

From food waste to innovative bio-based products

Dr. Johanna Buchert

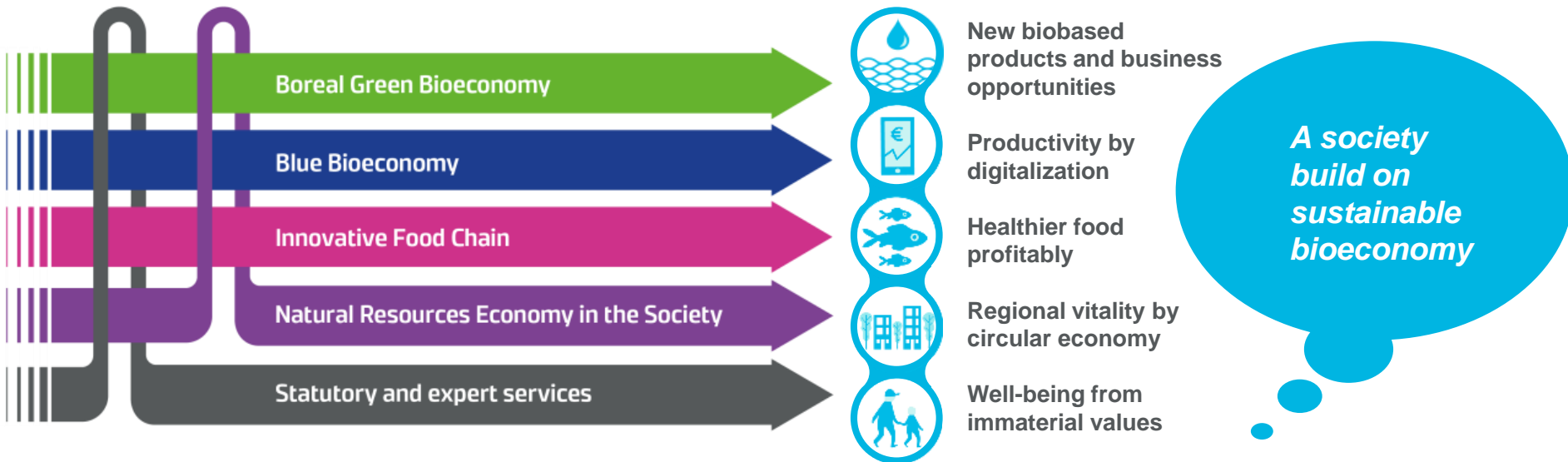
Executive vice president, research

Natural resources institute Finland (Luke)

Natural Resources Institute Finland (Luke)

is a research organisation under the Finnish Ministry of Agriculture and Forestry

Our expertise creates innovative solutions for bioeconomy and sustainable growth and well-being



