

Aquatic animal vaccines

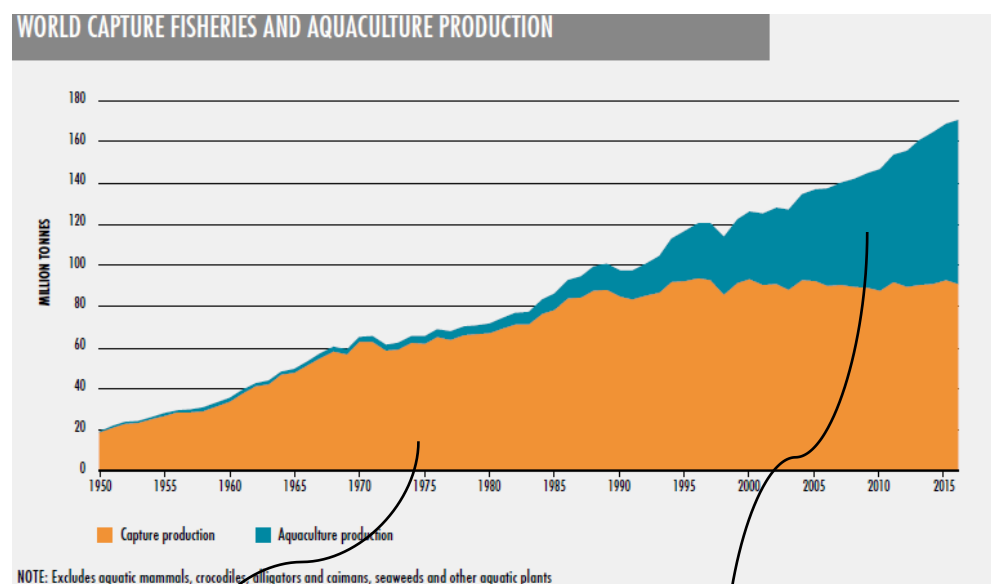
Nao Nakajima D.V.M., Ph.D.

Ministry of Agriculture, Forestry and Fisheries of Japan
National Veterinary Assay Laboratory



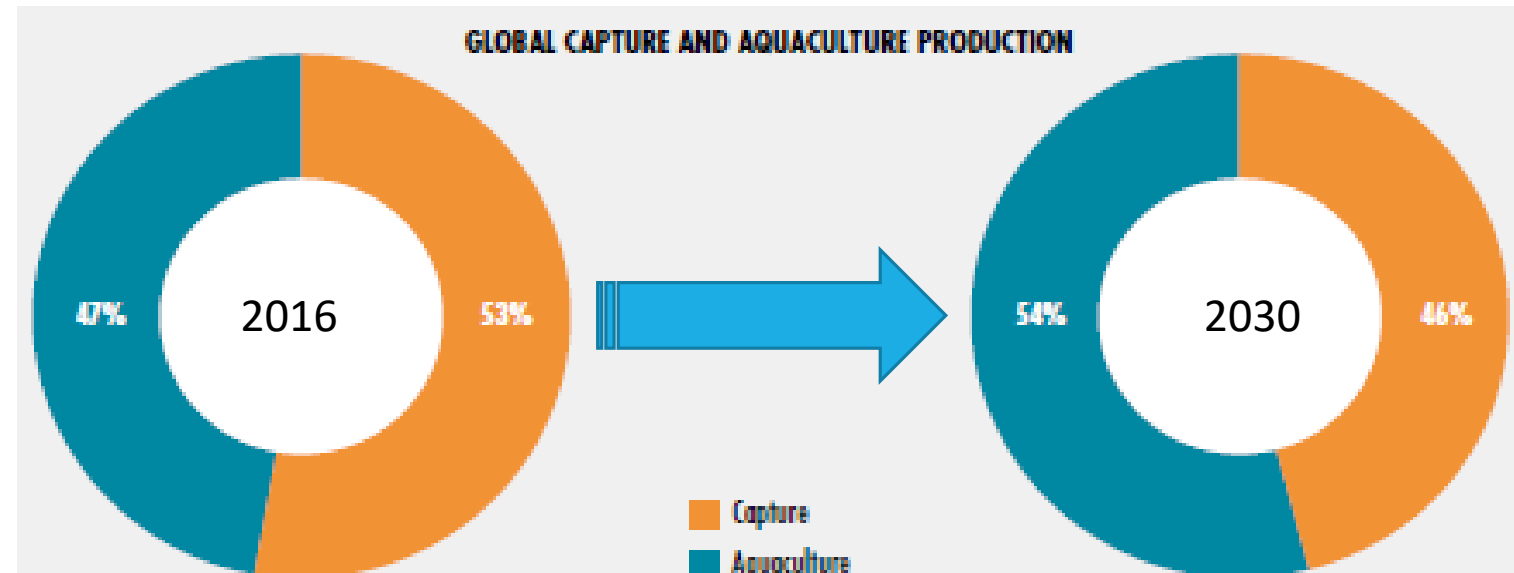
OIE-Collaborating center on diagnosis and control of animal diseases and related veterinary products assessment in Asia

