

Future Food Products

«Resilientes Ernährungssystem»

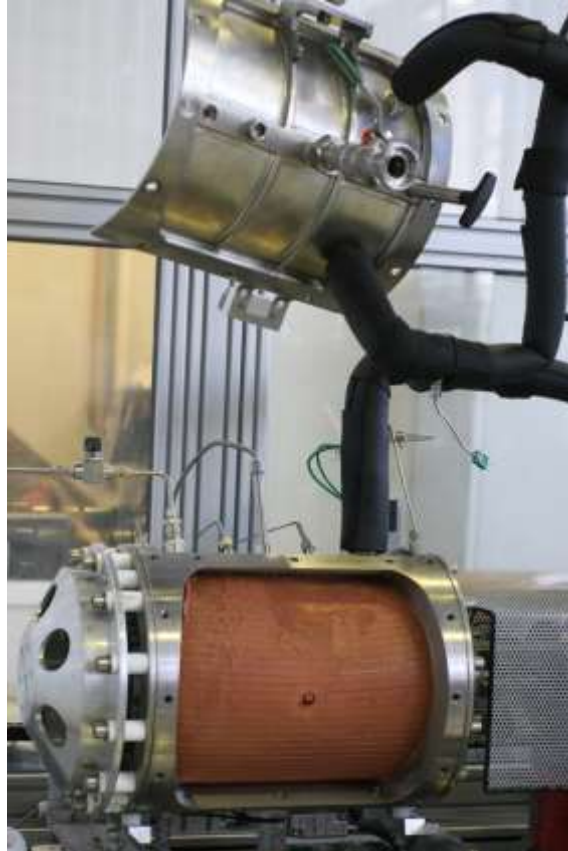
Atze Jan van der Goot



2021 Future
Food
Symposium



Shear cell technology



Shear cell technology

- A mild technology aimed at making anisotropic structures
- A technology that allows control over the degree of anisotropy, and size of the final product
- A technology that can be scale to:
 - *Large scale for use in big factories*
 - *Local scale to be used in retail, restaurants and kitchens in hospitals*
 - *Potential to become cheaper*



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"5 Best Herbs for Dementia"
Doctors Say 1 Blend Compound Protects Against Dementia in Surprising New Clinical Study
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Sacrilege for steak lovers! Scientists reveal they have recreated a vegetarian version of every carnivore's favourite meat... from LENTILS

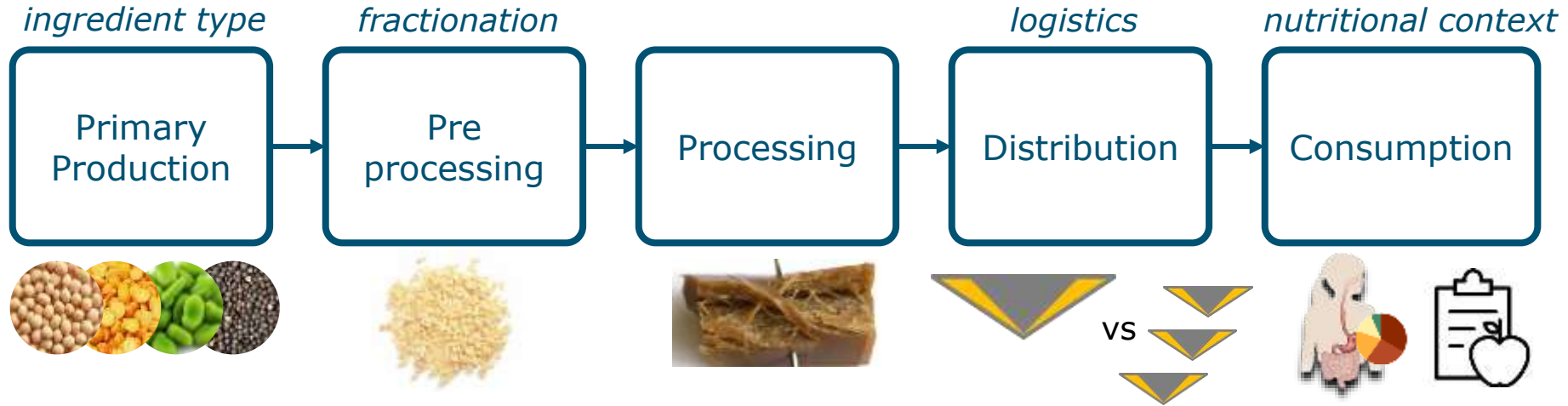
• Scientists in the Netherlands invent 'meat substitute' made from legumes
• Its texture 'resembles steak more closely than other meat substitutes'
• Researchers at Wageningen University an create 1.2in thick 'steaks'

