

# Plant Meat Matters

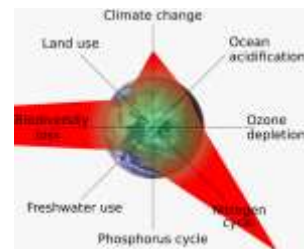
Towards a next generation meat analogues

April 2018, Ariette Matser, Atze Jan van der Goot



## Why?

- Current way of producing food is not sustainable
  - *Trend is towards more affluent diets*
- Rethink what products we produce, develop and consume
  - *Western-style diets: reduce intake of products from animal origin*
- Rethink how we make food products and food ingredients
  - *Focus on functionality*
  - *Novel process chains*
- Food science should include a different perspective as well
  - *Appreciate complex composition and structure*



WIRTSCHAFT **Die pfiffigen Erfindungen des Konrad Adenauer**

Von Walter Scheidel | Veröffentlicht am 30.05.2019 | Lesedauer: 5 Minuten



1915

umsetzungswissen  
30.11.-0001, 00:00 Uhr

Artikel - Kaufen - Produkte  
**Unnützes Wissen**

**Konrad Adenauer hat die Sojawurst erfunden.**

Um die Hungersnot im Krieg zu stillen, erfand Adenauer eine Wurst auf Soja-Basis - die sogenannte »Friedenswurst« oder auch »Kölner Wurst«.

Die Karrieren der BRD ging als großer Staatsmann in die  
Regierungsgeschichte ein. Wenig bekannt ist, dass Adenauer auch ein  
erster Erfinder war. Für eine Sojawurst und ein "Netzzeiterbrot" erhielt er  
Patente. Sein Inakzeptanz könnte jedoch weniger überzeugen, da er für  
weniger tödlich geendet hätte.



A next generation meat substitutes...



## What is novel?

- A mild technology aimed at making anisotropic structures, preferably fibrous such as meat\*
  - Isotropic: uniform in all directions
  - Anisotropic: varying properties in opposite direction
  
- A technology that can be scaled to:
  - *Large scale for use in big factories*
  - *Local scale to be used in retail, restaurants and kitchens in hospitals*



\* Based on consumer research:  
Attract largest group of consumers

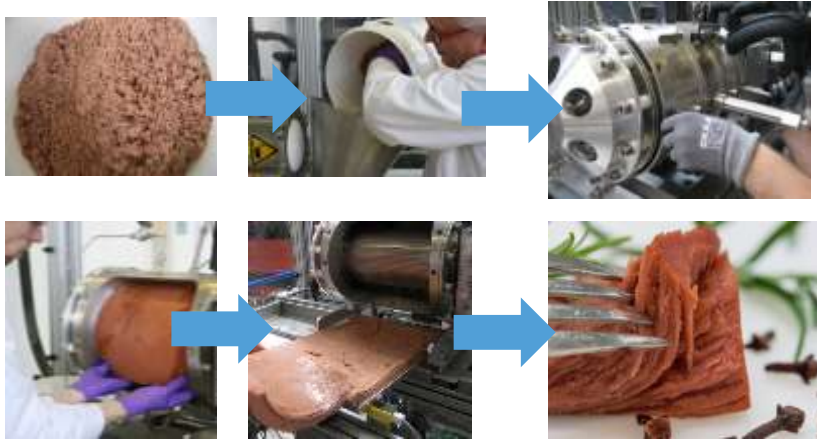
Een vegetarische biefstuk met een echte bite **nrc.nl**



## The "big" Couette Device

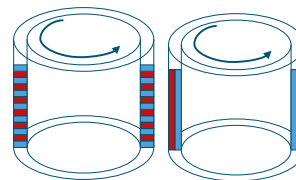


## The process of making a vegetable steak..

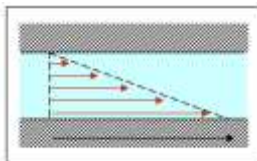


## The use of well-defined shear flow

- “Shear banding”
- String formation of particles
- Anisotropic structures
  - *Interplay* material properties and the flow applied



