Aquatic animal Welfare: What do we need to know?

Driving health, quality and profit in aquaculture

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NACA

Animal Welfare applied to Aquaculture
Murilo Quintiliano
FAI Farms, Director of Aquaculture Strategy

A practical framework for assessments on aquaculture productions
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Preliminary Assessment of Tilapia Welfare in Thailand
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Marius Nicolini
FAI Farms, Project manager-Thailand

Animal Welfare applied to Aquaculture:

Taking advantages from learned lessons of other animal-based supply chains

Murilo Quintiliano

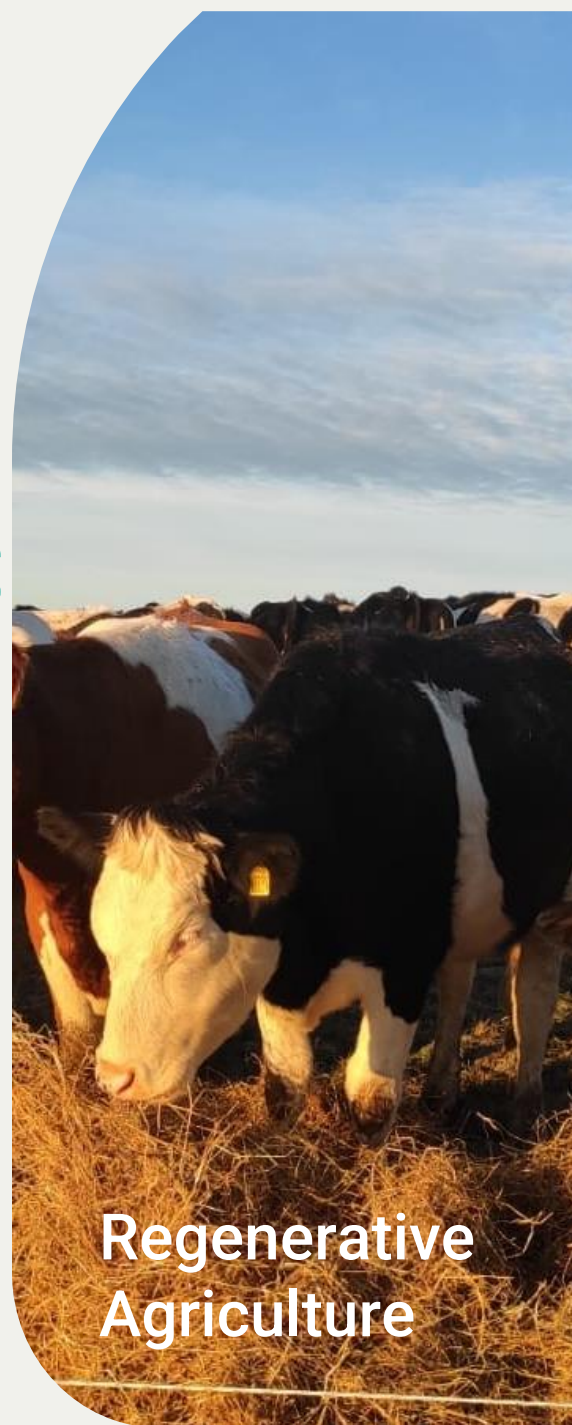March 2023

Our why

Positive food systems for

People and Animals and Planet

We create and deliver

FOOD
ANIMAL
SOLUTIONS

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Regenerative
Agriculture

Welfare
Improvements

Impact &
Performance
Data

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WHAT MAKES US
DIFFERENT

CREATIVE EXPERTS

We are creative problem solvers that embrace complexity.

TRUSTED PARTNER

We are collaborators and fun to work with. Ask our brand partners.

PRACTICAL RIGOUR

We are an impact focused team guided by science, data and practical expertise.

Reasons why Animal-based supply chains care about
ANIMAL WELFARE

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ETHICAL CONCERNS

ENVIRONMENTAL SUSTAINABILITY

FOOD SAFETY

ECONOMIC SUSTAINABILITY

CONSUMER DEMAND

What does it mean for
FISH WELFARE?

ETHICAL CONCERNS

Fish are sentient beings with the ability to **feel pain, fear, and stress**. As such, there are ethical concerns associated with subjecting them to inhumane conditions or practices.

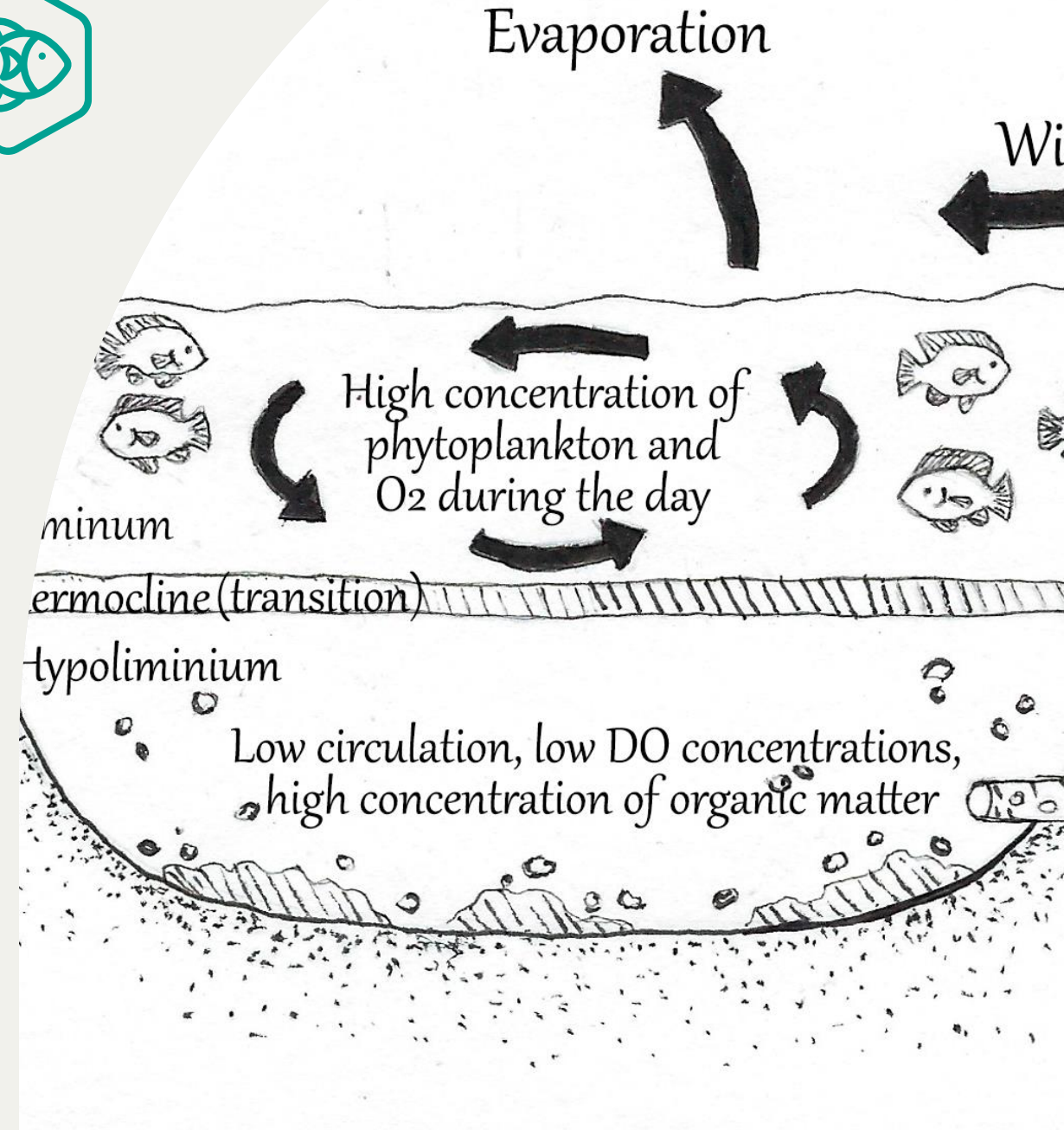**"We should care about it because it is the right thing to do"**

What does it mean for
FISH WELFARE?

ENVIRONMENTAL SUSTAINABILITY

The welfare of fish is closely linked to the health and sustainability of aquatic ecosystems.

By ensuring that fish are raised and harvested using humane and sustainable practices, we can help to protect and preserve these important ecosystems.

Evaporation

Wi...

High concentration of phytoplankton and O₂ during the day

...minum

...ermocline (transition)

...typoliminium

Low circulation, low DO concentrations, high concentration of organic matter

What does it mean for
FISH WELFARE?

FOOD SAFETY

Poor fish welfare can lead to increased stress and disease, which can have negative impacts on the **quality and safety of the fish** we eat.

By ensuring good welfare for fish can help to reduce the risk of disease transmission and improve the quality and safety of the fish we consume.

What does it mean for
FISH WELFARE?

ECONOMIC SUSTAINABILITY

Good **fish welfare** can contribute to the **long-term economic sustainability** of the industry.

By ensuring that fish are raised and harvested using humane and sustainable practices, we can help to maintain healthy fish populations and ensure that fishing and farming can **continue as viable industry for years to come**.

Competitive Advantage

BTJ DNA
Investment in people
Effciency
Integrity
Strategic Partnership
ESG

Integrated Process
Strategic Verticalization
Control and Information
Traceability
Risk management

Technology
automation
Precision Nutricion
Efficiency
Inovation
R&D

Testimonials

"Fish welfare is equal to good aquaculture practices. I am happy that tilapia production is engaging on this. I believe there are challenges, but it is possible to apply it on the farm routine, without losing production efficiency"

Emerson Esteves – owner, Global Peixes

Testimonials

"Although I have A small farm and supply locally, I am using the knowledge to reduce losses and secure constant improvement. FAI assessment protocol helps me to keep on track"

Tahara Pescados

Paulo Tahara – Tahara Tescados, Dracena - Brazil

What does it mean for
FISH WELFARE?

