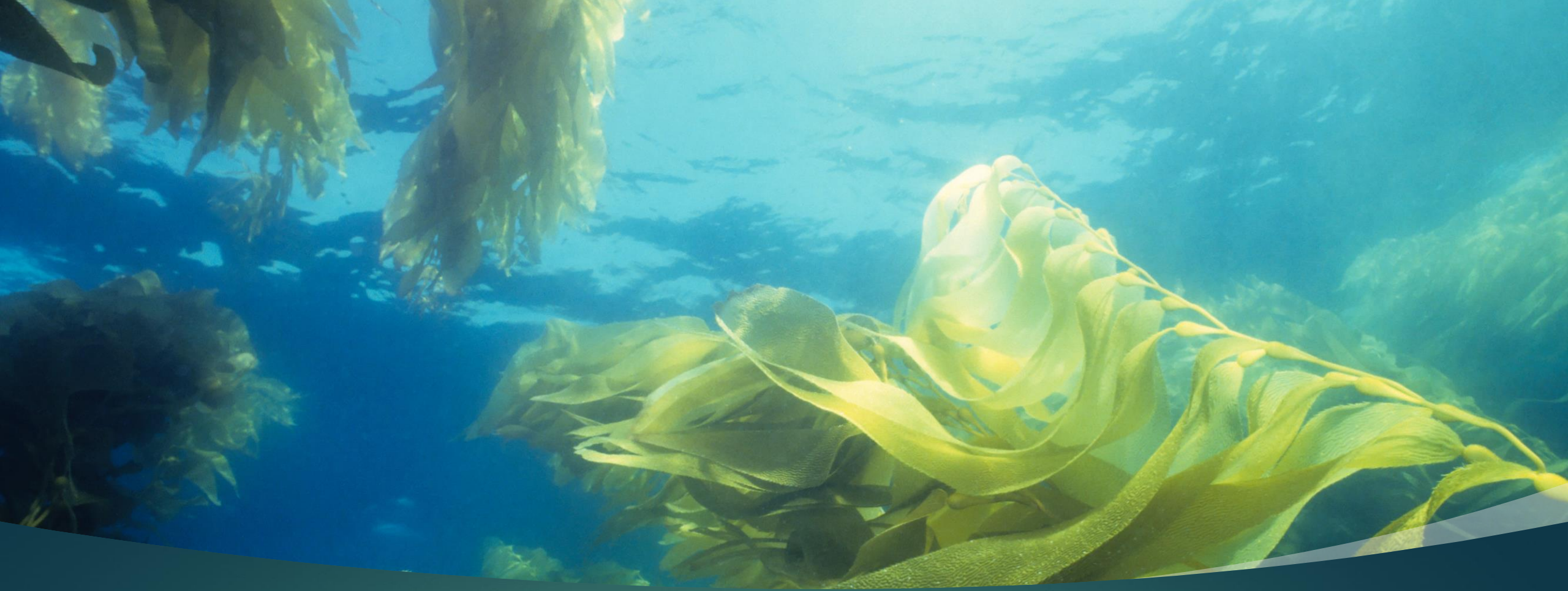

# Coastal Edge SIG Webinar

JUNE 2020

Bwyd a Diod Cymru
Clwstwr Maeth-Cymru
Food & Drink Wales
Nutri-Wales Cluster

IBERS
Athrofa y Gwyddorau Biolegol, Amgylcheddol a Gwledig
Institute of Biological, Environmental and Rural Sciences
Prifysgol Aberystwyth University

