



# Bioavailability of iodine in kelp

First evaluation in rodents and  
next steps

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## Iodine in seaweed

- Fish good source: 30-3500  $\mu\text{g}/\text{kg}$  ww
- Brown seaweed 100-1000x
- Upper tolerable intake level 600  $\mu\text{g}/\text{day}$  for adults (EFSA, 2006)
- Germany and Netherlands requests for data as basis for regulatory levels
- EFSA calls for data



## Levels of iodine in brown seaweed

- *Saccharina* and *Laminaria* high
- *Alaria* lower to much lower
- *Ascophyllum* intermediate
- *Fucus* low
  
- Green and red low

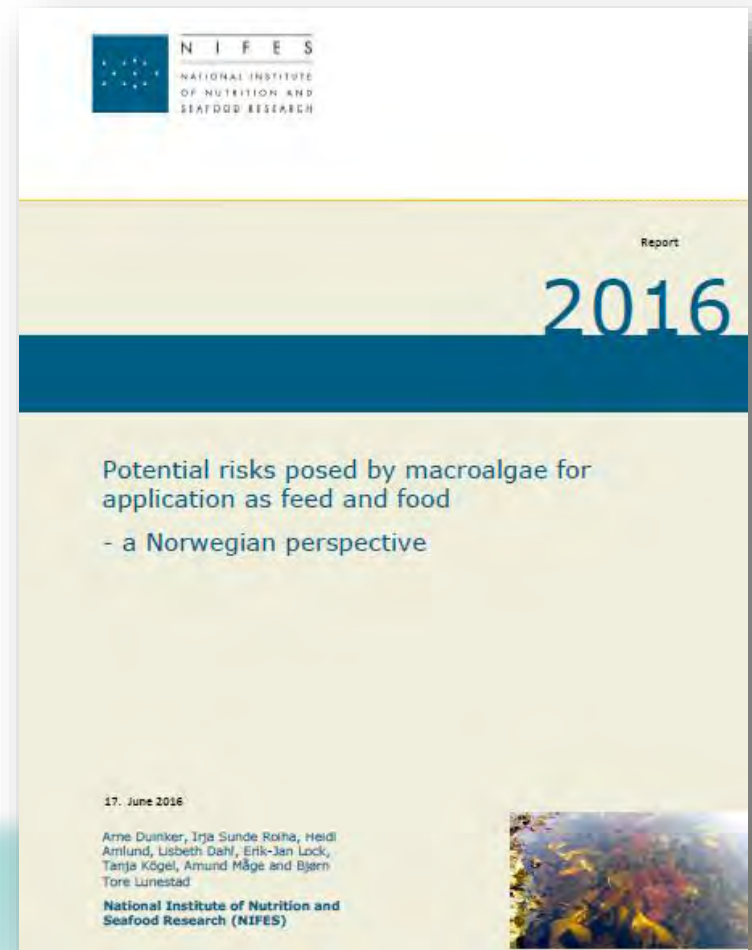


# Report potential risks

NSA mandate

Iodine, iAs, Cd

E. coli probably small problem  
but included in regulations



# AQUAFLY



30 species analysed



Insect meal



Insect lipid



Potential transfer

- ✓ Protein
- ✓ Lipid
- ✓ Minerals



- ❖ EPA
- ❖ I
- ❖ As, Cd



## The challenges

On one side:

- Fast increase interests
- Super-food
  - high levels of nutrients
  - Stimulating factors
- Tasty!

