



Utilization of by-products in Greenland: Challenges, opportunities and innovation

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Agenda

- Royal Greenland – Background
- Utilization of by-products in Greenland
 - Challenges
 - Opportunities
 - Innovation projects
- Perspectives



Background

- The history of Royal Greenland dates back to 1774
- The largest seafood company in the North Atlantic
- Independent company 100% owned by the Greenlandic Government
- Greenland is the world's largest island, roughly the size of Western Europe, but counts only 56.000 inhabitants
- More than 2.200 employees around the globe, here of almost 1.400 in Greenland
- More than 1.500 independent fishermen deliver their catch to Royal Greenlands facilities
- Operates own fishing fleet and production units in Greenland, Atlantic Canada and Germany



Royal Greenland World Map



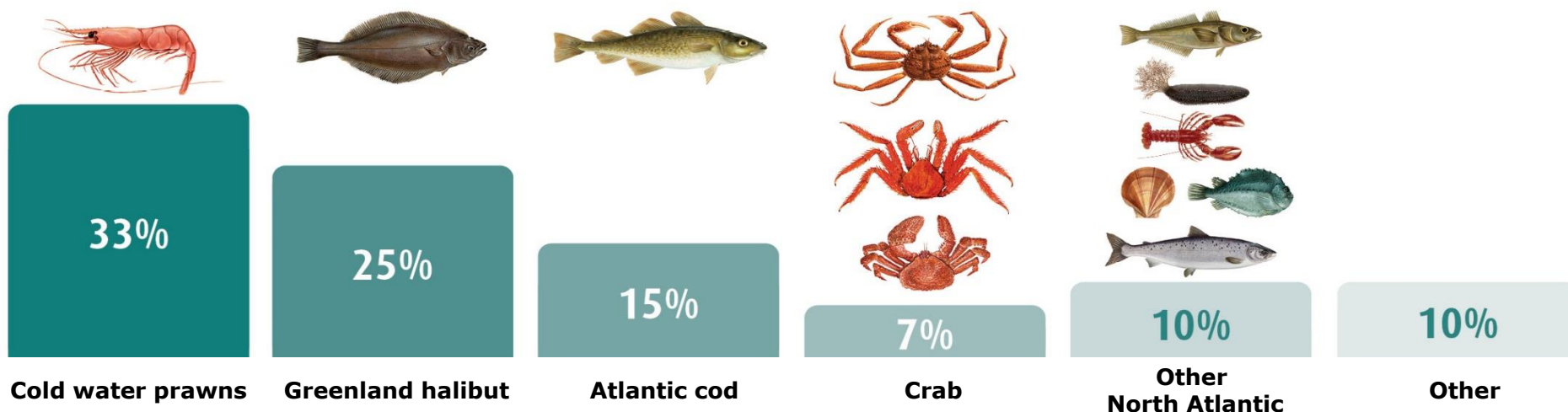
WORLD MAP

● 49 Production sites
● 15 Sales & administration offices

Volumes and product categories



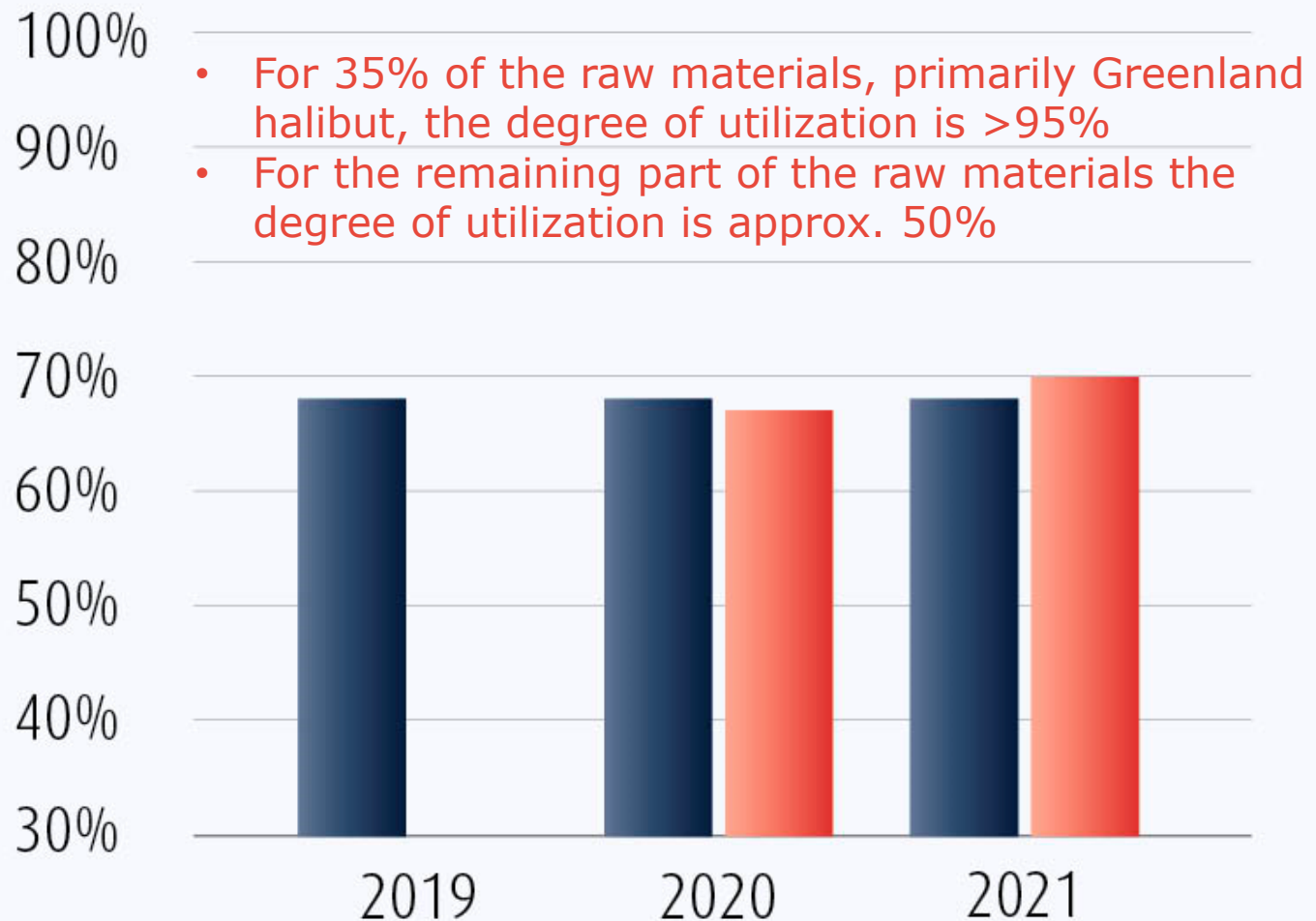
- Raw materials
 - Own fishing (trawlers) → 68.000 tonnes on an annual basis (25% of the catch should be landed and processed on-shore)
 - Independent fishermen → 86.000 tonnes on an annual basis



World's largest supplier

Resource utilization of raw materials

■ Greenland total ■ RG Group



Challenges

- Lack of infrastructure
 - No two cities in Greenland are connected by roads → large distances (2.500 km from Aappilattoq in the south to Qaanaaq in the north)
 - All side-streams must be transported by sea (costly and complicated by unstable weather conditions and ice formation)
- Volumes of side-streams
 - Some of the production facilities are very small (1-10 employees) → social responsibility (“survival” of the small settlements)