CONSUMER DEMAND

There is growing consumer demand for food that is produced in a humane and sustainable manner.

By caring about fish welfare, businesses can appeal to this demand and attract consumers who are looking for products that align with their values. This can lead to increased sales and greater customer loyalty.

Consumer opinions on the benefits of higher welfare fish products:

- Other 1%
- None of these 6%
- More nutritious 23%
- Fish was well treated 36%
- Food safety 38%
- 39% Better freshness
- 40% Better taste
- 41% Caught or farmed sustainably
- 50% High product quality
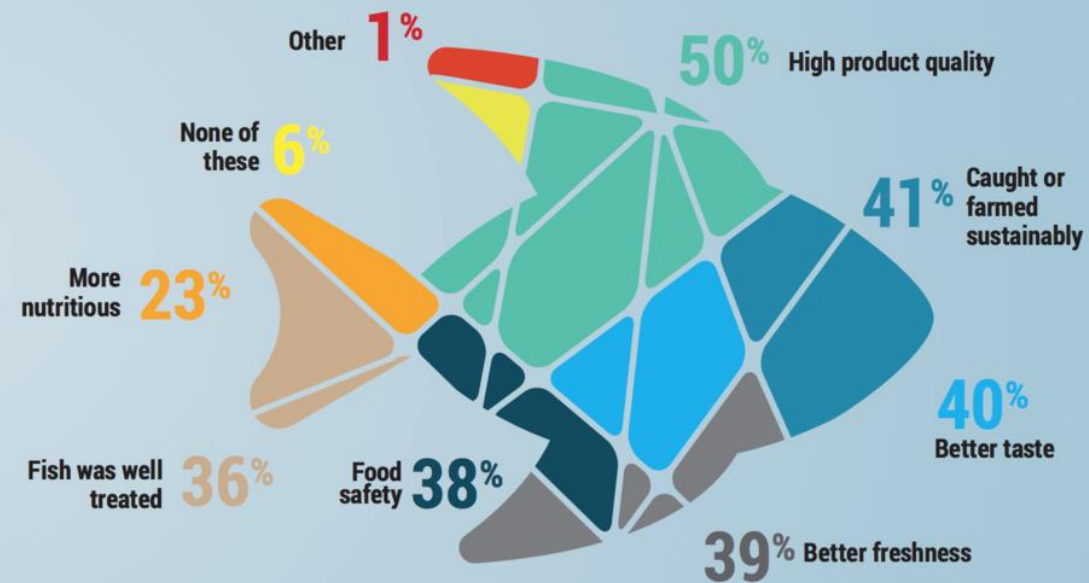
This is a reality on all animal-based supply chains…

Why would it be different for Fish and Shrimp?

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Conclusions

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- Fish can feel and it is our responsibility to promote a better quality of life for people and animals

- All other animal protein sources are adapting to the new consumer requirements.

- It is not about :What", but "How". Farm engagement is critical.

There is an opportunity for the aquaculture sector to take experiences from other supply chains and leapfrog the challenges.

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March 2023

OUR APPROACH

Develop species specific operational Welfare Indicators, **for health, behaviour, nutrition and environment**

Develop welfare assessment Protocol and App **to help farmers monitor and implement welfare improvements**

Create interactive, free, multi-language online training to **implement welfare in aquaculture, from hatchery to slaughter**

TILAPIA
EXAMPLE

- 10,000 academic articles reviewed (SIGMA methodology)

- Development of a Welfare Assessment Protocol

- Publication

Health	Environment	Behaviour	Nutrition
Eyes Jaws, Operculum Skin Fins Gills Spine Ectoparasite Mortality	Temperature, pH D.O. Alkalinity NH4 and NH3 Transparency Predators Interspecific species,	Respiratory Frequency Swimming Foraging behaviour Response to air and light Loss of consciousness	Amount of Feed Condition Factor (K) Protein level Feed Conversation ratio

Breeding | Hatchery | Nursery | Grow out | Slaughter House

3-point score

ASSESSMENT PROTOCOLS

CARP

Aquaculture Research

REVIEW ARTICLE | 🔓 Open Access | CC ①

New indices for the diagnosis of fish welfare and their application to the grass carp (*Ctenopharyngodon idella*) reared in earthen ponds

Ana Silvia Pedrazzani ✉, Camila Prestes dos Santos Tavares, Murilo Quintiliano, Nathieli Cozer, Antonio Ostrensky

First published: 18 September 2022 | https://doi.org/10.1111/are.16105

SECTIONS | PDF | TOOLS | SHARE

https://www.mdpi.com/2076-2615/13/5/807

TILAPIA

frontiers

Tilapia on-farm welfare assessment protocol for semi-intensive production systems

Ana Silvia Pedrazzani[1*], Murilo Henrique Quintiliano[2], Franciele Bolfe[2], Elaine Cristina d. Sans[1], Carla F. Molento[1]

[1]Animal Welfare Laboratory (LABEA), Federal University of Paraná, Brazil, [2]FAI Farms From Brazil, Brazil

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SHRIMP

animals

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Non-Invasive Methods for Assessing the Welfare of Farmed White-Leg Shrimp (*Penaeus vannamei*)

by Ana Silvia Pedrazzani [1,*] ✉, Nathieli Cozer [1,2,3], Murilo Henrique Quintiliano [4], Camila Prestes dos Santos Tavares [1,3,5], Ubiratã de Assis Teixeira da Silva [3] and Antonio Ostrensky [1,2,3,5] ⓘD

[1] Wai Ora—Aquaculture and Environmental Technology Ltd., Curitiba 80240-050, Brazil
[2] Graduate Program in Animal Science, Federal University of Paraná, Curitiba 80035-050, Brazil
[3] Integrated Group of Aquaculture and Environmental Studies (GIA), Animal Science Department, Agricultural Sciences Sector, Federal University of Paraná, Curitiba 80035-050, Brazil
[4] FAI Farms, Londrina 86115-000, Brazil
[5] Graduate Program in Zoology, Federal University of Paraná, Curitiba 81531-980, Brazil
* Author to whom correspondence should be addressed.

Animals 2023, 13(5), 807; https://doi.org/10.3390/ani13050807

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(This article belongs to the Special Issue Monitoring of Behavior, Affective States, and Health to Identify Welfare Concerns of Farm Animals)
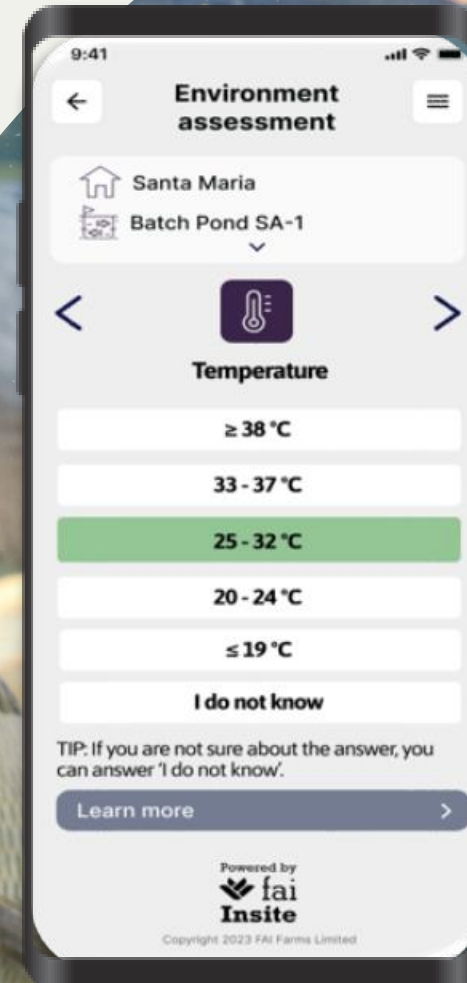
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https://www.mdpi.com/2076-2615/13/5/807

TILAPIA EXAMPLE

- On-farm tested and validated in Brazil, Thailand and China

- Metrics reflective of robustness, commercial practicality and ability to utilize data

- Empowering farmers through self-assessment process

- Define what good, moderate, poor welfare looks like

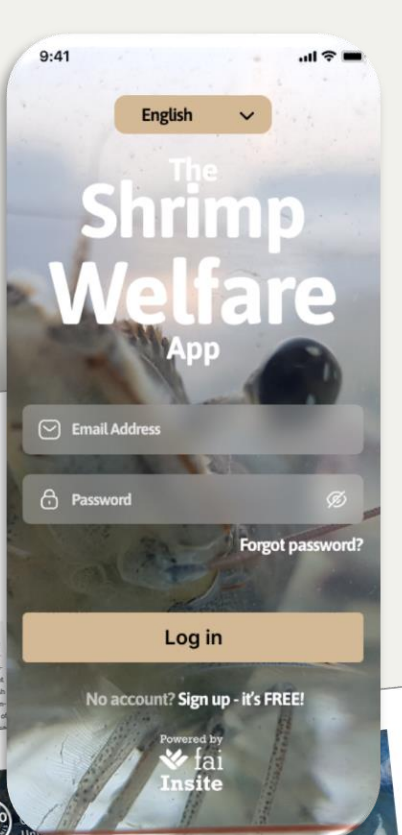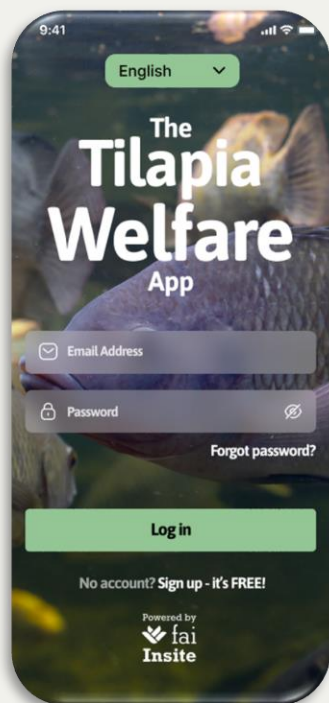| Health	Environment	Behaviour	Nutrition
Eyes Jaws, Operculum Skin Fins Gills Spine Ectoparasite Mortality	Temperature, pH D.O. Alkalinity NH4 and NH3 Transparency Predators Interspecific species,	Respiratory Frequency Swimming Foraging behaviour Response to air and light Loss of consciousness	Amount of Feed Condition Factor (K) Protein level Feed Conversation ratio

Breeding — Hatchery — Nursery — Grow out — Slaughter House

Environment assessment

Santa Maria
Batch Pond SA-1

Temperature

- ≥ 38 °C
- 33 - 37 °C
- 25 - 32 °C
- 20 - 24 °C
- ≤ 19 °C
- I do not know

TIP: If you are not sure about the answer, you can answer 'I do not know'.

