



HUNGARIAN UNIVERSITY OF
AGRICULTURE AND LIFE SCIENCES
INSTITUTE OF FOOD SCIENCE AND
TECHNOLOGY



Assessment of beneficial impacts of plant bioactives on macronutrient digestion by digestion simulation

László Abrankó

**MATE- Hungarian University of Agriculture and Life Sciences
Institute of Food Science and Technology, Department of Food Chemistry and Analytical Chemistry
Budapest, Hungary**



COST Action Meeting

Ancona, Italy, 23-25 January 2024.

Agrifood waste and by-products

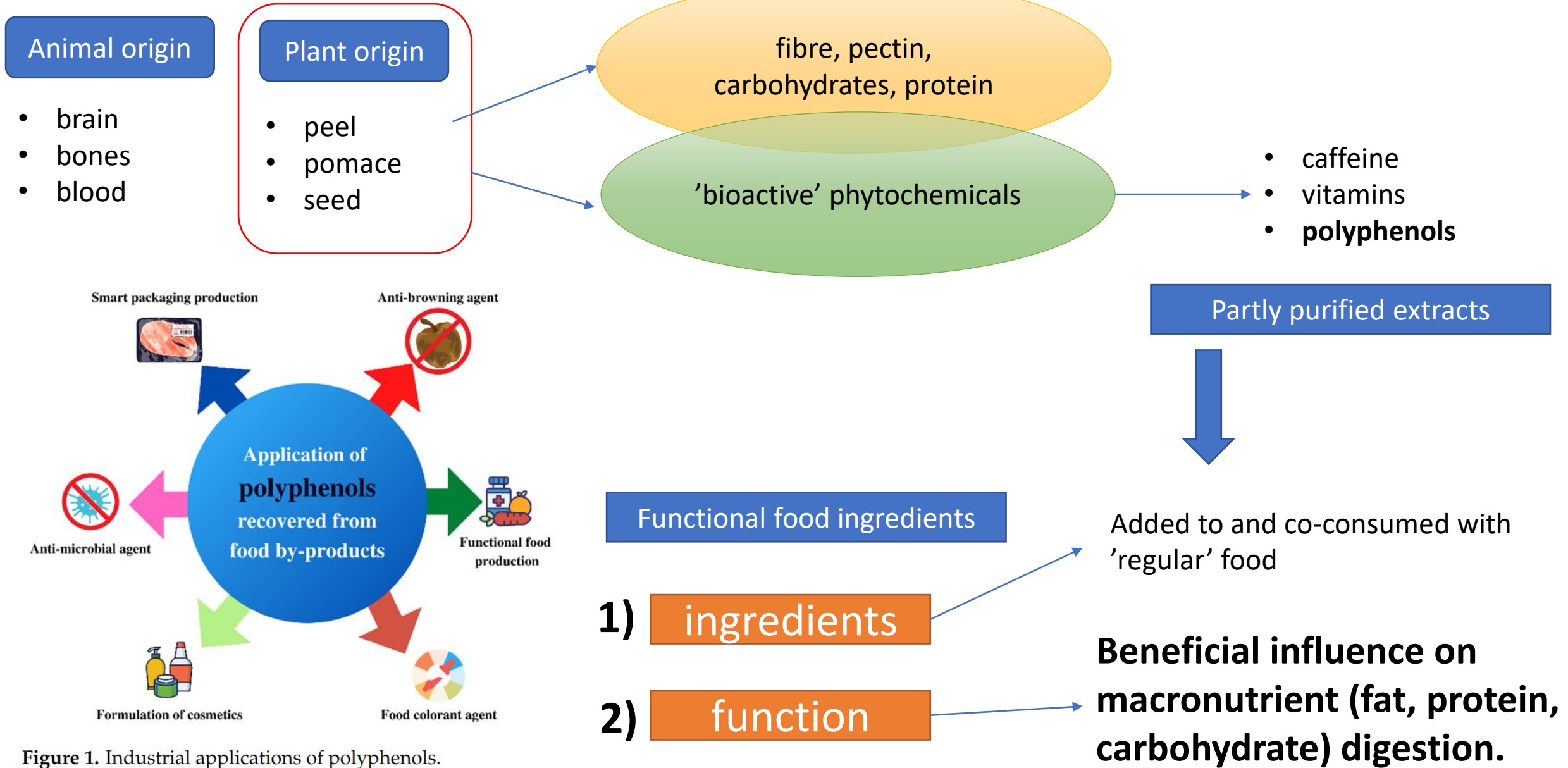


Figure 1. Industrial applications of polyphenols.