120 M€

Turnover

100 M€

Research & customer portfolio

20 M€

Statutory and expert services

25

Locations in Finland

HQ in Helsinki

1300

Employees

50 professors
650 researchers
300 other experts
300 research support staff

2015

Founded in merger of three research institutes



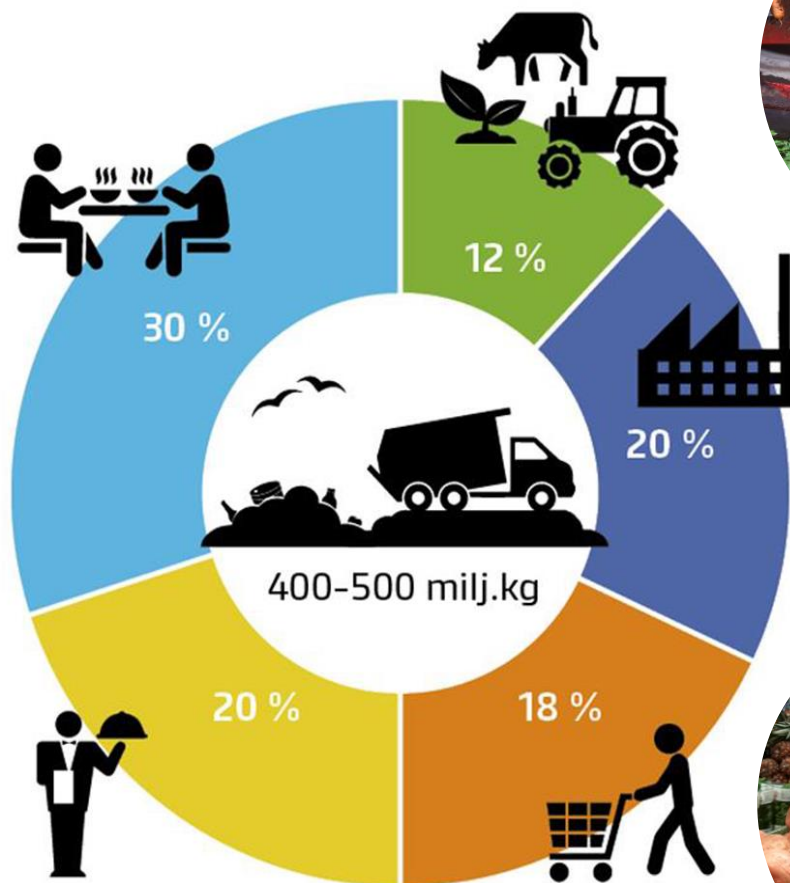
We are loosing a lot of valuable biomass as food waste in Europe

- 88 Mton food waste / a
- 173 kg per capita
- 20% of produced food goes to waste



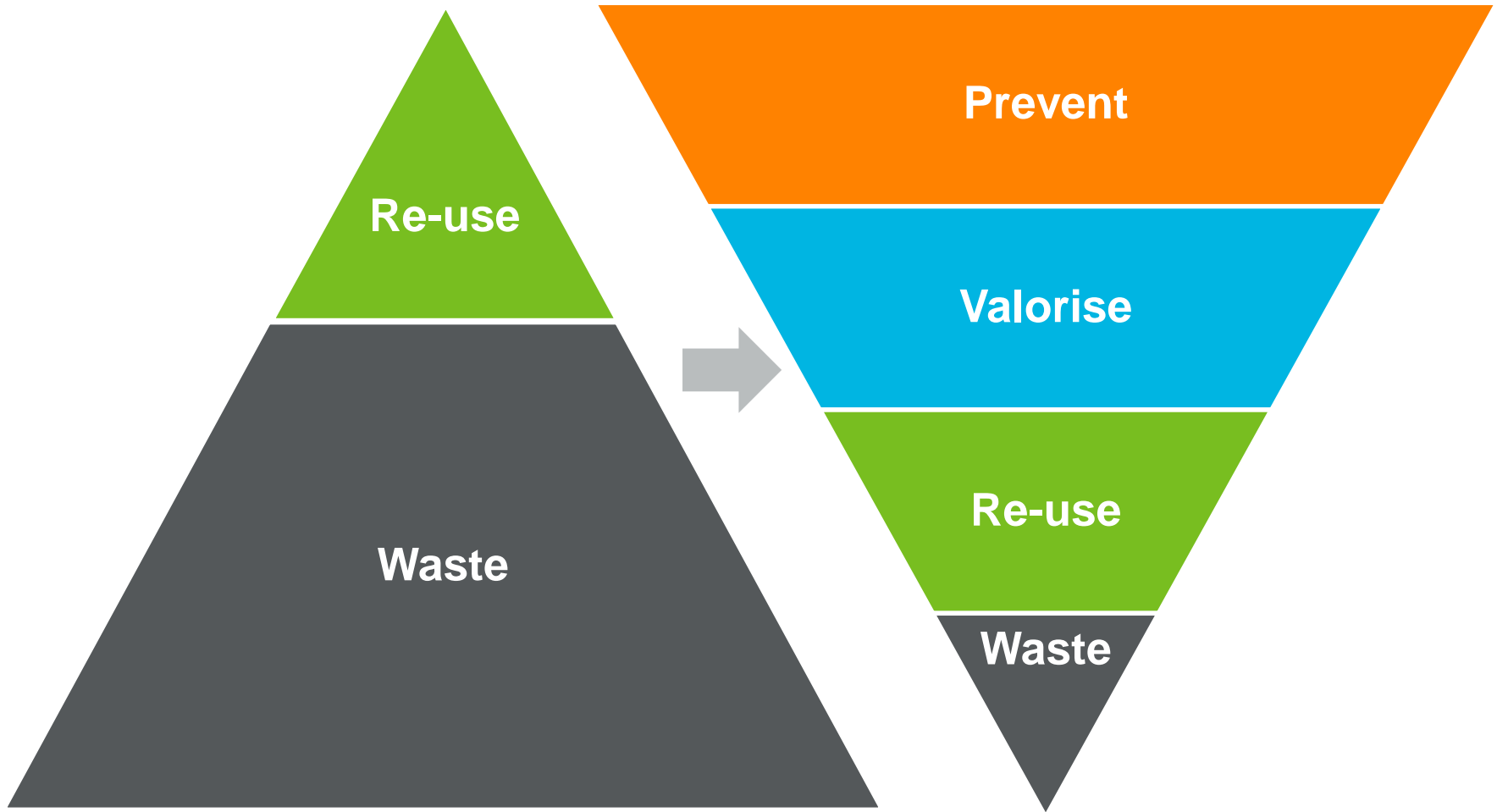
Simultaneously the population is increasing and we need more food