bicinnovation

Cefnogir gan Lywodraeth Cymru
Supported by Welsh Government

Cronfa Datblygu Rhanbarthol Ewrop
European Regional Development Fund

FutureFoods

Collaborate to Succeed | Cydweithio i Lwyddo

# Insight Series

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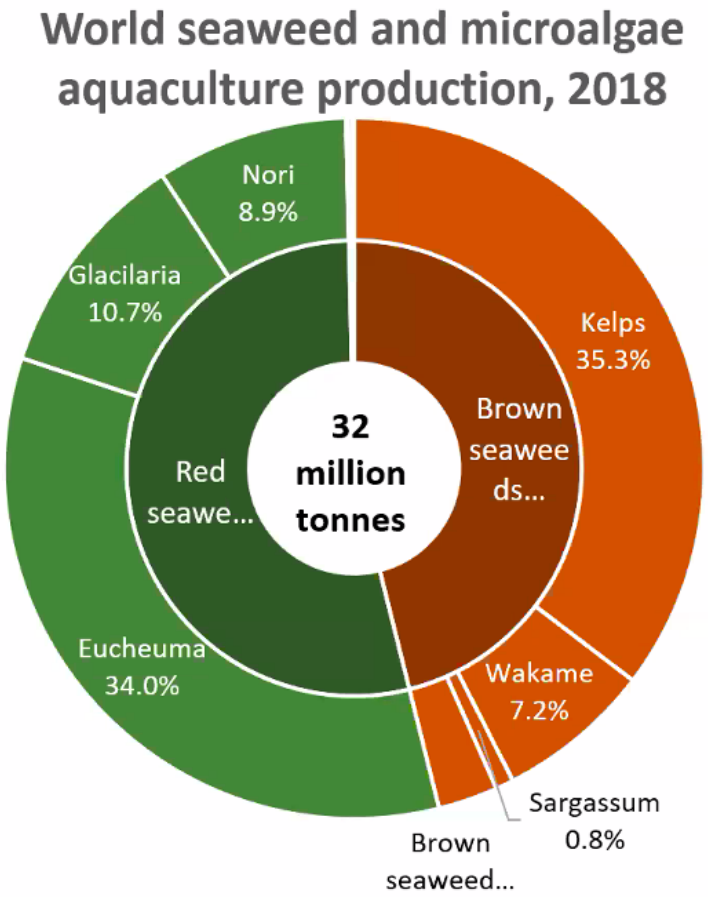
www.futurefoods.wales.