Vermant, 2001



Particles in 0.2% xanthan  
Won & Kim, 2004

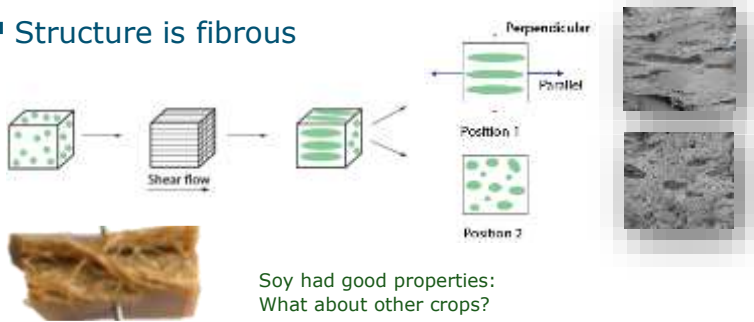


Gellan/k-carrageenan  
Wolf et al., 2001



## Structure, taste, and juiciness

- Structure is fibrous



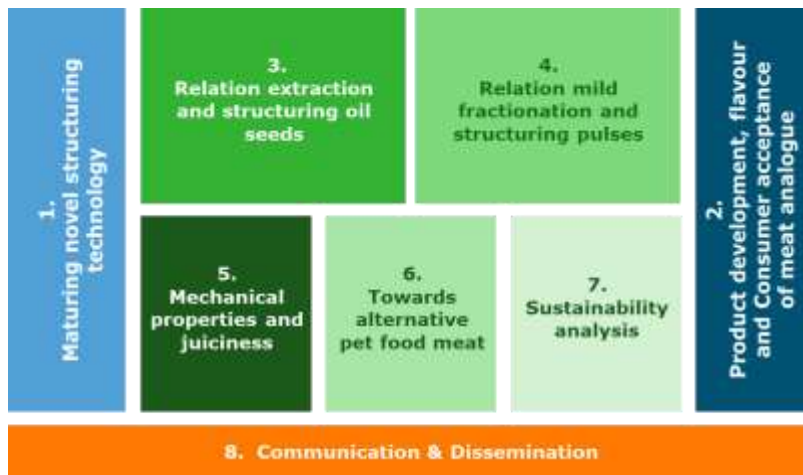
- Improve taste
- Improve 'juiciness'



Birgit Dekkers,  
Jarno Gieteling,  
Kasia Grabowska



## Plant Meat Matters: A R&D Project



## Project Partners



## Objectives PMM

- This project will build the required **scientific basis** to **understand** the structuring process while including flavour components, fat and other ingredients. Together with partners that span the entire vegetable protein chain, this basis will be used in this project to further developing **technologies** for making the next generation **consumer accepted** meat analogues **products** with **improved characteristics** that can be produced more **cost-effectively** and will have **reduced environmental impact** compared to meat analogue products currently on the market.



## The full team at Kick-off meeting



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## The Press....



### 3. Unilever Invests in Meatless Steak



It looks like Unilever's interest in the plant-based food space extends beyond just vegan mayonnaise and ice cream. Earlier this year, we learned that they invested in Netherlands-based food project Plant Meat Matters. Their first big project? To create an entirely plant-based steak that looks, cooks, and tastes just like meat made using "shear-cell technology," a technique developed by researchers at the Netherlands' Wageningen University that "transforms vegetable protein ... into a layered, fibrous structure that closely matches the



10 Signs the Food Industry Thinks the Future of Food is Plant-Based

1.4K TOTAL SHARES

### 1. Tyson Foods Invests in Plant-Based Meat

### 9. Restaurants Are Embracing the Impossible Burger and Beyond Burger



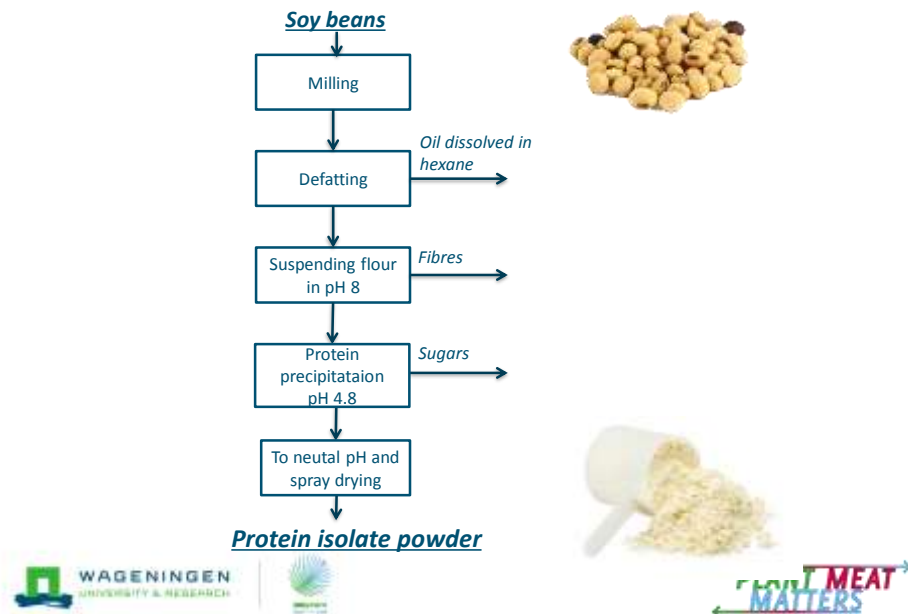
## Meat analogues and sustainable proteins