Increasing role of aquaculture



Capture

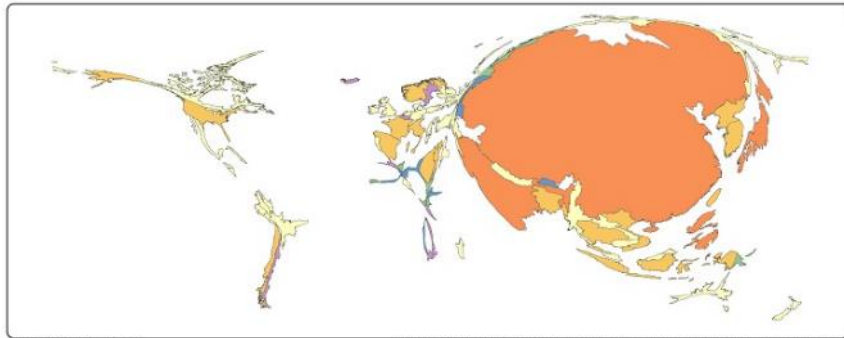
Aquaculture



FAO The state of world fisheries and aquaculture 2018

Asia pacific region is responsible for the world's aquaculture production

Aquaculture production cartogram 2000



Source: FAO FI (www.fao.org/fishery)

Data on aquaculture production for 2000 include aquatic plants, crustaceans, finfish, molluscs, and other aquatic animals.

The world total aquaculture production in 2000 was 41.7 million tonnes in live weight, with an estimated farm gate value of US\$51.1 billion. This total comprised farmed aquatic animals (32.4 million tonnes, US\$48.2 billion), aquatic plants (6.3 million tonnes, US\$2.9 billion) and non-food products (0.8 thousand tonnes; US\$427.1 million). The average annual percentage growth rate of farmed aquatic animals for 1990-2000 was 9 percent.

Aquaculture production cartogram (tonnes)

0 - 100	5 001 - 200 000
101 - 1 000	200 001 - 1 000 000
1 001 - 5 000	1 000 001 - 30 000 000

The designations employed and the presentation of material in the map do not imply the expression of any opinion whatsoever on the part of FAO concerning the legal or constitutional status of any country, territory or sea area, or concerning the delimitation of frontiers.

