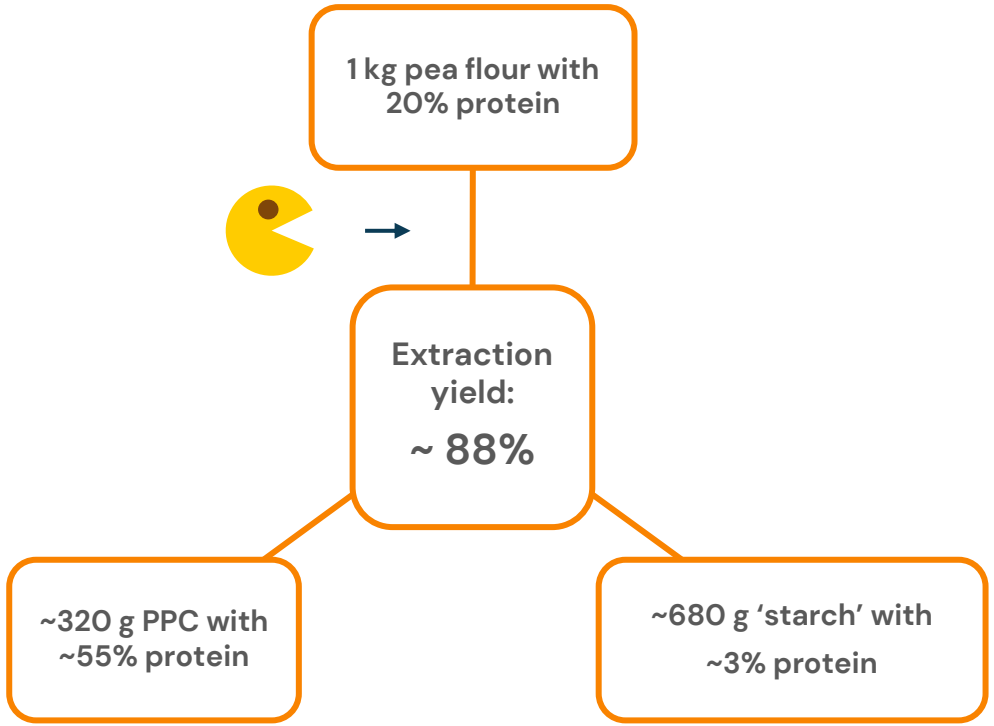
Yield increase observed with Maxamyl enzyme assisted Pea protein concentrate extraction