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Introducing a new technology for a meat analogue



Protein sources for meat analogues

Soy dominates market

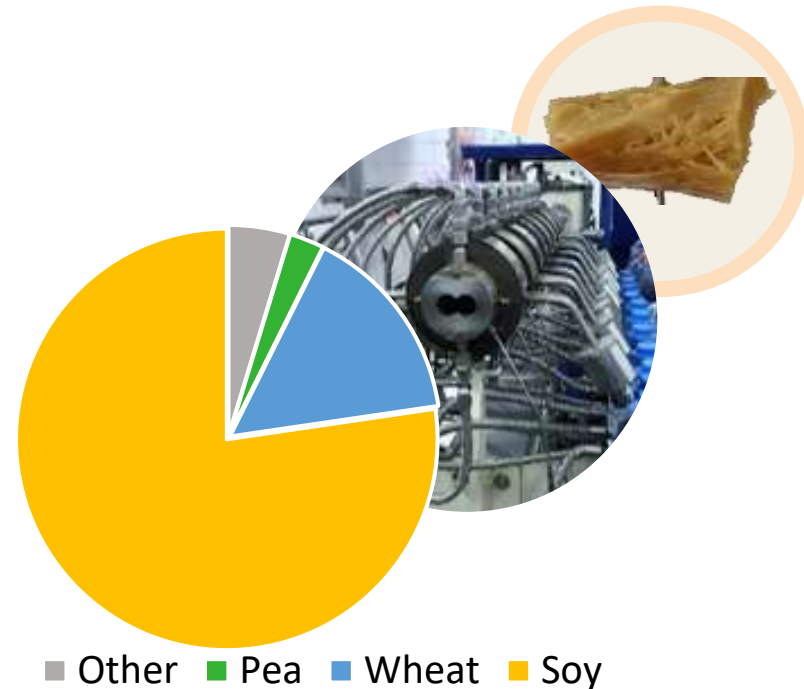
- Protein extracted from by product
- Cheap
- Good functionality for meat analogues (gel strength, WHC)

Wheat Gluten

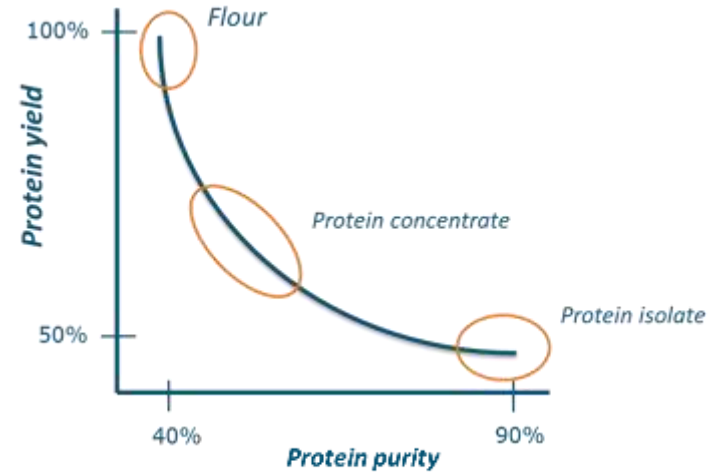
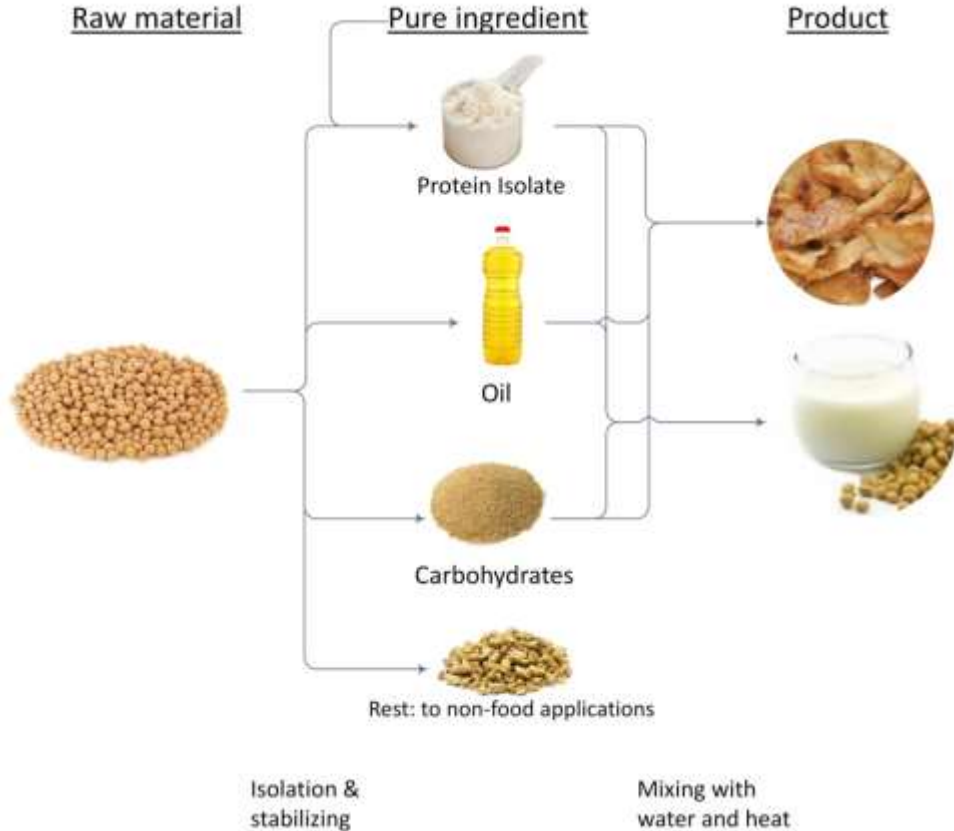
- By product from wheat starch production
- Characteristic film/fibre forming properties

