



Statens tilsyn for planter, fisk, dyr og næringsmidler



- Nordisk prosjekt på tang og tare
- Ufordringer rundt høyt jod-nivå

Marint Grenseforum Skagerrak, Teamsmøte 4 juni 2021

Solbjørg Hogstad, Senior rådgiver, Mattilsynets hovedkontor
Norwegian Food Safety Authority (NFSA)

Work on seaweed at The Norwegian Food Safety Authority (NFSA)

- **The Norwegian Government aims** to utilize more of the ocean's marine resources and facilitate both harvesting and farming of new species within a sustainable framework
- NFSA has been asked to contribute to facilitate this, with special focus on seaweed
- NFSA main focus in this work: **Food safety** (both food and feed)
- **There is little particular legislation on seaweed** - this makes it difficult for business operators to ensure the food safety - NFSA are therefore developing guidance on seaweed as use as food – both on a national and nordic level
- **Norway wants to reach a harmonised approach within the EU/EEA and has not established any national maximum levels or particular legislation for seaweed as use as food and feed**

Nordisk prosjekt på tang og tare

- The project is supported by the Nordic Council of Ministers (2020-2022)
- Participants: Food Authorities from Iceland, Norway, Denmark and the Faroe Islands (with Sweden in the reference group)

Project goals:

- Publish a report on risk management of food safety in seaweed with an included guidance to inspectors and food business operators
- Strengthen the networking and communication on seaweed between regulators in the Nordic countries

Main focus of the project is risk management of inorganic arsenic, heavy metals and iodine - but other aspects as hygiene and microbiology will also be included

Rapport fra Havforskningsinstituttet 8.desember 2020

The Institute of Marine Research (IMR), Norway

På oppdrag fra Mattilsynet

Authors: [Arne Duinker](#), [Malin Kleppe](#), [Even Fjære](#), [Irene Biancarosa](#), [Hilde Elise Heldal](#), [Lisbeth Dahl](#) and [Bjørn Tore Lunestad](#) (IMR)

Link to the report:

[Knowledge update on macroalgae food and feed safety | Havforskningsinstituttet \(hi.no\)](#)



The IMR-report 2020

- The report confirms previous conclusions in the report from IMR 2016 that **seaweed can have problematically high levels of metals and iodine**, and it may place restrictions on the use of seaweed as food and feed.
- In the new report, more data makes it possible to provide more reliable conclusions and **differentiation between species**. This gives us better knowledge of which species are best suited for production and sale, and which ones should be avoided to ensure food safety.
- 27 species analyzed – with a big variation in composition both between and within the species

Our risk management of high content of inorganic arsenic in some seaweed species

IMR-data showed that oarweed (*Laminaria digitata*) may have a problematically high level of iA.

NFSA therefore warns consumers against eating oarweed

https://www.matportalen.no/matvaregrupper/tema/diverse_retter_produkter_og_ingredienser/mattilsynet_advarer_mot_aa_spise_fingertare