Aim:

Development of a **comprehensive platform** suitable for objective and cost effective **testing** of the **impact of various food(ingredient)** co-consumption on the **digestion of macronutrients**.

```
graph TD; A[Development of a comprehensive platform suitable for objective and cost effective testing of the impact of various food(ingredient) co-consumption on the digestion of macronutrients.] --> B[A platform supporting nutritional research.]; A --> C[Test facility for the development and quality assessment of functional foods and food ingredients];
```

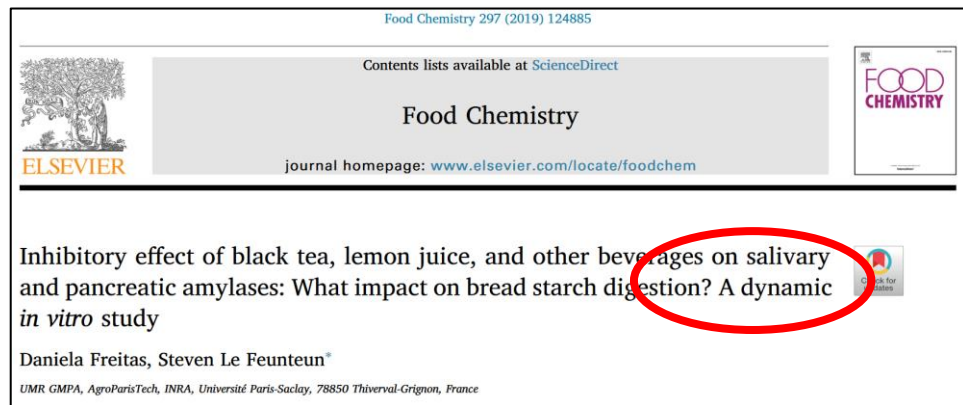
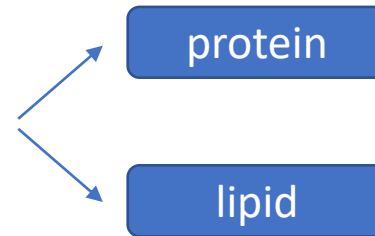
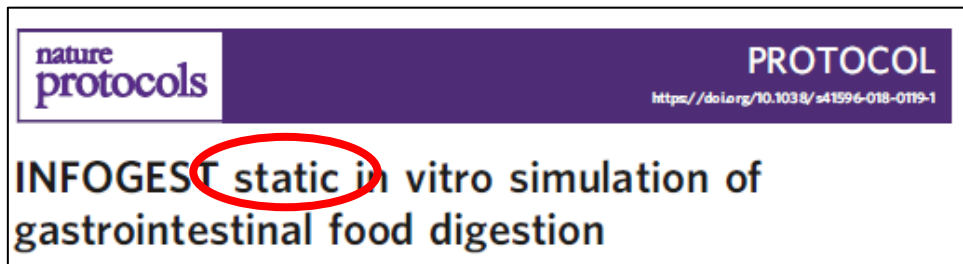
A platform supporting nutritional research.

Test facility for the development and quality assessment of functional foods and food ingredients

