

Autotrophic microalgae as an alternative source of omega 3 oils: from green water to health conscious consumer



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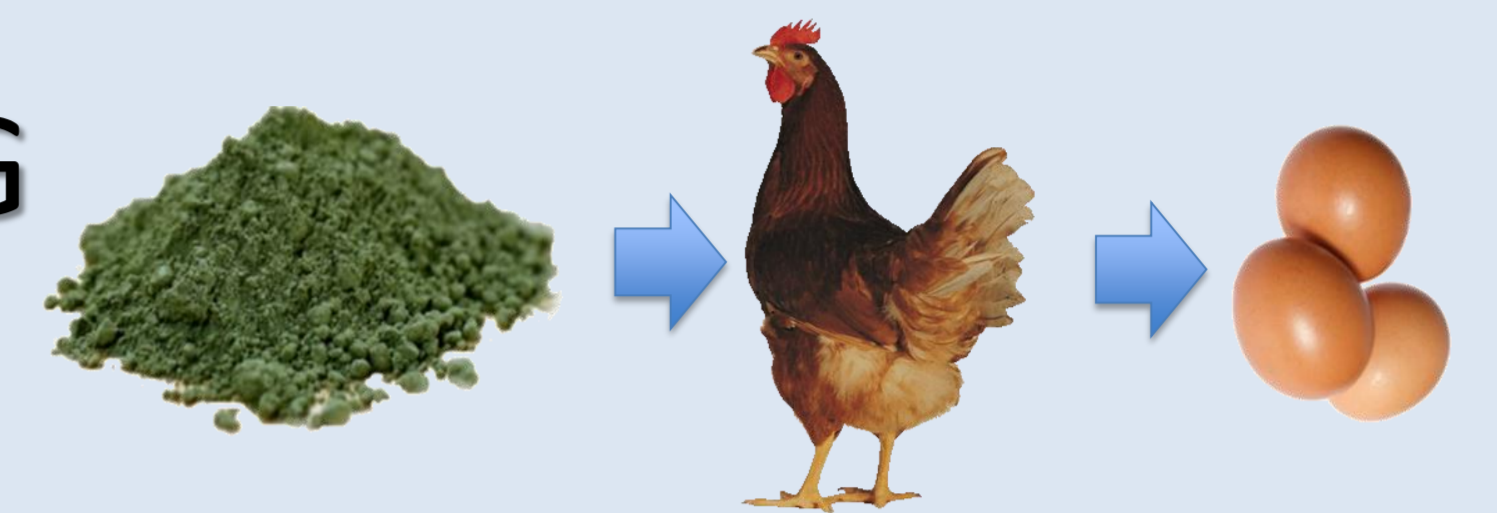
POTENTIAL OF MICROALGAE

Selected species of autotrophic microalgae: potential as alternative **source of n-3 LC-PUFA** for use in human nutrition

- Enough n-3 LC-PUFA
- Added value compared to fish oil
 - Also present in **polar lipids**
 - Presence of **carotenoids**
 - **Higher oxidative stability**

Ryckebosch et al. (2014). Food Chemistry 160: 393-400.
 Ryckebosch et al. (2013). J. Agr. Food Chem. 61: 10145-10155.

THROUGH LAYING HEN'S FEEDING



- Technically this certainly is a **feasible route**
- N-3 LC-PUFA **enrichment efficiency** depends on
 - Supplementation dose
 - N-3 profile (EPA or DHA better than ALA)
 - N-3 bioaccessibility: presence of rigid cell wall (*T-Isochrysis* versus *Nannochloropsis*) and biomass versus oil
- Extra: enrichment of carotenoids: better oxidative stability ??