The same warning is also given for Hijiki

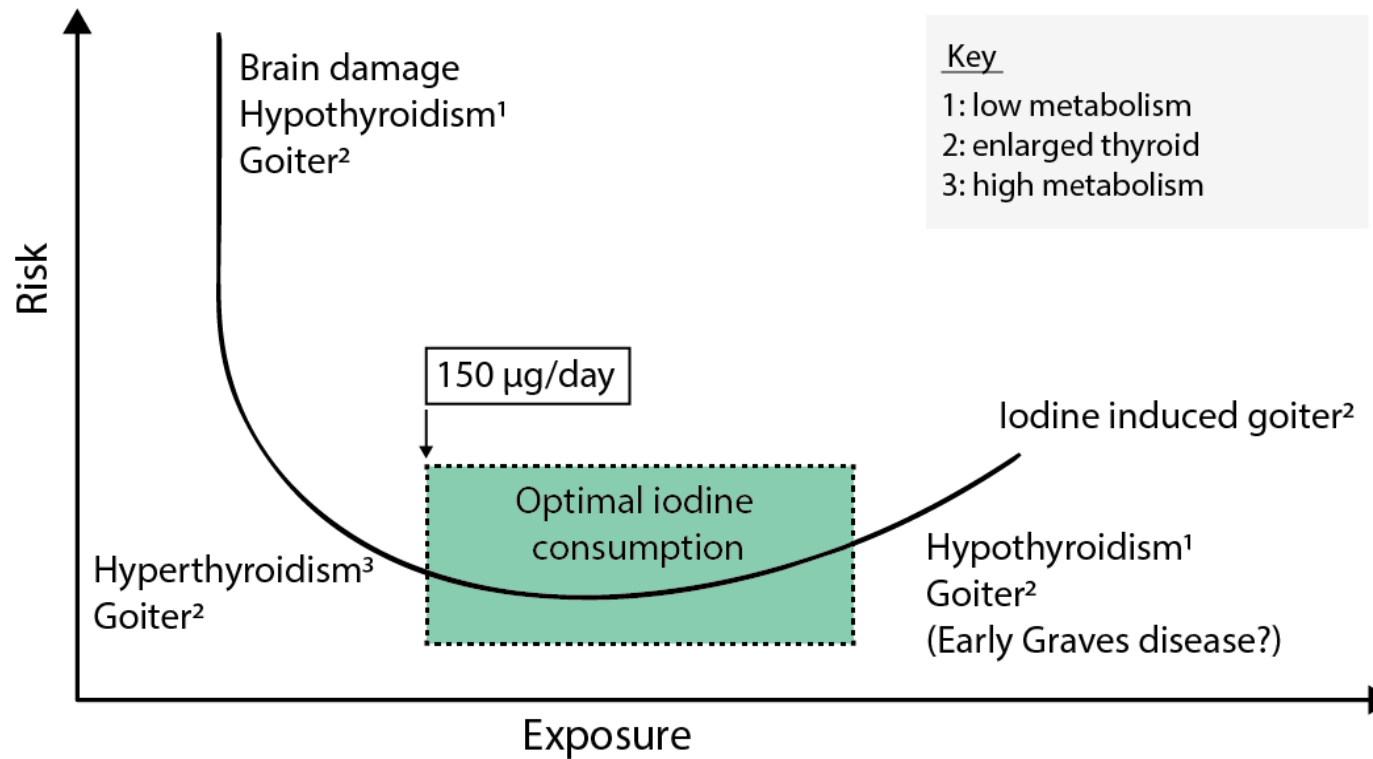


Ufordringer rundt høyt jod-nivå i noen produkter

- **At time the most problematic issue because of lack of knowledge and different risk management in different countries**
- What are the solutions? NFSA has not concluded for further risk management strategy and we are also discussing this with other nordic countries
- NFSA must have science-based arguments for our management if not forbidding sale of products with high iodine levels

Både for lite og for mye JOD er helsefarlig

Reconstructed figure based on Laurberg (2009), via National Council for Nutrition's (2016)
Source of the illustration: Marthe Jordbrekk Blikra, Nofima



For seaweed products with no EU harmonised maximum limits for iodine and metals – different countries have different risk management

- RASFF – Rapid Alert System for Food and Feed
- RASFF is an important source for the status of risk management
- A European reporting system where information on unhealthy food and feed is exchanged in cooperation between the authorities of the member states of the EU, EFTA / EEA, Switzerland, as well as EFSA (European Food Safety Authority) and the EU Commission
- The European Commission collects and publishes notifications of any serious health risks deriving from food or feed and any measures taken, e.g. withdrawing or recalling food or feed from the market in order to protect consumers.

Iodine alerts on seaweed in RASFF

RASFF (updated 11 April 2021):

In total 172 alerts on «*seaweed*» and **116** alerts when search on «*seaweed*» and «*iodine*»