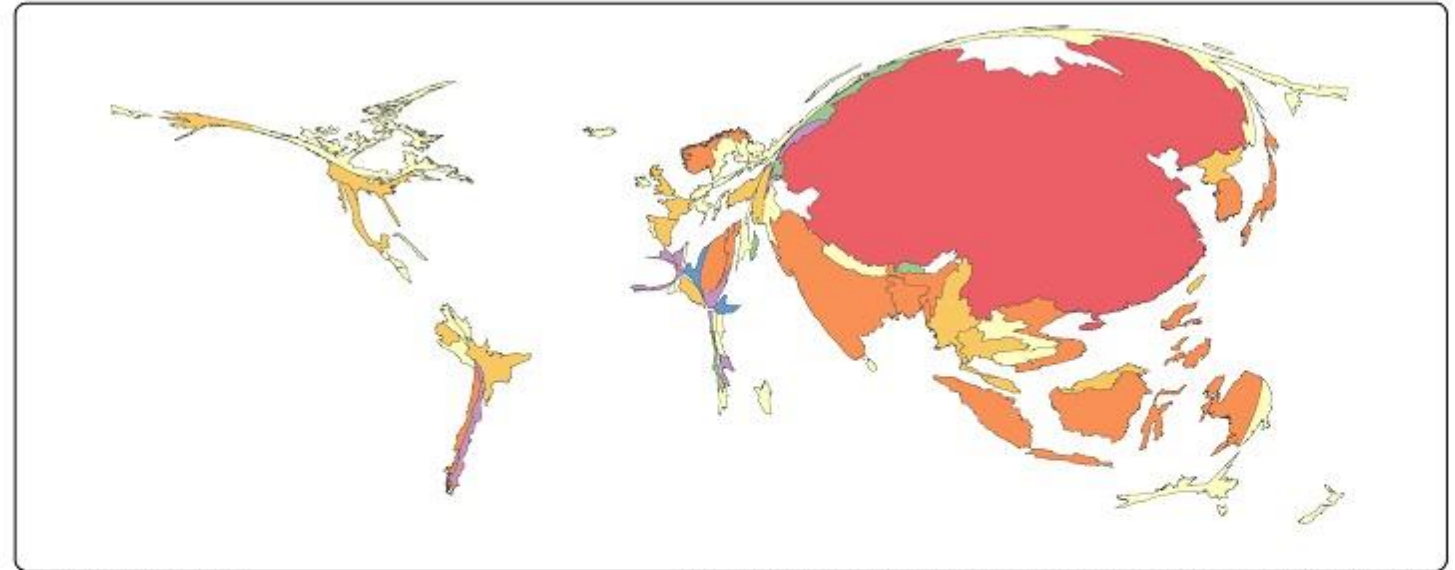
The underlying data used to create this map was derived from World Aquaculture Production (Quantities and values) Dataset 1950-2015, released in April 2017 by Statistics and Information Service, Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations (FAO). The data in their format used here were extracted from the Dataset using FishStat Plus - Universal software for fishery statistical time series (available at: www.fao.org/fishery/statistics/software/fishstat). However users can also use FishStatL, the new generation of the FishStat Plus software (available at: www.fao.org/fishery/topic/18238/en).



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Aquaculture production cartogram 2015



Source: FAO FI (www.fao.org/fishery)

Data on aquaculture production for 2015 include aquatic plants, crustaceans, finfish, molluscs, and other aquatic animals.

