»Aging Society«

a Need Towards Personalised Food for the Nutrition of Elderly Consumers

food innovations gmbh
biozoon®

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Company Profile

Established in 2001

Located in Bremerhaven, an important centre for North German food industry

Field of activity: Food technology & processing; contract manufacturing

Business concept

- **Development and protection of food processes and products, protecting them by means of IPR and licensing**
- **Production and sales of own products as well as contract manufacturing**
- **National and international R&I project involvement and management**

Business models are changing

baker confectioner

butcher miller

brewer maltster

Food crafts

- Standardization of product(s)/ion
- Increasing degree of automation
- Industrial mass production

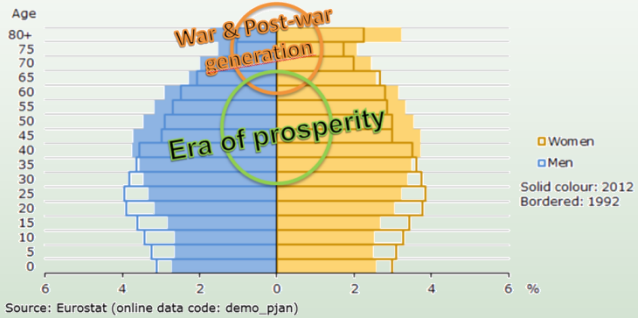
- Internet of things
- Fully automated production
- 24/365 (online) Availability of food (e.g., AmazoonFresh) Virtual stores(e.g.,eBay*) Personalized production (3D printing)

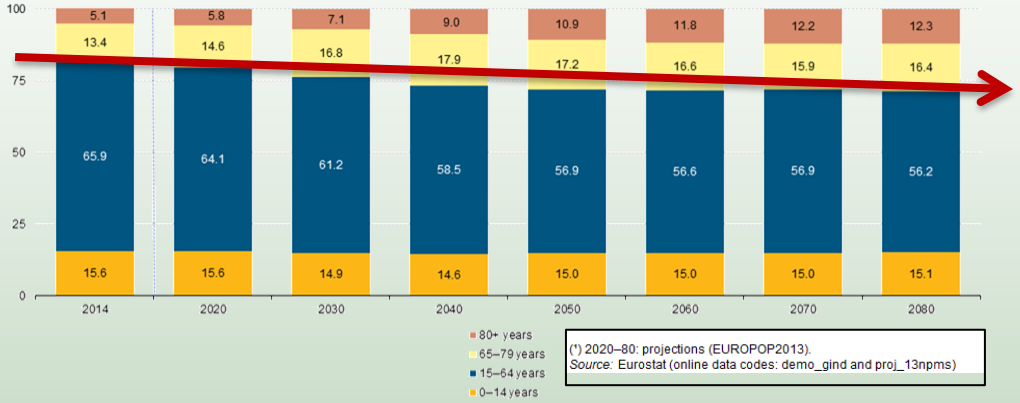
Food industry

*source: http://t3n.de/news/virtual-reality-store-ebay-708604

Demographic change

<u>Population ageing</u> is taking place in nearly all the countries of the world.
Ageing results from decreasing mortality and declining fertility



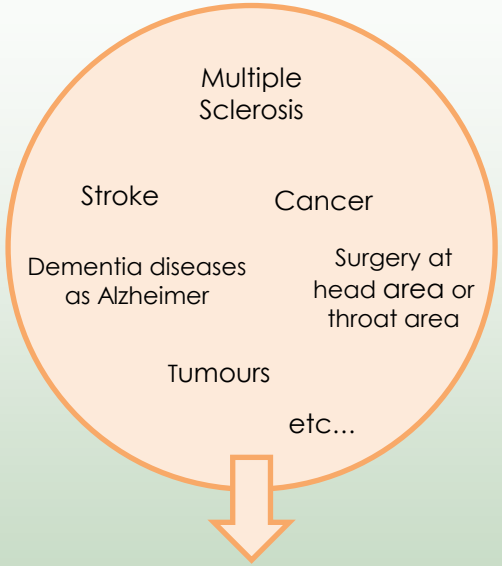


Age-related Diseases and Disorders such as chewing and swallowing difficulties become more frequent and can lead <u>to malnutrition</u>.