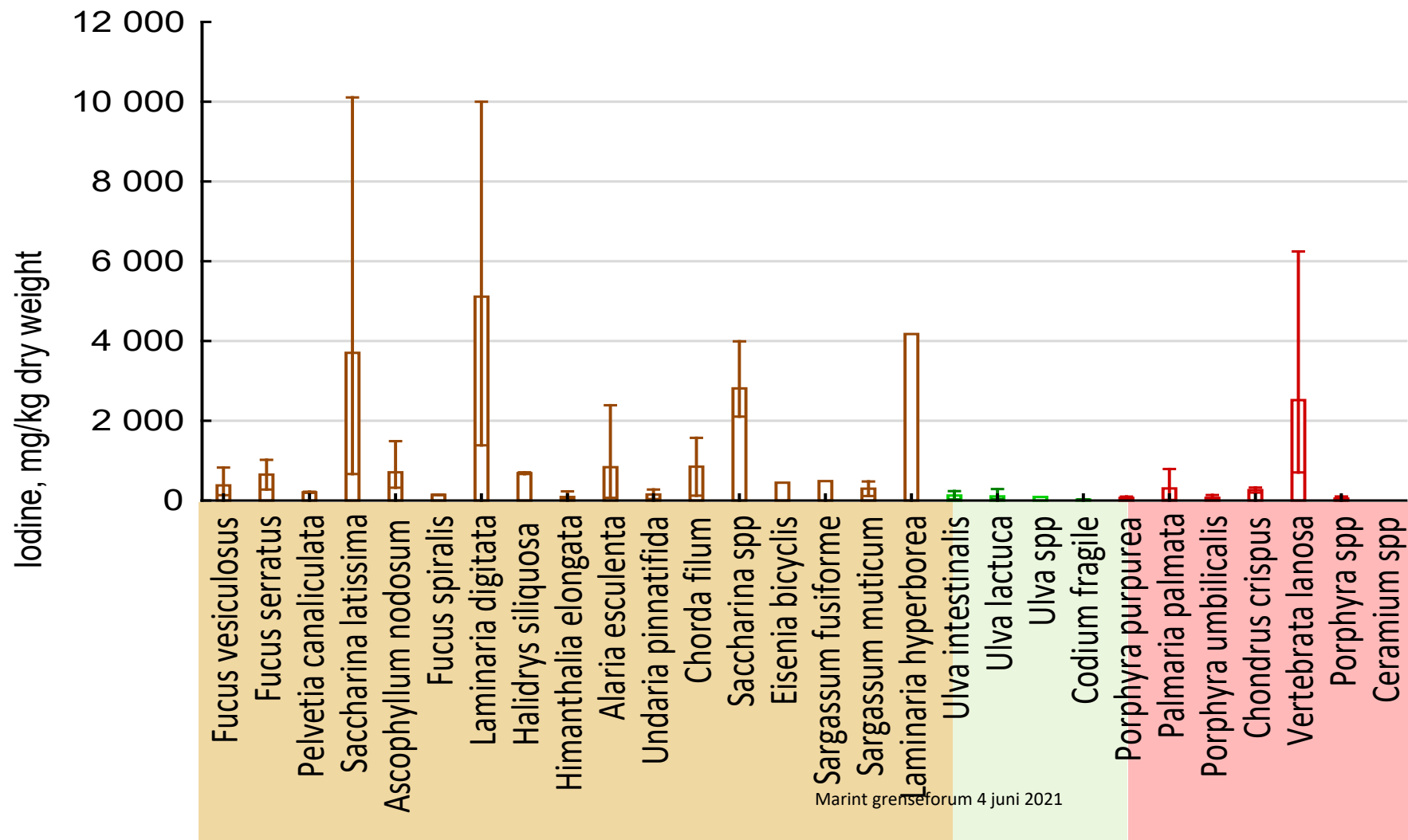
RASFF Consumer Portal <https://webgate.ec.europa.eu/rasff-window/portal/?event=SearchForm&cleanSearch=1#>

Make the search on the terms "seaweed" and also on "algae"

Jod-innholdet i ulike arter (fra IMR-rapporten) er for høyt for noen europeiske myndigheter

Germany uses 20 mg/kg dw as maximum limit for iodine in seaweed. Only 5 out of the 402 samples were under this limit (that means almost all seaweed species, both from Asia and Europe)

France uses 2000 mg/kg dw as maximum limit in seaweed – which excludes most of the samples from sugar kelp (*Saccharina latissima*) - the seaweed species most used in aquaculture in Norway



Norwegian risk management of high iodine levels in seaweed used as food

- We have no national maximum limits for iodine in seaweed
- We give dietary advice to the consumers about high levels of iodine in some seaweed products and about intake in general and for vulnerable groups https://www.matportalen.no/uonskedestoffer_i_mat/tema/miljogifter/er_det_trygt_aa_spise_tang_og_tare
- We have an active dialogue with business operators and R&D about this topic and have information on our website:
«What we know about the food safety of seaweed” https://www.mattilsynet.no/fisk_og_akvakultur/nye_marine_arter/tang_og_tare/hva_vi_vet_om_mattryggheten_for_tang_og_tare.34968

Iodine

The IMR-report: **Bioavailability** of 73-78 % of iodine from sugar kelp was found in a rat model study

NFSA comment: This indicate that humans also have high uptake of iodine from seaweed and much is available during digestion. This is important knowledge for the risk management.

