NIZO
FOR BETTER FOOD & HEALTH

For more information, please contact:

Dr. Fred van de Velde
NIZO Expertise Group Leader Protein Functionality
Fred.vandeVelde@nizo.com
+31 615908420

NIZO High Throughput Protein Extraction Tool

Fi Innovation Awards
Finalist 2024
Future Food Tech Innovation Award

FINALIST
Future Foodtech Innovation Award 2024

Introduction

- Increasing demand for high quality protein ingredients forces seed breeder to develop new cultivars
  → Better smell, taste, functional and nutritional properties

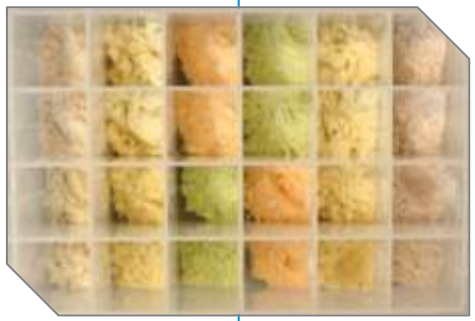
- This requires screening large number of cultivars on composition and functional properties

- NIZO developed the automated High Throughput Protein Extraction Tool

- 24 seed varieties can be extracted and analysed simultaneously

How does it work?

Step 1: Dispersion



- Meal or flour is weighted into the 24-well plate.
- Extraction buffer is added.
- Extraction buffer can be varied in composition, pH and amount.

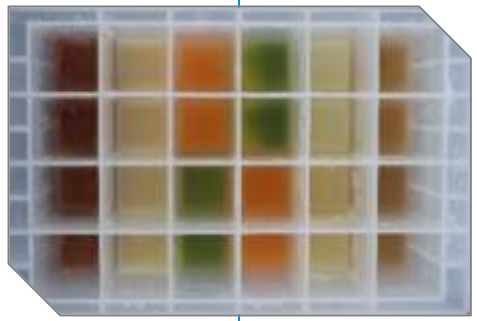
Step 2: Extraction

- The 24-well plate is sealed and installed in the shaker.
- Extraction time, shaking intensity, and temperature can be varied.

Step 3: Separation

- The 24-well plate is centrifuged to separate the solids (mainly starch and fibre).
- The protein solution (supernatant) is automatically transferred to a new plate.

Step 4: Quantification



- Protein extraction yield is automatically determined by BCA analyses.
- Samples can be further processed for analysis of protein composition, volatile and non-volatile compounds.

How does it work?