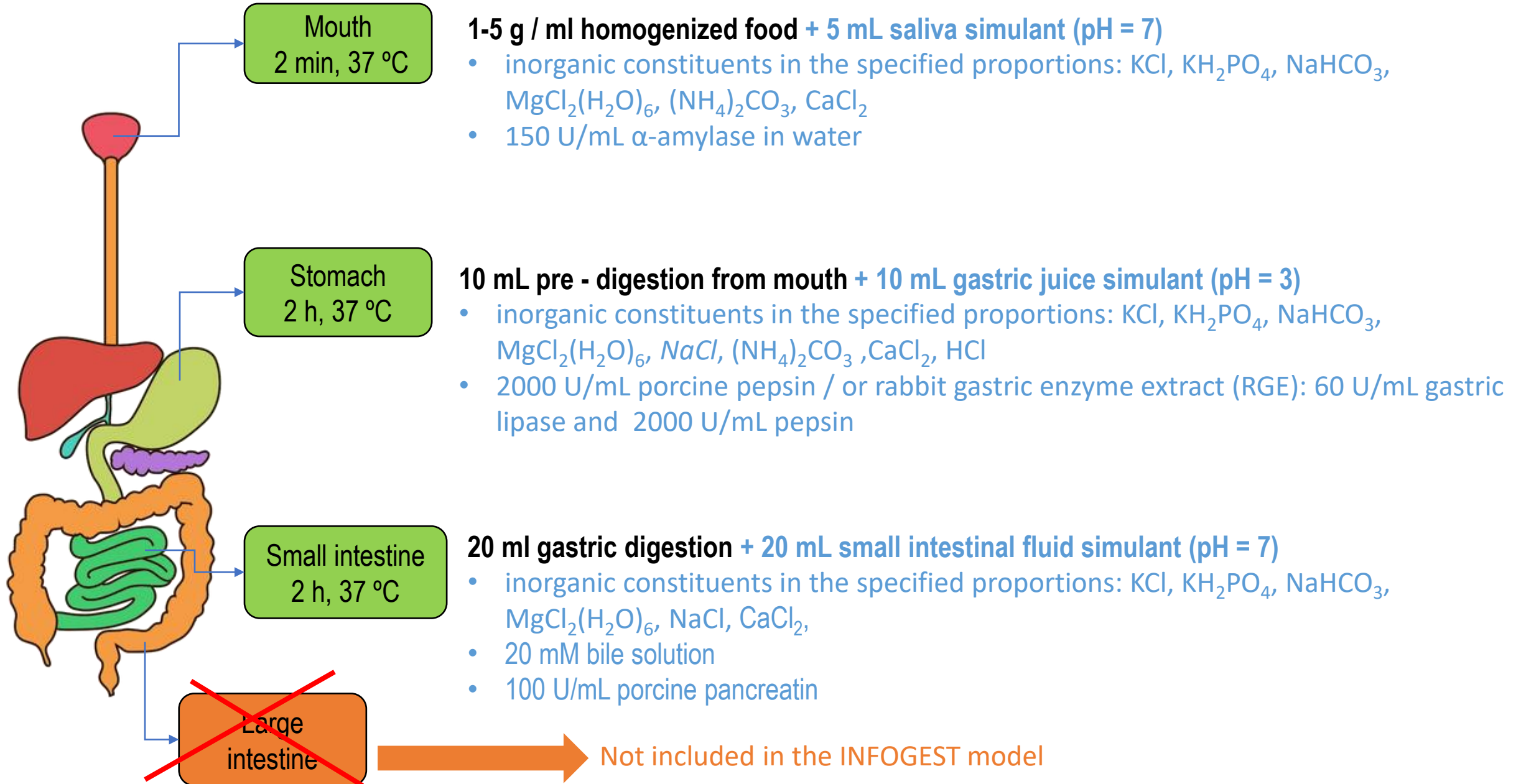
Digestion simulation

INFOGEST method:

- *In vitro* model simulating digestion of the mouth, stomach, and small intestine.
- Widespread static method based on international consensus.



In vitro digestion modeling → infogest model



In vitro digestion simulation

INFOGEST

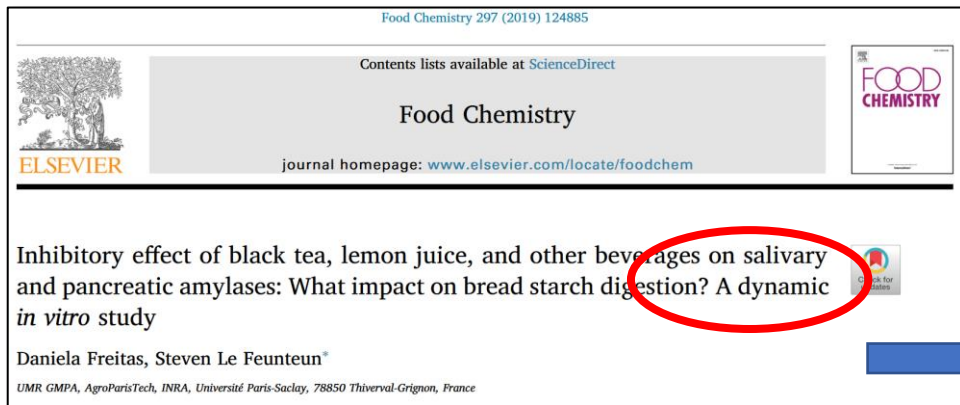
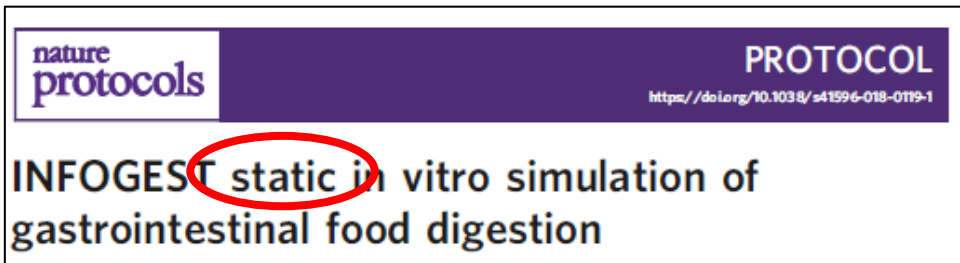