The IMR-report: The **iodine content can be reduced** by boiling, frying and drying

NFSA comment: This is primarily interesting for the business operators and may lead to products with a lower iodine content and less risk for both the consumers and market access. Methods for treatment of seaweed in preparation of food to reduce the iodine content in the finished dishes may also be relevant information for the business to communicate to the users (consumers, restaurants)

There are several other publications and ongoing research on iodine in seaweed and NFSA is observer i many projects to ensure focus on food safety

Informasjon fra Mattilsynet til forbrukere

- [h](#) Seaweed products **can contain thousands of times as much iodine as other foods**. Iodine is an element that has important functions in the body, but too much iodine can be harmful to health by affecting the function of the thyroid gland.
- **Adequate intake** of iodine is important for health, but intake of too much iodine, especially over a long period of time, is harmful.
- **Vulnerable groups** of the population must be especially careful with large intakes. This is especially true for pregnant, breastfeeding, young children and people who have diseases of the thyroid gland.
- In addition, **those with mild to moderate iodine deficiency** must be aware that the thyroid gland takes time to adjust. Sudden high iodine intake can therefore increase the incidence of thyroid disorders for this group.
- **Until we have more knowledge in place, we still recommend that people do not eat large amounts**

Noen av utfordringene

How much is the intake of seaweed among consumers?

Very little data on this in Norway and Europe. Such data is important for risk assessments.

Do for example many **young vegetarian and vegan women** (in fertile age) eat much seaweed to try to get enough iodine? This may true - in particular if business have a marketing strategy saying the product is a good source for iodine, without any warnings that you can get too much.

Some products also **lack labelling** with content of iodine or the labelled amount is **not correct** – this makes it difficult to make an informed choice for consumers

Reference: Aakre *et al* 2021: Commercially available kelp and seaweed products – valuable iodine source or risk of excess intake?

<https://foodandnutritionresearch.net/index.php/fnr/article/view/7584>

https://www.nrk.no/vestland/fann-altfor-mykje-jod-i-produkt-med-tang-og-tare_-_urovekkande-1.15474377

Noen tanker om løsninger

Business operators should think about the following:

- Must have **good knowledge about their products** – good analyses of iodine when needed
- Not to market the products in a **misleading way with non appropriate health claims** as for example that a product is a good source for iodine when it is high probability that you get too much when eating only small amounts
- Find good solutions as for example **not selling products with high levels of iodine**, in particular products it is difficult to measure what amount of seaweed you may eat - in order not to get too much according to the recommended daily intake of iodine (example one quarter of a teaspoon or 0,2 grams is difficult to measure for consumers)

Tang og tare på våre nettsider

For producers:

[https://www.mattilsynet.no/fisk og akvakultur/nye marine arter/tang og tare](https://www.mattilsynet.no/fisk_og_akvakultur/nye_marine_arter/tang_og_tare)

For consumers:

[https://www.matportalen.no/uonskedestoffer i mat/tema/miljogifter/er det trygt aa spise tang og tare](https://www.matportalen.no/uonskedestoffer_i_mat/tema/miljogifter/er_det_trygt_aa_spise_tang_og_tare)

Takk for meg!

My e-mail: solbjorg.hogstad@mattilsynet.no

Her følger noen ekstra bilder som dere kan lese på egen hånd

Included in the IMR-report

- **Analyses of inorganic arsenic, cadmium, mercury, lead and iodine**
- **Bioavailability of iodine**
- **Reduction of iodine through processing**

- Analyses of Ca,K, Mg, Na,P, Fe, Zn and Se
- Analyses of kainic acid in the species dulse
- Microbiology
- Bioavailability of metals in rats
- Seaweed as a fish feed resource
- Factors affecting the levels of metals in kelp
- Dioxins and PCB's
- Radioactivity

A quick overview of some results of the analyses in the IMR-report

Inorganic arsenic (iA), cadmium, mercury, lead and iodine

- Sugar kelp (*Saccharina latissima*) and winged kelp (*Alaria esculenta*), the most widely used species in aquaculture production in Norway, contain little iA, medium amount of cadmium and a relatively high level of iodine
- Red and green algae generally have much lower levels of iodine than brown algae
- The content of lead and mercury is generally low
- One commercial used species oarweed (*Laminaria digitata*) has problematically high levels of inorganic arsenic