Edible food waste in the Finnish food chain – 400 – 500 million kg per year



Katajajuuri, J.-M. et al. 2014. Food waste in the Finnish food chain. J. Cleaner Prod. 73: 322–329.

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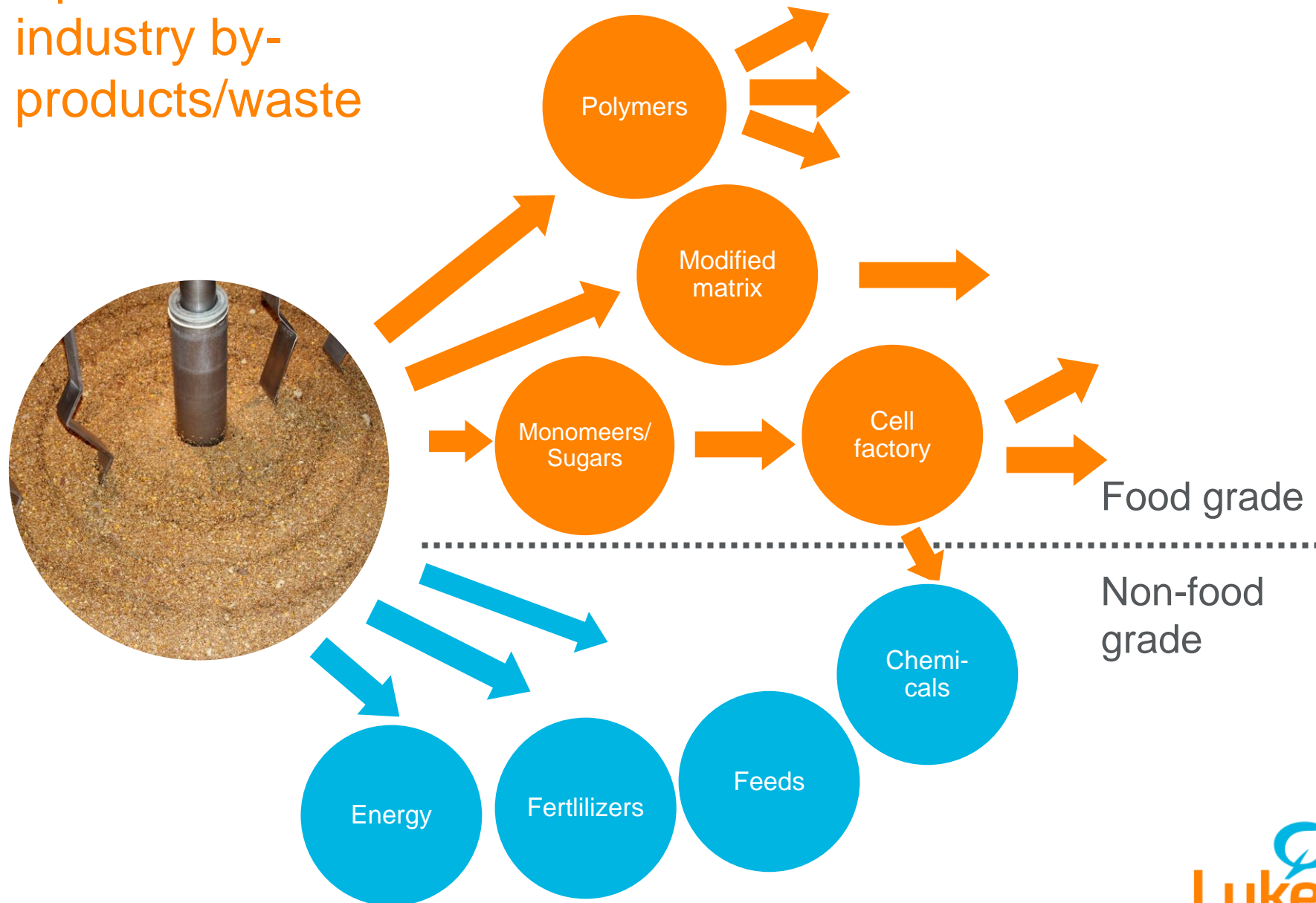
EU has invested huge amount of money on waste conversion RDI –business still in infancy