 - Relatively small volumes of side-streams → production must be centralized to make it profitable
- High energy costs
- Labor shortage



Opportunities – At sea

- On-going investments and renewal of Royal Greenlands trawler fleet
- Four new trawlers
 - 2019: Avataq (prawns and fish)
 - 2019: Sisimiut (fish)
 - 2021: Nataarnaq (prawns)
 - 2022: Tuugaalik (fish)
- Equipped with modern processing facilities for utilization of side-streams (e.g. production of fish oil and meal) → close to 100%



Opportunities – Land based production

- Production of prawn meal (flavorings) from the shells of cooked and peeled prawns
- Cut-offs from the production of Greenland halibut (i.e. heads, tails and fins)
 - Previously → used to feed the sledge dogs
 - Now → sold as high-value products to Asia
 - 95% of the raw material is used



Frills for sushi



- Production of bait from side-streams of fish and shellfish (joint venture with a Norwegian company)
- Drying of sea cucumber (test production)

Innovation projects





Optimal utilization of seafood side-streams through the design of new holistic process lines



Bio-based Industries Consortium



Horizon 2020
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For Research & Innovation

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MAIN OBJECTIVES

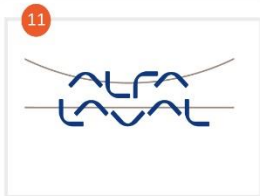
-  To solve challenges that prevents more sound exploitation of the aquatic resources

THIS WILL BE OBTAINED BY DEVELOPING:

-  Sorting technologies
-  Storage solutions
-  Decision tools that will secure an efficient, sustainable supply system for by-catches, and side-streams from aquaculture, fisheries and the aquatic processing industries
-  Technologies to convert seafood side-streams into high value food and feed ingredients

QUICK FACTS:

-  **Project duration:**
1 May 2019 to 30 September 2023
-  **Funding:** EC contribution € 3,2 million, overall budget € 4 million
-  **Consortium:** 3 research institutes/ universities, 1 industry cluster and 9 companies from Denmark, Sweden, Belgium & Spain

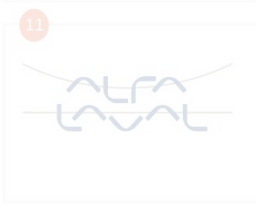


THE WASEABI CONSORTIUM





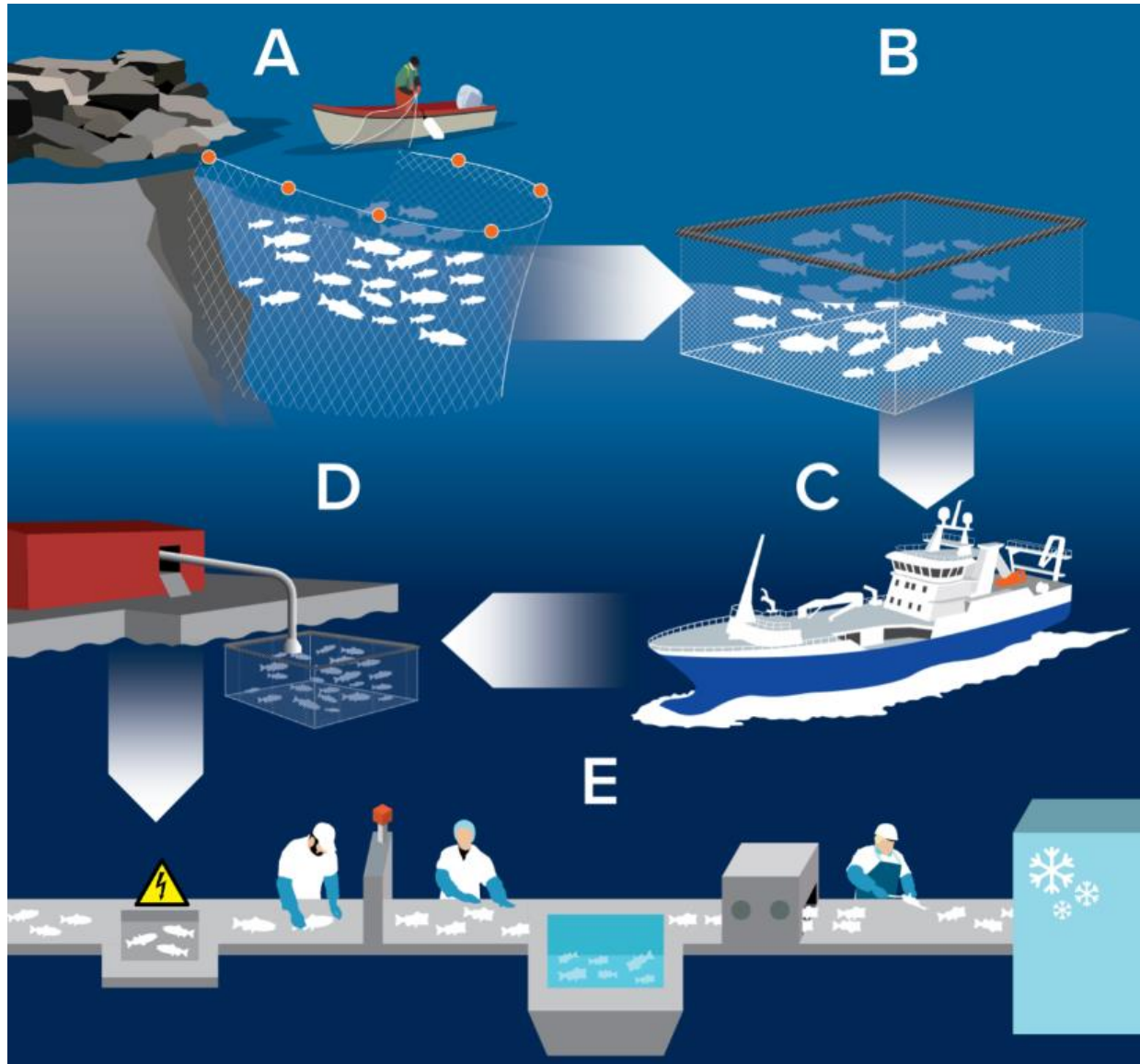
Case: Utilization of by-products from the production of Nutaaq[®] cod in Maniitsoq, Greenland



THE WASEABI CONSORTIUM



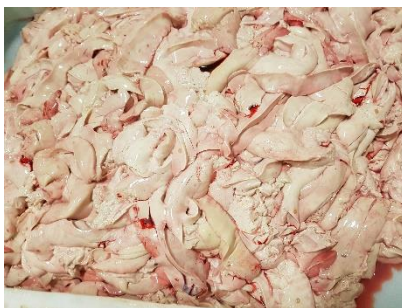
Production of Nutaaq® cod in Greenland



Nutaaq meaning "new" in Greenlandic

Production of Nutaaq® cod in Greenland

- 3.000 to 6.000 tonnes of raw material on an annual basis → 1.800 to 3.600 tonnes of high quality side-streams



- Small production of cod liver oil on-site in Maniitsoq
- Stomachs to China
- Heads to Iceland
- **Research and development of ingredients within the WASEABI-project**

How far are we?