Digesta

Digestion simulation

INFOGEST method:

- In vitro model simulating digestion of the mouth, stomach, and small intestine.
- Widespread static method based on international consensus.



Analytical methods

Protein digestibility

1) Total IVPD

2) Digestible Indispensible Amino Acid Score, DIAAS

3) Protein Digestibility Corrected Amino Acid Score, PDCAAS

UHPLC-UV Quantitative analysis of: His, Ile, Leu, Lys, SAA (Met + Cys), AAA (Phe + Tyr) Thr, Trp, Val

Lipid digestibility

1) Total IVLD

2) Fatty acid-specific digestibility

GC-FID Quantitative analysis 36 fatty acids

Starch digestibility

1) Time-dependent digestibility

2) In vitro glycemic response curve

- Rapidly digestible starch, RDS
- Slowly digestible starch, SDS
- Total digestible starch, TDS

Enzyme kit

HPLC-RID sugar determination

Dietary protein quality evaluation in human nutrition

Report of an
FAO Expert Consultation

FAO
FOOD AND
NUTRITION
PAPER
92

Lipid digestibility testing – example of **grape seed powder**

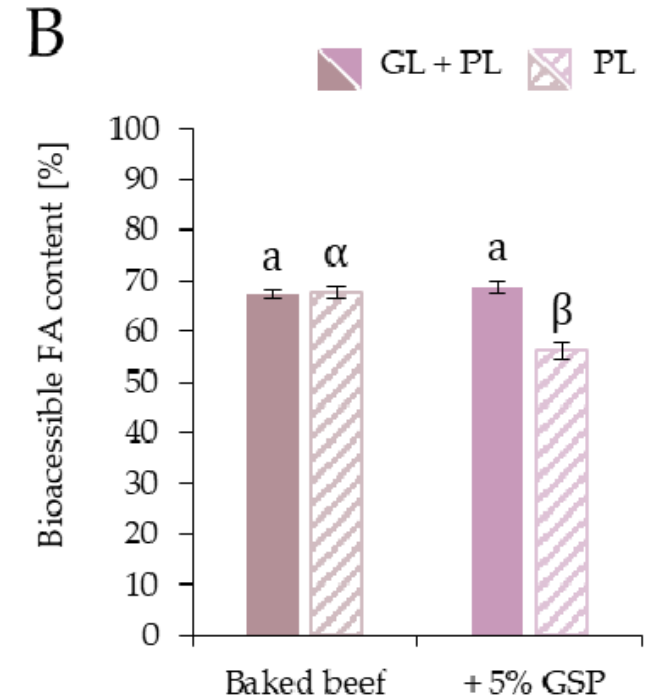
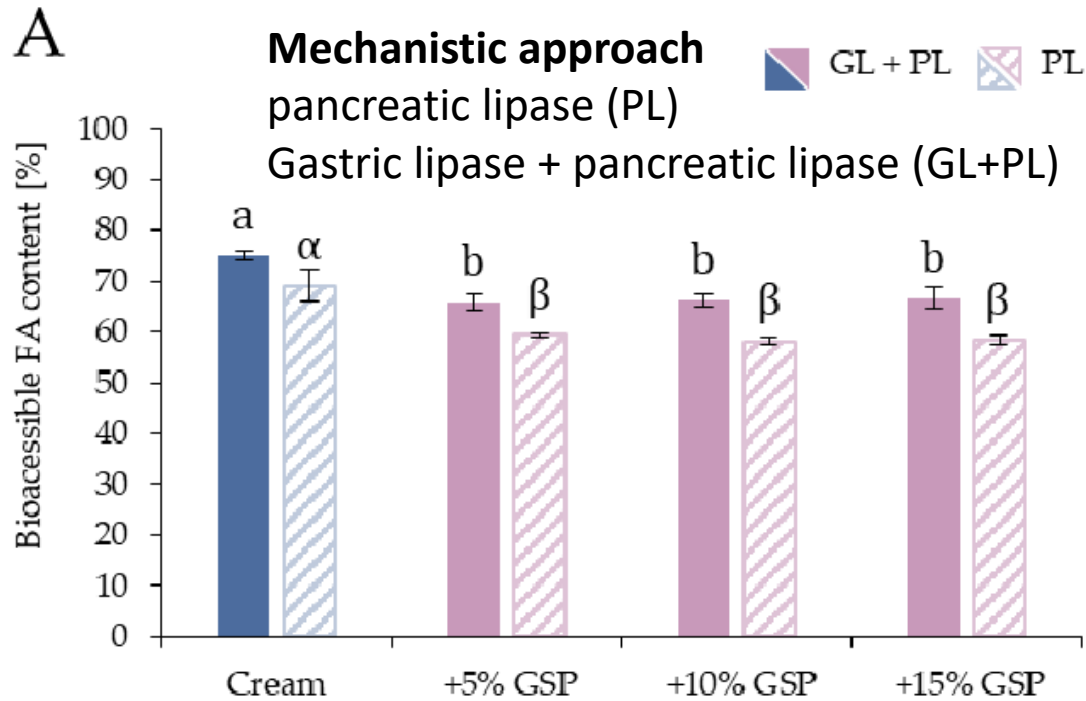