- Low volume streams
- High water content
- Logistics
- Heterogeneity
- Microbial stability
- Safety

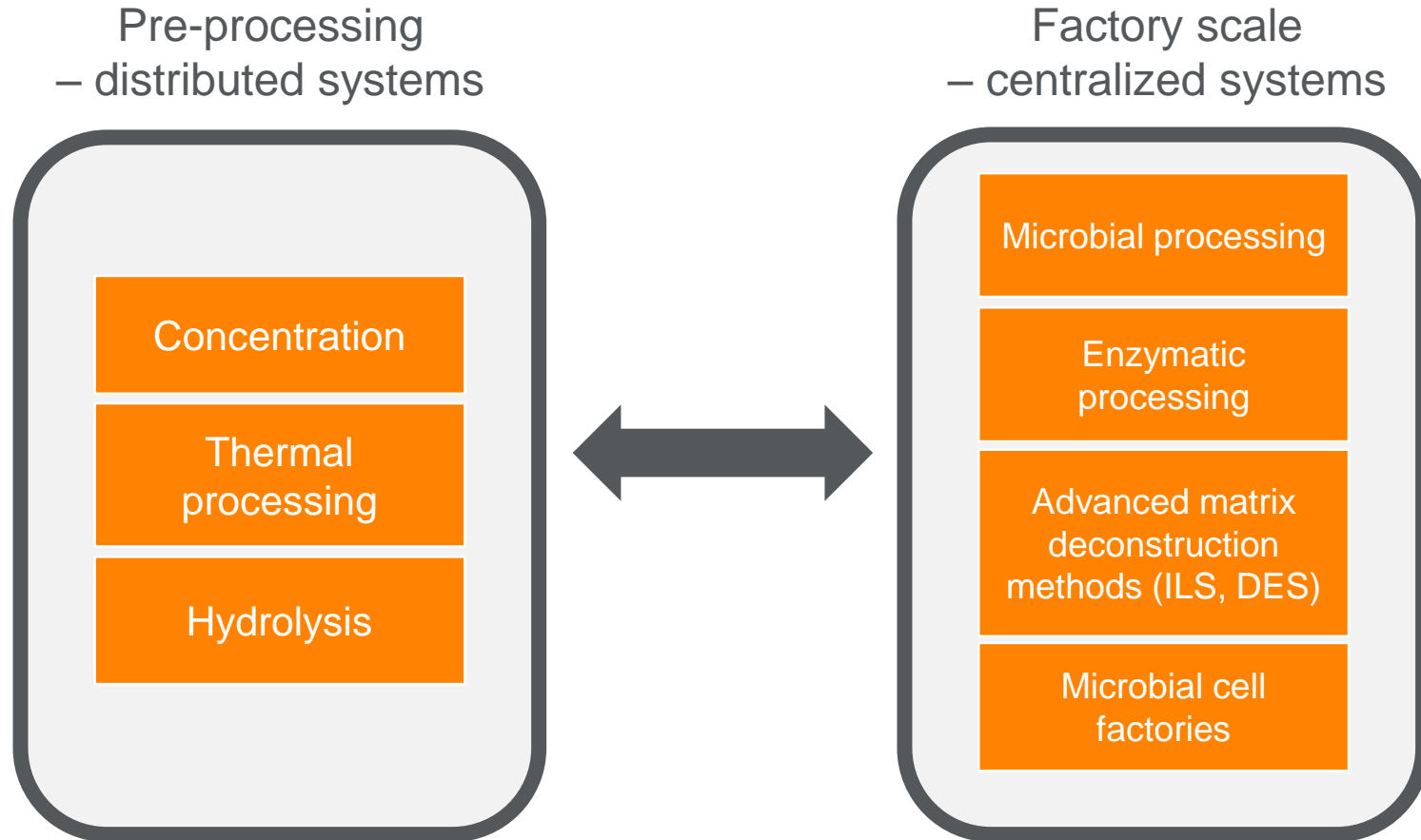
- Value co-creation
- Market opportunities
- Industrial symbioses
- Branding
- Consumer awareness
- Legislation/ regulation