Malnutrition can cause additional estimated costs for the European health system of approximately <u>170 billion Euros annually</u>[1]!

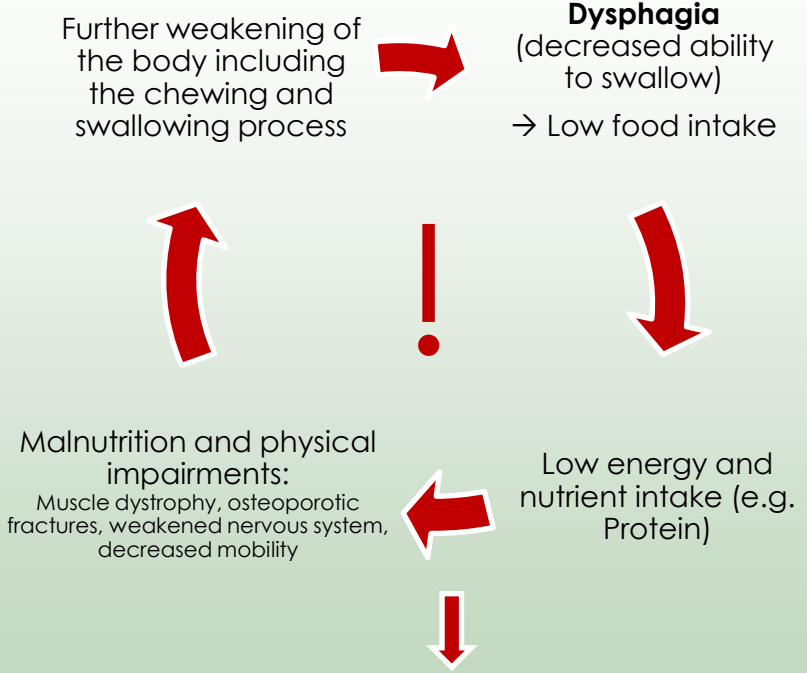
1) Ljungqvist O, de Man F. Under nutrition: a major health problem in Europe. Nutr Hosp 2009; 24: 369 - 70

Health Status – Direct Impact on Food Intake



May cause Chewing & Swallowing Difficulties - A Reason for Malnutrition

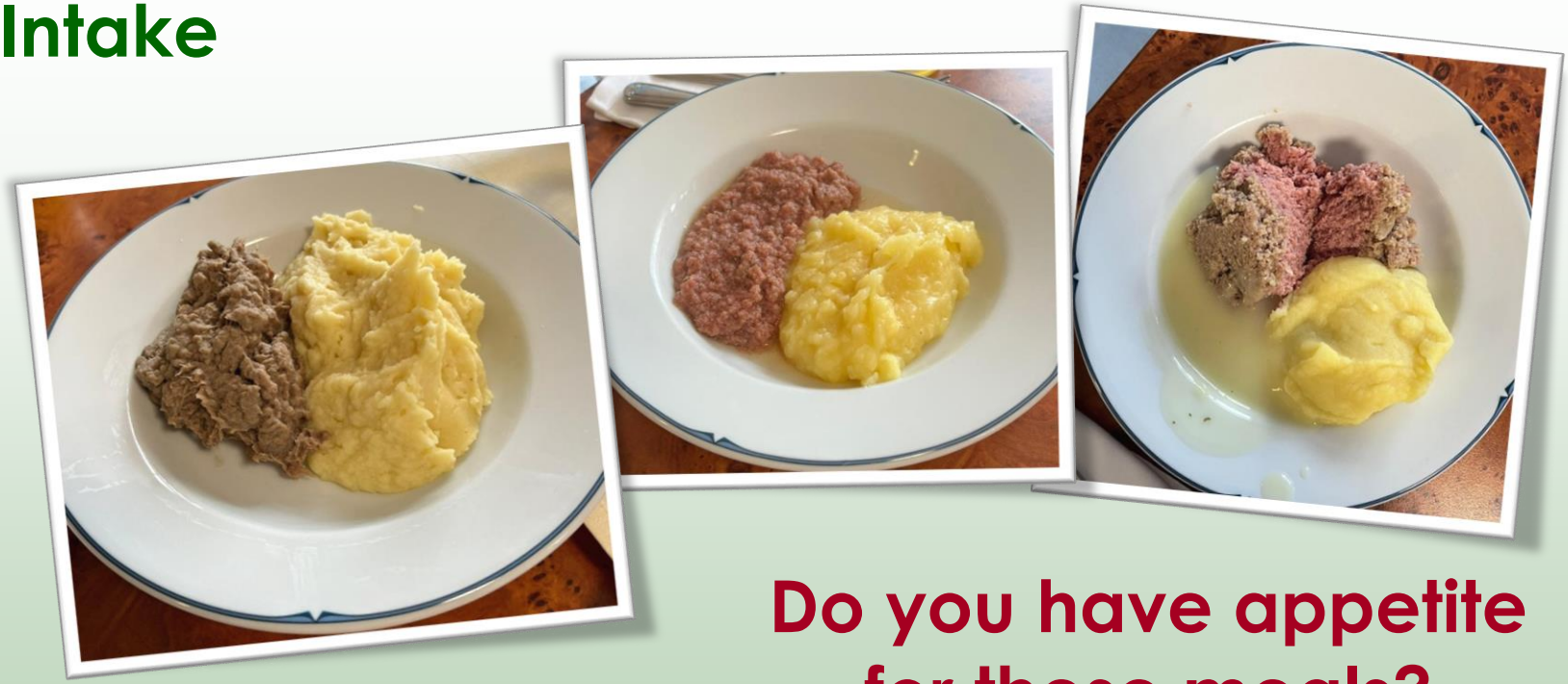
More than 30 million people only in Europe[2]