- 🐟 Antioxidant dipping technology to prevent lipid oxidation of cod side-streams has been developed and tested
- 🐟 Technology development for new ingredients completed in lab scale (ongoing):
 - 🐟 Savoury ingredients from cod solid side-streams
 - 🐟 Mineral products based on bones from cod





Preservation of underutilized fish biomasses for improved quality, stability and utilization



<https://profius-project.com/>

<https://www.linkedin.com/in/profius-project-bb9b15232/>

Main objectives

- To address challenges in the supply chain related to lumpfish (roe and carcass) and tuna side-streams

This will be obtained by developing:

- Preservation solutions for maintaining quality and improving utilization of the entire biomass
- New applications for lumpfish and tuna side-streams
- Gelatin extraction processes for lumpfish
- Fish feed based on tuna side-streams



Quick facts:

- Project duration: 1 October 2021 to 30 September 2024
- Funding: EC contribution € 1,3 million, overall budget € 1,6 million
- Consortium: 3 research institutes /universities and 3 companies from Malta, Iceland, Norway and Denmark

PARTNERS

Malta

- AquaBioTech Group (ABT)




Iceland

- University of Akureyri (UNAK)



- BioPol (BP) 

Norway

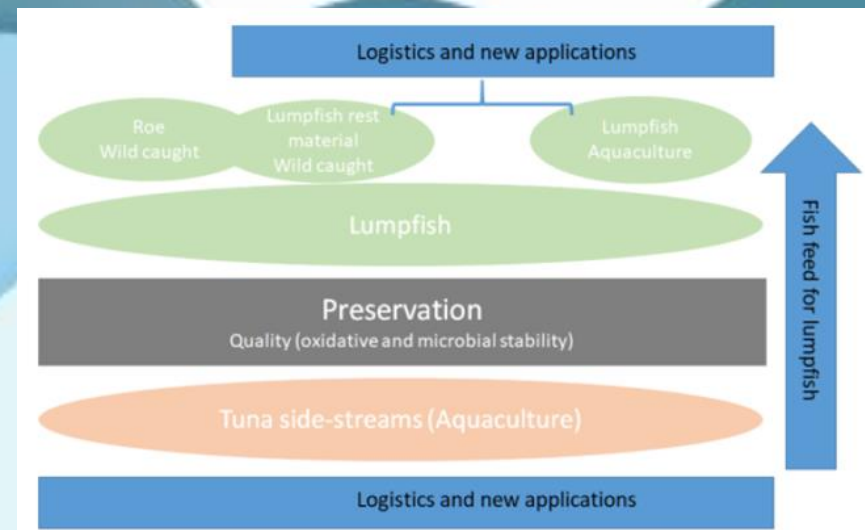
- Norwegian University of Science and Technology (NTNU)  NTNU

Denmark

- Technical University of Denmark (DTU)



- Royal Greenland Seafood A/S (RG)



Lumpfish roe production in Greenland

- Royal Greenland → annual production of approx. 800 tonnes of lumpfish roe (one of the world's largest supplier)
- Lumpfish carcasses are discarded (thrown directly into the sea) → approx. 2.400 tonnes on an annual basis
- A small percentage of the carcasses are exported to China



Lumpfish roe production in Greenland

- Challenges
 - Small boats < 6 meters → Limited space for storage and transportation of the carcasses
 - 14 production facilities along the west coast of Greenland (covering a distance of approx. 1.000 km) → collection of carcasses needs to be centralized (expensive and logistic challenging)
 - For now, the financial incentive for the fishermen is missing



- The Profius project will address
 - Logistic challenges
 - Development of processes and new applications for lumpfish carcasses (e.g. food ingredients)



Perspectives

- Approx. 50.000 tonnes of unused side-streams on an annual basis
- Started with “the low hanging fruits” → the ambition is to move higher up in the value pyramid
- Royal Greenland is open to new projects and business opportunities
- New Innovation Center established at Royal Greenland in 2022 → increased focus on utilization of side-streams
- Participate in the newly announced Danish Ocean Cluster
- 2030 → Close to 100% utilization



Thanks for your attention
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