The world total aquaculture production in 2015 was 106 million tonnes in live weight, with an estimated farm gate value of US\$163 billion. This total comprised farmed aquatic animals (76.6 million tonnes, US\$158.1 billion), aquatic plants (29.4 million tonnes; US\$4.8 billion) and non-food products (41.1 thousand tonnes; US\$208.2 million). The average annual percentage growth rate of farmed aquatic animals for 2010-2015 was 5 percent.

Aquaculture production cartogram (tonnes)

0 - 100	200 001 - 1 000 000
101 - 1 000	1 000 001 - 30 000 000
1 001 - 5 000	> 30 000 000
5 001 - 200 000	

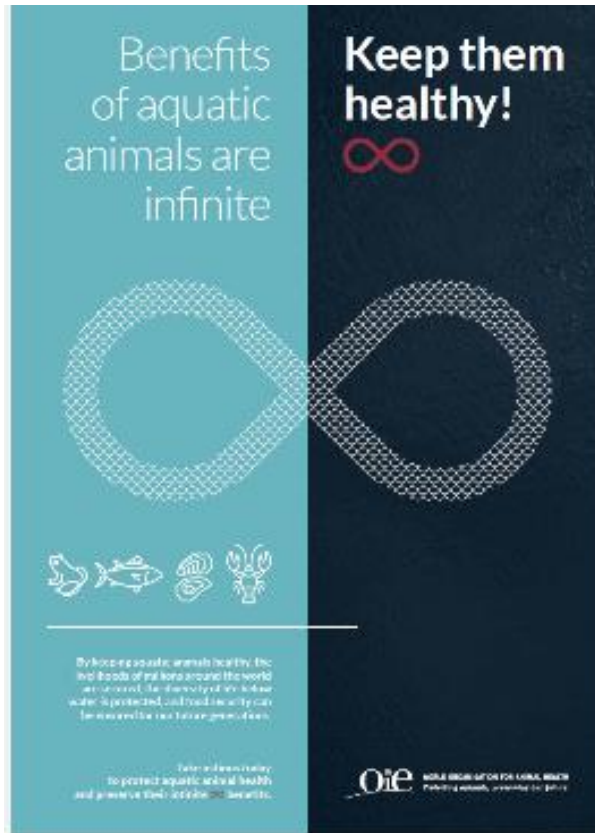
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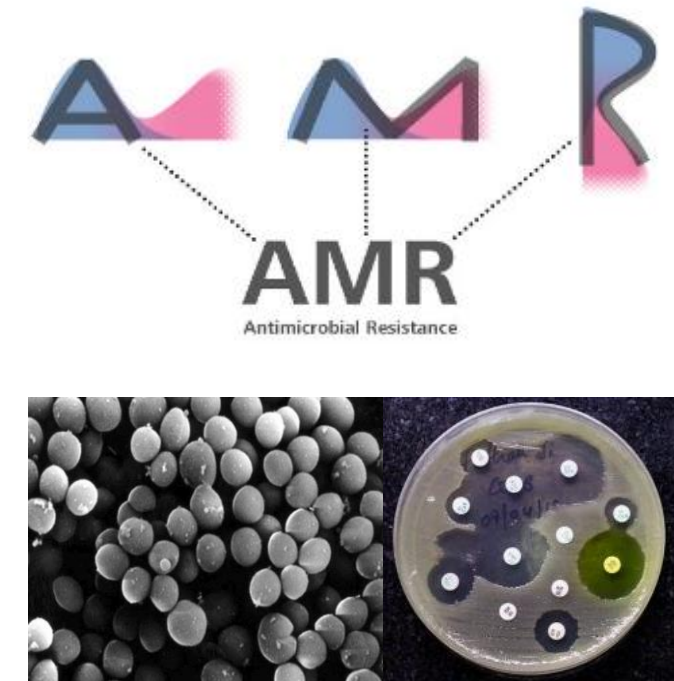
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Importance of Aquatic Animal Health