Learn more

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Insite

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3-point score

ASSESSMENT FRAMEWORK

- **3-point score**

- **Practical to use**

- **Scientifically validated**

- **Currently for Tilapia, Shrimp and Carp**

Recognition

Food and Agriculture Organization of the United Nations

DEFINING AND IMPLEMENTING A TILAPIA WELFARE ASSESSMENT PROTOCOL IN BRAZIL

The researchers behind a practical welfare assessment protocol for tilapia production in Brazil hope it can act as a framework for the implementation of a welfare management system that can be applied by tilapia farmers around the world.

https://www.fao.org/3/cc0407en/cc0407en.pdf

ACHIEVEMENTS IN NUMBERS

	Tilapia, carp and Shrimp
Estimated Number of Animals	4,5 billion Fish and Shrimp (increasing)
Companies in Aquaculture - direct and indirect influenced	156
Global Retailers Direct Influenced	3
Certification Bodies, Universities and Investors	9
Number of People Trained (online and presential)	> 5.000

Applying the assessment protocol to other regions

Dr.Win Surachetpong
Kasetsart University, Thailand

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Preliminary Assessment of Tilapia Welfare in Thailand

Win Surachetpong (DVM, MSc, PhD, CertAqV)
Associate Professor
Faculty of Veterinary Medicine, Kasetsart University
Bangkok, Thailand

WHO CARES ABOUT TILAPIA?
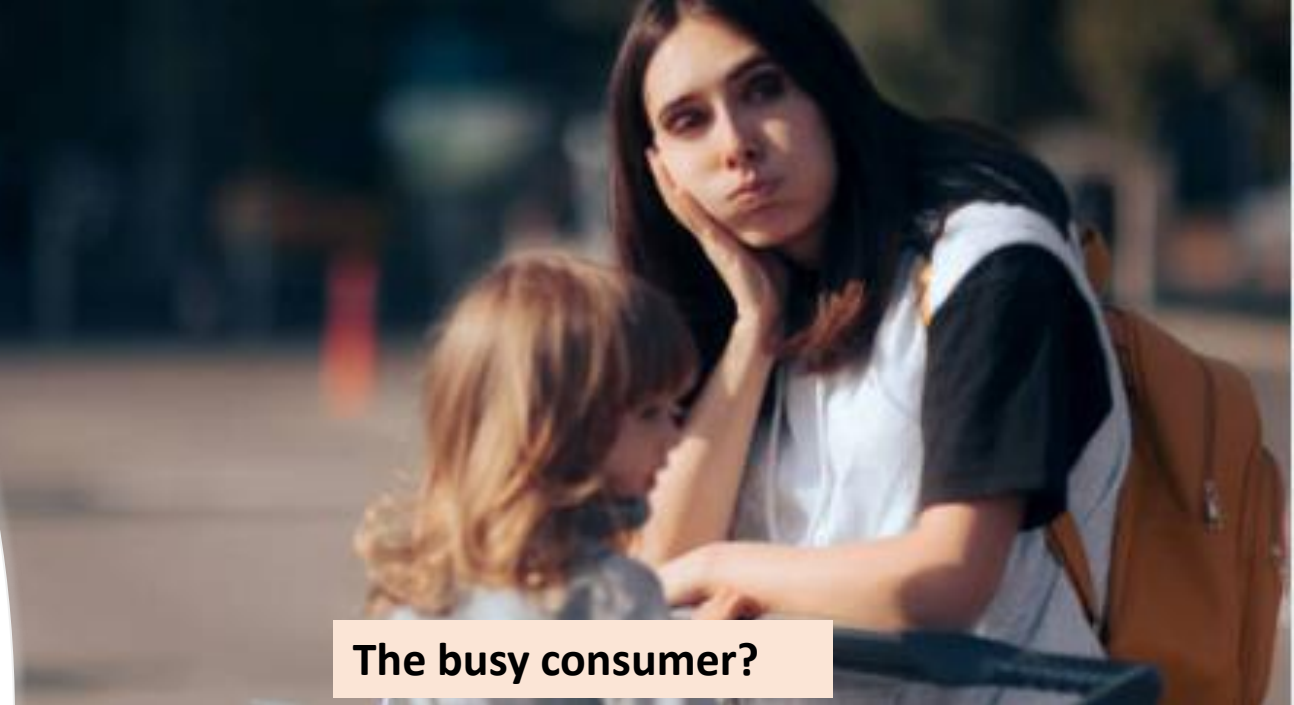
The busy consumer?

The farmer, who takes care of the fish every day?

FARMER ASSESSMENTS ARE CRUCIAL

Each farming practice has its unique cultural practices and requires different assessment that contributes to the fundamental assessment of animal welfare.

29

CRITERIA TO EVALUATE WELFARE

- **Water quality:** Temperature, pH, DO, ammonia, nitrite, and nitrate

- **Behavioral observations:** Abnormal behaviors-lethargy, gasping, or erratic swimming

- **Physical condition:** Body weight, length, and overall appearance

- **Health:** Signs of disease, such as lesions or abnormal growths

- **Feeding behavior:** Changes in feeding behavior, such as a lack of interest in food

- **Environment:** The size and design of pond, overcrowding, inadequate water flow

- **Stress levels:** Measuring stress hormones, such as cortisol

Tilapia Welfare Assessment in Thailand

Challenges

- No welfare assessment protocol for tilapia farms

- Commercial pressures may prioritize profit over fish welfare

- Tilapia welfare needs are not well understood by many fish farmers

- Difference in scales of tilapia production, extensive, semi-intensive, intensive

- Too many small-scale farmers

- Limited regulatory oversight & limited research

Opportunities

- Growing demand of Tilapia consumption

- Advances in technology

- Increase public awareness of the fish welfare

- Enhancing tilapia farming practices in accordance with the global quality standards

- Increase competitiveness for exportation
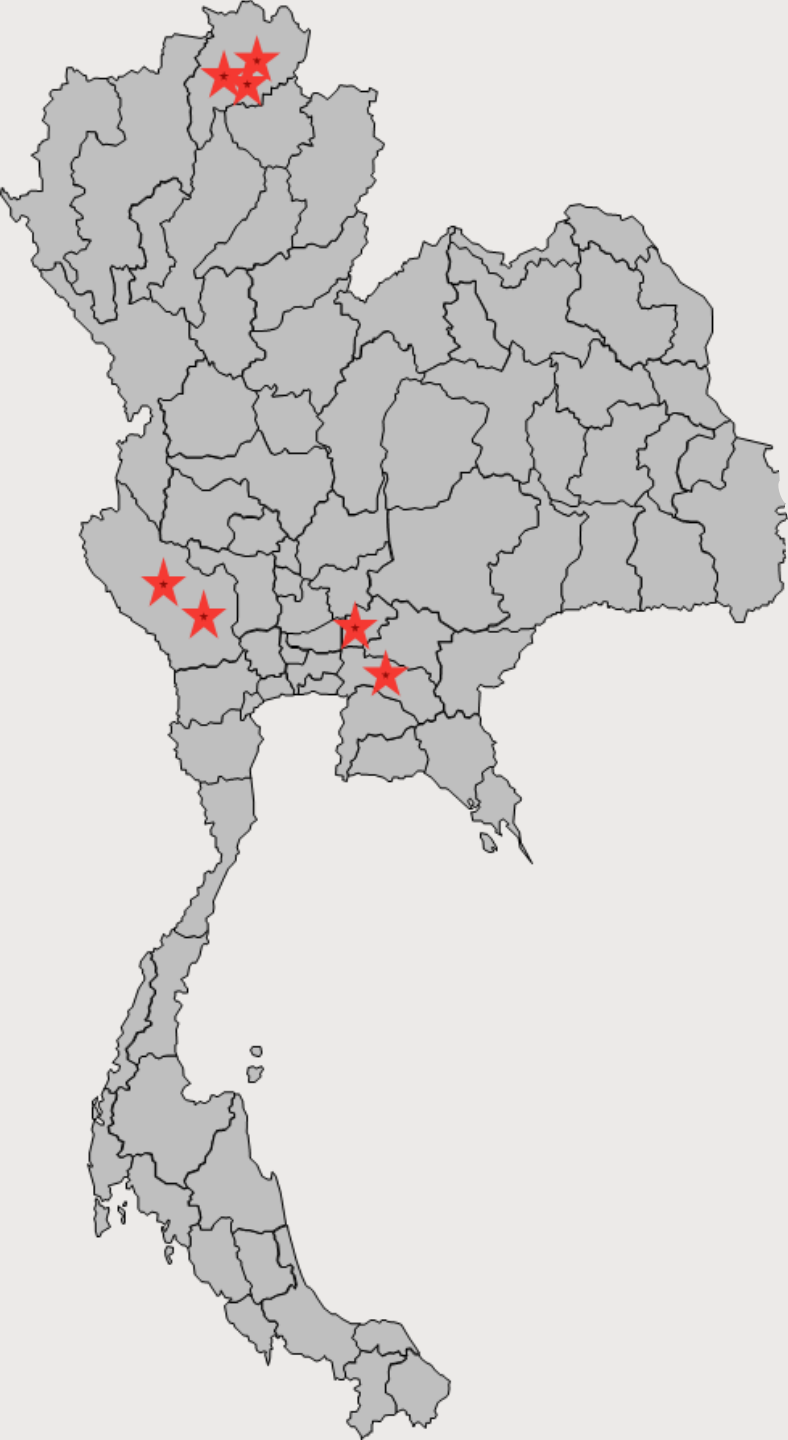
What we are doing…in Thailand

