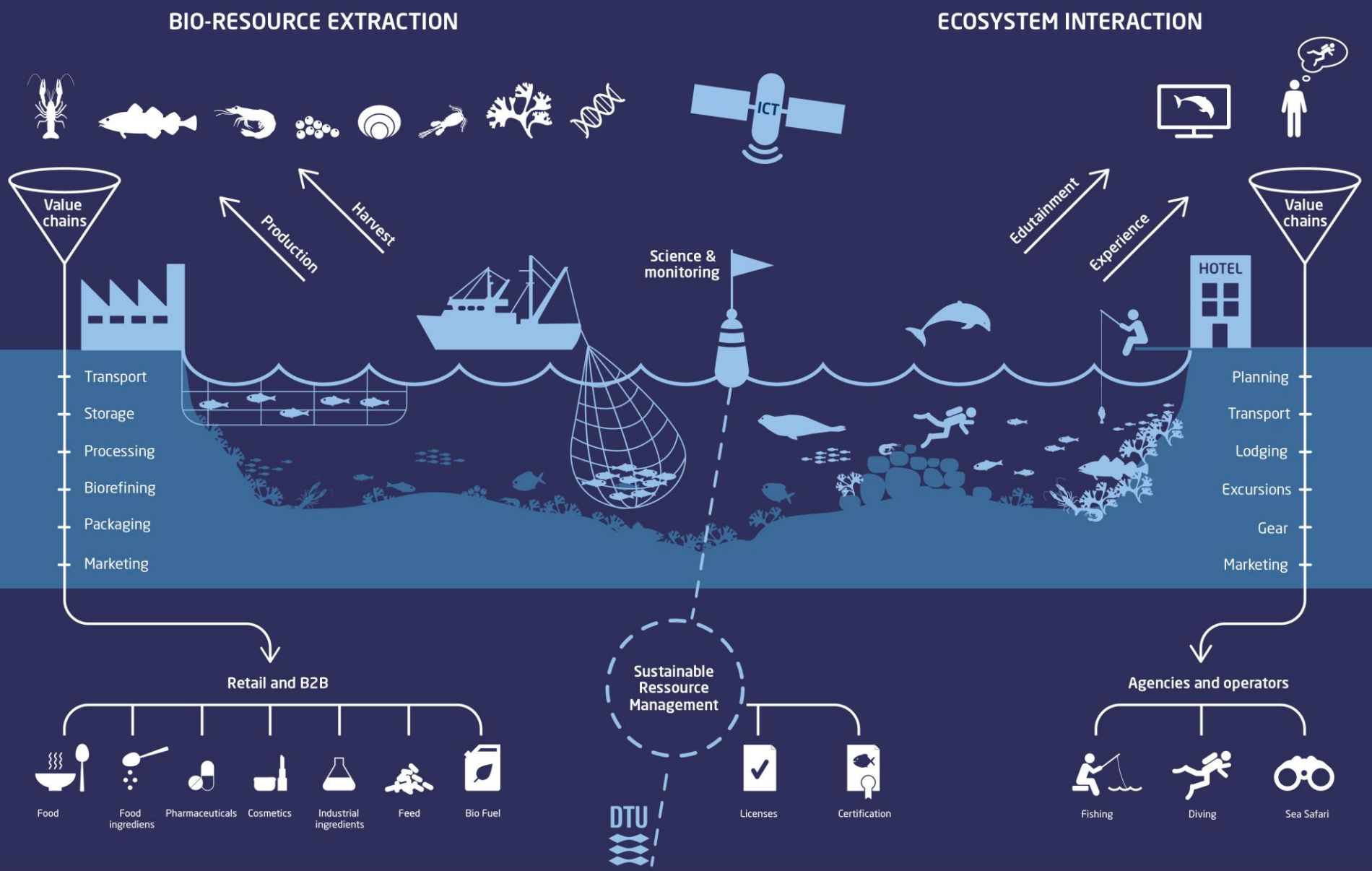
Blue Bioeconomy

Workshop on the Implementation of the European Strategy for the Bioeconomy

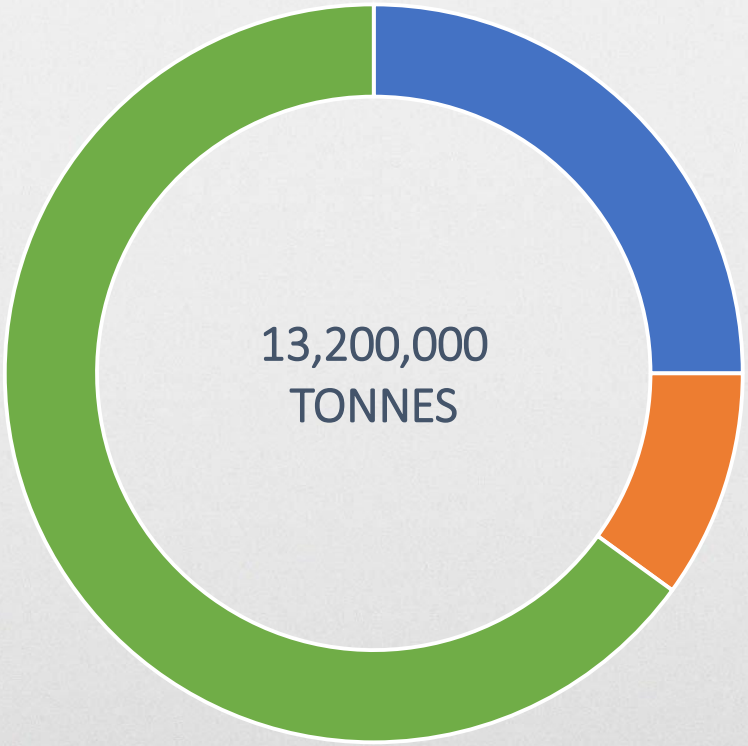