# World Seaweed & Microalgae Aquaculture Production

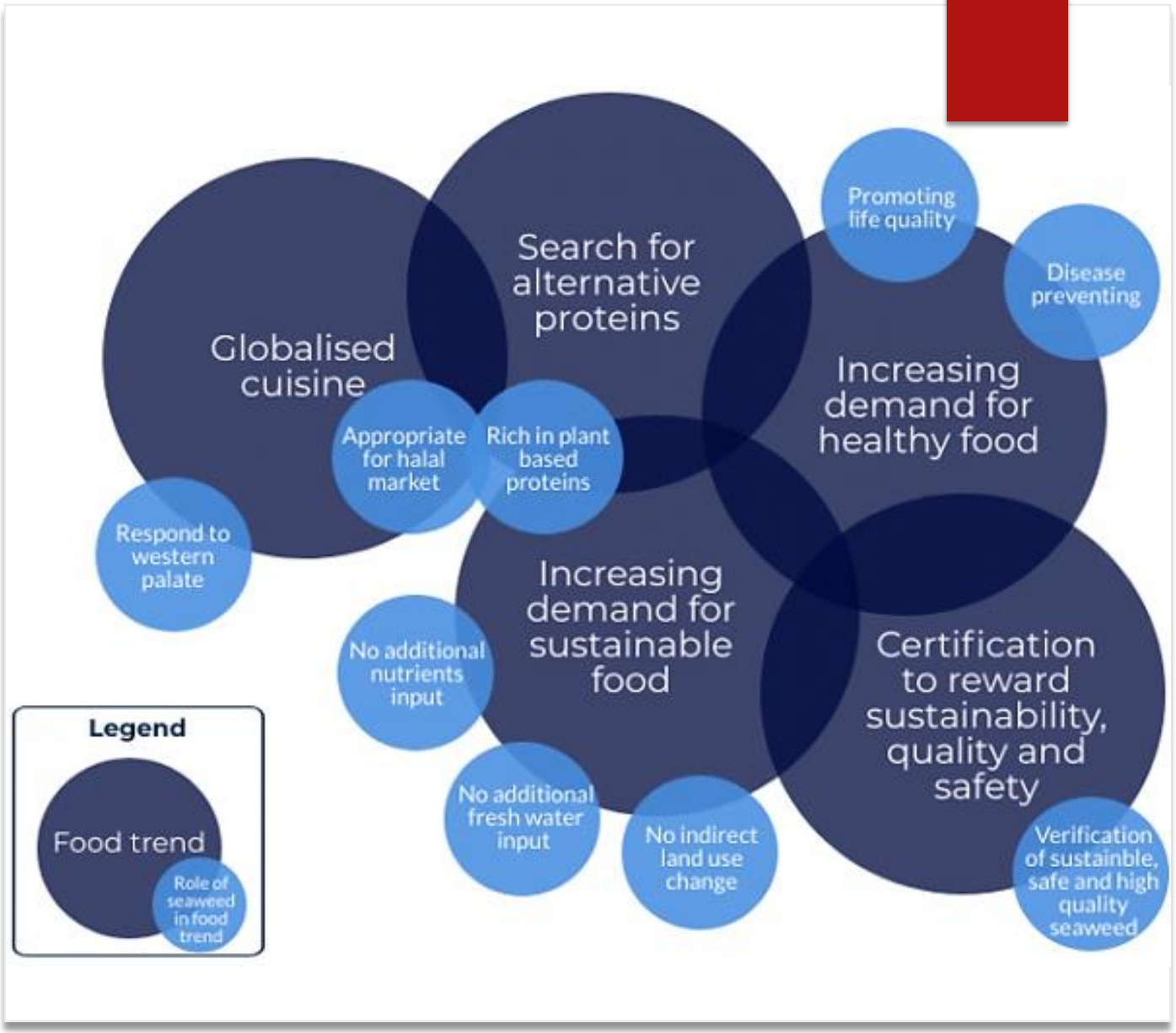
| Country/area | Seaweed and microalgae aquaculture production, 2018 | |
|---|---|---|
| | Tonnes (wet weight) | Share of world total (%) |
| **World** | **32 386 189** | **100.00** |
| **Asia** | **32 231 955** | **99.52** |
| China | 18 575 280 | 57.36 |
| Indonesia | 9 320 298 | 28.78 |
| Korea, Republic of | 1 710 500 | 5.28 |
| Philippines | 1 478 301 | 4.56 |
| Korea, Dem. People's Rep | 553 000 | 1.71 |
| Japan | 389 800 | 1.20 |
| Malaysia | 174 083 | 0.54 |
| **Africa** | **112 815** | **0.35** |
| United Republic of Tanzania | 104 550 | 0.32 |
| Madagascar | 5 337 | 0.02 |
| **Americas** | **21 984** | **0.07** |
| Chile | 21 178 | 0.07 |
| **Oceania** | **14 040** | **0.04** |
| Solomon Islands | 5 520 | 0.02 |
| Papua New Guinea | 4 300 | 0.01 |
| Kiribati | 3 650 | 0.01 |
| **Europe** | **5 396** | **0.02** |
| Russian Federation | 4 527 | 0.01 |



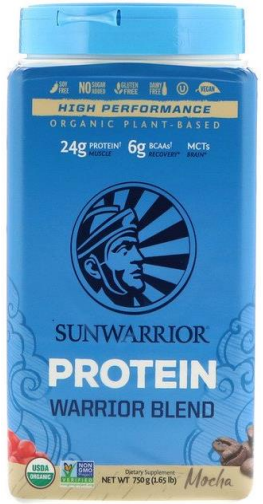

*Data source*: FAO Fishery and Aquaculture Statistics. Global aquaculture production 1950-2018 (FishstatJ) ; www.fao.org/fishery/statistics/software/fishstatj/en).