- Surveyed 8 tilapia farms (Earthen ponds, cages)
- Collect primary data from the owners and workers related to:
  - Routine work at the farm, history
  - Fish rearing/ farm practice
  - Expertise and knowledge in fish health monitoring
  - Most concerned critical points
- Collect information by direct interviews and observing on farm activities

Assessment Framework

Health	Environment	Behaviour	Nutrition
Eyes Jaws, Operculum Skin Fins Gills Spine Ectoparasite Mortality	Temperature, pH D.O. Alkalinity NH4 and NH3 Transparency Predators Interspecific species,	Respiratory Frequency Swimming Foraging behaviour Response to air and light Loss of consciousness	Amount of Feed Condition Factor (K) Protein level Feed Conversation ratio

Breeding   Hatchery   Nursery   Grow out   Slaughter House

Preliminary results (May 2022 to February 2023)

Earthen pond at Chachoengsao, East

Cage farm at Kanchanaburi, West

External appearance

Water quality measurement

- Test kit - nitrite, alkalinity, ammonia
- Probe & meter - pH, DO, temperature, conductivity
- Secchi disk- water transparency

Harvesting process & method

- From harvesting, grading and transporting the fish to the merchant or consumers

Harvesting method

Grading of fish

Transportation

From the preliminary assessment

Improving tilapia welfare is one strategy to enhance the quality of the fish.

The assessment process for tilapia welfare is based on four indicators: environment, health, behavior, and feeding.

Tilapia welfare assessment is currently limited in Thailand.

Fish Health Criteria

- In Thailand, the average survival rate for tilapia ranges from 60% to 80%.

- Farmers typically stock additional fry based on their past experiences.

- Common practice for farmers to use the same pond for juvenile and grow-out stages.

- Farmers typically rely on visual observations of fish behavior during feeding times.

- However, ensuring good welfare practices during the harvesting process can be challenging.

- Therefore, when assessing the welfare of tilapia, the harvesting and transportation processes should be excluded.

Overview of the preliminary findings

- Health indicator
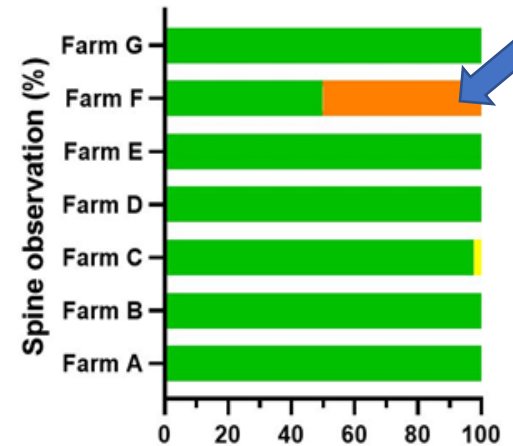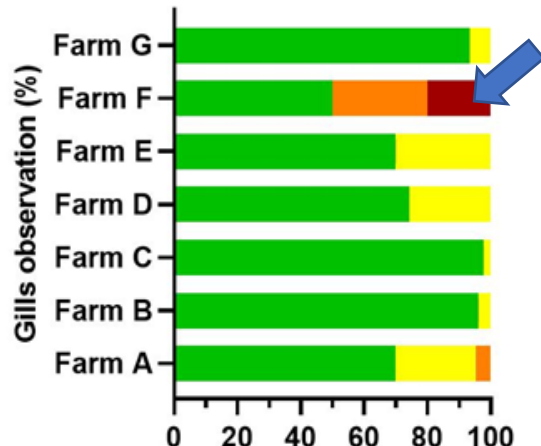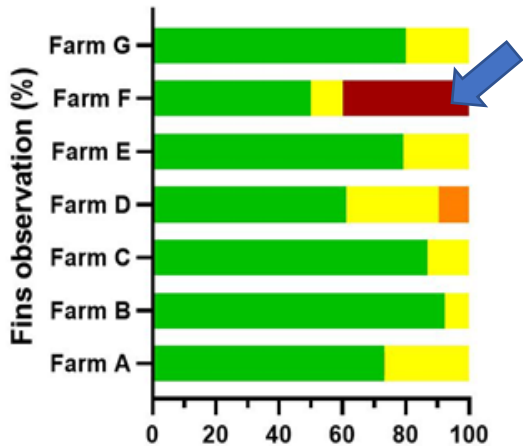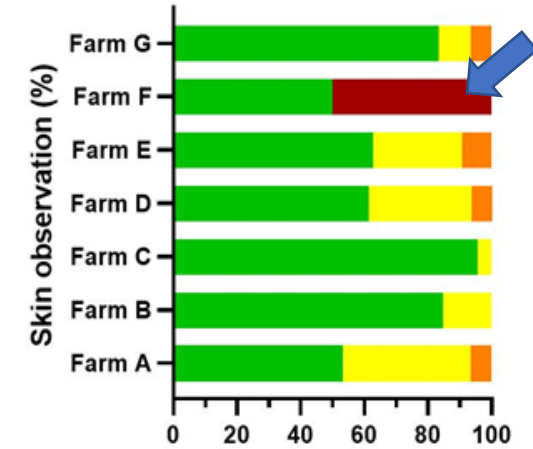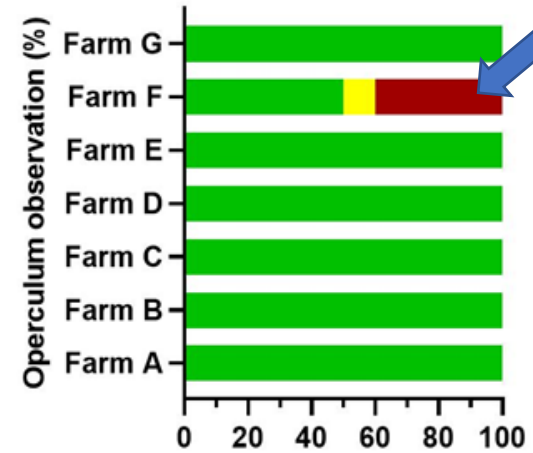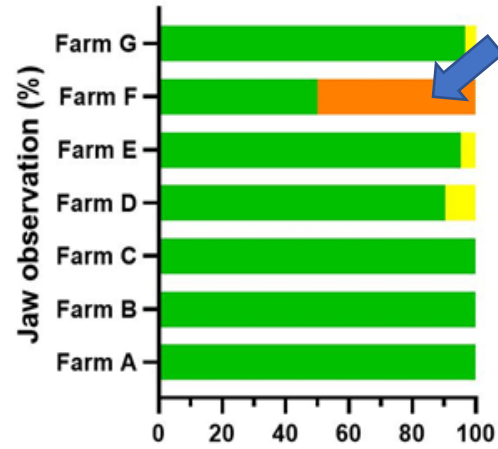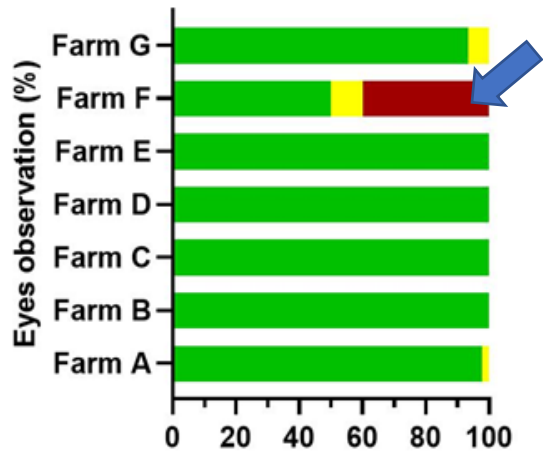
Most of the fish in all farms exhibited good health.

Except for farm F which some fish showed signs of diseases.

Environmental criteria

- Assessing water quality is a crucial factor for good welfare of aquatic animals.

- Most common farming practice semi-intensive, intensive methods, creating a highly natural environment in the earthen ponds.

- Most farms located near water resources e.g. river, dams

- Water quality varied among farms, with some farmers preferring green water ponds.

- Most farmers only inspect the appearance of water in the pond (no water quality testing).

Environmental scores

Most farms showed good environmental score.

Farms A, B, C, D, and E are earthen ponds with no water flow while F and G are open cages inside river with continuous water flow.