Tom Redd

JPI OCEANS

BLUE BIOECONOMY



THE EU SEAFOOD MARKET SUPPLY



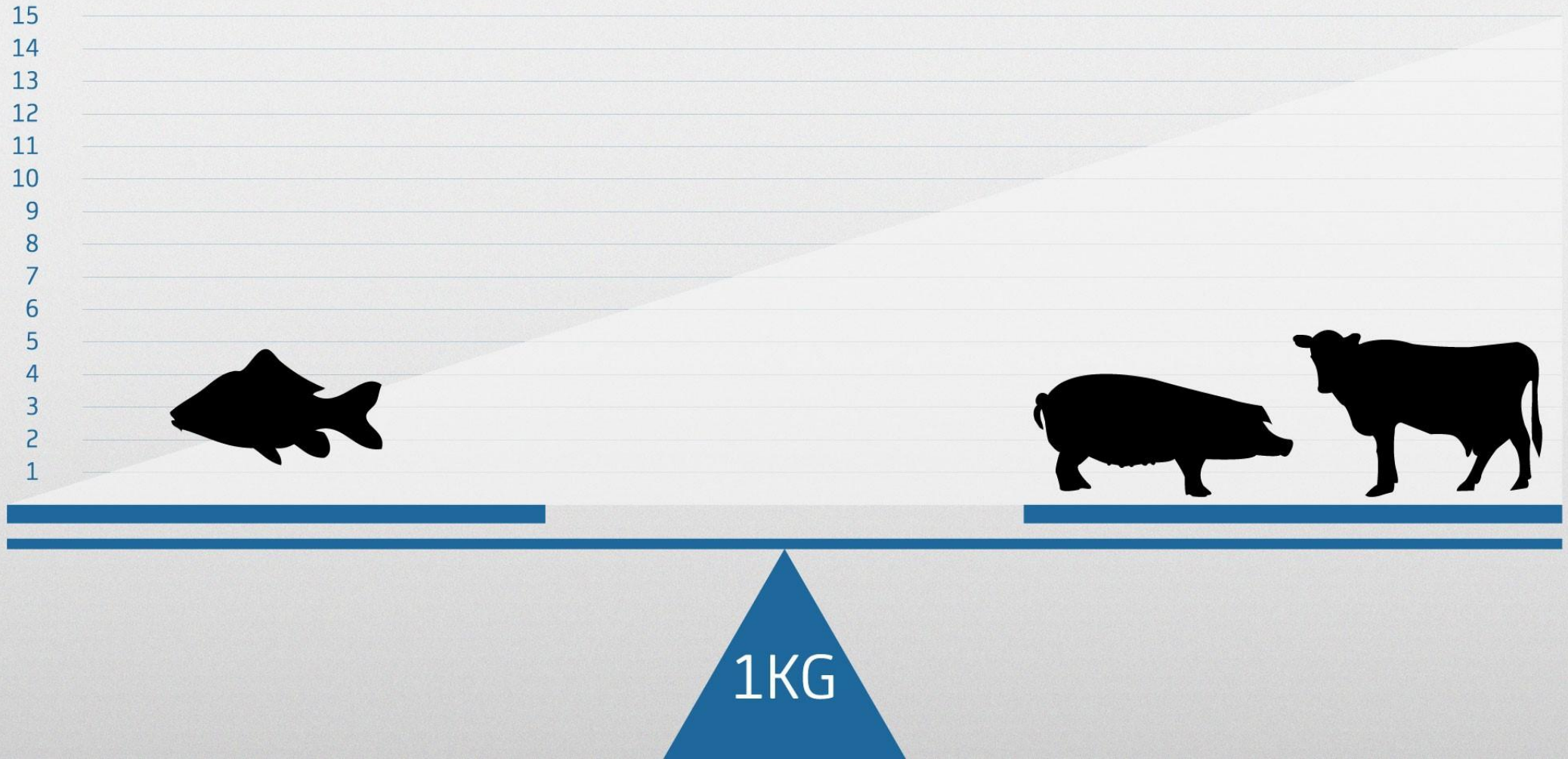
FROM EU FISHERIES
25%

FROM EU AQUACULTURE
10%

FROM IMPORTS
65%

AQUACULTURE

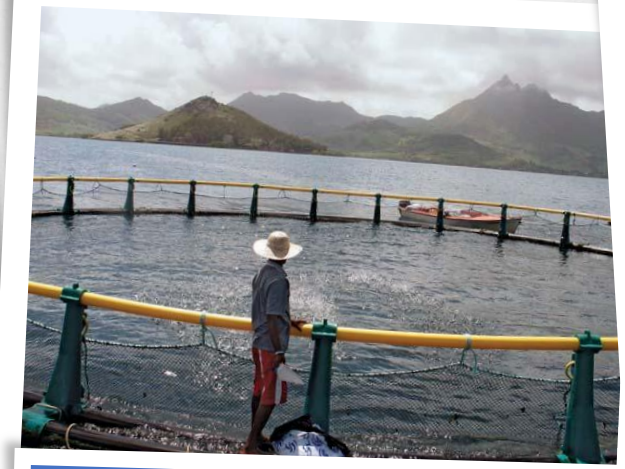
IT TAKES 15 TIMES AS MUCH FEED TO PRODUCE 1 KILOGRAM OF BEEF AS TO PRODUCE 1 KILOGRAM OF CARP.



