



# Plant PROMISE

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Public Private Partnership  
Plant PROtein Meat alternatIveS using Extrusion



**WAGENINGEN**  
UNIVERSITY & RESEARCH

Offering attractive and tasty alternatives plant-based meat analogues to the consumer could stimulate the transition from animal to plant proteins.

PlantPROMISE will improve the understanding of physico-chemical changes during processing in the extruder, combined with a better understanding of product attributes like texture, flavour, juiciness, digestibility and sustainability. Together with the partners, these findings will be used to develop meat analogues which offer a better experience to the consumer, while using a cost effective and sustainable approach.



Photo: Brabender

### Background

For a sustainable supply of healthy food for the growing population, a transition is needed from animal proteins towards sustainably produced, often plant-derived, proteins. Alternatives of sustainably produced proteins for consideration to be included into the human diet are urgently needed. The current meat analogues are mainly based on soy protein and gluten and, to a limited extent, on other sources like lupine or pea. These protein sources are fractionated towards standardised protein rich powders, often mixed with other ingredients, and processed towards meat analogues. Tuning the processing of ingredients towards specific applications for meat analogues, for which milder conditions may be needed than for the production of the standardized protein powders, more of the raw material may be applicable and more sustainable production routes for meat analogues can be developed. Furthermore, a wider range of protein sources can be used.

PlantPROMISE focusses on extrusion as a structuring process. Extrusion is an established and highly versatile technique for the production of food. It enables a continuous and cost-effective means of production and is currently applied for the production of meat analogues, mainly based on soy. A major obstacle for consumer acceptance of current available (extruded) meat analogues are

the texture, flavour and juiciness compared to real meat products. Limitations of extrusion for meat analogues are the lack of understanding of the relevant physical and chemical processes in the extruder and the cooling die, and the relationship between processing and the resulting texture and juiciness. The poor understanding is also limiting the use of alternative protein sources other than highly refined protein isolates. The current empirical knowledge is very difficult to translate to alternative protein sources.

Alternatives for meat, made from sustainably produced proteins for the human diet are urgently needed. PlantPROMISE's focus is to develop novel, high quality products but also to create standards for quality and to optimise production, and, in particular, to develop meat-alternatives which have an optimal digestibility and bioactivity as determined by their peptides.

The PlantPROMISE project aims to develop a new generation of novel, high quality extruded meat analogues using the improved understanding of physico-chemical processing in the extruder, combined with a better understanding of product attributes like texture, flavour, juiciness, digestibility and sustainability that are acceptable to the consumer. The project focusses on pre-

competitive technology and know-how in a cross value-chain collaboration to translate fundamental insights to application understanding.

### Vision and ambition

PlantPROMISE has the following vision and ambition towards a better meat analogues using extrusion:

- Scientific understanding between ingredient characteristics and product quality for the design of the next generation of extruded meat analogues;
- Transition towards a reduction in consumption of animal-derived products and an increase in plant-based foods, by improving the quality of extruded meat analogues;
- Increase the flexibility of ingredients used in meat analogues by a better understanding of the changes the ingredients go through in the extruder.

### Project objectives

- Improve scientific bases for extruded meat analogues made of different ingredients (proteins, fibres, oils):
  - understanding of physico-chemical processing in the extruder,
  - understanding of product attributes like texture, flavour, juiciness,
  - understand nutritional value and digestibility

– understanding consumer acceptance and sustainability.

- To develop a new generation of novel, high quality extruded meat analogues.

### Project structure

The project is divided in 6 work packages. WP1 to 4 will build on background knowledge and results from each other.

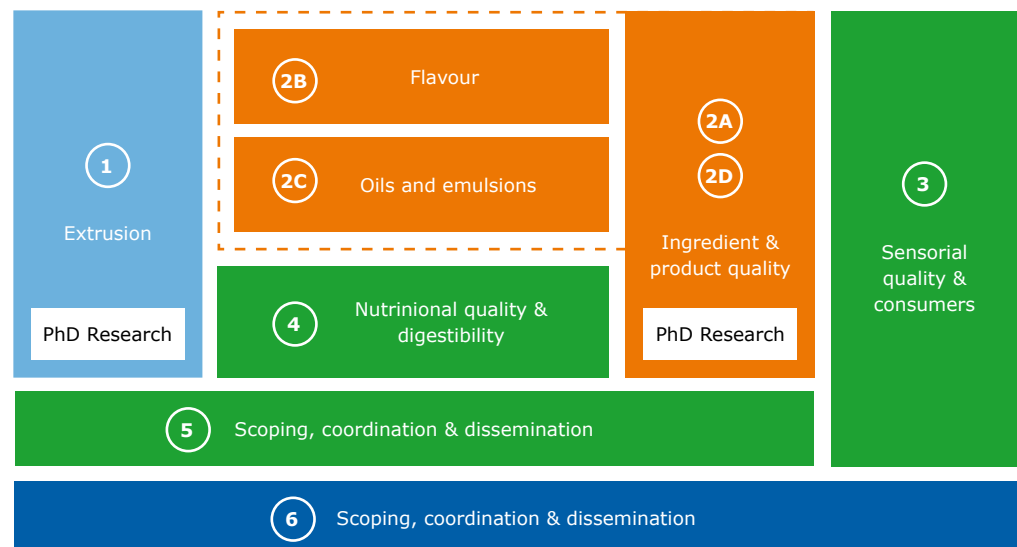
- WP 1 Focus on the physico-chemical changes occurring during the extrusion process.
- WP 2 Focus on ingredient formulation (WP2A), on the effect of flavour addition (WP2B), on the effect of oil/emulsion addition (WP2C), and on the product quality (WP2D).
- WP 3 Focus on the consumer acceptance of meat analogues.
- WP 4 Focus on the effect of structuring on the digestibility of meat analogues.

WP 5 Focus on sustainability of the production of meat analogues using extrusion as a tool.

Background information and results from WPs 1 and 2 will be used as input.

The dark blue work package focusses on knowledge transfer:

- WP 6 Scoping, coordination and dissemination.



## Consortium partners

Partner	Location	Role
AVEBE	Veendam, The Netherlands	Ingredient supplier
Brabender	Duisburg, Germany	Technology supplier
Firmenich	Geneva, Switzerland	Flavour components
FujiOil	Osaka, Japan	Ingredient supplier
Marel	Boxmeer, The Netherlands	Technology supplier
Nomad Foods	Middlesex, England	Application to meat analogues
Ojah	Ochten, The Netherlands	Application to meat analogues
Unilever	Wageningen, The Netherlands	Application to meat analogues
Wageningen University & Research Food Processing Engineering	Wageningen, The Netherlands	Knowledge organisation
Wageningen University & Research Physics and Physical Chemistry of Foods	Wageningen, The Netherlands	Knowledge organisation
Wageningen Food & Biobased Research	Wageningen, The Netherlands	Knowledge organisation

## Project information

PlantPROMISE is co-financed by the Top Consortium for Knowledge and Innovation 'Agri & Food' by the Dutch Ministry of Economic Affairs. The project is registered under contract number LWV-19027.

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1 June 2019 – 31 December 2022



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