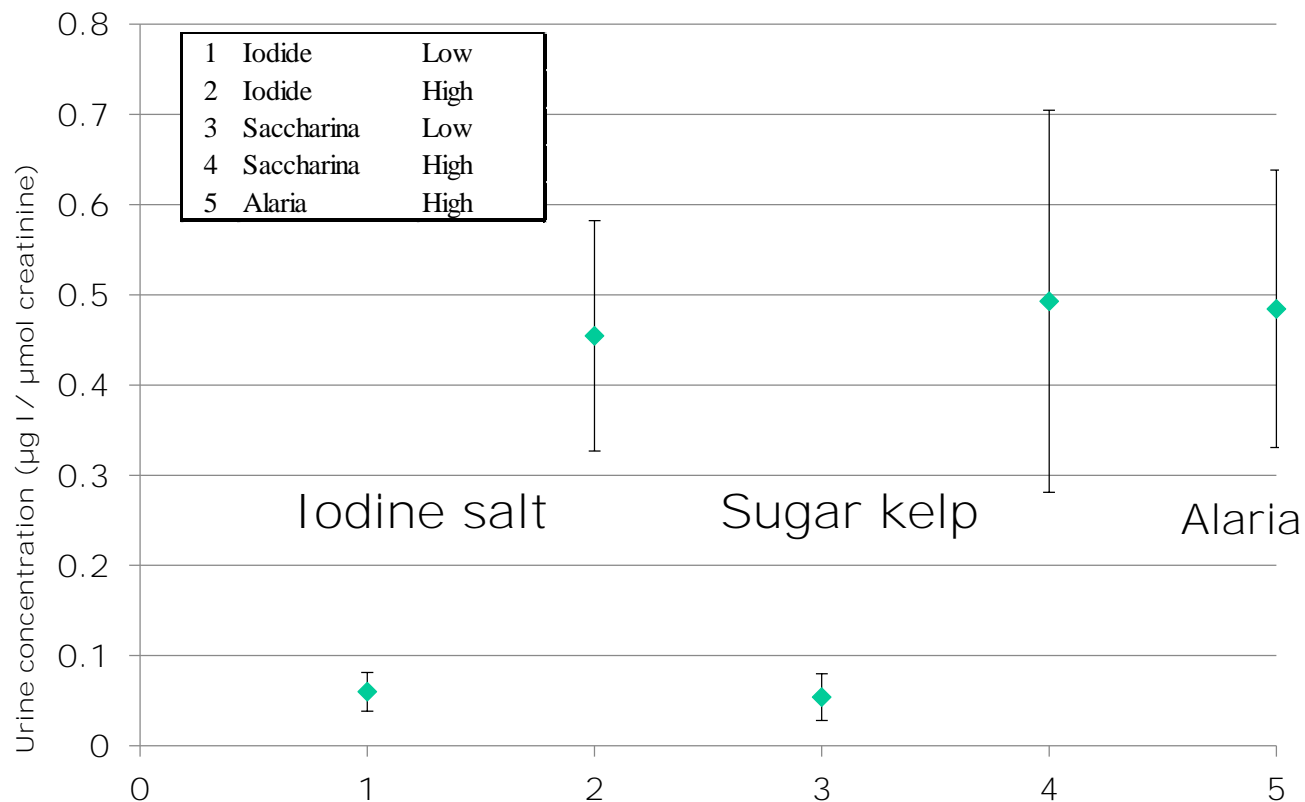
On the other side:

- High levels I,  
Cd, iAs
- Digestible?
- Bioavailable  
nutrients?

Rats fed for 2 weeks

Iodine in urine (24h collection)