AQUACULTURE

ROOM FOR IMPROVEMENT IN EUROPE

INTEGRATED MULTI-TROPHIC AQUACULTURE



CARP FARMING INTEGRATED WITH SERICULTURE IN CHINA

AQUAPONICS

OTHER USES FOR MARINE-DERIVED COMPOUNDS

COSMETICS

NUTRITIONAL SUPPLEMENTS

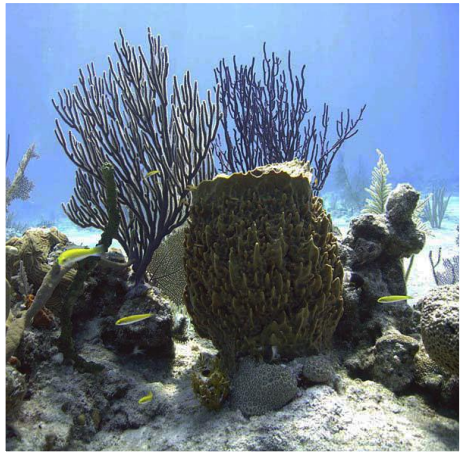
ARTIFICIAL BONE

INDUSTRIAL APPLICATIONS

POTENTIAL AND OPPORTUNITY

MARINE BIOTECHNOLOGY – MEDICAL ADVANCEMENTS

ZOVIRAX – DRUG DERIVED FROM A CARIBBEAN SPONGE
THAT TREATS HERPES, CHICKENPOX AND SHINGLES



YONDELIS – DRUG DERIVED FROM SEA SQUIRT THAT TREATS SOFT TISSUE SARCOMA

PRIALT - A PAINKILLER
DERIVED FROM A CONE SNAIL

JPI Oceans – an intergovernmental process

Vision:

Enabling Blue Growth and jobs whilst fostering the health and productivity of seas and oceans and addressing the pressures posed by climate change and human impacts.

Mission:

Providing a strategic platform for a long-term approach to marine and maritime research and innovation to increase impact of investments.

Members

21 member countries

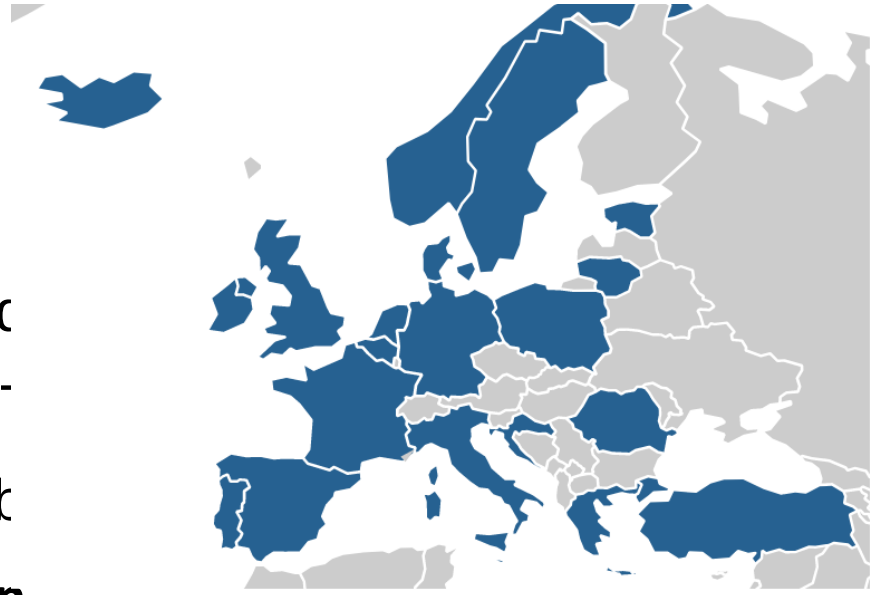
Management Board of Ministries and Research func

European Commission services as observer (DG R

International Partners may engage in actions case b

JPI Oceans covers all European sea basins and European

interests in the global ocean



Blue Bioeconomy Cofund

Unlocking the potential of aquatic bioresources

National and regional funding organisations from 16 European countries

1st Joint Call 2018

29 million Euro
with 8 million Euro EU top-up

- Priority area 1: Exploring new resources
- Priority area 2: Exploring improvements in fisheries and aquaculture
- Priority area 3: Exploring synergies with other sectors
- Priority area 4: Exploring Biotechnology and ICT