Pea: Alternative for soy

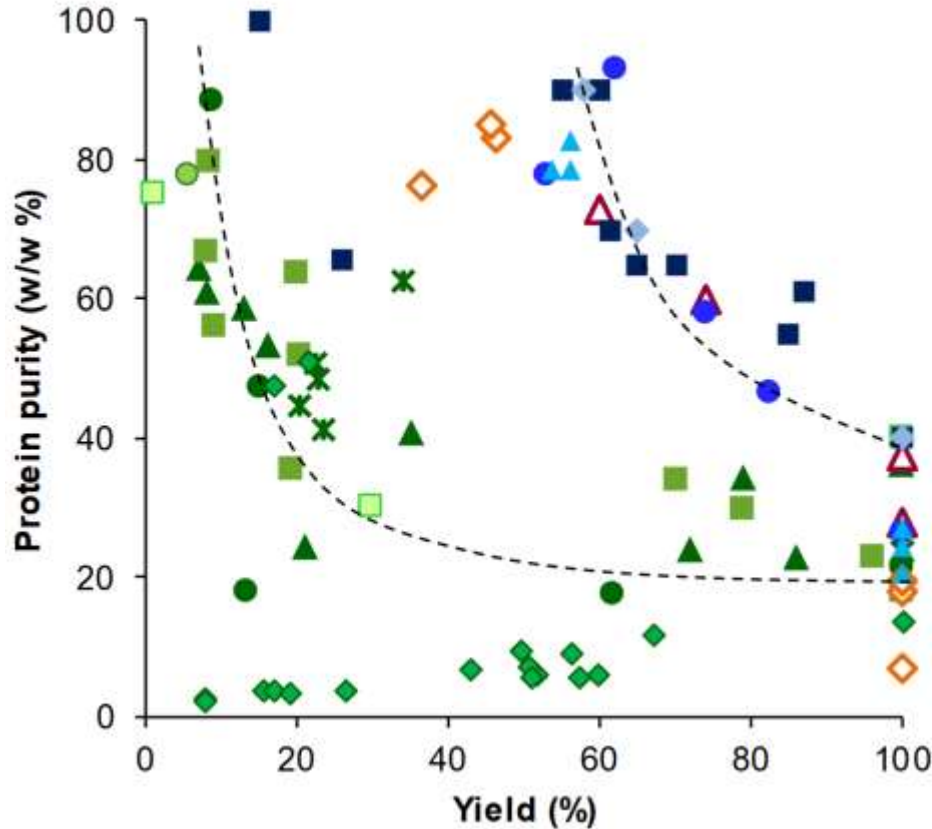
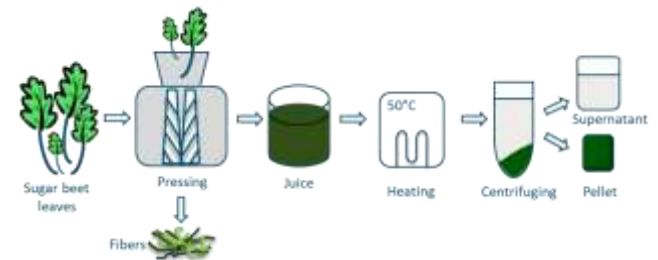
- Grows well in moderate climate: local sourcing possible
- Properties are suitable for meat analogues



