Next Generation Processing for better health and sustainability

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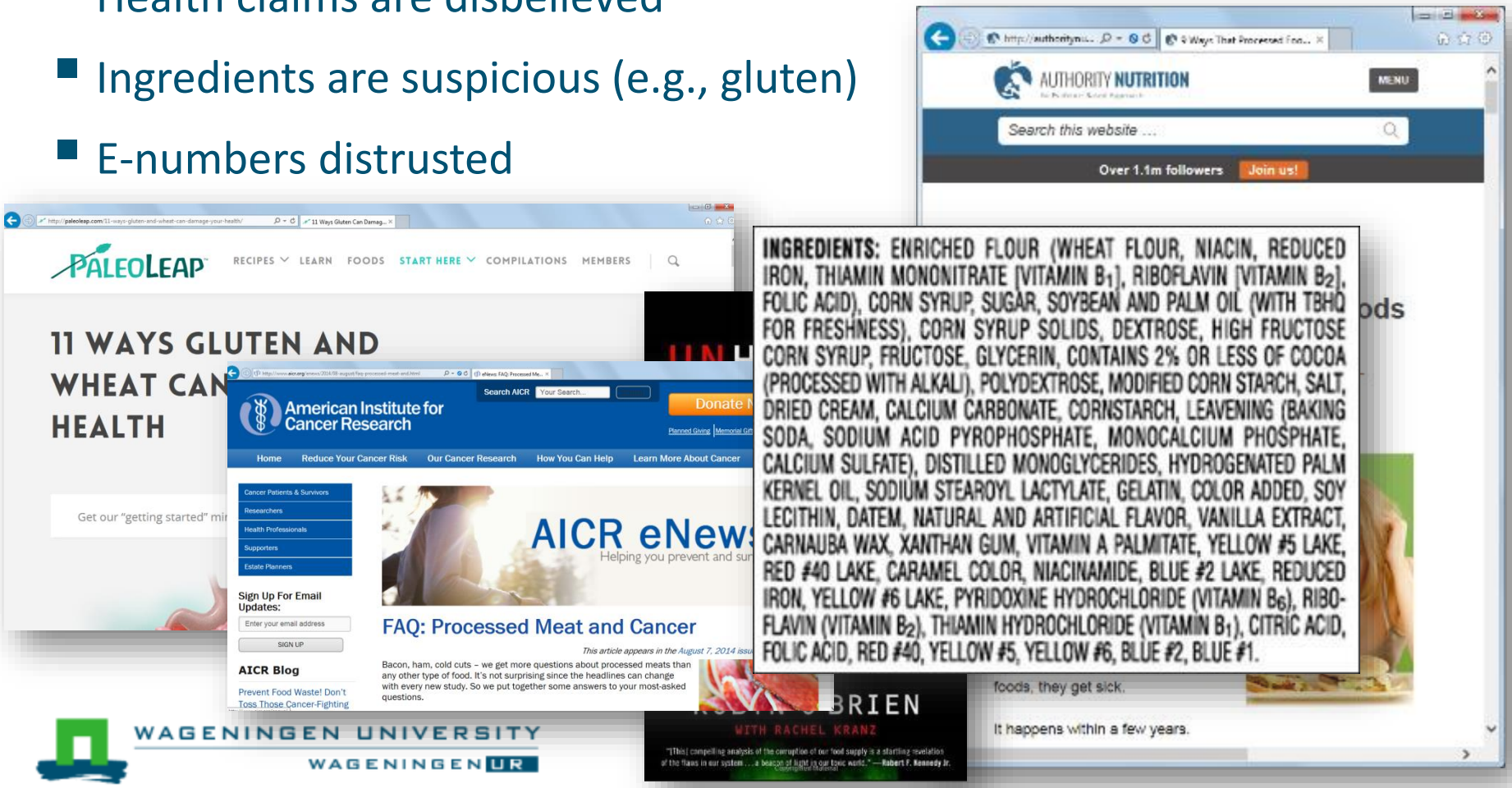
Challenges food products for the 21st century