Keep Aquatic animals healthy



Tackling AMR



Aquatic vaccines

- ✓ History
- ✓ Impact for fish production
- ✓ Vaccination method
- ✓ Considerations
- ✓ Regulations
- ✓ Challenges

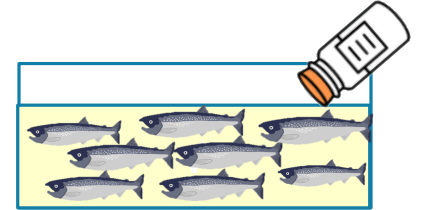
History of Aquatic Vaccines

●1986-1990

Immersion vaccines for *Vibrio salmonicida* (Norway, 1986)

Immersion vaccines for *Vibrio anguillarum* (Japan, 1988)

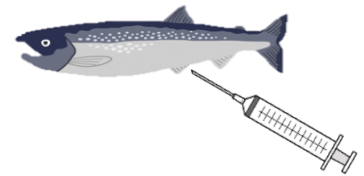
Immersion/Injection vaccines for *Aeromonas salmonicida* (Norway, 1989)



●1990's

Development of many types of injection vaccines

-Combined vaccines, Adjuvant vaccines



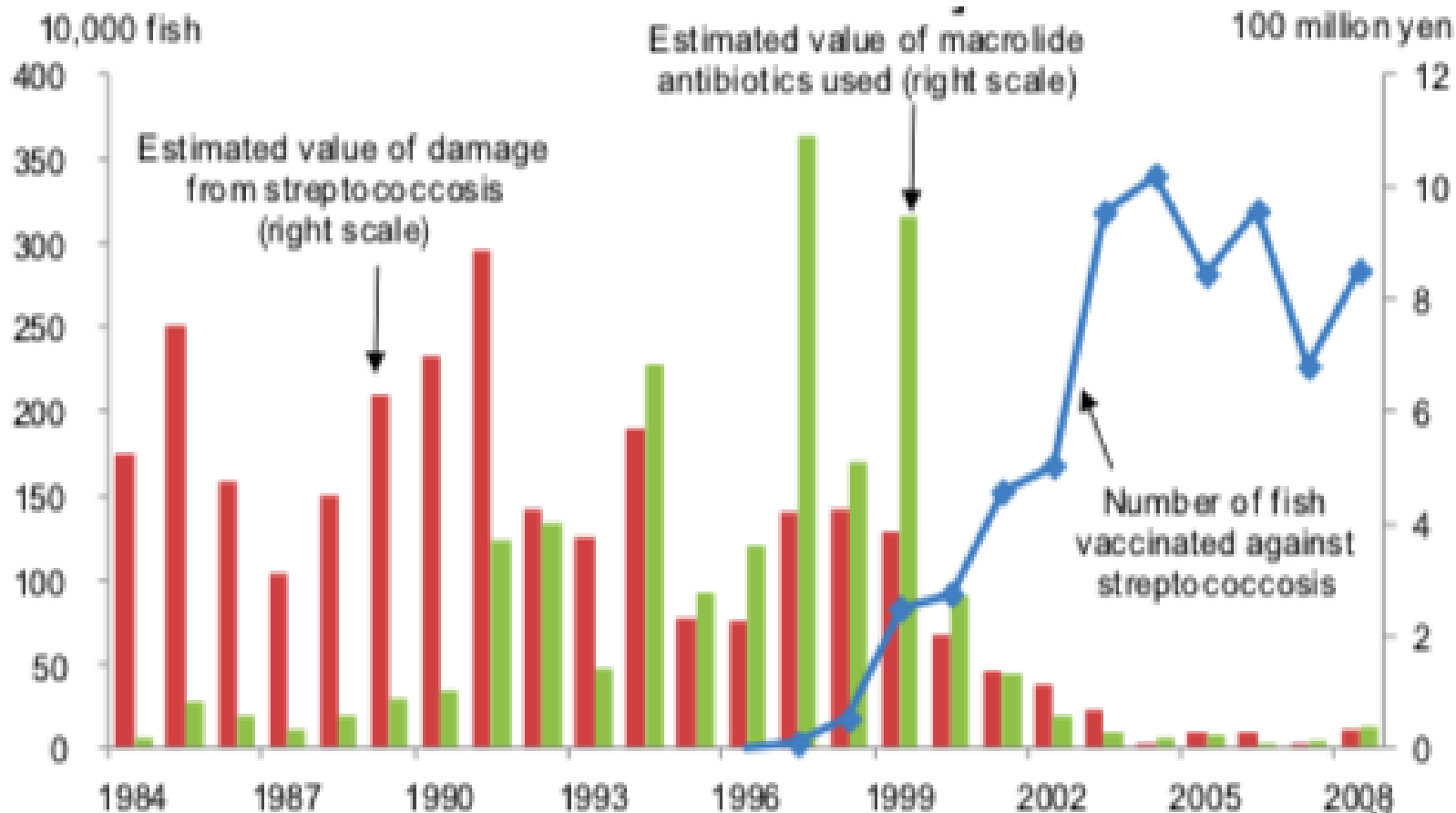
●2000's ~

DNA vaccines for Infectious Hematopoietic Necrosis Virus (Canada, 2005)

DNA vaccines for Infectious Pancreatic Necrosis Virus (Norway, 2018)

Impact to the fish production

Shift to Prevention from Treatment



- Improving productivity
- Cost down
- Decreasing antibiotic usage

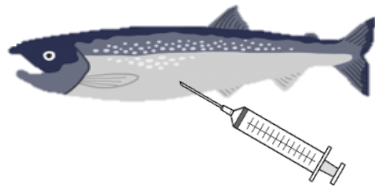
Good for
Eco, Food safety, Public Health

Improve the Market Value

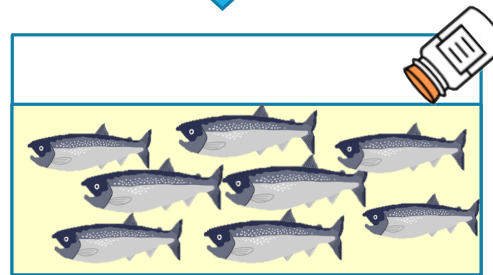
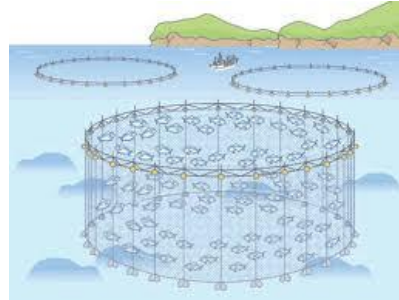


Vaccination methods

Injection



Immersion

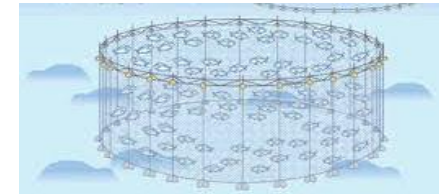


Treatment tank

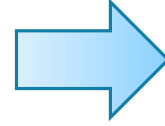
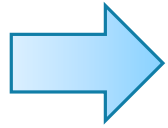
Oral



