



Welcome to Wando, The Capital of The Clean Sea!  
WWF(세계자연기금) 및 영국·미국·캐나다 어업인  
완도 해조류 양식산업 현장방문  
2023. 4. 4. ~ 4. 6. (3일간) / 완도군일원 완도군



# SOUTH KOREA KNOWLEDGE EXCHANGE TRIP

- Panel session for the 2023 Scottish Seaweed Industry Association
- April 2023
- Supported by WWF US, WWF UK and the Builders Initiative



**OWEN HAINES**  
Câr-y-Môr community benefit society seaweed and shellfish farm



## Breeding Collaboration to ensure consistent supply

- Government hatcheries
- Universities
- Private hatcheries



# International bonding in Co-op shop

- Advantages of co-op shops
- The power of a grappling hook...to unite nations
- The value of regional farmers working together

# Test government facility open to all

- Daily renting available for testing
- Facilitating product development
- Supporting seaweed processing sector





## Evidence that seaweed grows in the UK

- Superb growing conditions
- Stakeholder support can be achieved
- Some licensing challenges?!





## Can we replicate SK's collaboration?

- A committed and collaborative network throughout the seaweed industry
- Adequate funding and licensing
- Developing markets
- Câr-Y-Môr shows collaboration is possible as a CBS



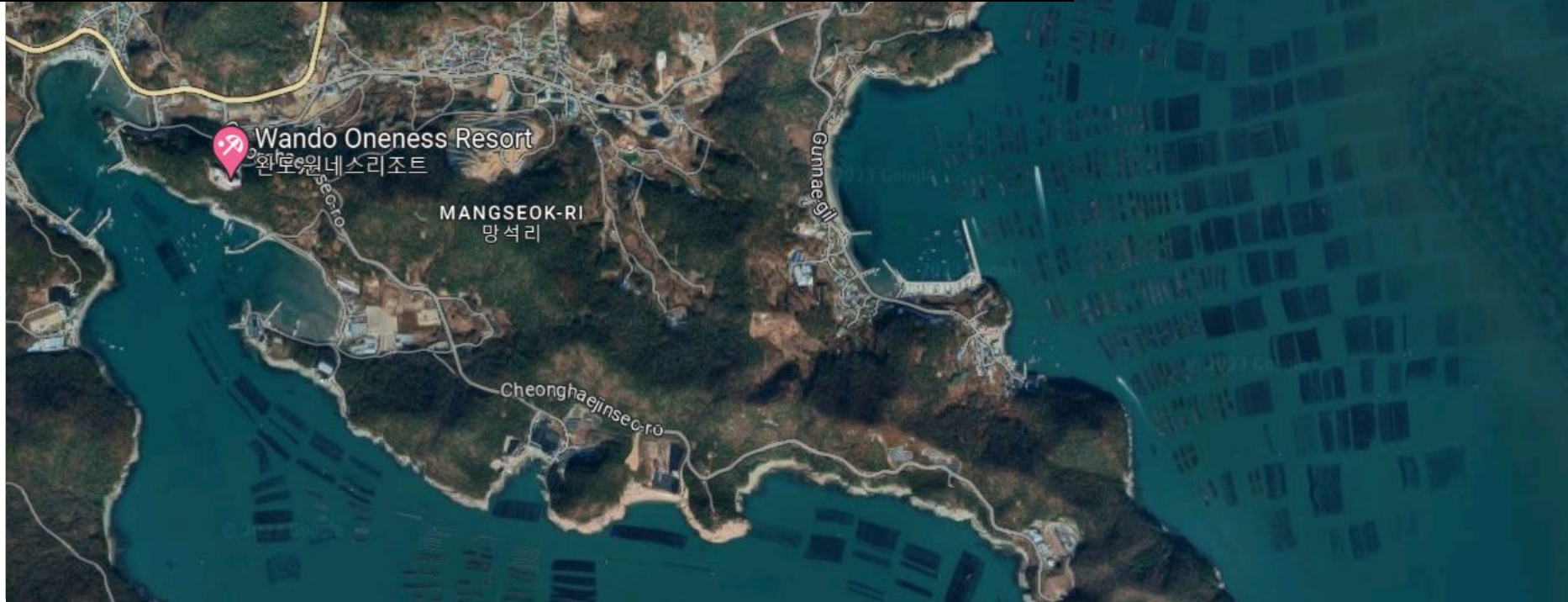
# STEVIE JARRON

Argyll Aquaculture, SSIA Director



# No eureka moment!, but lots of smaller differences

- Co-operative harbour for all
- IMTA in designated cultivation sea area
- Multiple farms of different sizes