Food preparation and how the food is served becomes a more and more important issue!!!

2) EESD

Health Status – Direct Impact on Food Intake



Do you have appetite for these meals?

→ **Ethical responsibility to react on malnutrition in elderly care!!**

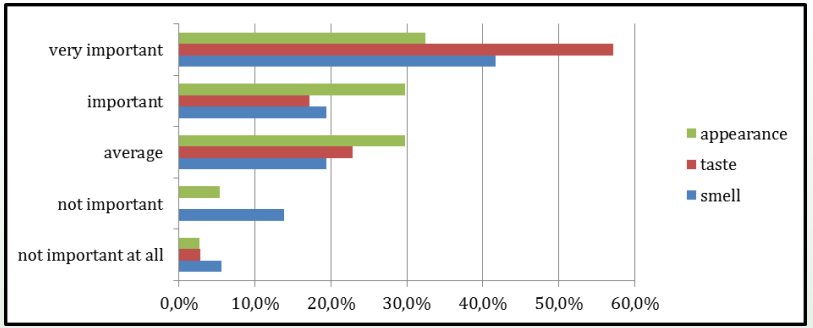
Motivation ⇄ Aspects related to food intake (survey)

Strong influence of the social context on eating behaviour

- 34.5% not feeling alone anymore
- 31% thinks the food tastes better
- 27.6% like to speak while eating

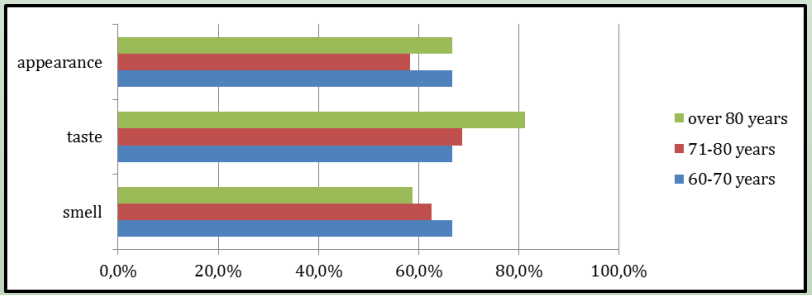
Strong negative connection between eating difficulties and eating behaviour

- 60% feel affected by their diffuculties (e.g. dysphagia)
- Consequently over 50% is not looking forward to eat



Supplementing the meals in order to avoid malnutrition

50% of the respondents confirmed, that portions are too big



Strong influence of meals sensory aspects on eating behaviour

- Importance of taste and appearance are higher with increasing age
- Importance of smell is decreasing with higher age

This project has received funding from European Union's Horizon 2020 research and innovation program under grant agreement No 690425.

INPUT

- Gender
- Weight
- Physical Activity level
- Higher protein demand?