Yield without enzyme



Yield with enzyme



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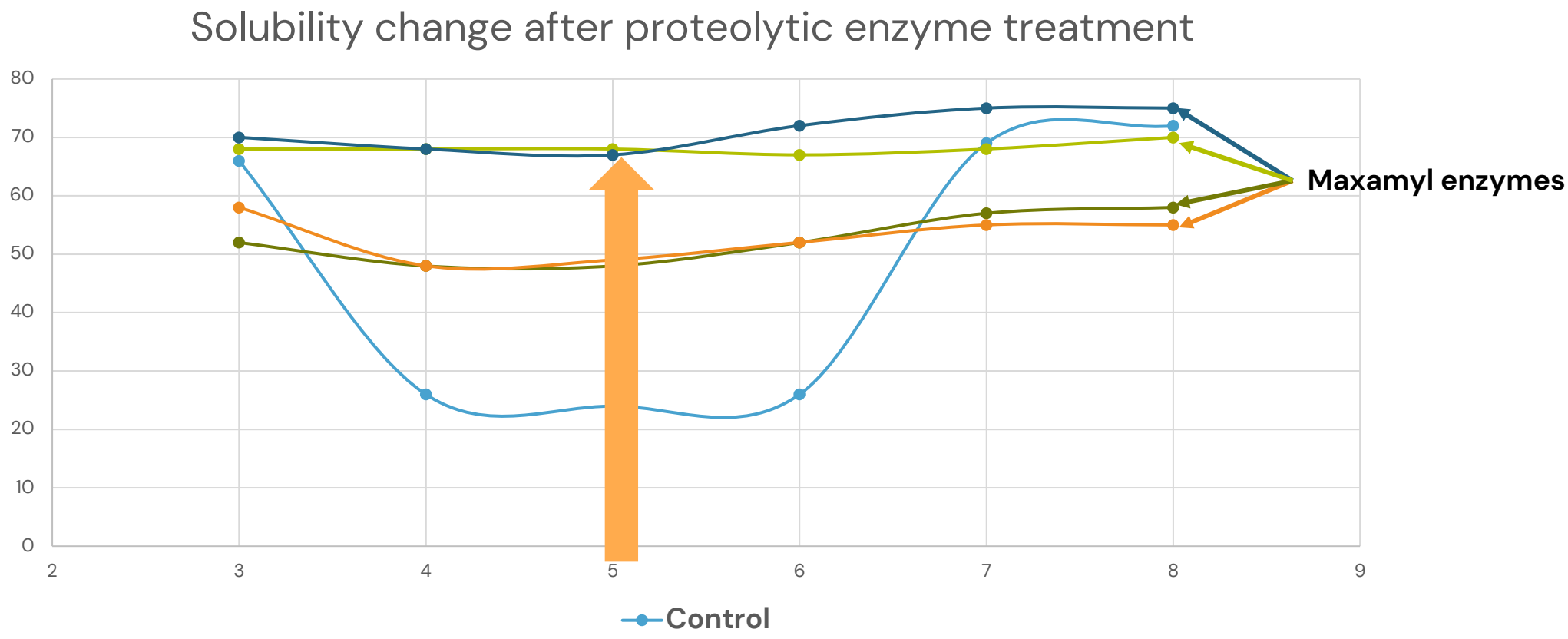
Significant increase in solubility, especially at acidic pH, when Maxamyl enzymes are applied during the extraction process of pea protein concentrate



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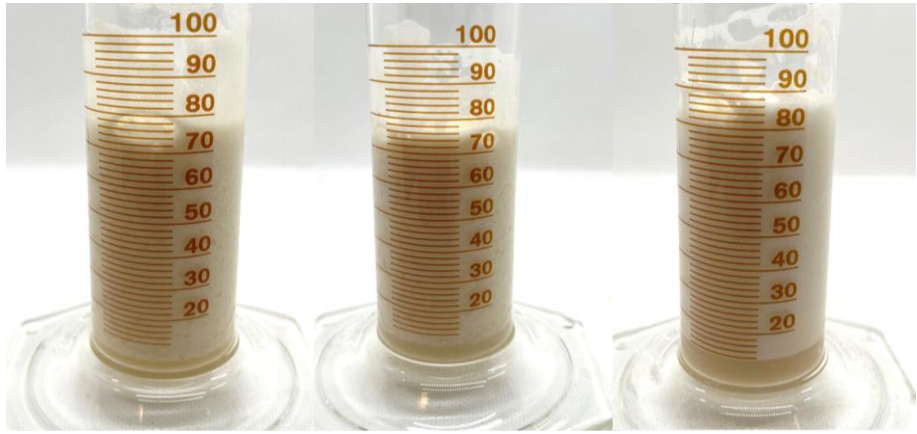
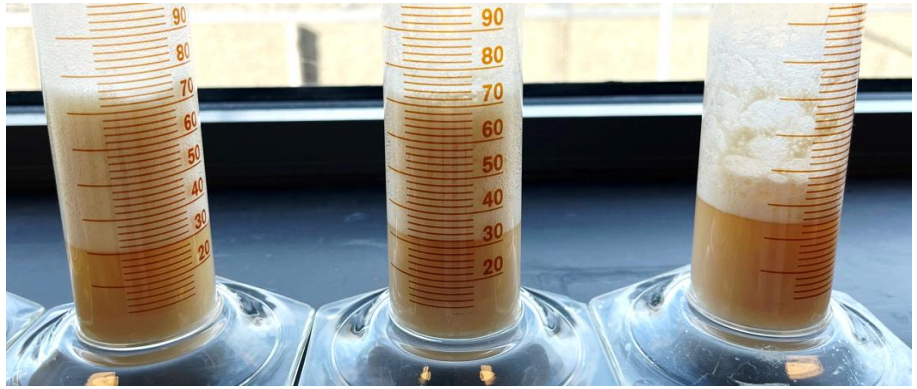
The impact on foam stability can be tailored based on the choice of enzyme from the Maxamyl range