# No eureka moment!, but lots of smaller differences

- Co-operative harbour for all
- IMTA in designated cultivation sea area
- Multiple farms of different sizes and species



# Co-operative harbour for all

- Safe moorings area
- Landing and storage shore facilities
- Dock cranes and pontoon walkways





## Versatile but simple farm vessels

- 16m aluminium, low freeboard landing craft
- Long reach versatile deck crane, generator powerplant
- Twin outboards for redundancy and manouveability



## Versatile but simple farm vessels

- 16m aluminium, low freeboard landing craft
- Long reach versatile deck crane, generator powerplant
- Twin outboards for redundancy and manouveability



## IMTA in designated cultivation sea area

- Abalone as a high value crop
- Fed by 65% of Undaria (Wakame) crop
- Simple, nets suspended in water, abalone fed kelp



## Multiple farms of different sizes and species

- miyeok or wakame
- = *Undaria pinnatifida*







## Multiple farms of different sizes and species

- dasima or kombu  
= *Saccharina japonica*





## Multiple farms of different sizes and species

- kim or Nori =
- *Neopyropia yezoensis*, *Neopyropia tenera*,
- *Neopyropia dentata*, *Neoporphyra seriata*



<b>SPECIES</b>	<b>PRODUCTION (MT, WET WEIGHT)</b>	<b>VALUE (US\$ 1,000S)</b>
<b>dasima or kombu</b> = <i>Saccharina japonica</i>	572,595 (33.5%)	90,608 (10.8%)
<b>kim or Nori</b> = <i>Neopyropia yezoensis</i> , <i>Neopyropia tenera</i> , <i>Neopyropia dentata</i> , <i>Neoporphyra seriata</i>	567,827 (33.2%)	572,864 (68.2%)
<b>miyeok or wakame</b> = <i>Undaria pinnatifida</i>	515,666 (30.1%)	135,923 (16.2%)
<b>mojaban</b> = <i>Sargassum fusiforme</i>	36,170 (2.1%)	17,833 (2.1%)
<b>Others</b>	18,226 (1.12%)	22,700 (2.74%)
<b>Sum</b>	<b>1,710,484</b>	<b>839,928</b>

Data from Ministry of Oceans and Fisheries Korea –  
Hwang et al, *Botanica Marina* 2020; 63(4): 395–405



**“Others” high value species grown**

- Mojaban
- = *Sargassum fusiforme*





## “Others” high value species grown

- kkosiraegi or bootlace seaweed
- = *Gracilariopsis lemaneiformis*





# Research on Cultivars

- Hybrids bring best qualities for processors needs
- Best farmers given best seeded lines
- Seamless tie in between research, farming and processing



## Seeded string in pool sized tanks

- String production on frames not spools
- No direct seeding, all string.
- Deployed in short sections, not continuous



# Harvested Seaweed in huge tanks (half the room)

- Stored in seawater for days until needed
- Seawater, agitated by rotating arms
- Piped into factory, slurried for processing