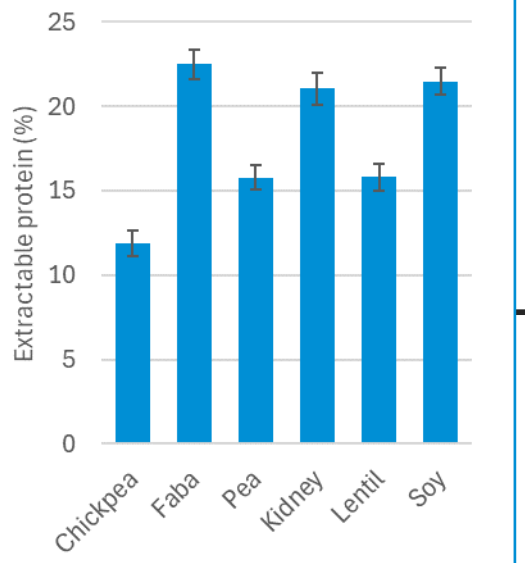
Step 1: **Dispersion**

Step 2: **Extraction**

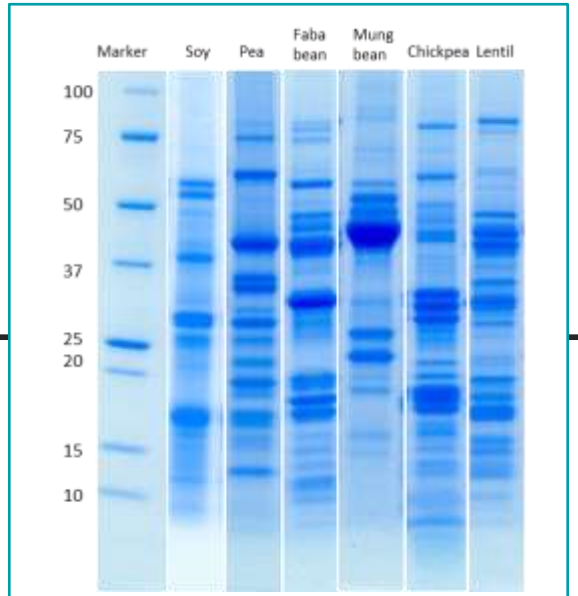
Step 3: **Separation**

Step 4: **Quantification**

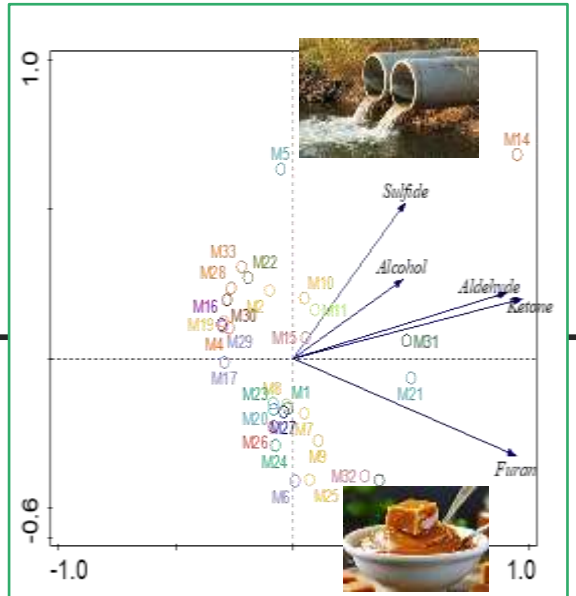
Step 5: **Characterisation**



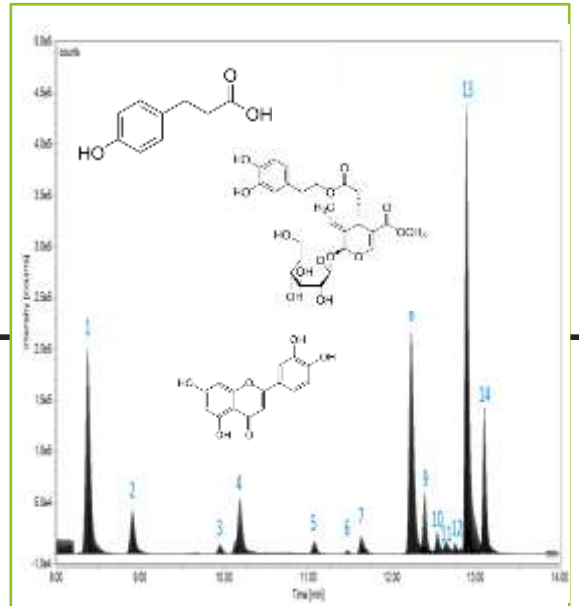
- Extractable protein



- Protein composition



- Aroma → Volatiles



- Taste → Non-volatiles

Protein transition: current and future vegan protein sources

NIZO has hands on experience with these proteins

ESTABLISHED


Soybean


Pea


Lupine


Potato


Rice


Corn


Faba bean


Chickpea


Lentils


Oat


Almond


Wheat

EMERGING

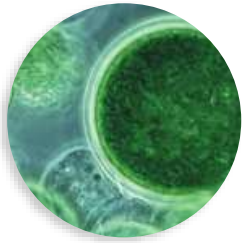

Sunflower


Mung bean


Rapeseed


Green leaves


Quinoa


Microalgae

UP COMING


Nuts


Single cell/ Fermentation


Duckweed


Flaxseed


Hemp


Seaweed

Photos by Sanjay Acharya, Shihmei Barger, Kristina D.C. Hoeppner, K.R. Harsha, Luis Molinero, Stefan Malmesjö, Mirjam van de Velde and others.

NIZO has been conquering this ‘protein-berg’ for over 75 years

10 years
Global
plant-based trend

25 years
NIZO’s
plant-protein research

> *Which ingredient to use in my application?*
> *How to process my raw material?*
> *Can I use fermentation?*

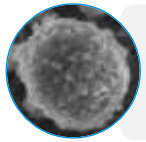
75 years
NIZO’s
protein knowledge

> *How does the protein interact with other ingredients?*
> *How is the food safety/microbial quality affected?*
> *What is the source/origin of off flavour and taste?*
> *Which functionality can be delivered by alternative proteins?*
> *What is the best micro-organism and fermentation conditions?*

INNOVATING
TOGETHER

NIZO
FOR BETTER FOOD & HEALTH

NIZO's 75 years of protein knowledge



Development of **Casein Micelle Models**

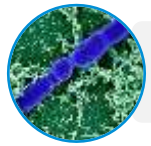
First Flavour Analysis

Development of **Spray Drying Models**

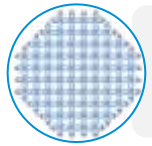
Development of **Cheese Proosdij**

Development of **The first low fat, low salt cheese**

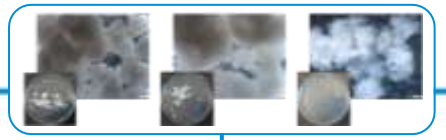
Plant Protein knowledge



Strict anaerobes HTS and upscaling



Advancement of **Casein Micelle Model**



***In Vitro* Gastric Digestion Tools** to characterise dairy and plant protein gastric behaviour

SPRINT project expansion of the food-grade pilot plant to **promote protein transition** and **valorization of by-products**

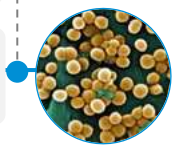
1948 1960 1970 1980 1990 1996 2004 2009 2014 2017 2019 2020 2023

Development of **NIZO Butter Process**

First heterologous enzyme expression in bacteria & yeast

Development of **Maasdammer Cheese** - a Gouda style specialty cheese

NIZO Starter Culture Collection



Complete **genome sequence** of *L.plantarum*

MicroCheese and other HTS platforms

Development of **0% FAT soft ice cream**

Development of **plant protein fibers** used in **meat replacement products**

Dairy-knowledge based development of **plant-based dairy alternatives**

Wheat Soy Potato RuBisCO Pea Faba bean Oil seeds Single cell

Our customers & partners

Integrated approach

Confidentiality

Connected in FoodValley and other eco-systems

Higher chance of success

Excellent track record

Excellent project management

Speed

Tailor-made solutions for your next step to market by combining science, technology & practice

75-year experience

Leading experts

Knowledge and innovations through consortia

5m€ recent investment on food-grade scaling up facilities for dairy and meat analogues

Expansion for Biotechnology Fermentation upscaling facility, including Precision Fermentation up to 10,000 l – Coming soon

Expertise in sustainable processing & upscaling, microbiology & fermentation, protein functionality, sensory and health.

The largest open-access food grade pilot plant in Europe & food application center

80+ specialized labs