0 min



Control Enzyme 3 Enzyme 4

60 min



Stable foam

non-stable foam

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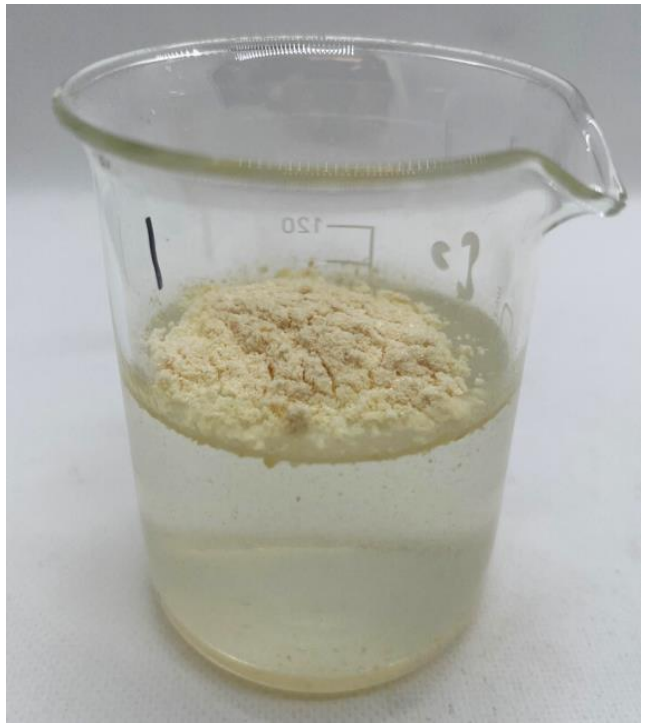
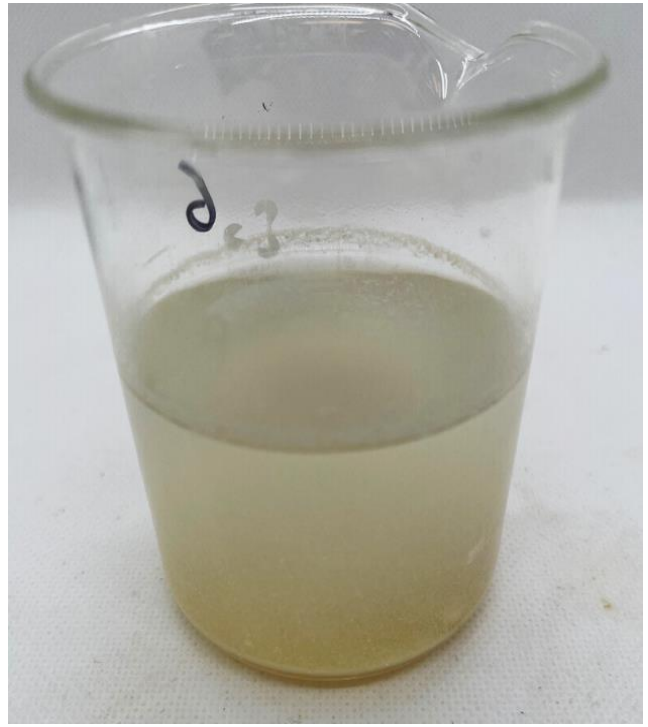
Maxamyl enzyme assisted extraction shows improved wettability