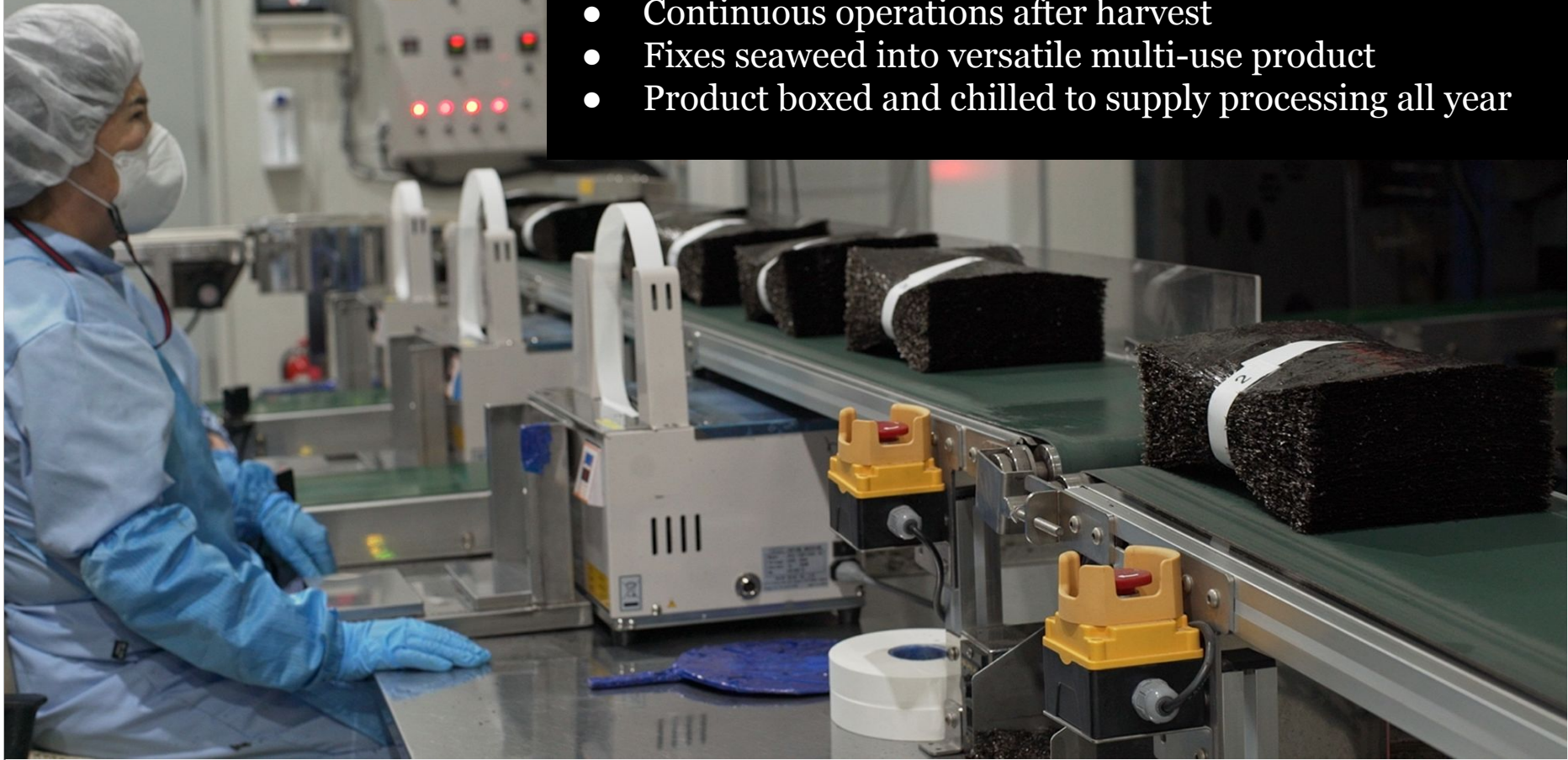
# Kim, sprayed onto trays to created roasted sheets

- Continuous operations after harvest
- Fixes seaweed into versatile multi-use product
- Product boxed and chilled to supply processing all year