Fractionation plant materials



Novel protein sources



- SBL1
- Alfalfa leaves 2
- Cauliflower leaves 3
- Duckweed 4
- Aquatic plants 5
- Algae 6
- Algae 7
- Seaweed 8
- Seaweed 9
- Soy 10
- Lupine 11
- Rapeseed 12
- Pulses 13

One size fits all...



A closer look at the meat alternative ingredients

■ SPC + water

- Obtained through removal of oil and soluble ingredients
- Fibrous structures in shearing device and extruders

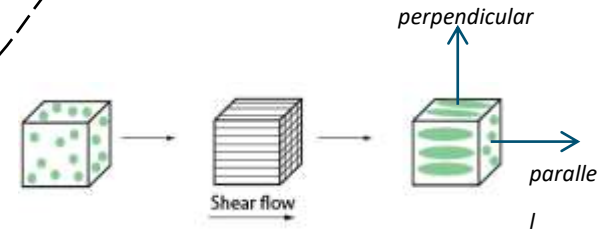
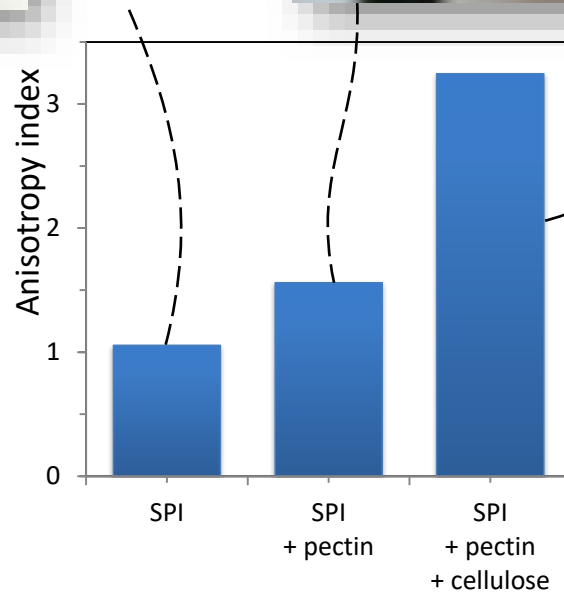
■ SPI + water

- Extensive purification procedure
- Does not give fibrous structures in shearing device or extruder
- Functional properties for structuring are less good than SPC



Less purified ingredients have better functional properties for making meat alternatives!

Separate phases are required for structure formation



Anisotropy index is defined as the ratio of the tensile stress in parallel and perpendicular direction

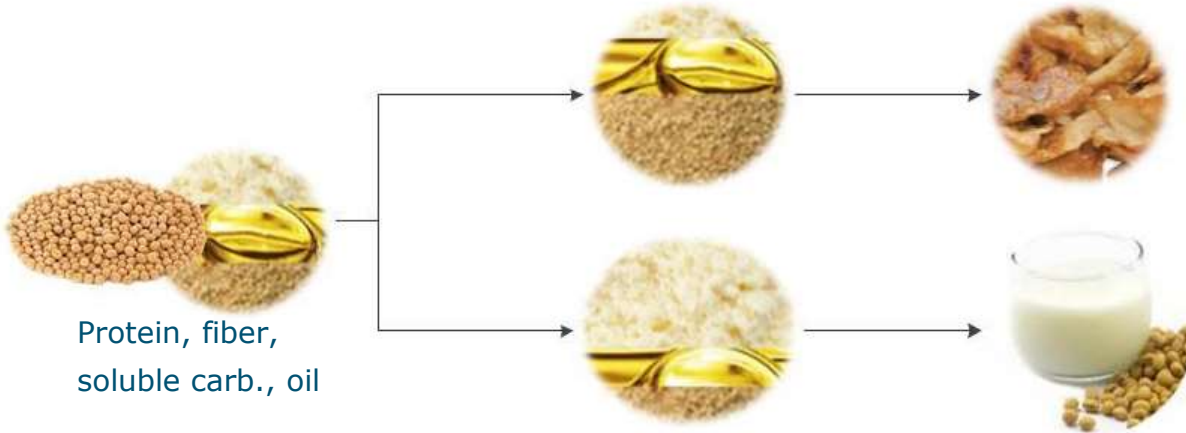


Towards functional ingredients

Raw materials

Functional fraction

Product



Protein, fiber,
soluble carb., oil

Fractionation
-mild processing
-dry separation

Structuring /
Product assembly

- Take advantage of richness and behaviour of natural materials without over processing
- Fibres and bioactives might be interesting “new” nutrients
- Protein content in ingredients should match target product group