List of the 27 species collected by IMR in the period 2014-2019

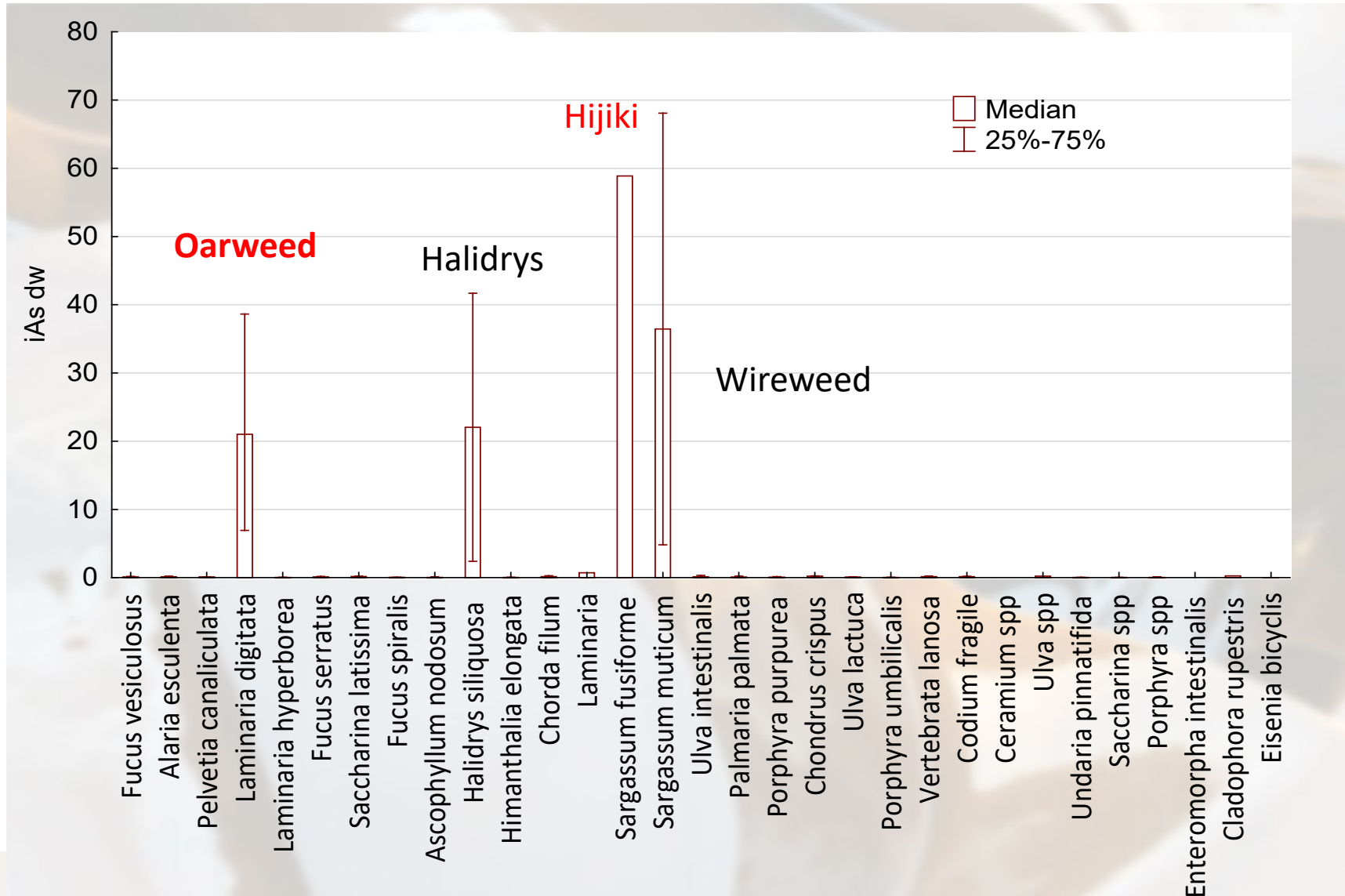
	Latin name	English name	Norwegian name
Brown algae	<i>Alaria esculenta</i>	Winged kelp	Butare
	<i>Ascophyllum nodosum</i>	Rockweed	Grisetang
	<i>Chorda filum</i>	Dead man's rope	Martaum
	<i>Eisenia bicyclis</i>	Arame	Arame
	<i>Fucus serratus</i>	toothed wrack	Sagtang
	<i>Fucus spiralis</i>	Spiral wrack	Kaurtang
	<i>Fucus vesiculosus</i>	Bladderwrack	Blæretang
	<i>Halidrys siliquosa</i>	Halidrys siliquosa	Skolmetang
	<i>Himanthalia elongata</i>	Thongweed	Remtang
	<i>Laminaria</i>	Laminaria	Laminaria
	<i>Laminaria digitata</i>	Oar weed	Fingertare
	<i>Laminaria hyperborea</i>	Tangle	Stortare
	<i>Pelvetia canaliculata</i>	channelled wrack	Sauetang
	<i>Saccharina latissima</i>	Sugar kelp	Sukkertare
	<i>Saccharina spp</i>	Kombu	Kombu
	<i>Sargassum fusiforme</i>	Hijiki	Hijiki
<i>Sargassum muticum</i>	Wireweed	Japansk drivtang	
<i>Undaria pinnatifida</i>	Wakame	Wakame	
Green algae	<i>Codium fragile</i>	green sea fingers	Pollpryd
	<i>Ulva intestinalis</i>	Gutweed	Tarmgrønske
	<i>Ulva lactuca</i>	Sea lettuce	Havsalat
	<i>Ulva spp</i>	Green nori	Green nori
Red algae	<i>Chondrus crispus</i>	Irish moss	Krusflik
	<i>Palmaria palmata</i>	Dulse	Søl
	<i>Porphyra purpurea</i>	Purple laver	Purpurfjærehinne
	<i>Porphyra spp</i>	Nori	Nori
	<i>Porphyra umbilicalis</i>	Pink laver	Vanlig fjærehinne
	<i>Vertebrata lanosa</i>	Wrack siphon weed	Grisetangdokke