Mixed with feeds



Process of Injection vaccine

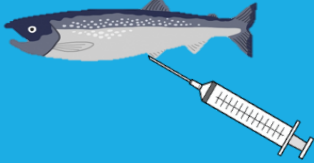
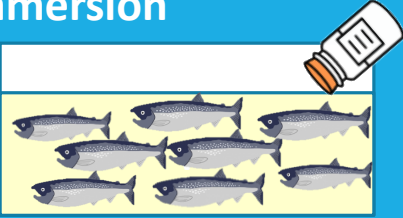
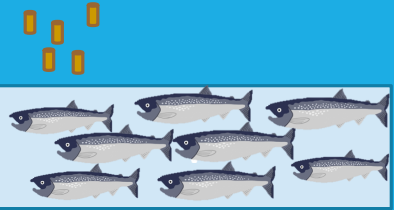


Automatic injection devices

Number and body weight of vaccinated fish are monitored

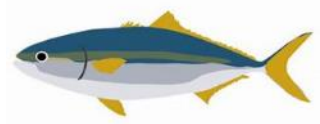


Features of vaccination methods

	Injection 	Immersion 	Oral 
Efficacy	+++	+	+
Application	+	++	+++
User safety	+	+++	+++
Stress for fish	+++	+	-
Labor costs	+++	+	+
Amount of Vaccine	+	+++	+++
Accuracy of administration	+++	+	-
Handling skill	+++	+	-
Comments	Most common methods		Easiest methods

Cost Benefit

Yellowtail:
Average Wholesale price :13\$/kg
(17\$/Kg for Export)



Matured size 4 kg >
(2 years >)

80\$/fish (Aqua cultured)
250\$/fish (Wild caught)

Vaccine cost
0.3-0.6\$/head



Most of Vaccines are targeting valuable fish
(Most of Aqua-cultured fish are valuable one)



Dec 30, 2019 at the fish market

Seabream:
Average Wholesale price :15\$/kg



Matured size 800 kg >
(20 months >)

25\$/fish (Aqua cultured)

Flat fish:
Average Wholesale price :22\$/kg



Matured size 800 kg >
(2years >)

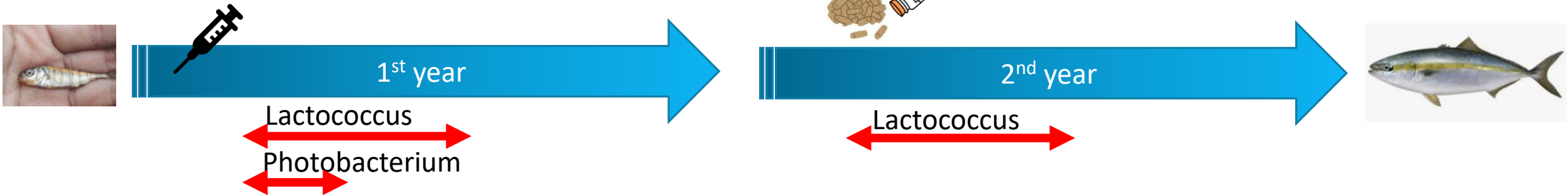
18\$/fish (Wild caught)



Considerations

1. To know the disease

- What kind of diseases do you want to control?
- When is the season of outbreak?



2. Vaccination should be carried out for healthy fish

- Good nutrition
- Good health condition

Considerations

3. Based on Label

-Target fish*, Condition of water temperature, Fish size, Dose, Administration route
EX. Yellowtail , 18 to 22 degree, 20 to 1000g , 0.1ml , i.p.