At addition
(3% protein)

Control
5 minutes



Enzyme assisted
30 seconds

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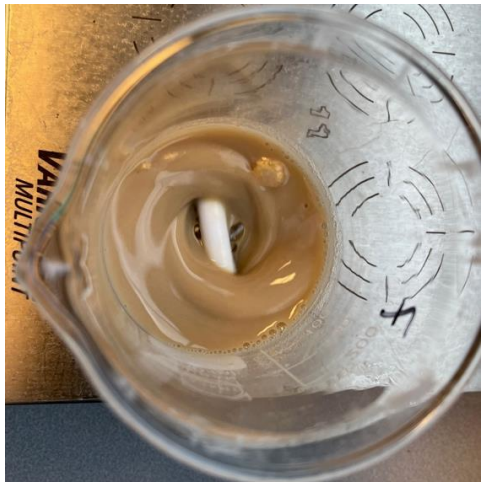
Smoother texture with Maxamyl enzyme assisted extraction

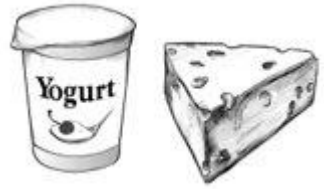
Neutral pH,
14% protein

Acidic pH,
14% protein



Control

Enzyme assisted



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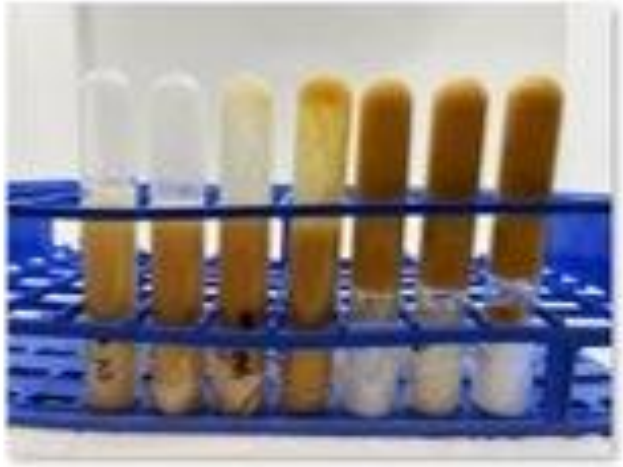
Gel formation requirements for different applications can be tailored by choice of enzyme from the Maxamyl range

Control



Enzyme 2

Gelling at 10% PPC

Enzyme 1

No gelling < 14% PPC

In Summary

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Enzymes bring benefits in processability of Pea Protein Concentrate