- Small scale opportunities

Food Ingredients and products of the future

- New innovations (shear cell, 3D printing) allow local production
- Broad variation, with focus on applications, local taste

- Production of ingredients at local scale:
 - Immediate use
 - Less drying
 - Less fractionation
 - More and different ingredients



Improved efficiency raw material use

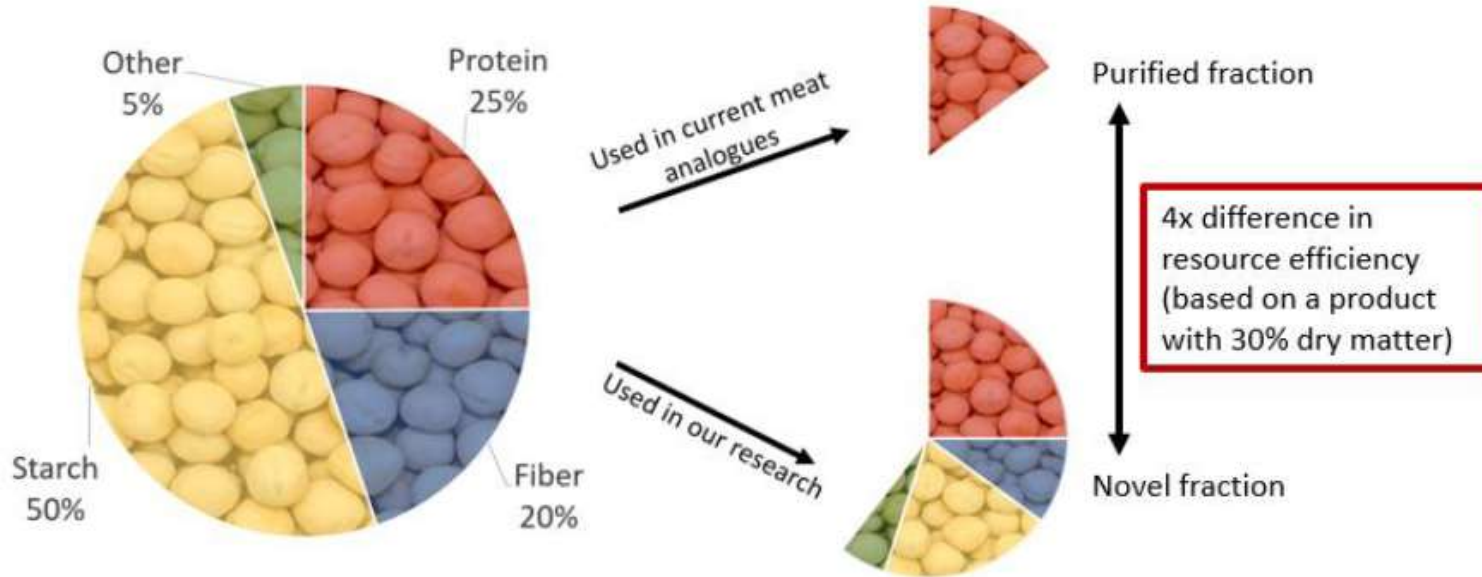


Figure 1 Schematic overview of composition of yellow pea (dry) and its utilization.

The idea already exists (existed)

- Windmill to separate raw materials
 - Wheat in to a broad range of ingredients for many different products
 - Oil extraction from flaxseed, rapeseed
 - Total crop use
 - Food ingredient – feed
 - Green energy
 - 500 ton/year, 100 – 200 kg/hr
 - Still 1000 grain mills in NL: increasingly popular



Flour Milling System
100-1000tons/day of wheat flour
milling plant.

The modern wind mill for food ingredients and products

- Why did the windmill (concept) disappear ?
- New ideal concept for smaller countries having full supply chain
- Less dependency on protein import



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