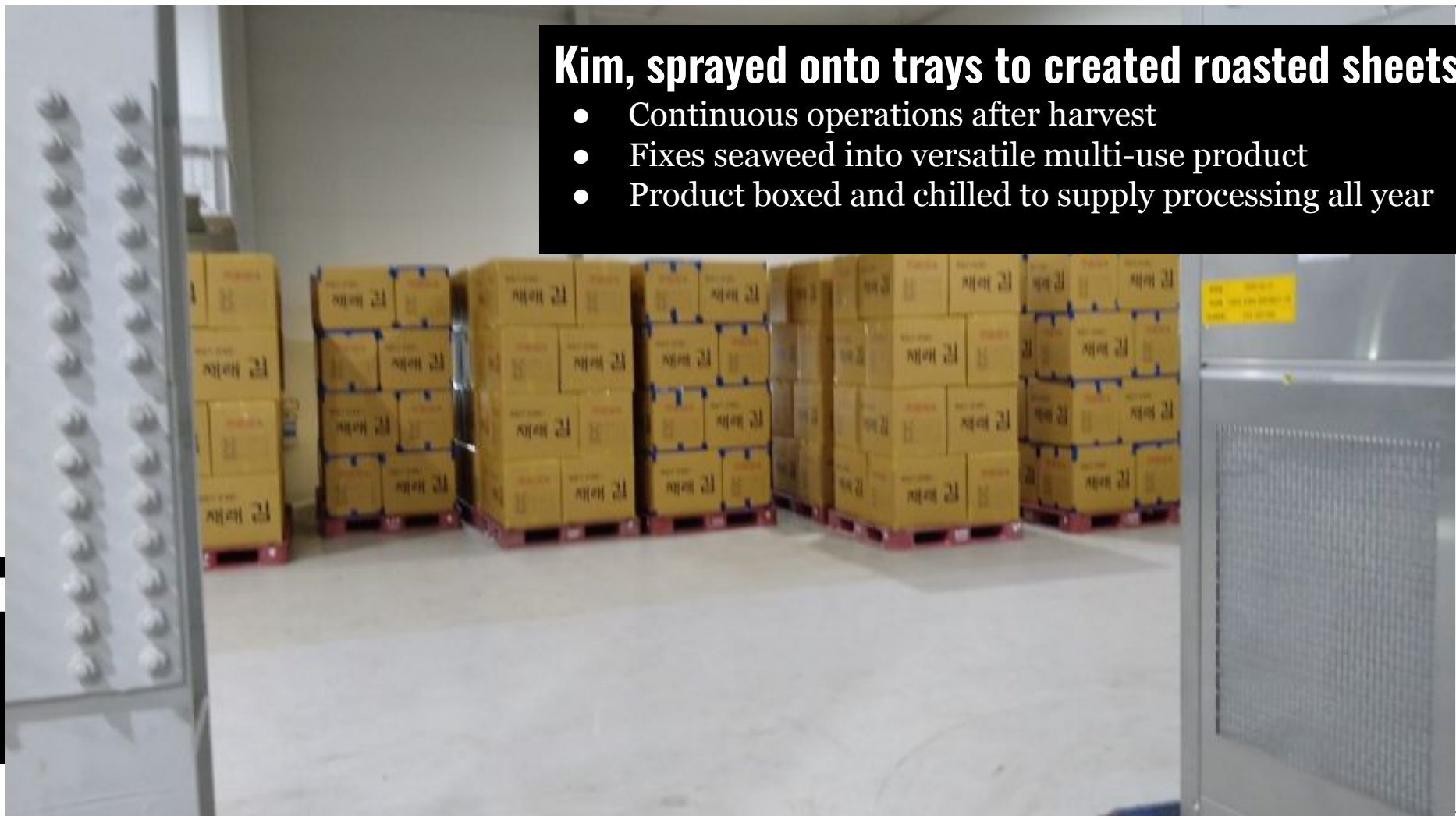
## Kim, sprayed onto trays to created roasted sheets

- Continuous operations after harvest
- Fixes seaweed into versatile multi-use product
- Product boxed and chilled to supply processing all year



## Kim, sprayed onto trays to created roasted sheets

- Continuous operations after harvest
- Fixes seaweed into versatile multi-use product
- Product boxed and chilled to supply processing all year



## Sheets processed into finished goods

- Roasted (sesame oil, wasabi etc), cut in smaller sheets
- Automated lines, quickly process into finished packs
- Small factory, but makes millions of packs per year





# Sheets processed into finished goods

- Roasted (sesame oil, wasabi etc), cut in smaller sheets
- Automated lines, quickly process into finished packs
- Small factory, but makes millions of packs per year



## Bioreactor for novel chemical extraction

- Very small part of harvest used for none food products
- Recent diversification into new uses for algae
- Pharmaceutical and nutrient uses highlighted



A man with blonde hair and a beard, wearing a white jacket and an orange life vest, is speaking to a group of people. The group is wearing orange life jackets and dark jackets. They are outdoors, near a body of water, with a rocky hillside in the background. The man is gesturing with his hands as he speaks. The background is slightly out of focus, showing other people in similar gear. The overall scene suggests a training or safety briefing for a maritime activity.