# Market Overview

- Global Algae market (food and supplements) was valued at $3.89 bn in 2018. Expected to reach $ 5.98 billion by 2026; a CAGR of 5.5% (Reports and Market, 2020).
- Global commercial seaweeds market is expected to be reach $11.9 billion by 2027, a CAGR of 10.1% (Grandview Research, 2020).
- Driven by the awareness of the health benefits the demand for commercial sea vegetables in food applications is set to continue to grow.



# Seaweed & Algae as a Quality Protein Source





ALGAE HAS DEMONSTRATED POTENTIAL TO MEET THE POPULATION'S NEED FOR A MORE SUSTAINABLE FOOD SUPPLY

SPECIFICALLY PROTEIN & ITS BIOACTIVE COMPOUNDS

## MICROALGAE PROTEIN

- Low land requirements and higher protein yield per area, even for plant-based protein.
- Potential replacement of non-sustainable soy imports
- High-quality protein and amino acid profile (source of lysine, often low in plant protein ) - up to 70% protein content

*The marine environment represents a relatively untapped source of functional ingredients that can be applied to various aspects of food processing, storage and fortification.*


# Edible Seaweed Nutritional Overview



THE NUTRITIONAL COMPOSITION OF SEAWEED VARIES BETWEEN SPECIES, SEASON AND ECOLOGY OF THE HARVESTING LOCATION.

*Research into the relationship of location and seasonality would aid the identification of the ideal conditions for functional food & bioactive components.*

- High calcium, magnesium, phosphorous, iron and iodine compared to land plants
- High in vitamins compared to land plants with high level of vitamin A,D, E and B-complex
- Potassium content is high, responsible for its salty taste – **NOT SODIUM** so beneficial for reducing salt intake
- High amounts of PUFAs, omega 3 fatty acids
- Bio actives in microalgae are linked to being antioxidative, anti-hypertensive, immunomodulatory, anti-carcinogenic, hepato-protective, and anti-coagulant
- Good source of protein, carbohydrates, fibre and low sugar

Many studies advocate the health benefits of seaweed supplementation alongside a balanced diet

*Regular consumption of seaweed effectively reduced the depressive symptoms among pregnant Japanese women as well decreased the risk of suicide in adults.*

*Frequent consumption of dietary seaweeds decreased the risk of diabetes mellitus in the Korean population.*


# Spirulina and Chlorella


Algael biomass is currently restricted to only a few species, e.g., Spirulina (Arthospira), Chlorella, Dunalliella, and to a lesser extent, Nostoc and Aphanizomenon

The powder is commonly used to boost food product nutritional profile

Chlorella must be taken as a supplement due to its hard cell walls and high fibre content


Both highly nutritious sources of vitamins, including vitamin A, B vitamins (not B12), and beta-carotene

Spirulina is linked to improved heart health by lowering LDL cholesterol and blood pressure