Blue Bioeconomy Cofund

Unlocking the potential of aquatic bioresources

Achieving zero waste by optimising the use of underutilised material

Applying biotechnology and ICT to develop smart, efficient, traceable food systems

Creating synergies between aquaculture and fisheries

Unlocking the potential of microbiomes in aquaculture, fisheries, and food processing

Creating predictive tools to conserve biodiversity hot-spots in the oceans

Exploring synergies with land-based production

Improving aquaculture and fisheries

Strategies…


Cooperation in Fisheries, Aquaculture and Seafood Processing
Summary results
FORESIGHT ANALYSIS STUDY
November 2014
SHARED RESEARCH INFRASTRUCTURES
STRATEGIC RESEARCH AGENDA
For Fisheries, Aquaculture and Seafood Processing
COFASP
MARINE BIOTECHNOLOGY STRATEGIC RESEARCH AND INNOVATION ROADMAP
INSIGHTS TO THE FUTURE DIRECTION OF EUROPEAN MARINE BIOTECHNOLOGY
MarineBiotech
Perspectives for the Fisheries, Aquaculture, Seafood processing in the EU – The COFASP Case Studies
ERA-MBT Foresight Report
CSA OCEANS
JPI Oceans
A Foresight Process for JPI Oceans
A Final Recommendation
JPI OCEANS
Strategic Research and Innovation Agenda 2015-2020

Blue Bioeconomy Forum

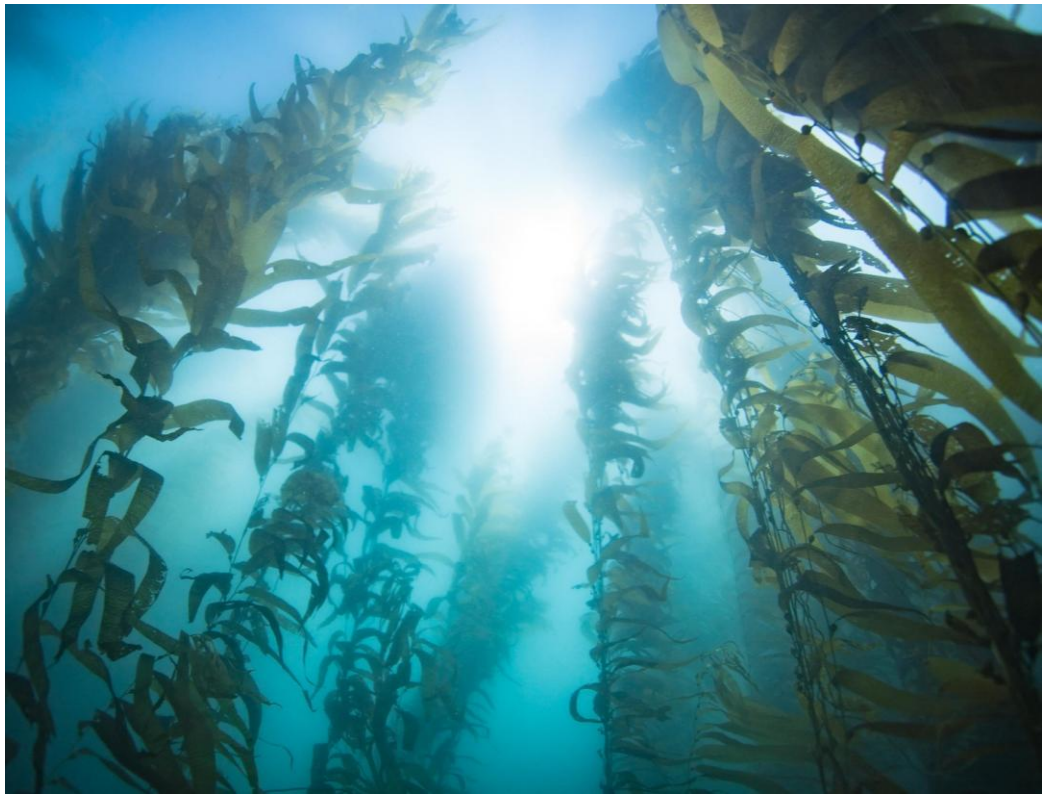
Unlocking the potential of aquatic bioresources