Commercially available product

Cream

Baked beef

Vertical label: Grape seed powder



Test lipid substrate: **milk cream**

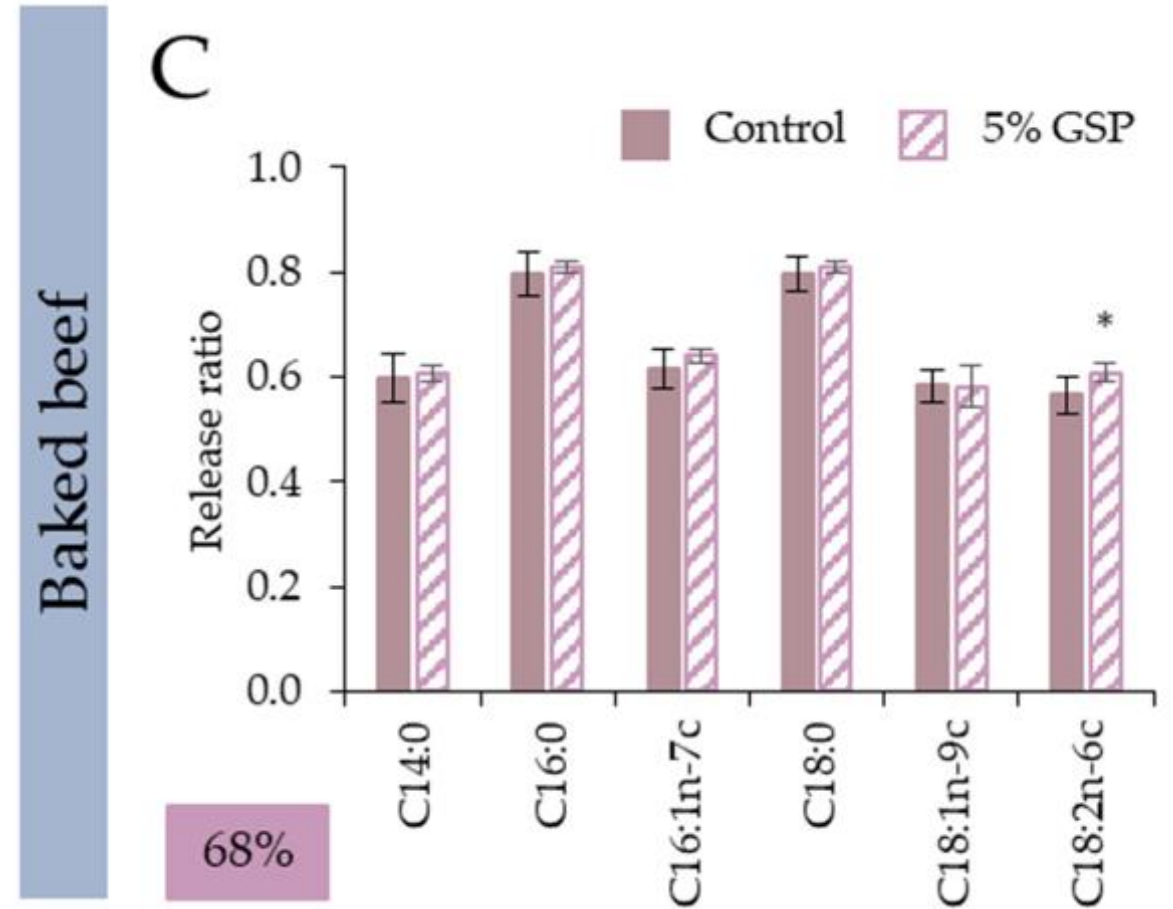
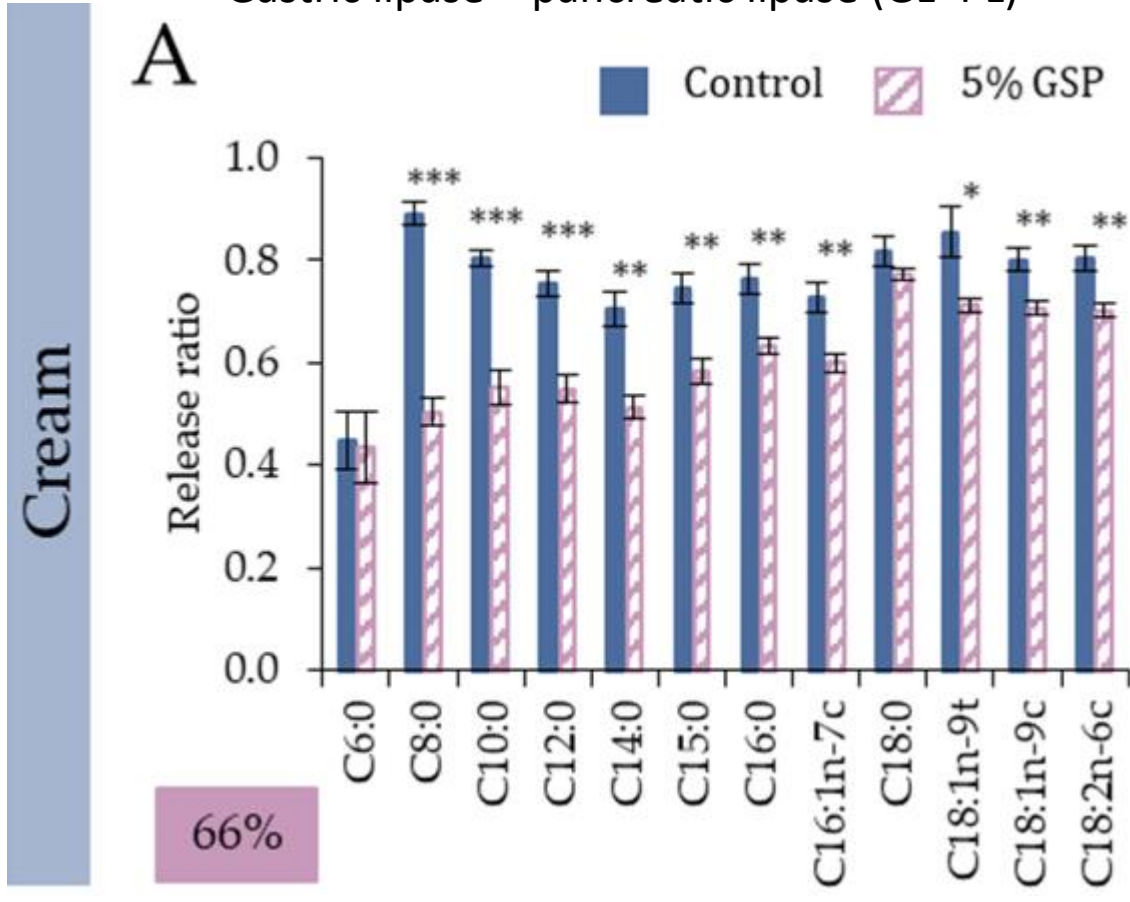
Test lipid substrate: **baked beef**