Enzyme assisted extraction

- Enzyme applied during the extraction process
- Only one drying step needed

Yield

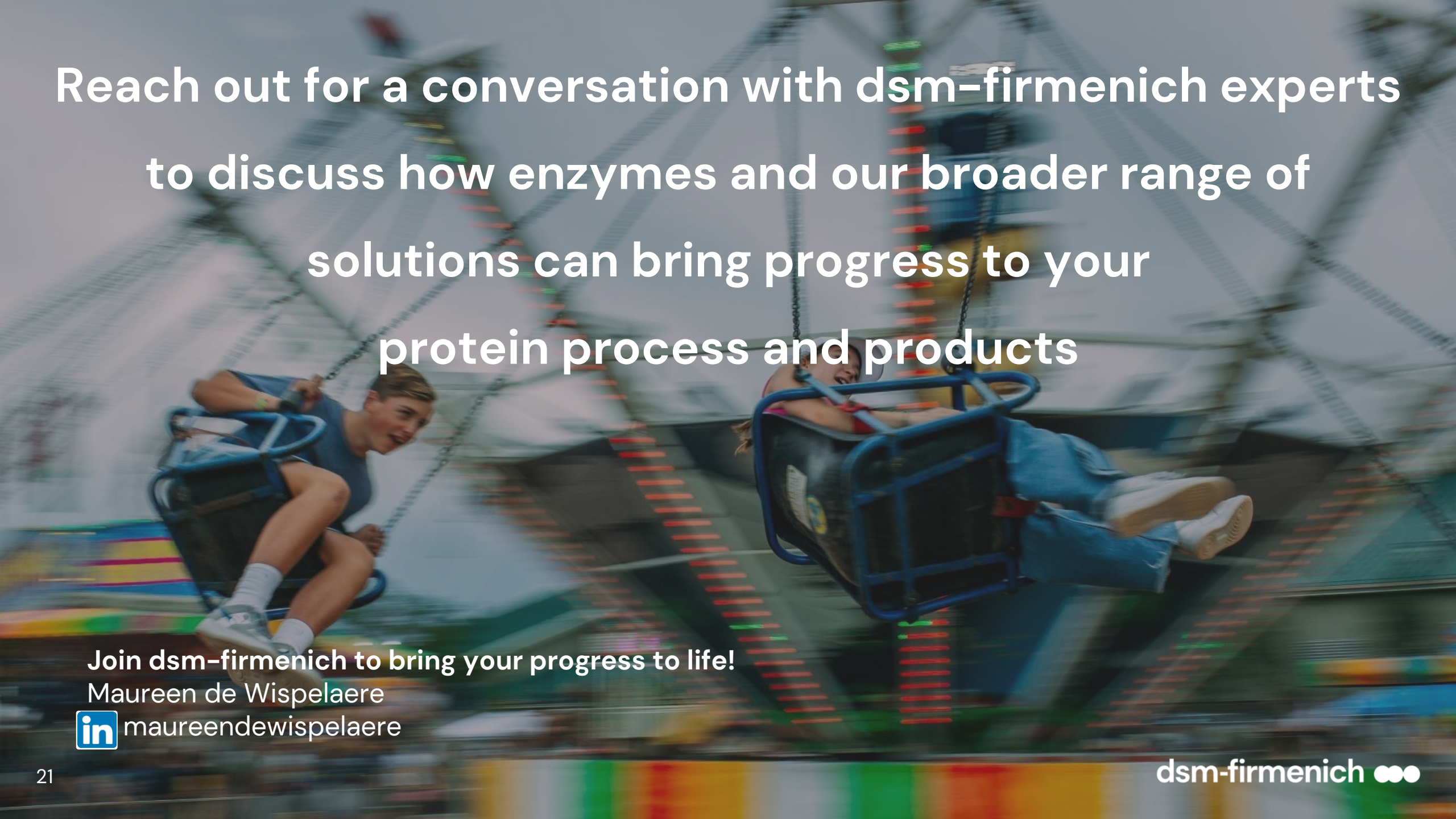
- Protein yield increase
- 20kg extra pea protein concentrate per ton flour Protein

Solubility
Wettability

- Significant solubility improvement, especially at acidic pH
- Instant wettability, wetting time < 30 sec
- Smoother texture with high protein incorporation rate

Foam
Gel

- The desired effect on foaming and gelation can be selected by choice of enzyme



Reach out for a conversation with dsm-firmenich experts to discuss how enzymes and our broader range of solutions can bring progress to your protein process and products

Join dsm-firmenich to bring your progress to life!

Maureen de Wispelaere
maureendewispelaere

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We bring progress to life™

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Our portfolio of Taste and Ingredients Solutions

- Cultures
- Delivery systems
- Enzymes
- Fibers & bulking
- Flavors
- Gellan gums
- Integrated taste & functional solutions
- Flavors with masking properties
- Nutritional lipids
- Pectin
- Premix blends
- Probiotics
- Plant proteins
- Reaction, extracts & molecules
- Salt & umami enhancement
- Sugar & Salt reduction solutions
- Taste modulation
- Technical antioxidants
- Tests
- Vitamins, carotenoids, micro-nutrients

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