Brings together a partnership of industry, public authorities, academia, and finance in order to strengthen Europe's competitive position in the emerging Blue Bioeconomy

Aims:

- Develop a shared understanding of the current status of the Blue Bioeconomy in Europe
- Identify strategic developments, market opportunities, appropriate financial assistance, regulatory actions and research priorities to advance the Blue Bioeconomy in Europe

Next Stakeholder Conference: 25 June, Brussels




0092

Synergies with other areas of the Bioeconomy

Roque et al. Animal Microbiome (2019) 1:3
https://doi.org/10.1186/s42523-019-0004-4

RESEARCH ARTICLE

Animal Microbiome

Open Access

Effect of the macroalgae *Asparagopsis taxiformis* on methane production and rumen microbiome assemblage

Breanna Michell Roque[1], Charles Garrett Brooke[1], Joshua Ladau[2], Tamsen Polley[1], Lyndsey Jean Marsh[1], Negeen Najafi[1], Pramod Pandey[3], Latika Singh[3], Robert Kinley[5], Joan King Salwen[4], Emiley Eloe-Fadrosh[2], Ermias Kebreab[1] and Matthias Hess[1]*

Abstract

Background: Recent studies using batch fermentation suggest that the red macroalgae *Asparagopsis taxiformis* has the potential to reduce methane (CH_4) production from beef cattle by up to ~ 99% when added to Rhodes grass hay; a common feed in the Australian beef industry. These experiments have shown significant reductions in CH_4 without compromising other fermentation parameters (i.e. volatile fatty acid production) with *A. taxiformis* organic matter (OM) inclusion rates of up to 5%. In the study presented here, *A. taxiformis* was evaluated for its ability to reduce methane production from dairy cattle fed a mixed ration widely utilized in California, the largest milk producing state in the US.

Results: Fermentation in a semi continuous in vitro rumen system suggests that *A. taxiformis* can reduce methane production from enteric fermentation in dairy cattle by 95% when added at a 5% OM inclusion rate without any obvious negative impacts on volatile fatty acid production. High-throughput 16S ribosomal RNA (rRNA) gene amplicon sequencing showed that seaweed amendment effects rumen microbiome consistent with the Anna Karenina hypothesis, with increased β diversity, over time scales of approximately 3 days. The relative abundance of methanogens in the fermentation vessels amended with *A. taxiformis* decreased significantly compared to control vessels, but this reduction in methanogen abundance was only significant when averaged over the course of the experiment. Alternatively, significant reductions of CH_4 in the *A. taxiformis* amended vessels was measured in the early stages of the experiment. This suggests that *A. taxiformis* has an immediate effect on the metabolic functionality of rumen methanogens whereas its impact on microbiome assemblage, specifically methanogen abundance, is delayed.

Conclusions: The methane reducing effect of *A. taxiformis* during rumen fermentation makes this macroalgae a promising candidate as a biotic methane mitigation strategy for dairy cattle. But its effect in-vivo (i.e. in dairy cattle) remains to be investigated in animal trials. Furthermore, to obtain a holistic understanding of the biochemistry responsible for the significant reduction of methane, gene expression profiles of the rumen microbiome and the host animal are warranted.

Keywords: 16S rRNA community profiling, *Asparagopsis taxiformis*, Feed supplementation, Greenhouse gas mitigation, In-vitro rumen fermentation, Macroalgae, Rumen microbiome

JPI OCEANS

THANK YOU

Tom Redd

Email: tom.redd@jpi-oceans.eu

Website: www.jpi-oceans.eu

Twitter: @jpioceans