Iodine content (mg/kg dry weight) – IMR report 2020

Latin name	English name	N	Mean	Median	Min-max	25 % Quartiles
<i>Laminaria digitata</i>	Oar weed	33	5 100	5 000	1400-10000	3600-6400
<i>Laminaria hyperborea</i>	Tangle	1	4 200	4 200		
<i>Saccharina latissima</i>	Sugar kelp	150	3 700	3 500	670-10000	2600-4600
<i>Saccharina spp</i>	Kombu	4	2 800	2 600	2100-4000	2100-3500
<i>Vertebrata lanosa</i>	Wrack siphon weed	18	2 500	2 200	710-6200	1900-3000
<i>Chorda filum</i>	Dead man's rope	2	850	850	120-1600	120-1600
<i>Alaria esculenta</i>	Winged kelp	30	840	740	70-2400	450-1100
<i>Halidrys siliquosa</i>	Halidrys siliquosa	2	690	690	670-710	670-710
<i>Ascophyllum nodosum</i>	Rockweed	24	710	670	320-1500	510-800
<i>Fucus serratus</i>	toothed wrack	20	650	620	280-1000	530-760
<i>Sargassum fusiforme</i>	Hijiki	1	490	490		
<i>Eisenia bicyclis</i>	Arame	1	450	450	450-450	450-450
<i>Fucus vesiculosus</i>	Bladderwrack	27	380	310	140-830	210-520
<i>Sargassum muticum</i>	Wireweed	2	300	300	120-480	120-480
<i>Chondrus crispus</i>	Irish moss	2	260	260	200-330	200-330
<i>Palmaria palmata</i>	Dulse	26	300	260	15-790	130-430
<i>Pelvetia canaliculata</i>	channelled wrack	3	210	200	200-220	200-220
<i>Undaria pinnatifida</i>	Wakame	5	150	160	39-280	110-170
<i>Fucus spiralis</i>	Spiral wrack	3	150	150	140-150	140-150
<i>Ulva intestinalis</i>	Gutweed	7	130	130	29-240	41-220
<i>Ulva lactuca</i>	Sea lettuce	12	110	100	37-290	53-120
<i>Ulva spp</i>	Green nori	1	92	92		
<i>Porphyra purpurea</i>	Purple laver	3	67	79	22-100	22-100
<i>Porphyra umbilicalis</i>	Pink laver	6	68	69	14-140	15-100
<i>Himanthalia elongata</i>	Thongweed	5	90	59	41-230	58-61
<i>Porphyra spp</i>	Nori	11	51	37	8-100	32-85
<i>Codium fragile</i>	green sea fingers	2	23	23	17-29	17-29

Inorganic arsenic - mg/kg dry weight (data from IMR-report 2020)

Oarweed (*Laminaria digitata*) compared with other species



Novel food status on seaweed species

- Current work in the Joint Research Center (EU) on a report collecting the information on authorized consumption of algae species in the Member States
- They are collecting data on all the species consumed before May 1997 as food or food supplements and mostly with the help of the national lists set up in each Member States
- The information will be integrated in the report in the form of a comprehensive table
- **NFSA has reason to believe that the following two commercial interesting species in Norway - will get the status “novel food” because of lack of evidence of consumption as food before 1997: *Laminaria hyperborea* and *Vertebrata lanosa***