	1	2	3	4
Patient	Smith	Hernandez	Muller	Gonzalez
Gender	man	woman	man	woman
Weight	80kg	56kg	100kg	75kg
PAL	1,2	1,4	1,2	1,4
Higher Protein dema	No	Yes	No	Yes

Calculation of the individual nutritional needs

- Kcal/kJ
- Protein (15%)
- Carbs (55%)
- Fat (30%)

DGE-requirements

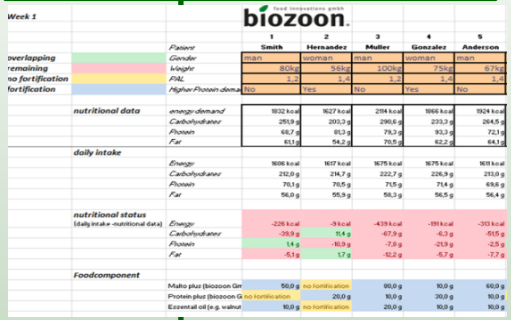
→ Divided into 4 meals

Development of recipes/food

- Ingredients Database
- Development of recipes
- Entering of experienced consumed amount of the individual
- Calculation of individual fortification

OUTPUT

- 4 meals per day for up to 20 persons on 28 day basis
- Calculation of daily intakes/ nutritional status
- Personalization/ Fortification
- Detailed recipe directions for the chef



Scenario 1

Elderly living at home and are responsible for theirselves (cooking, shopping etc.)

Scenario 2

Elderly living in nursing homes catered by centralised cooking with common food

Scenario 3

Elderly living in nursing homes, suffering from dysphagia, catered by centralised cooking with pureed food

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PAL – Physical activity level

Calculating daily energy need:

Women >65 years:
(0,0377 x weight in kg + 2,75) x 239 = [kcal/day]

Men >65 years:
(0,0491 x weight in kg + 2,46) x 239 = [kcal/day]

Example for the nutritional need of a woman, 66 years, 75kg:

(0,0377 x 75kg + 2,75) x 239 = 1333 kcal/day

Calculating example of individual PAL for a day:

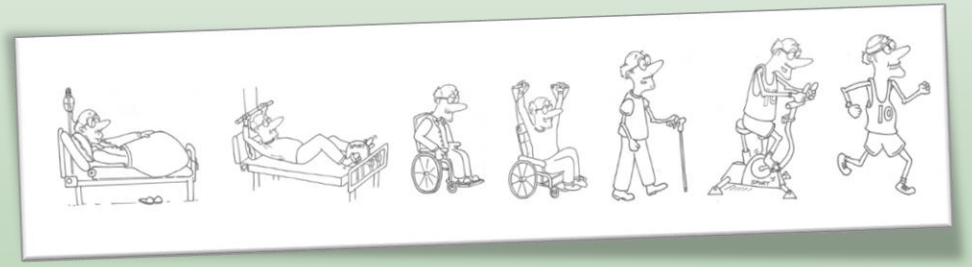
A Person sleeps 8 hours per night, followed by hard work for 8 hours and resting on the couch for the last 8 hours:

PAL = (8h x 0,95 + 8h x 2,0 + 8h x 1,3) = 1,416 (~1,4)

Calculating example of the individual Total Energy Consumption combined from both examples above:

TEC = 1333 kcal/day x 1,4 = **1866 kcal/day**

PAL 0,95	Sleeping
PAL 1,2-1,3	Immobile, bedridden
PAL 1,4-1,5	Mobile elderly
PAL 1,6-1,7	Mainly sitting, immobile, strong restlessness
PAL 1,8-1,9	For mainly walking and standing lifestyle, mobile, demented with strong restlessness
PAL 2,0-2,4	Immobile (2,0) to mobile (2,4) severe pronounced sore or consumptive disease



Facing new demands

- → Increased request of appealing dishes
- → Less tolerance towards mash-type food
- → Rising number of people suffering from masticating and swallowing difficulties

Problem

- → Increased home care
- → Often lack of knowledge for preparation of nutritional diets
- → Time pressure in nursing home kitchens
- → Insufficient detection of nutritional status and reporting

Solution?