- Raw material composition of potential crops

Crop	Proteins (%)	Carbohydrates(%)	Oils and fats (%)
Lupine	40.4%	45.1%	10.9%
Soy beans	39.9%	33.0%	21.8%
Peas	25.6%	68.4%	1.9%
Wheat	15.4%	79.9%	2.8%
Corn	10.5%	82.9%	5.3%
Potato	9.8%	84.6%	0.4%

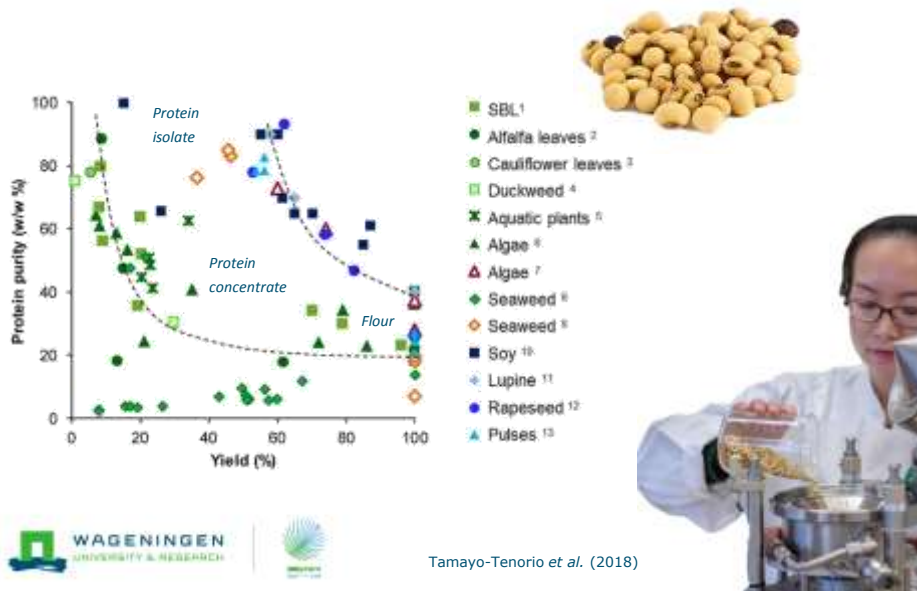


## Production process of soy protein isolate





## Dilemma Purity and Yield



## Do we need pure ingredients for food production?

- It is convenient during production
  - Well-defined, stable ingredients
  - Quality control and food safety
  - Supply chain management

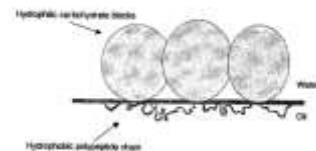


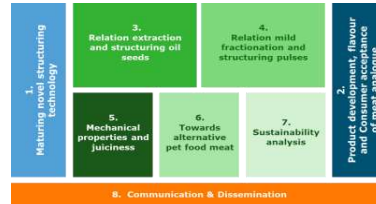
Fig. 1. Schematic representation of gum Arabic adsorbed onto oil droplets.

- But:
  - Hardly any food product consists of 1 pure ingredient
  - Structures present in natural materials and presence of complex molecules might possess interesting properties



## Approach Plant Meat Matters

- Wide range of potential ingredients
- Mild fractionation towards functional fractionation
- Shear cell technology for structuring of ingredient mixtures
- Product quality
- Sustainability
  
- R&D: PhD students in combination with applied research
- Strong interaction with project partners



## Summarizing remarks

- Towards sustainable and healthy food
  - Requires reduced processing intensity and number of material transformations
- Plant-based meat alternative are the best alternatives for meat
  - Most sustainable
  - Market is established
- Our structuring (shear-cell) technology
  - Novel structures, sizes, possibilities
  - Potential to enlarge the market size even further
  - Mild and natural



## Conference: Science and Technology for Meat Analogues



- 1 & 2 November 2018, Wageningen
- Conference themes:
  - Structuring Technologies for Meat Analogues
  - Functional Fractionation of Ingredients for Meat Analogues
  - Product Quality of Meat Analogues
  - Sustainability of Meat Analogues
  - Consumer Acceptance for Meat Analogues
- More information & call for abstracts:
  - <https://www.wur.nl/en/activity/Conference-Science-and-Technology-for-Meat-Analogues.htm>



Thank you

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