Raising system	Earthen ponds										Cage			
Environmental Indicator	Farm A		Farm B		Farm C		Farm D		Farm E		Farm F		Farm G	
	value	score	value	score	value	score	value	score	value	score	value	score	value	score
Temperature (°C)	28.4	1	28.4	1	30.0	1	30.4	1	30.0	1	27.0	1	27.8	1
pH	8.5	1	8.0	1	8.7	2	7.7	1	6.8	1	7.5	1	7.5	1
Transparency (cm)	20	3	21	3	18	3	24	3	15	3	35	1	30	1
DO (%)	106.2	4	70.8	1	117.8	4	85.2	1	45.0	3	77.3	1	66.2	2
NH_3 (mg/L)	0.00	1	0.00	1	0.00	1	0.01	1	0.08	2	0.0	1	0.0	1
NO_2^- (mg/L)	0.00	1	0.00	1	0.00	1	0.10	1	0.00	1	0.0	1	0.0	1
Alkalinity (mg/L)	102	2	85	1	34	1	102	2	85	1	119	2	119	1
Shading (%)	0	3	0	3	0	3	0	3	0	3	0	3	0	3
Predators	UP	3	UP	3	UP	3	UP	3	UP	3	UP	3	UP	3
Inhabitants	UP	3	A	1	A	1	A	1	UP	3	A	1	A	1
Density (fish/m²)	0.55	1	2.50	1	2.03	1	1.79	1	1.71	1	60.0	1	60.0	1

*UP; Uncontrolled presence, A; Absence

Nutrition Criteria

- The low price of tilapia makes the famers trying to reduce costs by using inexpensive feed.

- Some farmers use by-products from agriculture to reduce costs and maximize profits.

- Data collected in this study, derived from farms with commercial feed and natural feed.

Nutrition values and scores

Nutritional parameters are in good conditions in most of the farms

Nutritional indicators	Farm A Value	Farm A Score	Farm B Value	Farm B score	Farm C Value	Farm C Score	Farm D Value	Farm D Score	Farm E Value	Farm E Score	Farm F Value	Farm F Score	Farm G Value	Farm G Score
Fish weight (g) (mean±SD)	710.6±167.2	-	306.2±39.0	-	151.5±28.5	-	508.6±116.2	-	246.9±27.9	-	292.0±72.6	-	106.6±29.6	-
Fish age (days)	213	-	115	-	90	-	180	-	186	-	75	-	75	-
Use commercial feed	Yes	-	Yes	-	Yes	-	Yes	-	No	-	Yes	-	Yes	-
Crude protein ratio (CP) (%)	25	3	30	1	30	1	30	1	ND	ND	30	2	32	1
Feed conversion ratio (FCR)	1.1	1	1.3	1	1.3	1	1.2	1	ND	ND				
K factor (mean±SD)	2.53±0.27	3	2.22±0.20	2	2.53±0.21	3	2.26±0.21	2	2.20±0.17	2	3.7±1.44	3	2.2±0.34	2

Major constraints

- Some farmers may not interested in conducting welfare assessments.

  → Efforts should be made to educate or inform them of the benefits of doing so.

- Farmers are often not familiar with welfare assessment concepts/tools.

- Some small-scale farmers have poor data recording practices.

- Economic constraints can also hinder the adoption of welfare assessment practices.

- There is limited availability of tools for monitoring and measuring fish welfare.

Conclusion

- Ensuring the welfare of tilapia is an important and complex issue that **requires attention and action** from individuals, organizations, and governments.

- Tilapia can experience pain, stress, and suffering, and it is **our responsibility to minimize these experiences as much as possible**.

- Achieving this goal requires a better understanding of the welfare needs of tilapia, the development of appropriate monitoring and assessment tools, and the implementation of effective welfare practices.

- To achieve better welfare practices for tilapia, there must be a willingness to invest in it, despite the potential economic costs.

The team

Dr. Win Surachetpong

Thitima Purimayata

Dr. Aslah Mohamad

Dr. Neetu Shahi

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Communicating welfare to the aquaculture industry

Marius Nicolini, FAI Farms

March 2023

COMMUNICATING WELFARE
TO THE AQUACULTURE INDUSTRY
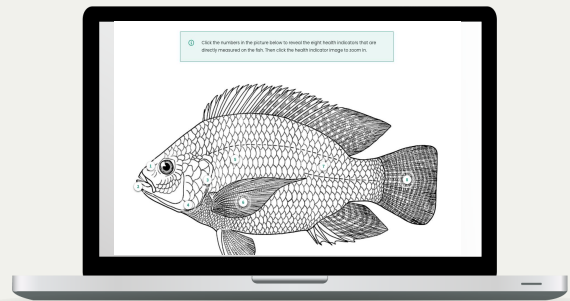
Online course
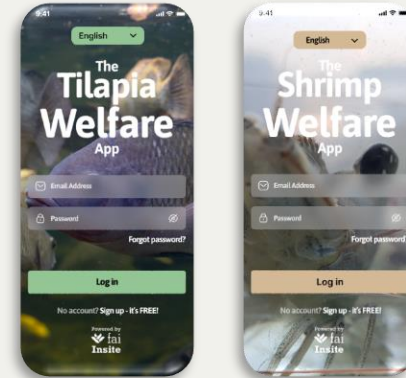
Mobile application

Websites-Social Media

Workshops (Online, on-farm)

TILAPIA WELFARE ONLINE COURSES

INDICATORS

NUTRITION

NEW!

LOCATION
Online

LANGUAGE
English
Portuguese

PROVIDER
FAI Farms

AVAILABILITY
Free Course
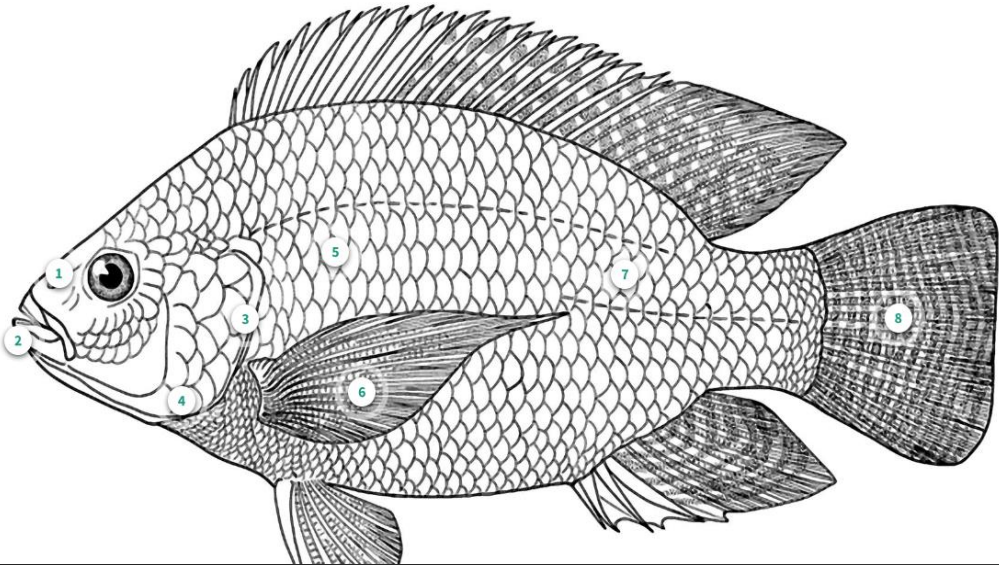
E-LEARNING

Welfare Indicators
Accessible on different devices and languages

Interactive
Using best practice e-learning pedagogy

Self-taught
Secure and safe environment to learn and discuss.

Certificate
Quizzes and free certificate on completion.