Supplementing daily positively reduced cholesterol and blood pressure


High in essential amino acids and mineral content - influenced by water culture

Natural source of DHA accounting for up to 9.1% of the total fatty acids

# Key Trends

FUNCTIONAL

PROTEIN

PLANT BASED

VEGAN

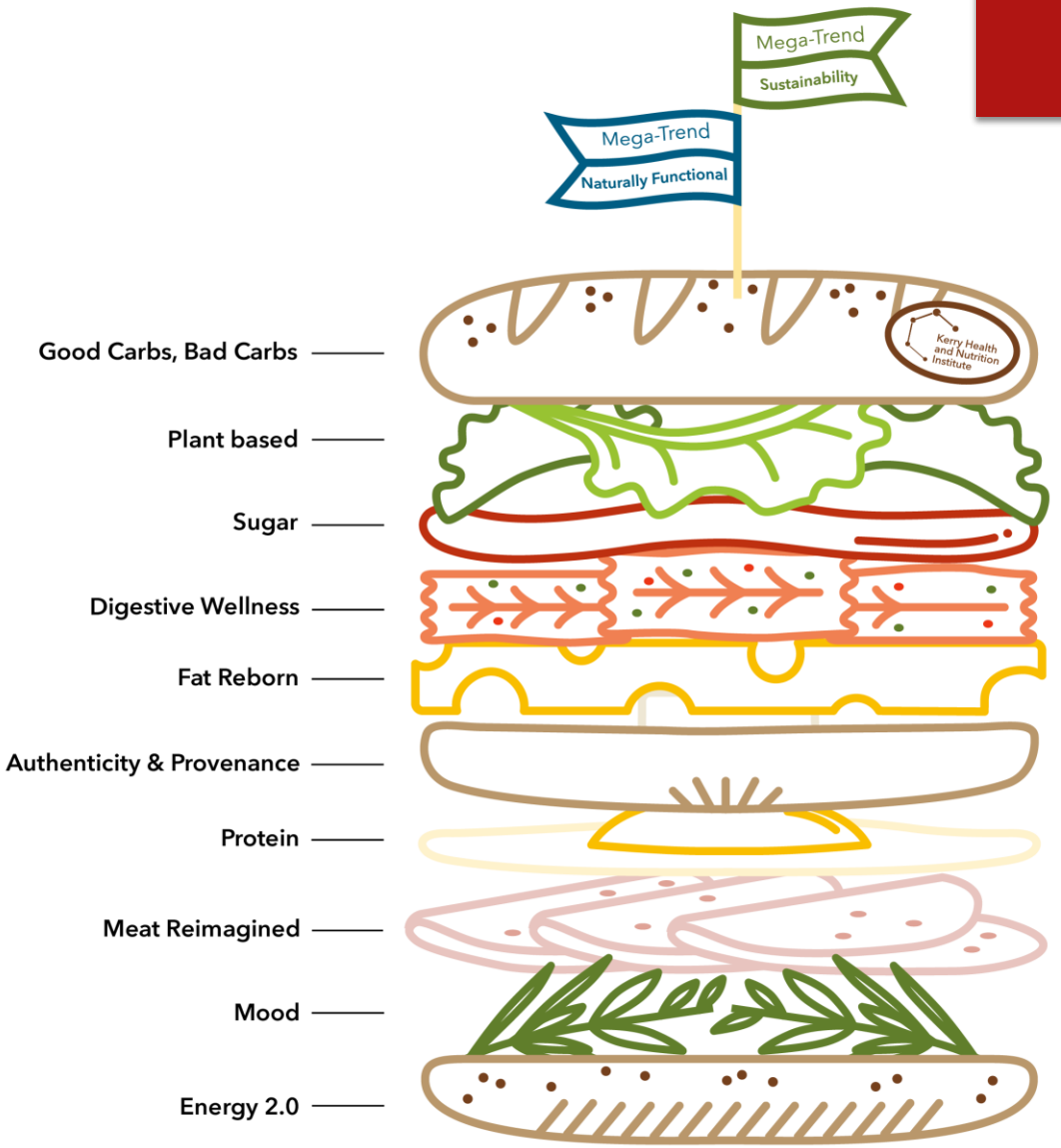
ENVIRONMENT

SUSTAINABLE

NATURAL GOODNESS

CONVENIENCE

But…. taste reigns **KING!**




https://khni.kerry.com/trends-and-insights/ten-key-health-and-nutrition-trends-of-this-year/

# Ipsos Mori Consumer Research

- 1,010 consumers surveyed

## Seaweed Grinder

Ground seaweed is a healthy, convenient alternative to salt and can be used to replace salt in everyday dishes as a natural flavour enhancer. It is rich in iodine which is a vital nutrient for a healthy diet especially for vegetarians and vegans.