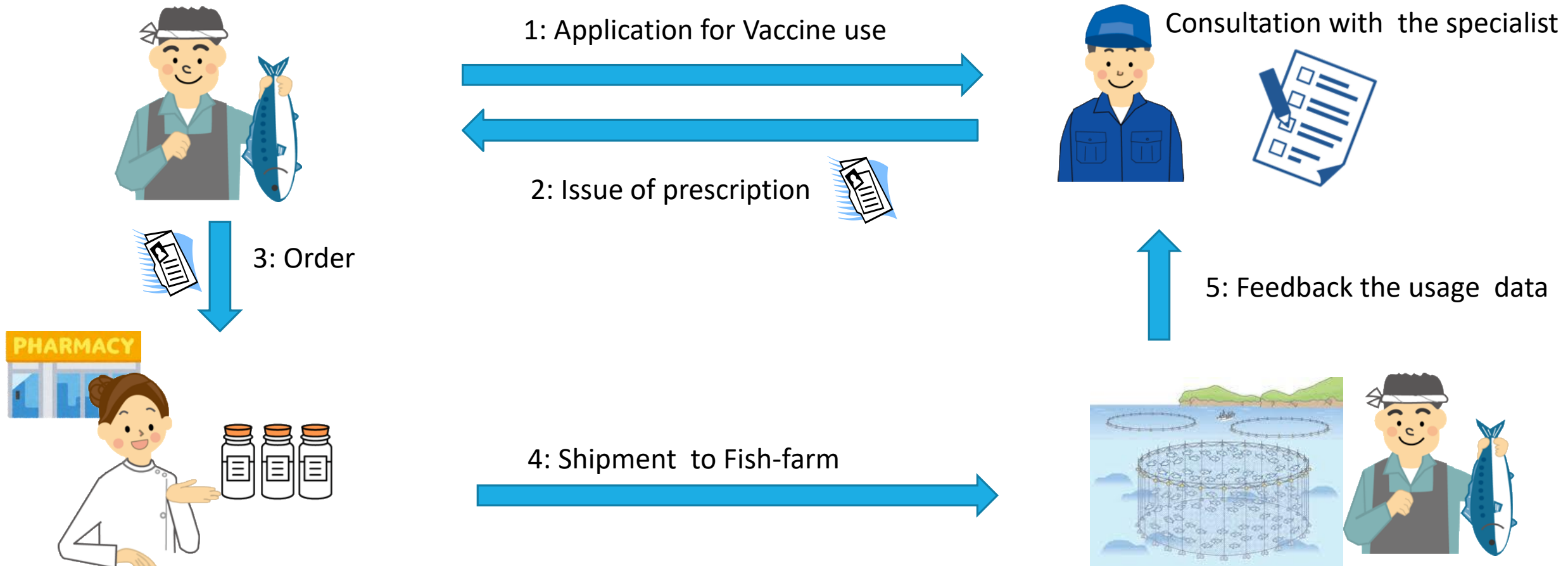
*Target fish :Salmon, Tilapia, Pangasius, Bass, Sea-Bream, Flat fish, Grouper, Yellowtail etc.

4. Based on Instruction

- Food should be withheld for 1 day prior to vaccination.
- Do not move fish for 5-6days before and after vaccination
- Withdraw period etc.



Distribution and use of Aquatic vaccines



Quality control

- GMP based manufacture
- Inspection for final products by the national authority
 - National assay (Efficacy / Safety tests)
 - Reviewing of Summary lot protocol (Paper review)



Safety tests / Efficacy tests

Vaccination



Quarantine period

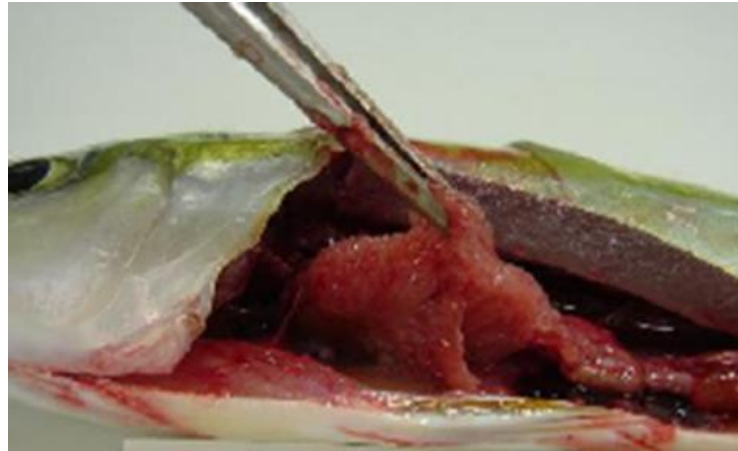
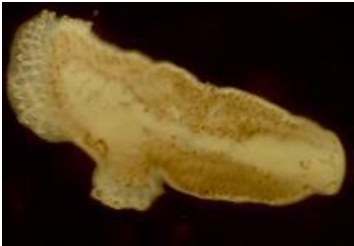
Safety test

Efficacy test



- Adverse effect
- Local reaction

- Artificial challenge test
- Immunological test



Grading score for local reactions



Challenges

- Involvement of specialist, Vets or other
- Development of effective vaccines for local fish in your country





Thank you for your attention

Special thanks for

Kagoshima Fisheries Technology and Development Center

Azuma-cho Fishery Cooperative in Kagoshima