Courses available – click to open
Courses to be published

NEW!
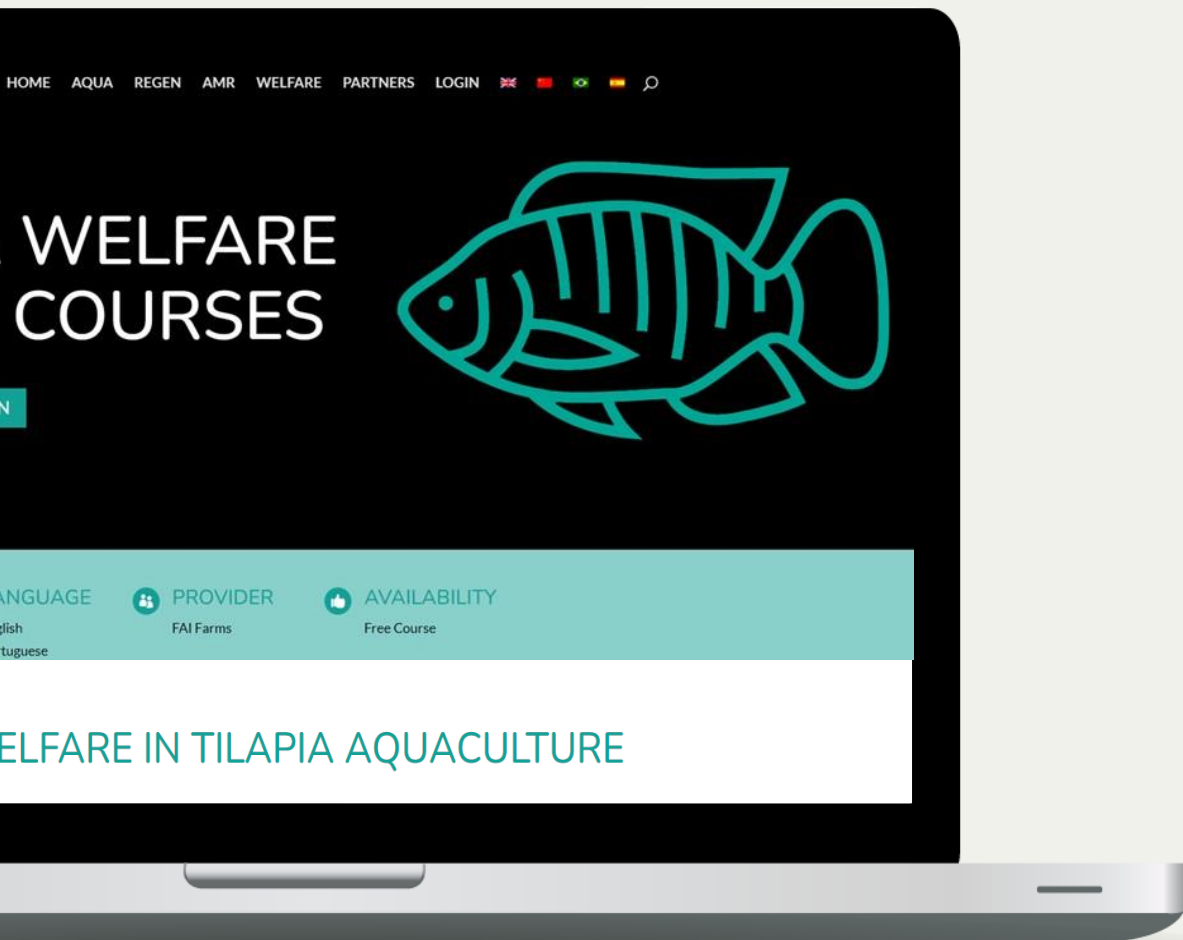
1 **Tilapia Welfare Indicators**

2 **Tilapia Nutrition and Welfare** NEW!

3 **Tilapia environment and welfare**

4 **Tilapia health and welfare**

5 **Tilapia behaviour and welfare**

E-learning that is responsive
accessible in different devices
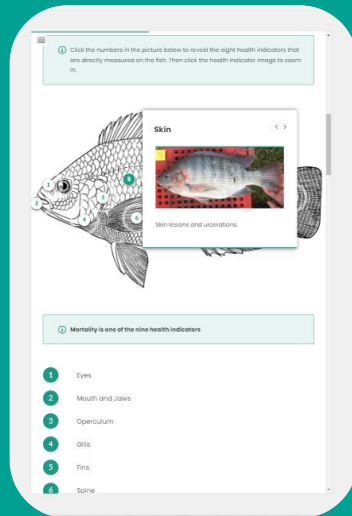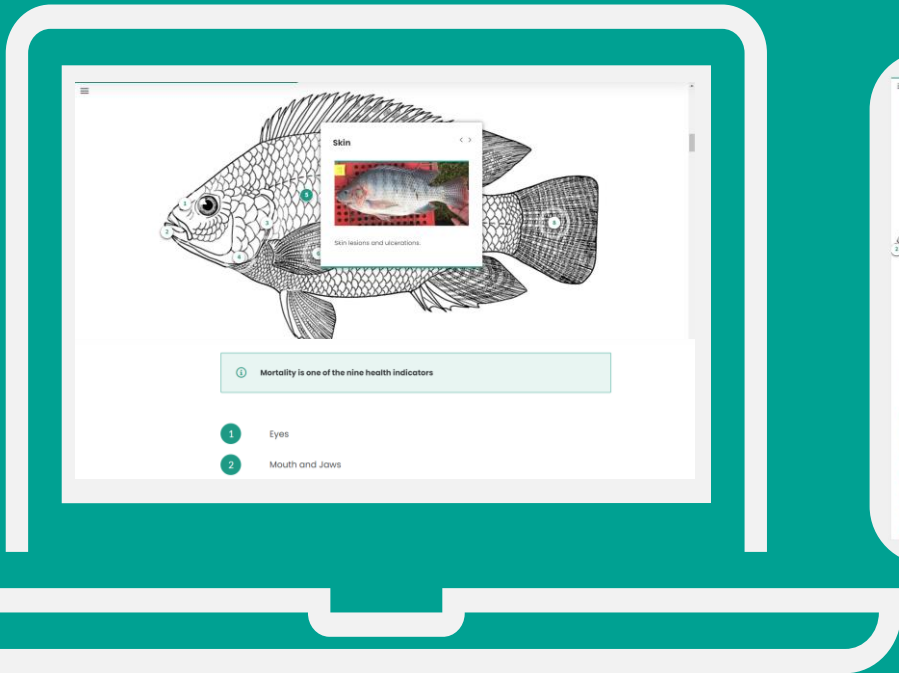
Hasim Djamil. DVM • 2nd
Veterinarian di Regal Springs Indonesia
1w • 🌐

+ Follow

This training module are attractive and pleasant, make some complex things simple and easy to understand. certainly, it was enlightening for me to implement a similar module and share it to my team. Massive thank Sara Barrento Øistein Thorsen
#elearning #fishwelfare #tilapia #health #aquaculture

fai
academy

Certificate of Training

This is to certify that

Hasim Djamil

has completed the course on

Tilapia Welfare Indicators

and is aware of tilapia welfare, and the basic principles to assess tilapia welfare, based on the nutrition, environment, health and behavioural welfare indicators.

Completed on: 26 February 2023

Tilapia, Shrimp, Carp

5 Modules

5 Languages
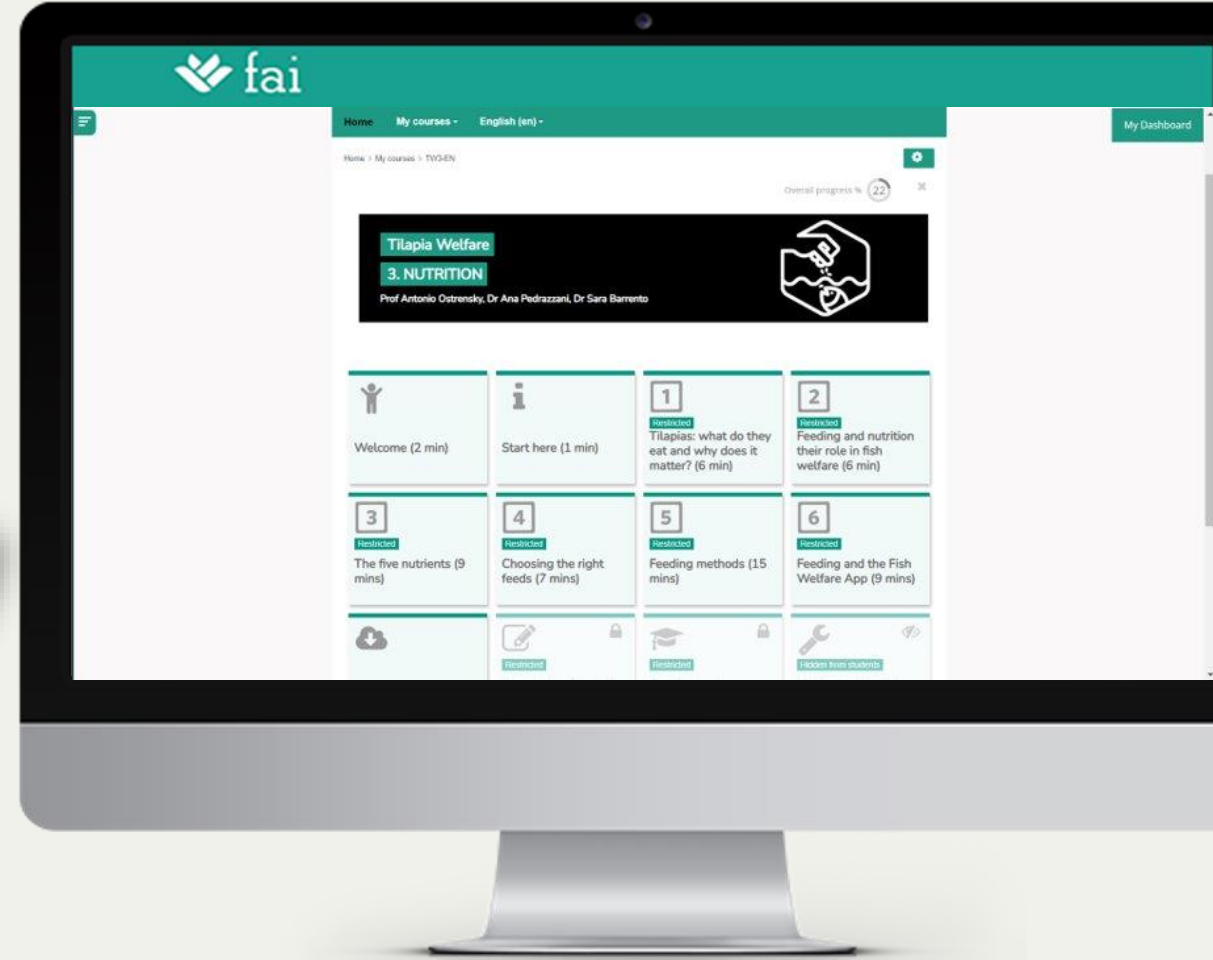
A free welfare toolkit for any farmer.

A **practical and free app** for Tilapia farmers has been developed for day-to-day use from breeding to slaughter

Will be available in 5 languages:

Thai
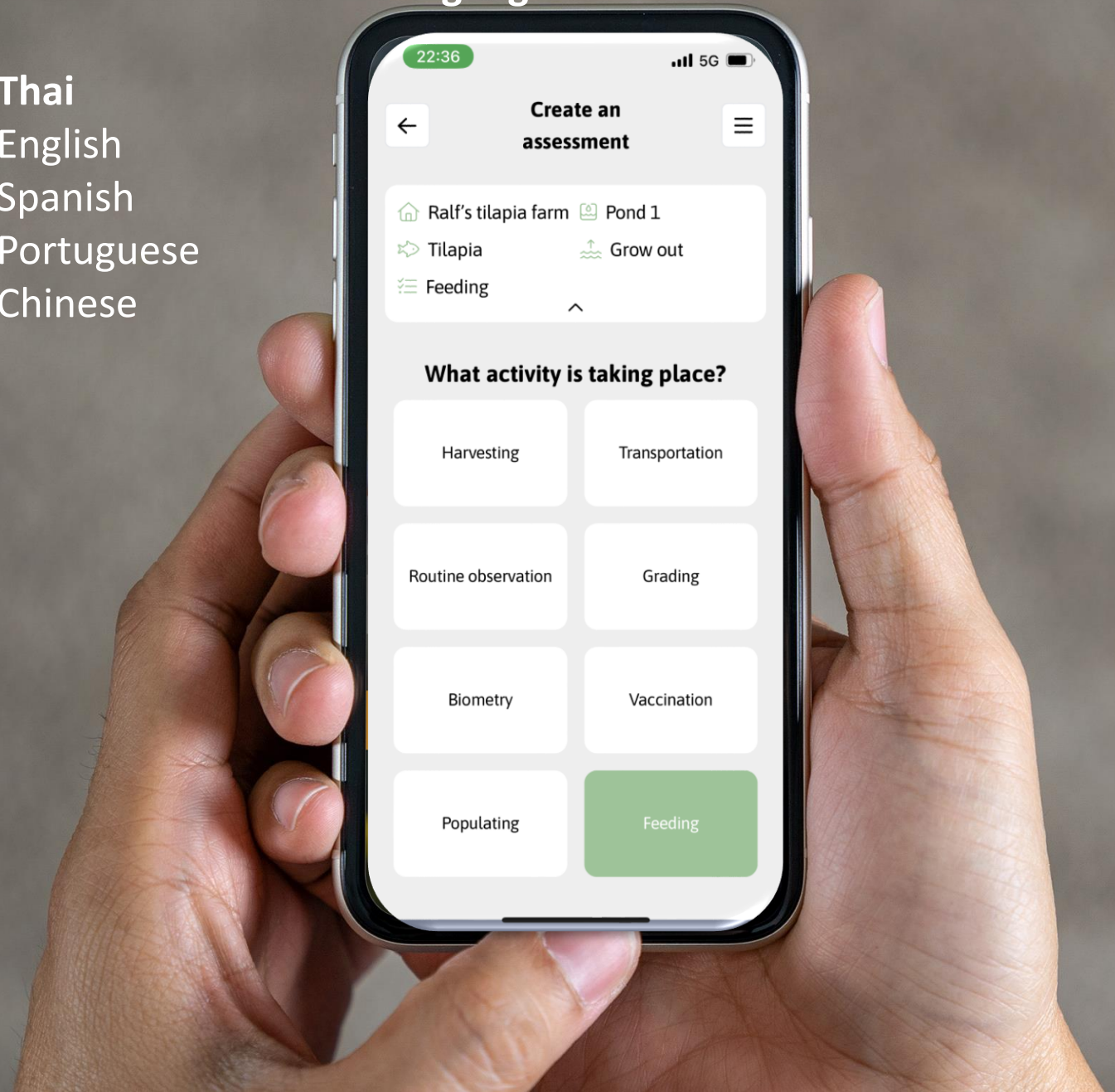English
Spanish
Portuguese
Chinese

A free welfare toolkit for any farmer.

Perform an **assessment tailor made** to:

- Production type
- Production system
- Fish size
- Activity

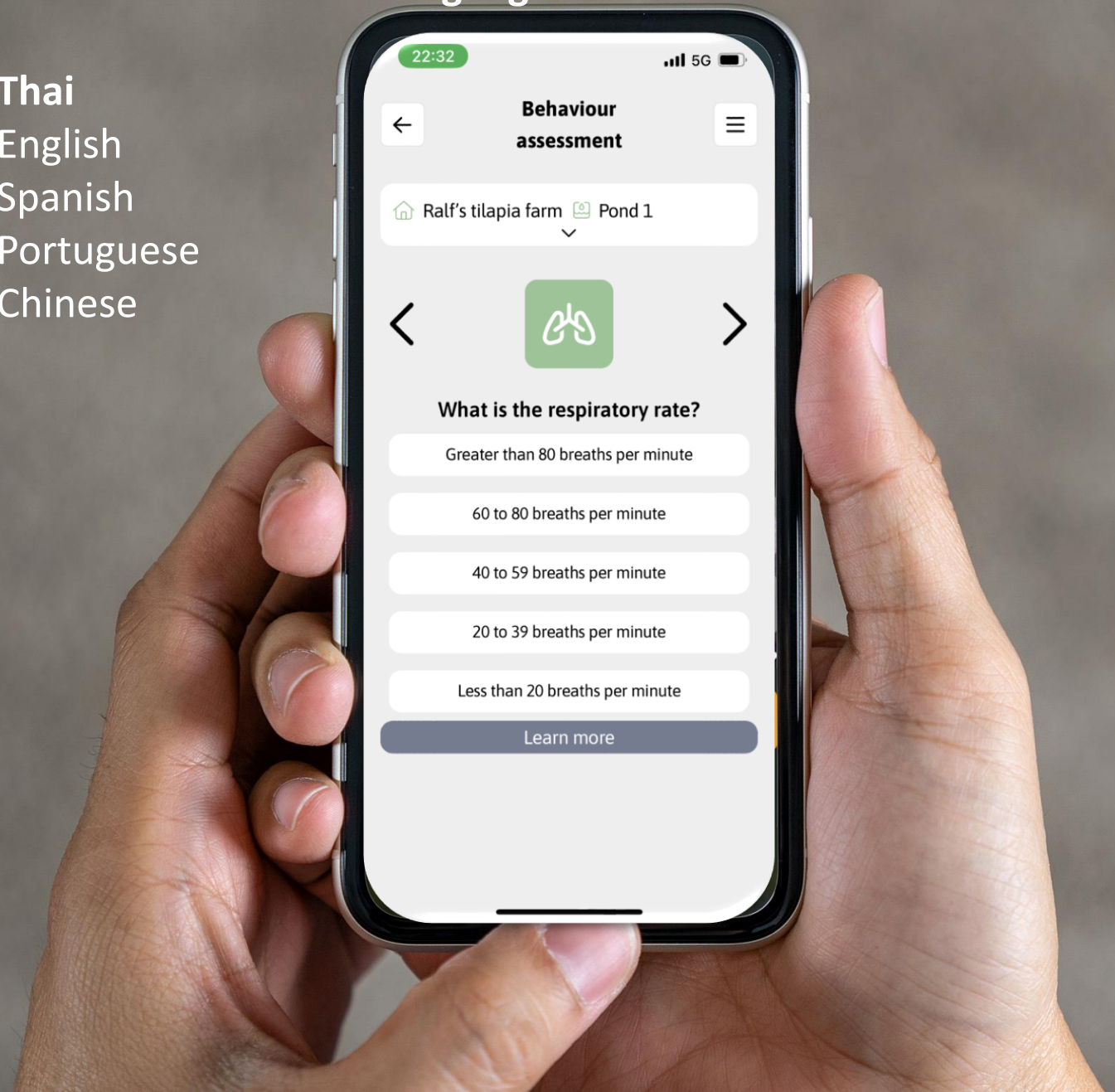**Will be available in 5 languages:**

Thai
English
Spanish
Portuguese
Chinese

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Indicators to be recorded in **4 assessment categories**

- Environment
- Nutrition
- Health
- Behaviour

Will be available in 5 languages:
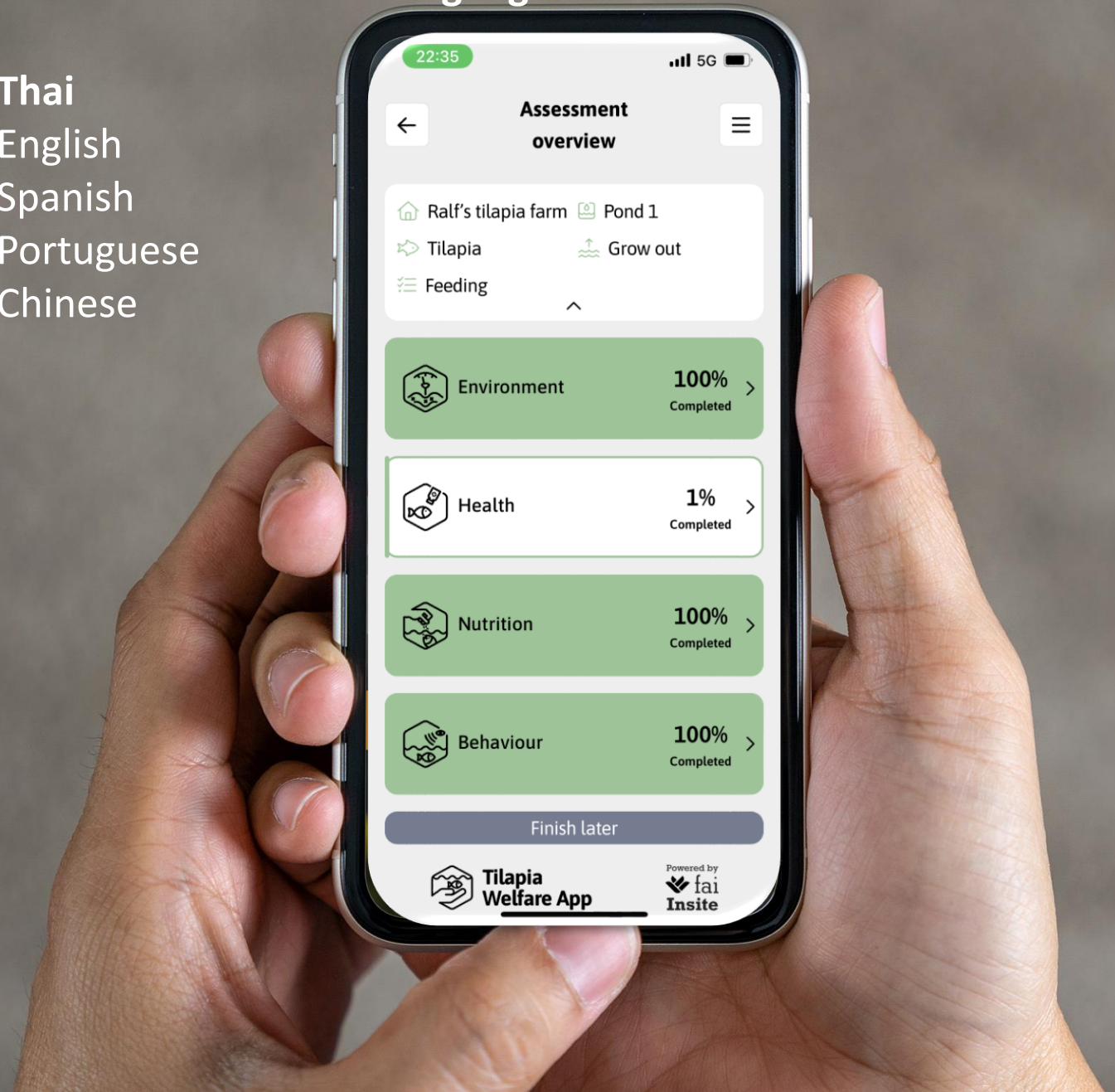
Thai
English
Spanish
Portuguese
Chinese