Options for food industry by-products/waste



Innovative processing as tool – learn from other bioeconomy sectors



Household waste processing: Partially distributed – partially centralized



Preprocessing on-site
or during transport



Final fractionation/
conversion
centralized



Vegetable waste has technological potential



- Natural colors
- Dietary fibre
- Feed
- Antioxidants
- Prebiotics
- Antioxidants

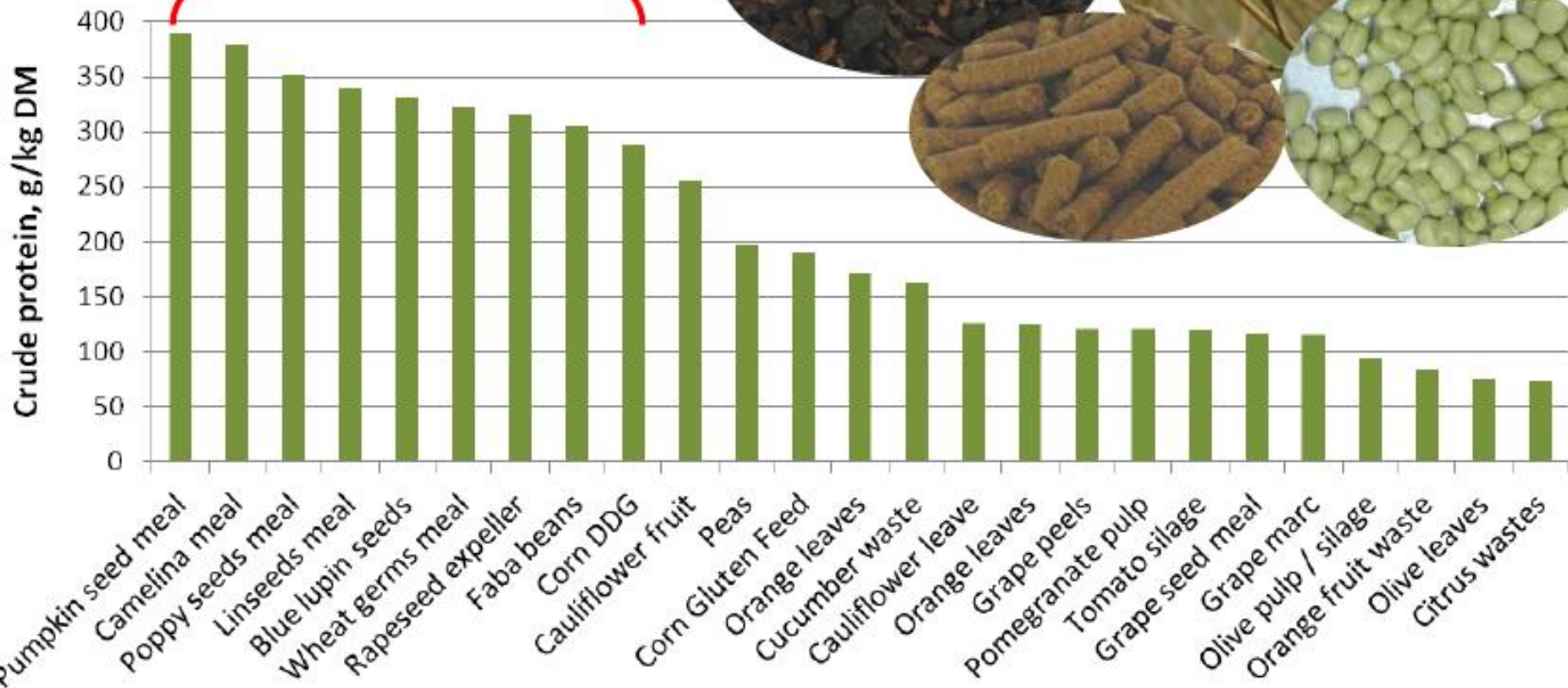


Food waste as protein feed

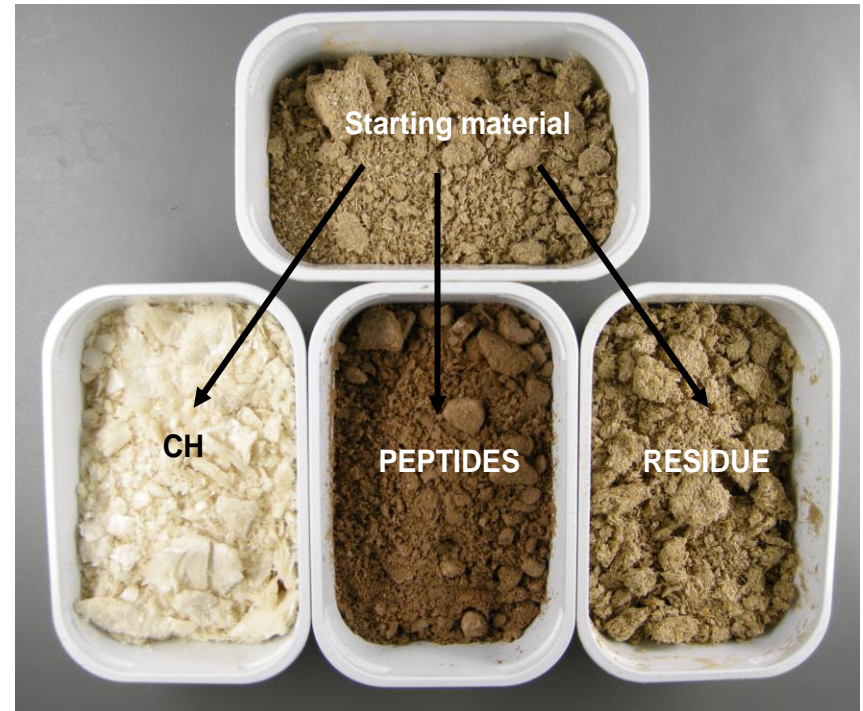
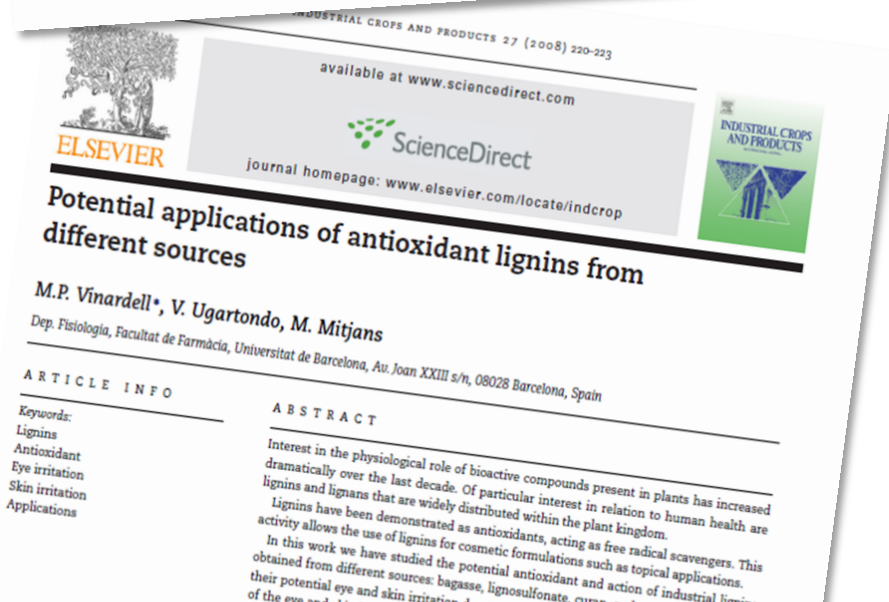
Results
from
SOLID
project