Lipid digestibility testing – example of **grape seed powder**



Commercially available product

Gastric lipase + pancreatic lipase (GL+PL)



Starch digestibility testing – example of sour cherry juice

Unfiltered sour cherry test juice

Cultivar, year:
Érdi bőtermő, 2022

Pressing

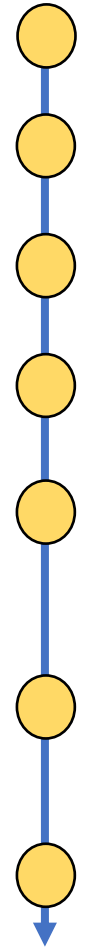
Pasteur

Bottling

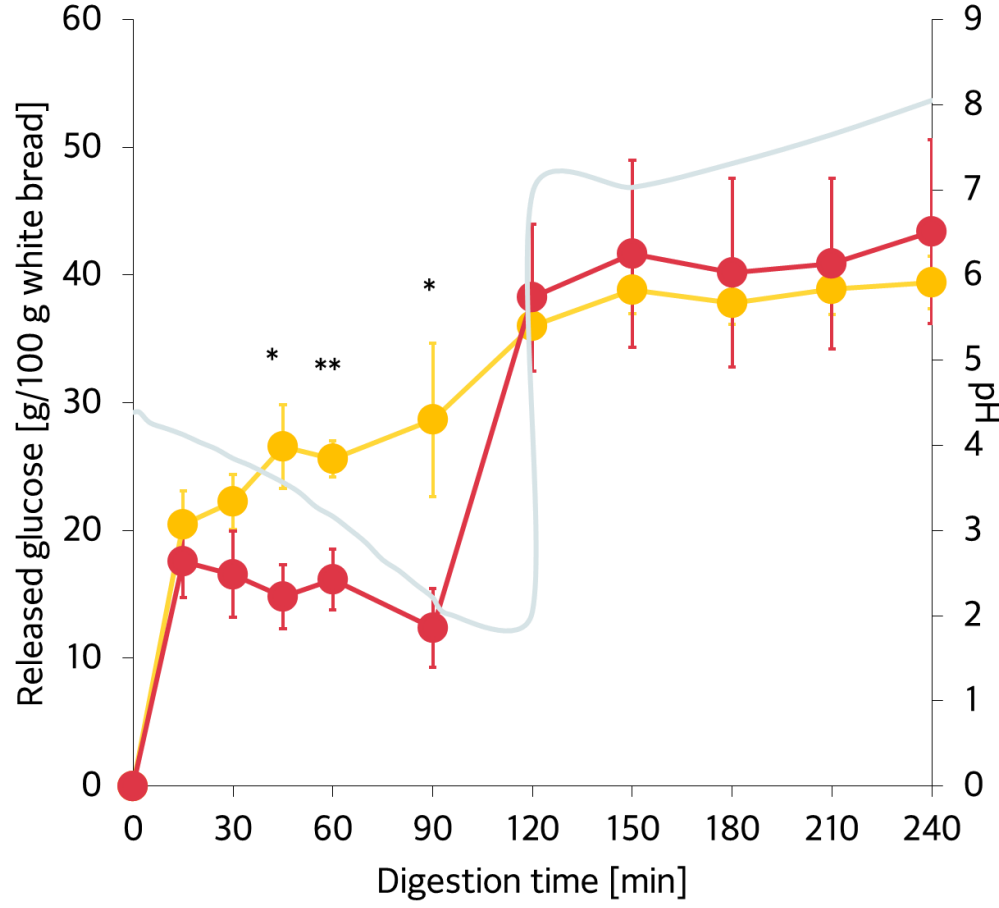
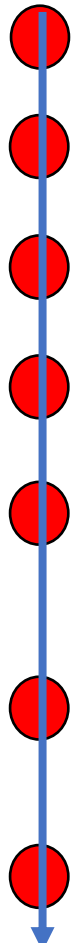
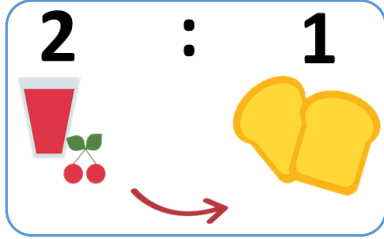
Digestion