Nutritional concept for frail and elderly with chewing and swallowing difficulties

seneoPro®

Soft gel-pureed/strained food, attractively served

Compact food foams
- warm and cold
- sweet and salty

Airy foams for taste stimulation

Thickening of liquids

Enrichment of food and beverages

Respect to the affected persons - breakfast foam

Please don‘t do it like this!

… much better

Fotografie Katharina Jaeger© 2011

Respect to the affected persons – meat with vegetables

Please don´t do it like this!

… much better

Personalisation through “Print on demand”

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*smooth*food 1.0

*smooth*food 2.0

PERFORMANCE

smoothfood 2.0

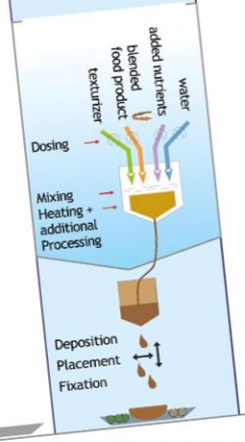
Personalisation IT System:

- Personalised Recipe Concept
- Personalised Food printing technology
- Personalised Packaging Technology
- Personalised Food/Menu

Personalised parameters:
1. Texture softness
2. Portion size
3. Nutrient content
4. Natural flavour intensity
5. Packaging coating/labeling
6. Nutritional status

Personalised Meals:
Reheating at Nursing Home or Residential Home Care

Innovative 3D-Food Printing:



Personalised Packaging:

Personalised Ink-jet coating pattern for different heating zones (transmission/reflection of microwaves)

ID Tagging and QR-Code on sealing

Step 1: New/reused plates

Step 2: Personalised mixing and 3D food printing

Step 3: Personalised ID Code (QR-Code)

Step 4: Personalised microwave coating by ink jet printing

Step 5: Freezing and transport to customer

3D printing
- ✓ Individual image selection (data file)
- ✓ Individual portion size

→ **Personalisation**

Prototype 3D food printing reduction line

PERFORMANCE– Development of Personsalised Food using Rapid Manufacturing for the Nutrition of elderly Consumers. GA number: 312092
Funded by the 7th Framework Programme of the European Union, Collaborative Project.
KBBE.2012.2.3-04 – Personalised approaches to food production and distribution

PERFORMANCE
Personalised Food for the Nutrition of Elderly Consumers

Food ingredients: „when less means more!“

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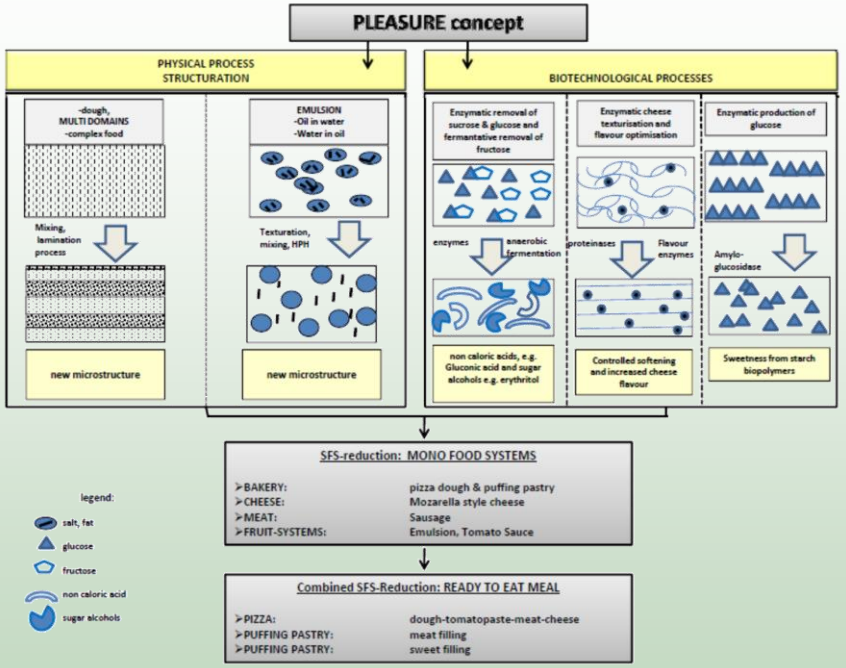
Since the early 90's an epidemic growth of dietary induced diseases has been observed among the European population