- Health
- Consumer trust
- Sustainability

The Crisis in Consumer Trust

- Food bloggers for many are more credible than multinationals
- ‘Whole foods’ → natural → better than manufactured foods
- Health claims are disbelieved
- Ingredients are suspicious (e.g., gluten)
- E-numbers distrusted



Processed foods: (perceived as) not healthy

aHealthylife.nl

HOME WEBWINKEL NIEUWSBRIEF CATEGORIEËN PAGINA'S LEZINGEN OVER MIJ CONTACT

20 Voedingsmiddelen die slecht zijn voor je gezondheid (Vermijd ze echt!)

20. Zeer sterk bewerkte voedingsmiddelen

Als je gezond wilt eten en gewicht wilt verliezen, is het verreweg het eenvoudigst om bewerkte voedingsmiddelen zoveel mogelijk te vermijden. Eenvoudig gezegd: "Als het eruit ziet alsof het in een fabriek geproduceerd is, dan is het waarschijnlijk slecht voor je". Een goede regel om te onthouden is dat echt voedsel geen ingrediëntenlijst behoeft, omdat het echte voedsel het ingrediënt is (met toestemming vertaald).

What went wrong?

Food industry mimicked chemical industry

Focus on quantity rather than (nutritional)quality

Cost-effective products

Economy of scale

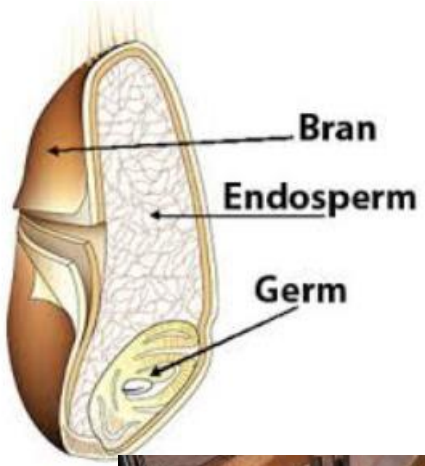
Simple supply chain: standard ingedients

INGREDIENTS: ENRICHED FLOUR (WHEAT FLOUR, NIACIN, REDUCED IRON, THIAMIN MONONITRATE [VITAMIN B_1], RIBOFLAVIN [VITAMIN B_2], FOLIC ACID), CORN SYRUP, SUGAR, SOYBEAN AND PALM OIL (WITH TBHQ FOR FRESHNESS), CORN SYRUP SOLIDS, DEXTROSE, HIGH FRUCTOSE CORN SYRUP, FRUCTOSE, GLYCERIN, CONTAINS 2% OR LESS OF COCOA (PROCESSED WITH ALKALI), POLYDEXTROSE, MODIFIED CORN STARCH, SALT, DRIED CREAM, CALCIUM CARBONATE, CORNSTARCH, LEAVENING (BAKING SODA, SODIUM ACID PYROPHOSPHATE, MONOCALCIUM PHOSPHATE, CALCIUM SULFATE), DISTILLED MONOGLYCERIDES, HYDROGENATED PALM KERNEL OIL, SODIUM STEAROYL LACTYLATE, GELATIN, COLOR ADDED, SOY LECITHIN, DATEM, NATURAL AND ARTIFICIAL FLAVOR, VANILLA EXTRACT, CARNAUBA WAX, XANTHAN GUM, VITAMIN A PALMITATE, YELLOW #5 LAKE, RED #40 LAKE, CARAMEL COLOR, NIACINAMIDE, BLUE #2 LAKE, REDUCED IRON, YELLOW #6 LAKE, PYRIDOXINE HYDROCHLORIDE (VITAMIN B_6), RIBOFLAVIN (VITAMIN B_2), THIAMIN HYDROCHLORIDE (VITAMIN B_1), CITRIC ACID, FOLIC ACID, RED #40, YELLOW #5, YELLOW #6, BLUE #2, BLUE #1.