Bruneel et al. (2013). J. Functional Foods 5:897-904
 Lemahieu et al. (2014). Algal Research 6:119-123
 Lemahieu et al. (2015). J. Functional Foods 19:821-827
 Lemahieu et al. (2013). Food Chemistry 141:4051-4059
 Lemahieu et al. (2016). Algal Research 16:209-215

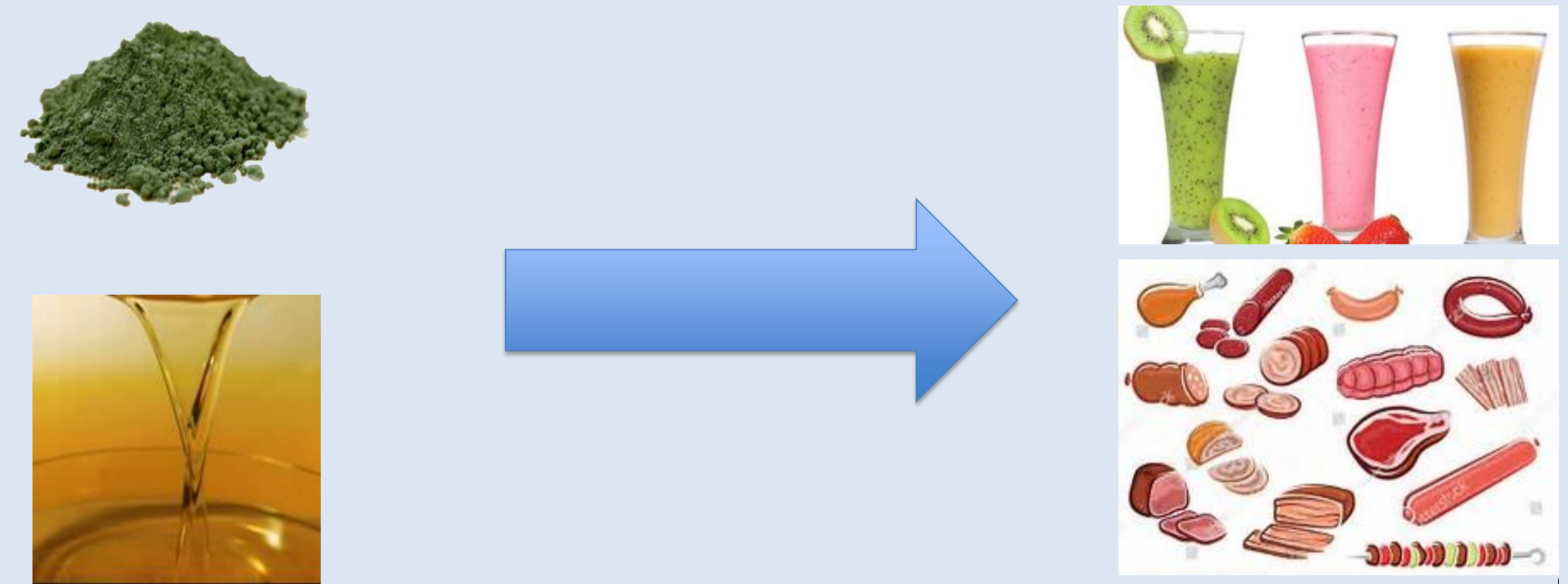
STABILITY DURING WET STORAGE



- Much neglected topic
- Short period of storage of wet algae paste can cause **detrimental lipolysis** (and thus high amounts of free fatty acids !) depending on storage temperature
- Also depends on species ~ cell strength ~ **cell integrity** after harvesting: *T-Isochrysis* versus *Nannochloropsis*
- Also depends on cell disruption treatment: rupture of cell induces lipolytic processes BUT in many species necessary for efficient lipid extraction

Balduyck et al. (2016). Algal Research 18: 281-287.
 Balduyck et al. (2017). Algal Research 25: 516-524.

ADDITION TO FOOD PRODUCTS



- Important to investigate influence of **thermal and mechanical processing** common to food products
- In model systems
- In tomato based systems

Gheysen et al. In preparation

Future research (PhD Valerie Matton): application in processed meat products

DRYING



- Freeze drying nor spray drying leads to lipid oxidation
- Spray drying leads to **loss of carotenoids**
- Deserves further detailed study

Ryckebosch et al. (2011). J. Agr. Food Chem 59: 11063-11069

CELL DISRUPTION AND EXTRACTION



- **Cell disruption** does not only lead to more efficient **lipid extraction** BUT also induces **lipolytic processes**
- **Choice of extraction solvent** (different classical solvents, supercritical CO₂ with or without co-solvent) influences lipid extraction efficiency, but also non-lipid extraction, type of lipids extracted, extraction of carotenoids, antioxidants

Ryckebosch et al. (2014). J. Appl. Phyc. 26:1501-1510
 Balduyck et al. Submitted
 Bruneel et al. In preparation

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