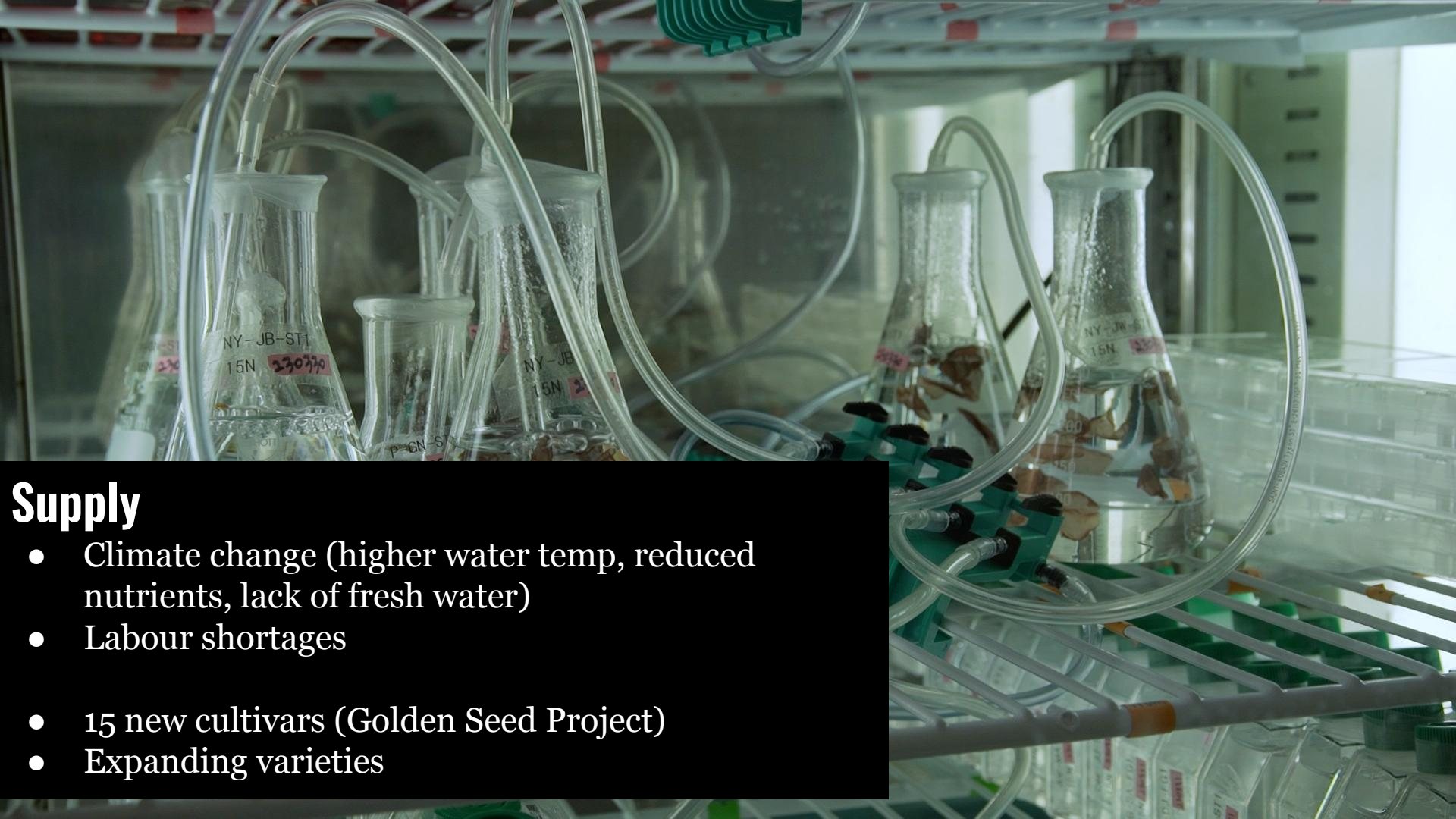
# TIM VAN BERKEL

The Cornish Seaweed Company



## Goal

- Increase seafood export in 5y by 50%
- From USD 3.15 - 4.7 bln
- Focus on nori and abalone