Prof. Marletta
Rinne

"Protein feeds"



Lignin is unexploited dietary fibre component –present in cereal waste (e.g. BSG)

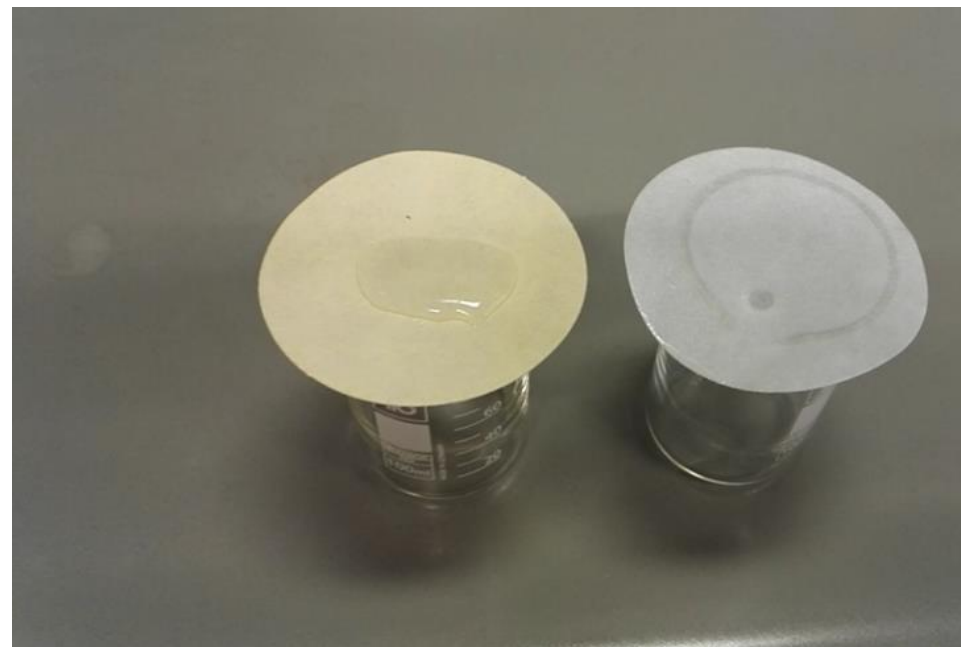
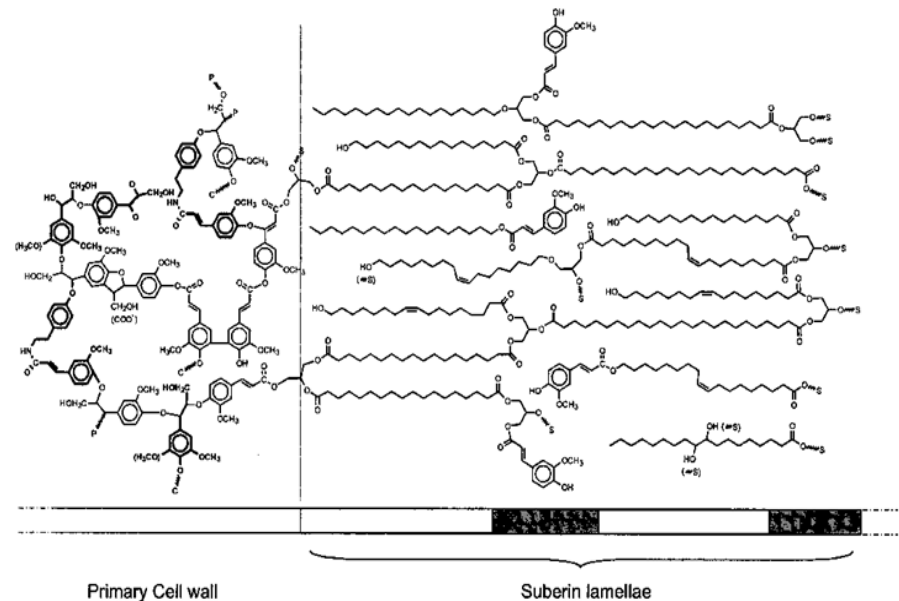