ISO 26642
Food – glycemic index

REF



TEST

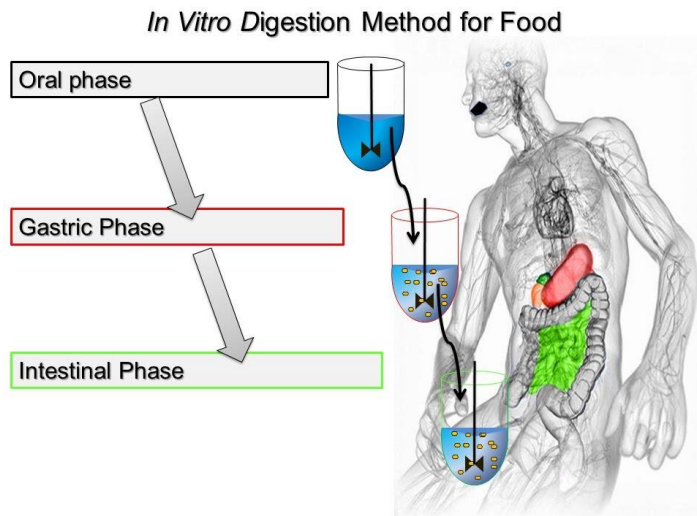


Judit Tormási, Eszter Benes, László Abrankó
Sour cherry (*Prunus cerasus*) juice decreases starch bioaccessibility of white bread. (poster) 4th International Conference on Food Bioactives & Health, 18-21 September, 2023 Prauge, Czechia

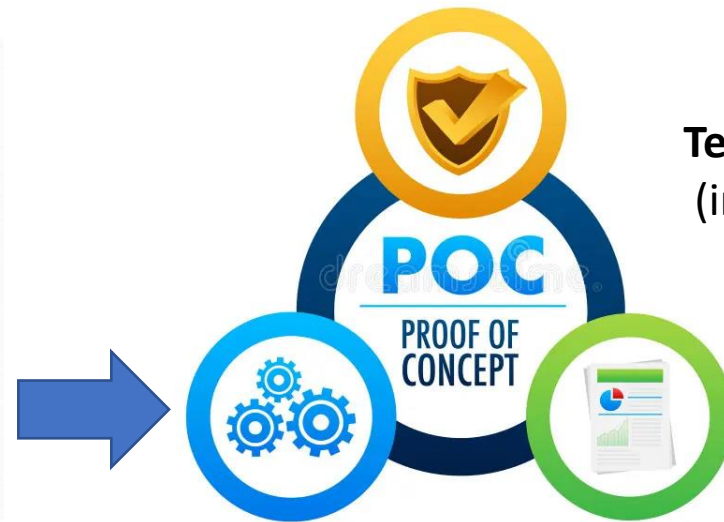
Summary

Agrifood waste **valorisation** → one possibility:

- targeting **extraction/isolation** of 'valuable' constituents
- to use as functional **food ingredients**.
- to **beneficially** impact macronutrient digestibility.



Valorisation



MATE

HUNGARIAN UNIVERSITY OF
AGRICULTURE AND LIFE SCIENCES
INSTITUTE OF FOOD SCIENCE AND
TECHNOLOGY

Techno-functional additives
(improving foaming, gelling, water holding capacity)

Natural preservatives
(shelf life improvement)

Natural colourant/colour stabiliser

Sensory testing

Acknowledgment



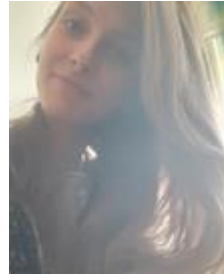
Dr. Judit
Tormási



Dr. Éva
Lengyel-Kónya



Mária
Berki



Dr. Eszter
Benes



OTKA K135294

In vitro investigation of the bioaccessibility of food components
in digestion simulation model



HUNGARIAN UNIVERSITY OF
AGRICULTURE AND LIFE SCIENCES
INSTITUTE OF FOOD SCIENCE AND
TECHNOLOGY

Thank you for your attention!

laszlo.abranko.peter@uni-mate.hu