## Supply

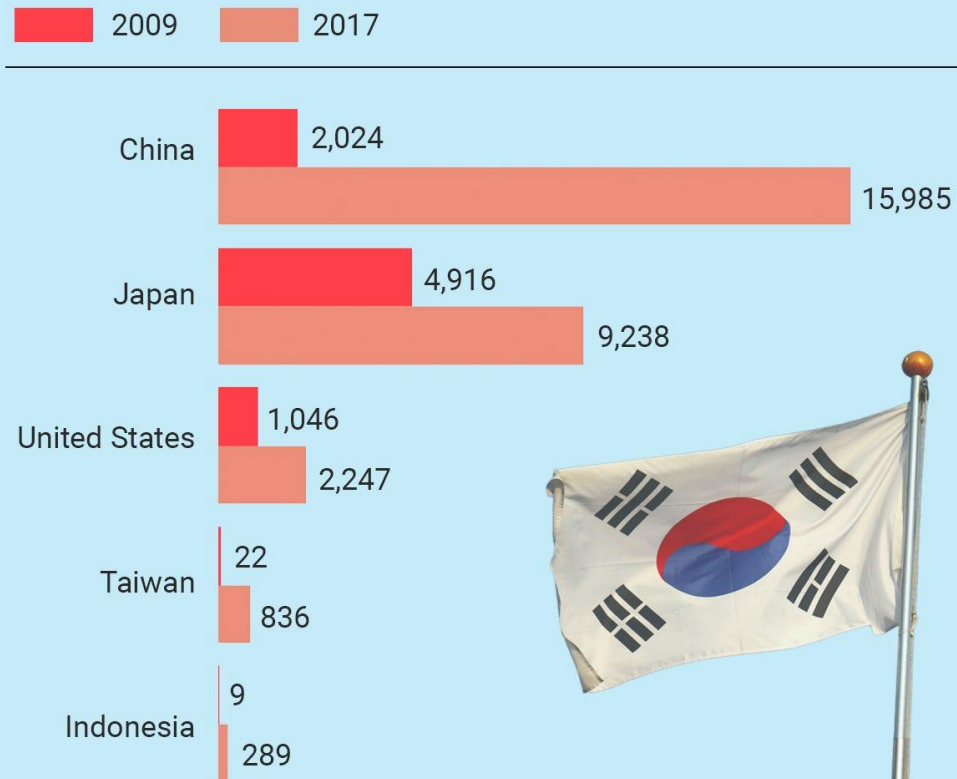
- Climate change (higher water temp, reduced nutrients, lack of fresh water)
- Labour shortages
- 15 new cultivars (Golden Seed Project)
- Expanding varieties



- Shift to Western diet
- Heavy metals and iodine might not conform to future EU standards
- No change in domestic seaweed intake (~24g/day)
- Increasing global demand

## The Korean restaurant wave

# of Korean restaurants in select countries, 2009 vs. 2017





UNIQUE  
SEAWEED  
EXTRACT  
PROVIDES  
POWERFUL  
ANTIOXIDANT  
SUPPORT



# Investment & Innovation

- Lack of product innovation
- Lack of automation
- Development of value added, functional food products





## What does this mean for the UK?

- Prepare for climate change
- Can we compete with nori from Korea?
- Invest in automation
- Develop new products to increase market





## Questions and thank you

- Mollie Gupta, WWF UK
- Owen Haines, Câr-y-Môr
- Stevie Jarron, SSIA, Argyll Aquaculture
- Tim Van Berkel, The Cornish Seaweed Company

TEMPLATE SLIDE - DO NOT  
DELETE

Insert picture(s) here

**Title here**

- Bullet point 1
- Bullet point 2
- Buller point 3