Using our seaweed grinder in your cooking can help with weight reduction, improving healthy heart function and reducing blood pressure.

As our seaweed is harvested and cultivated in the UK it has a lower carbon footprint than seaweed imports from Asia. Because seaweed is a highly renewable and natural food resource, we can provide a constant supply of products without impacting on the environment.

## Algae Burgers

Our burgers are made combining algae with other vegetables to provide a great tasting and highly nutritious, convenient product.

They contain high levels of protein and omega 3 fatty acids, ideal to support a healthy diet for vegetarians and vegans. The algae can boost human immune systems and maintain healthy blood sugar and cholesterol levels.

When algae is growing, it consumes carbon dioxide and releases oxygen. By using waste carbon dioxide, algae is extremely useful in reducing the carbon footprint by reducing carbon dioxide emissions.

## Spirulina Flour

Spirulina flour is an easily-digested, neutral-tasting flour, and an ideal protein source.

It is made from algae with excellent protein quality (similar to eggs), giving you all the amino acids you need

Spirulina flour also contains phycocyanin - a powerful antioxidant - and has anti-inflammatory properties, perfect for your general well-being

Our Spirulina is grown responsibly, by using waste carbon dioxide from industry. Helping to reduce carbon dioxide emissions and carbon footprint.

# Seaweed grinder is the best performing of all the ideas in Wales as a healthy and unique alternative to salt

- Consumers also like that added benefit of a lower carbon footprint

Seaweed Grinder

**166** **Opportunity Score**

Relevance Differentiation Believability

Archetype: **'Winner'**

Potential beyond marketplace expectations

**Likelihood to try**

**68%**

*Definitely / probably would try*

**Most Relevant:**

- *healthy heart function*
- *reducing blood pressure*

**New & Different:**

- *convenient alternative to salt*
- *lower carbon footprint*

**Least Relevant:**

- *Vegetarians and vegans*

**Difficult to Believe:**

- *without impacting [on the] environment*

Underlined text denotes most common messages specific to Wales (vs. UK)

Best Worst

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# Unlike UK, algae burgers perform well in Wales, driven by much stronger relevance for associated health benefits

Algae Burgers

- Providing free samples may encourage trial by supporting 'great tasting' claims

**127** **Opportunity Score**

Relevance Differentiation Believability

Archetype: **'Breakthrough'** Likelihood to try

Potential for (sub) category creation

**44%**

*Definitely / probably would try*

**Most Relevant:**

- *Healthy blood sugar and cholesterol levels*
- *Protein, omega 3*
- *Boost immune systems*

**New & Different:**

- *Combining algae with other vegetables*

**Least Relevant:**

- *Vegetarians / vegans*
- *Algae*

**Difficult to Believe:**

- *Great tasting*
- *Maintain healthy blood sugar*

Underlined text denotes most common messages specific to Wales (vs. UK)

Best Worst

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Food & Drink Wales

Clwstwr Maeth-Cymru
Nutri-Wales Cluster

# Spirulina flour is a winning idea, thanks to its health benefits

Spirulina Flour

- But evidence to support reduced $CO_2$ claims would help bolster credibility

**123** **Opportunity Score**

Relevance Differentiation Believability

Archetype: **'Winner'**

Potential beyond marketplace expectations

**Likelihood to try**

**40%**

*Definitely / probably would try*

**Most Relevant:**

- *Easily-digested*
- *Protein*
- *Antioxidant & anti-inflammatory*

**New & Different:**

- *[made from] algae*
- *antioxidant [and has] anti-inflammatory*

**Least Relevant:**

- *Algae*
- *Anti-inflammatory*
- *Neutral-tasting*

**Difficult to Believe:**

- *reduce carbon dioxide emissions*

Underlined text denotes most common messages specific to Wales (vs. UK)

Best Worst

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Food & Drink Wales

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# In general, the idea of algae is off-putting until people understand the benefits – then they quite like it

“

At first impression, the micro-algae doesn’t sound appealing. However, the benefits of high in protein and antioxidants is a nutritional benefit.