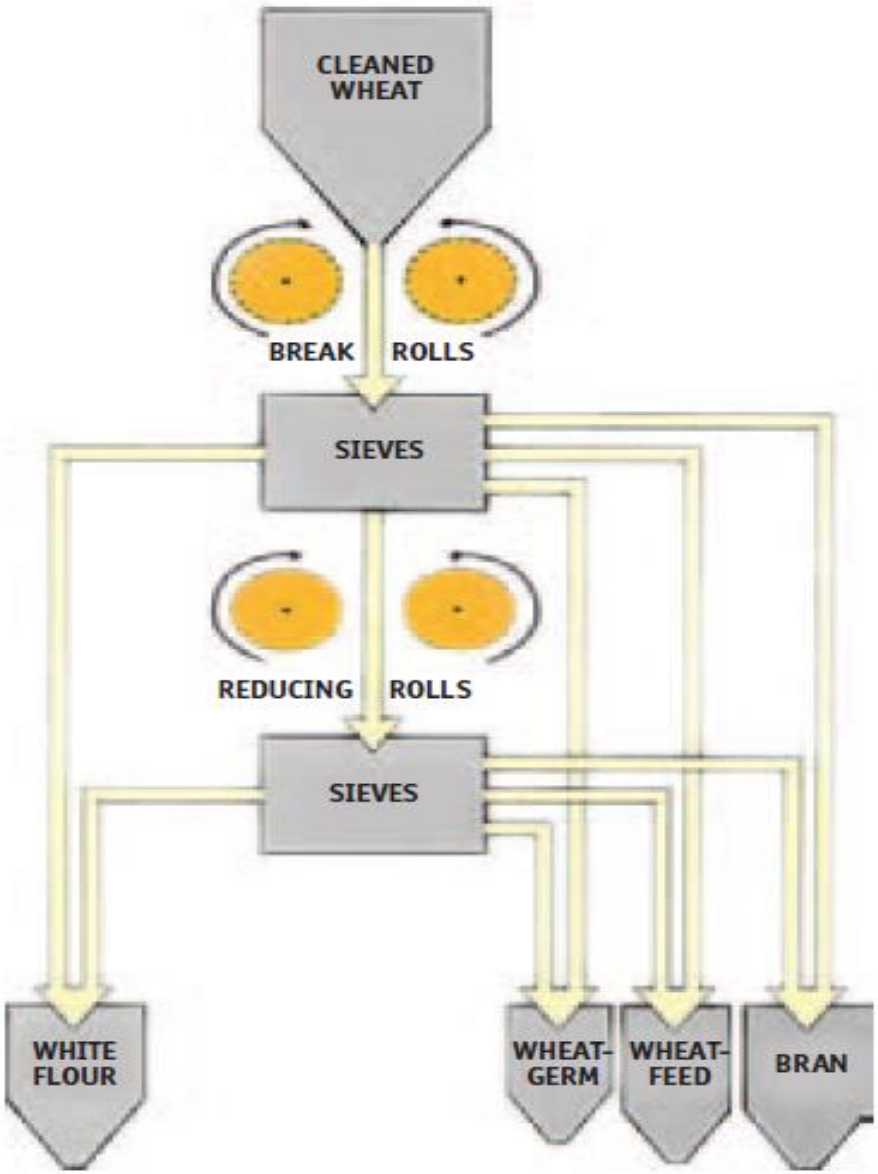
Wheat milling

- Traditional process to separate
  - Bran
  - Endosperm
  - Germ

- Wheat
  - 10- 15% protein
  - 80 % carbohydrates
  - mostly starch
  - 3% lipids (germ)
  - 2% ash



Modern wheat milling: overprocessing



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Towards dedicated food processes

- Raw material have two main characteristics
  - *Composition*
  - *Structure*
- Combination gives biological activity and effects in human body
- Food research: how to use both compositions and structure effectively
  - *From complex processes to simple material streams (Chem. Eng. Approach)*
  - *Towards simple/mild processes with complex materials streams*