PLEASURE

novel processing approaches for the development of food products low in fat, salt and sugar reduced



New **micro structured and naturally *reduced in* foods**

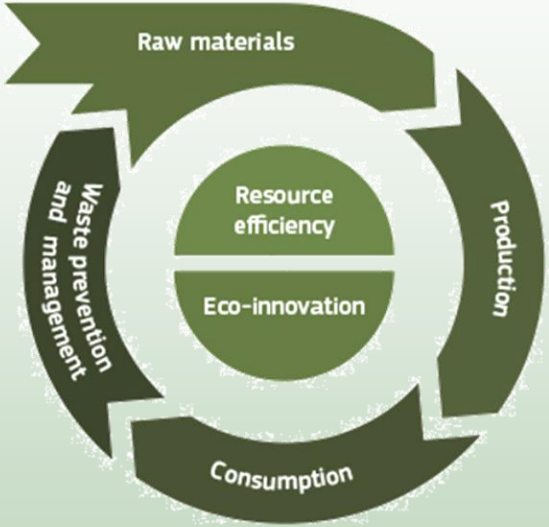
with similar sensory properties

conventional products

- ✓ **30% less salt**
- ✓ **higher saltines perception (27%)**

Funded by the 7th Framework Programme of the European Union, Small Collaborative Project.
KBBE.2011.2.3-05 – Processed foods with a lower salt, fat and sugar content.

Food ingredients: „towards circular economy and sustainability!“



Source: http://ec.europa.eu/environment

Stance4HEALTH

Originated to improve consumer's nutrition (all behaviors) by the *Smart Personalized Nutrition App*:

- Implementation of a wearable body device which will monitor important body functions
- Provide healthy recipes

- **Food database**
- **Recipe database**
- **Monitoring body functions**

UP4HEALTH

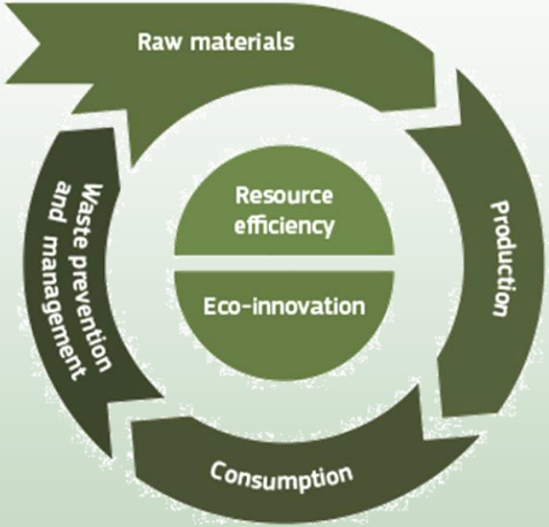
By-products from wineries, olive mills, nut oil processingindustry:

- Grape pomace
- Nut press cake & nut discars
- Olive pomace
- Olive pits

- **XOS**
- **Polyphenolic compounds**

These projects have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 816303 (Stance4Health), grant agreement No. 888003 (Up4Health),

Food ingredients: „towards circular economy and sustainability!“



Source: http://ec.europa.eu/environment

NEXTGEN PROTEINS

Use of biomass/energy sources to process:

- Micro algae growth
- Insect growth
- Microbiobal growth

for:

- Aquaculture
- Poultry
- Food

- Microalgae protein meal
- Insect Protein meal
- Single cell protein meal

Like a Pro

From niche to mainstream – alternative proteins for everybody and everywhere

Aims to shift alternative protein food products from niche to mainstream:

- Developing 16 alternative protein products from 7 novel & improved protein sources

Proteins from: rapeseed kernels, meaworm, krill, microbial biomass, mushrooms, fermented fungus and peas

ALEHOOP

Recovery of LOW-COST DIETARY PROTEINS to meet market requirements of consumers and industry:

- Green and brown residual macroalgae
- Legume by-products

Proteins from: Green and brown residual macroalgae and legume by-products

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This project received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101083961 (ALEHOOP), grant agreement No. 862704 (NextGenProteins). This project has received funding from European B.2 Farm2Fork research and innovation program under grant agreement No 101083961 (Like-a-Pro)

Thank you very much!

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