Same availability as potassium iodide

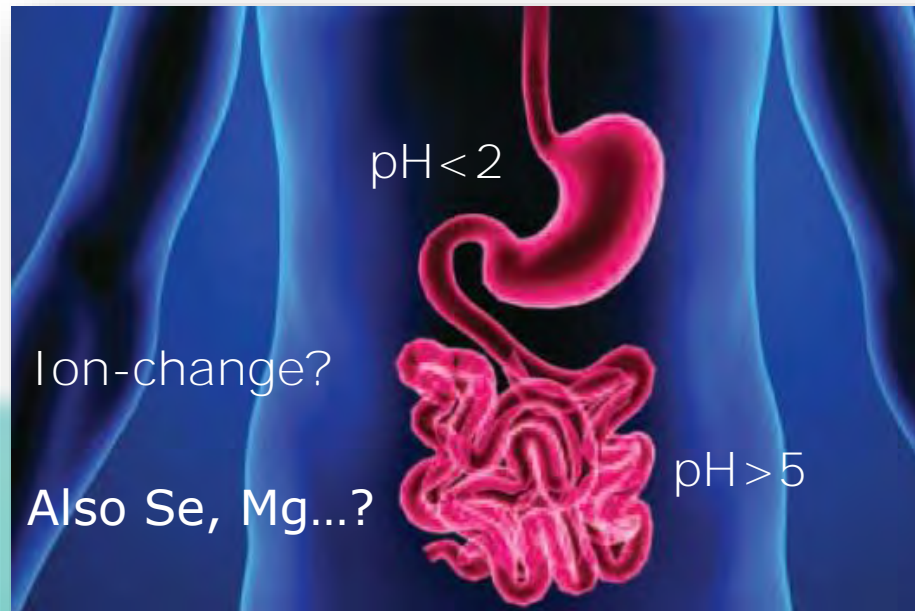


Group	N	Mean (mg/kg)
Group 1 salt low	4	409
Group 2 salt high	5	5079
Group 3 sugarkelp low	5	403
Group 4 sugarkelp high	5	5447
Group 5 Alaria	5	4032
Altromin (C1036) base feed	1	110



## Indigestible fibres special properties

- Tough food: Alginates and other polysaccharides
  - Used as "bio sorbents of heavy metals"
  - Also in digestive system?





## High iodine

Drying, cooking, frying, stock  
- evaporation of  $I_2$

400-1100  $\mu\text{g/g}$  ww

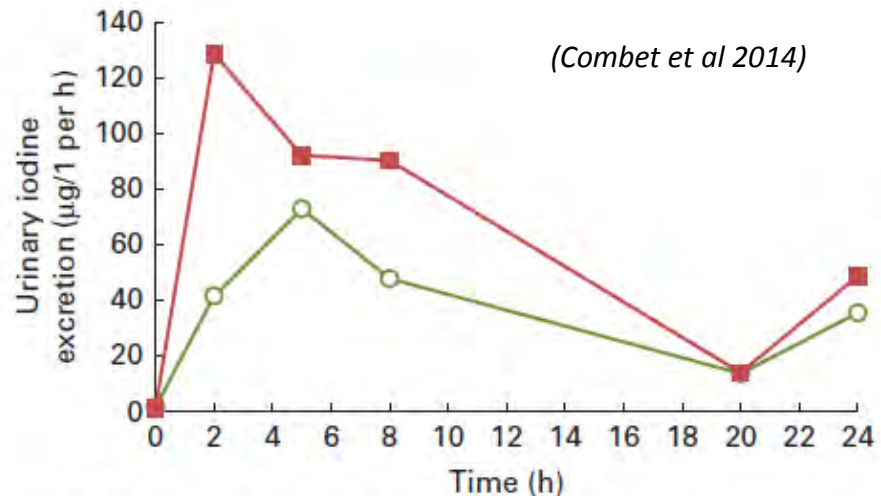
4000-7000  $\mu\text{g/g}$  dw

Max daily dose 600  $\mu\text{g}$  mg

Max meal size  $\sim 1$  g ww?

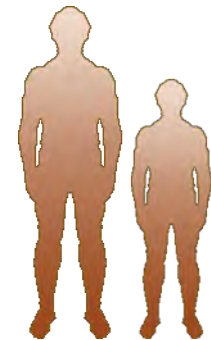
Slow release?

Can we tolerate  
higher levels of iodine  
from kelp?



**Fig. 1.** Urinary iodine excretion over 24h after the ingestion of a dose of 712  $\mu\text{g}$  of iodine from potassium iodide (■) or Napiers Hebridean Seagreens *Ascophyllum nodosum* (○). (A colour version of this figure can be found online at <http://www.journals.cambridge.org/bjn>).

- Iodine: Rodent trials dose-response  
Mechanisms and responses
- Iodine: Human intervention studies: Safe levels, confirm (if finances)
- **Metabolomics more mechanisms (if ...)**
- Cd and iAs: Accumulation or not with increasing doses of kelp?





Can kelp be used in fortification of foods to overcome the low iodine status of the European population?