Ref. Forssell et al. 2011 "Enzyme-aided fractionation of brewers' spent grain in pilot scale"

Suberin or cutin – can it be exploited as fat mimick or barrier material packaging

- Berry and fruit skin
- Potato peels
- Natural polyester, hydrophobic protective layer
- Main role to as natural barrier
- Polyester similar to wine cork stoppers

Foto: Dr. Risto Korpinen, Luke



Insects as tools to valorize low-grade waste to food and feed – what about regulation and consumer perception?



Novel protein sources
for food security
ScenoProt 2015-2020,



*Insects in the Food Chain,
2015-2017*

THE WALL STREET JOURNAL

WSJ.com

The Six-Legged Meat of the Future

Insects are nutritious and easy to raise without harming the environment. They also have a nice nutty taste

By [MARCEL DICKE](#) and [ARNOLD VAN HUIS](#)

Tekes

Urban bioeconomy and new soil-free food production concepts are coming

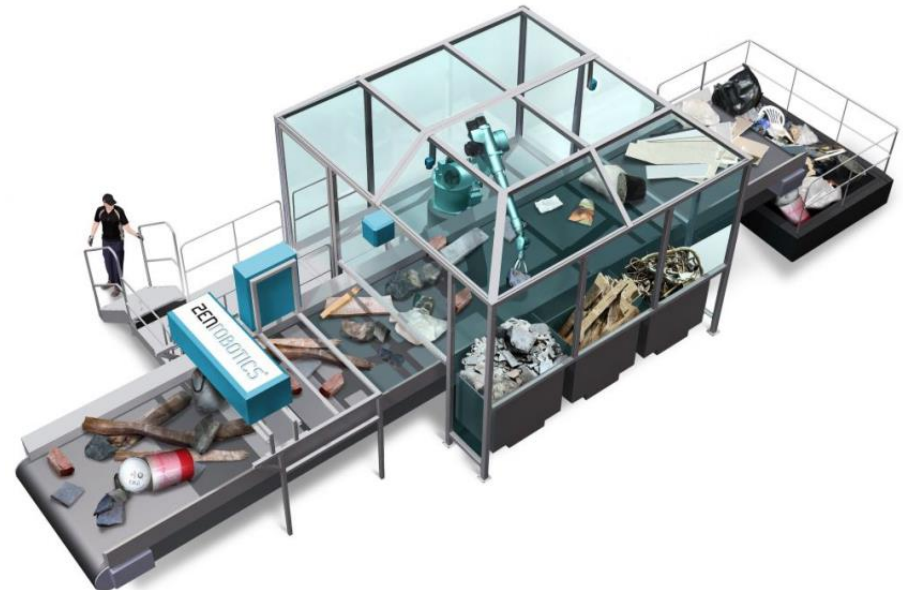
- In-house food production
- Small-scale circular bioeconomy
- Industrial symbiosis



Silmusalaatti Ref. Kauppalehti 29.12.2015

What is needed

- **Research and innovation**
 - On-line-analysis on chemical/ macromolecular properties
 - Advanced sorting and pretreatment technologies
 - Novel biomass deconstruction/ fractionation methods
 - exploiting knowledge from other sectors
 - Piloting
- **New business models and industrial symbioses**
 - Combination of small scale and large scale industries
 - Active SMEs
 - Venture capitalists



Thank you!