Female, traditional diet

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# Current & Emerging Products

- Omega 3
- Mineral and vitamin enhanced substitutes
- Antioxidant capsules – food supplement
- Super greens powders, vegan protein powders
- Protein and meat alternatives
- Gut health, Fibre enhancers, Probiotic
- Functional snacks
- Energy shots
- Carbohydrate alternatives
- Anti inflammatory
- Metabolic health
- Weight management/loss
- Neurological enhancer
- Salt alternative















# Commercial opportunities

Products such as β-carotene, astaxanthin and phycocyanin hold high values – but purity is KEY

Products with natural bio active and functional compounds command higher values

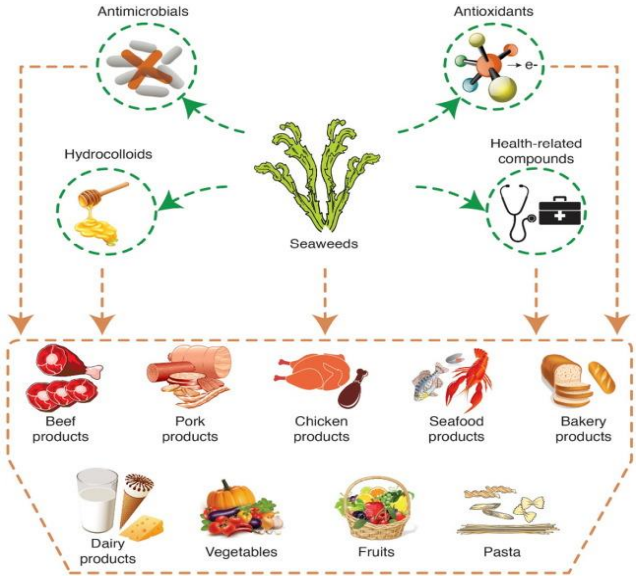
The health associated benefits are THE driving factors to their growing interest and consumer base

## Commercial opportunities

- Microalgae as a food additive could reduce oxidation and improve shelf life
- Microalgae to deliver bioactive compounds to stimulate the growth of probiotic bacteria in yogurts, kefir and fermented milk.
- Used to promote the nutrition profile and aid functionality of new and existing food products
- Salt alternatives
- Sustainable packaging
- Animal feed
- Agricultural bio-stimulants
- Sustainable farming
- Circular economy tool to reduce waste and add-value

# Opportunities

- Sustainable farming
- Bio stimulates
- Micronutrient enhancers
- Decrease oxidation
- Bio compounds for probiotics
- Stabilisers
- Salt alternative
- Packaging



# Coastal Edge SIG Development

- There is a potential ocean of opportunities for the region within the Coastal Edge sector.
- Explore and demonstrate the opportunity based on the current global market with regard to farming, aquaculture, technology and utilisation of seaweed and algae; the growth of seaweed and algae based products internationally and the organisations and industry leaders within the category.
- The abundance of coastline within Wales could provide an economic and sustainable solution for supporting the health & well-being of the population whilst also delivering environmental benefits as well as future skilled workforces.

Seaweed and Algae

Aquaculture

Sea Salt & Sea Vegetables

CEA Brine Crops

Nutritional Solutions

Fertiliser

Animal Feed

Desktop Research

Study Tour looking at Farming, Technology, Infrastructure: The Netherlands/Asia/France

Event Activity to Engage Experts and Organisations

Consumer Insight Research (Ipsos Mori)

Feasibility Studies within Wales for Infrastructure Development

Stage 2: Scale Up Trial Activity for R&D: Species, Sustainable Agriculture Analysis, Nutrition & Product Delivery

Dutch Weed Burger


Mushroom & Seaweed Bites