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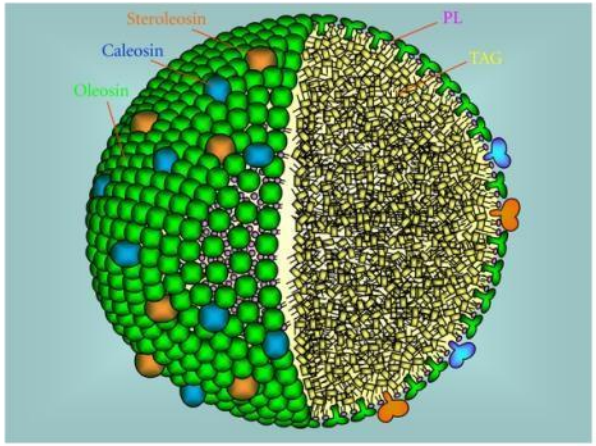
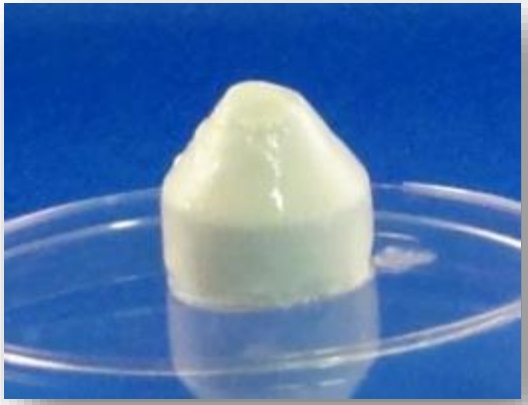
Structure and composition (oleosomes)

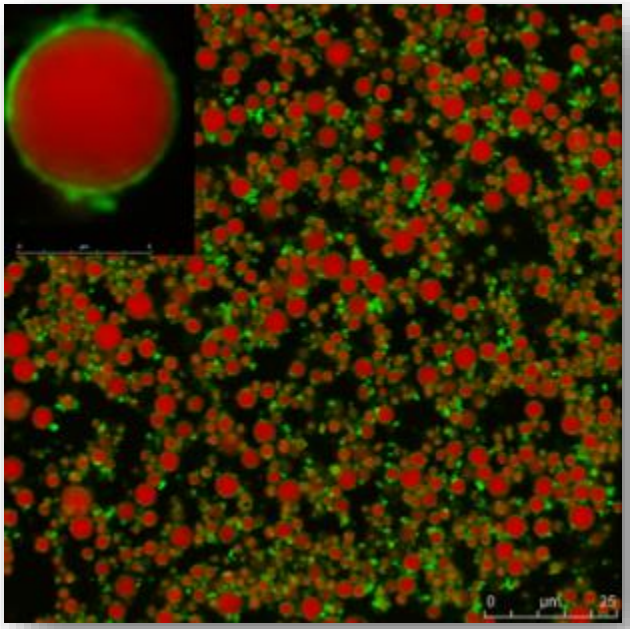
- Aqueous extraction to maintain oleosome stucture
- No stabilisers/emulsifiers necessary

- Very stable product (physical, oxidation)
- Regulates satiety
- Lowers risk on CVD



Olie-in-protein self-supported gel (96 w% oil)





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C. Nikiforidis *et al.*, 2015; J. Romero Guzmán *et al*, 2016

Towards precision, mild processing

Micronutrients and fibre

Lower glaecemic index

Ileal break effect on satiety

Less waste, towards total use

Much less water and energy, no chemicals

Well suited for local processing

Chemical and physical stability

Simpler formulation, clean label

Better taste of structured products

What it could mean...

Less refined & natural ingredients

- A different way of formulating products

Next Generation Food Processing

... requires complete integration of the entire operation of any food manufacturing company

nt production

ore distributed

Healthy, personalized & trusted products

- Giving consumer what they want, *and* what is good for them

Key words novel processing

Mild & simple processing conditions

More units

Transparency

Understandable for consumer

Dedicated processing

Knowledge-based

Smaller plants

Next Generation Food Processing

... requires complete integration of the entire operation of any food manufacturing company

Local processing
Central control

Fresh

Integration product/processing

Complex product streams

Sensor technology to monitor product quality

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