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Online and Offline
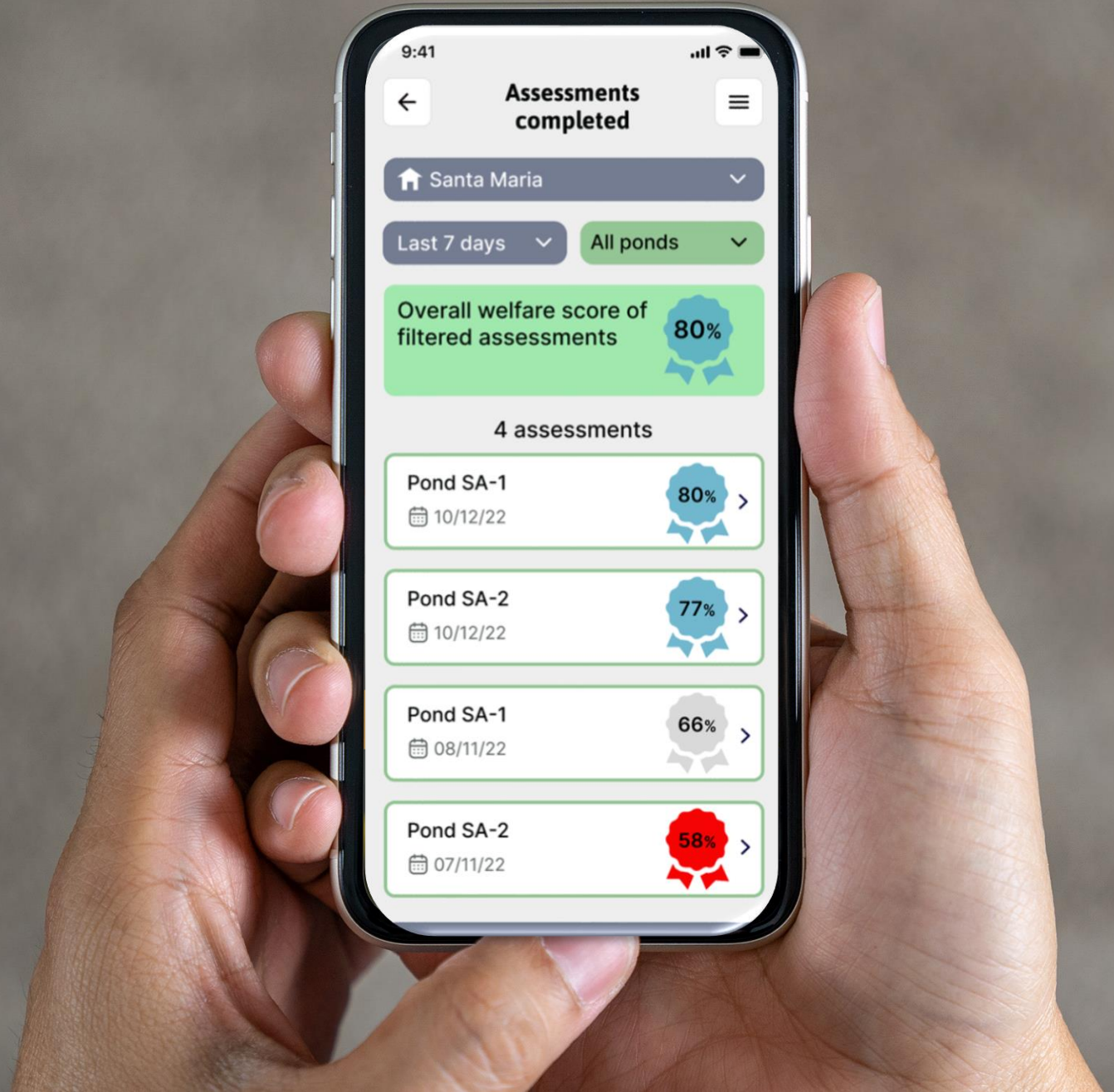
Stop and restart assessment at any time

Will be available in 5 languages:
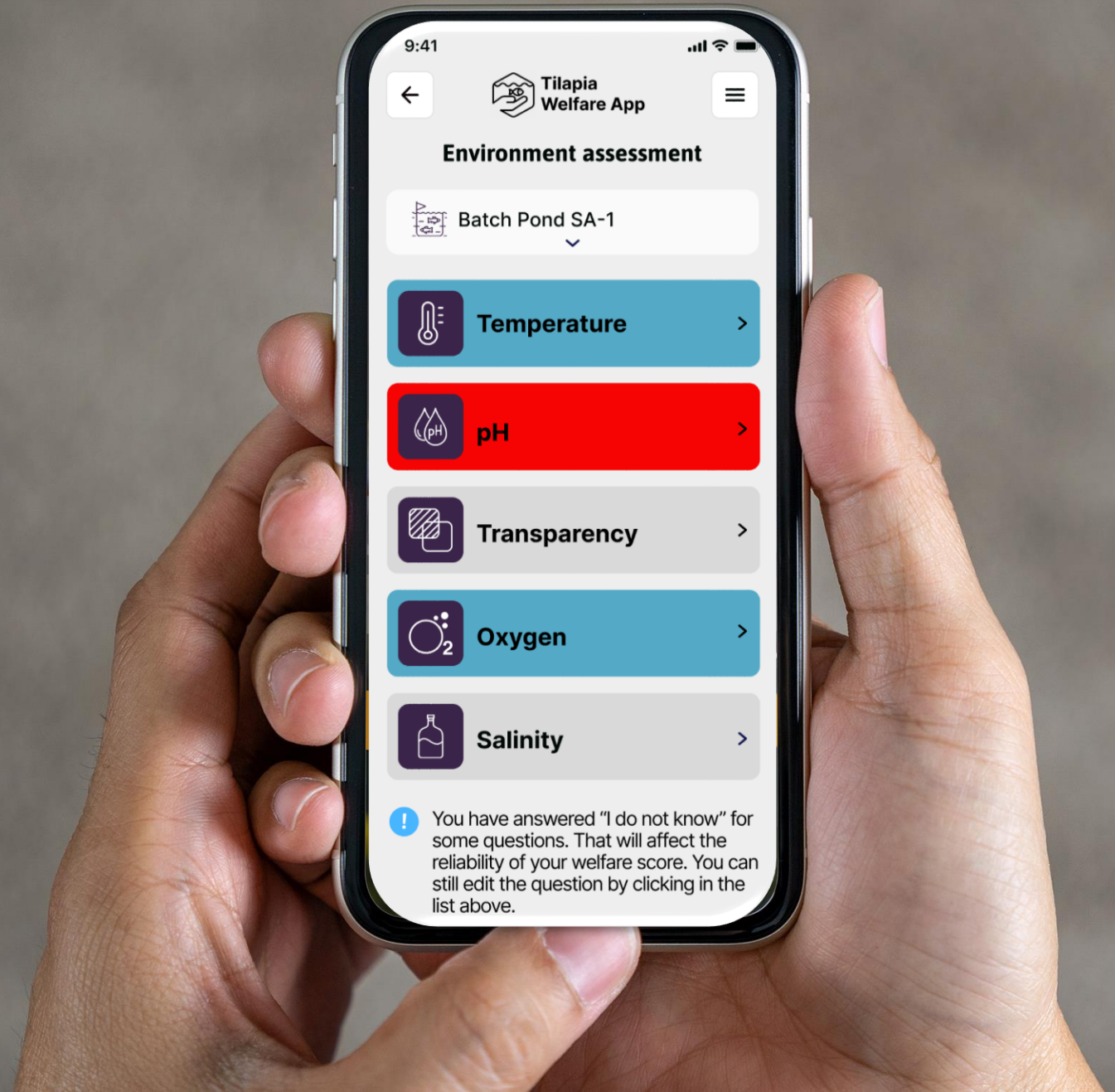
Thai
English
Spanish
Portuguese
Chinese

A free welfare toolkit for any farmer.

After performing an assessment. The app gives an **instant welfare score** of your pond/tank/cage
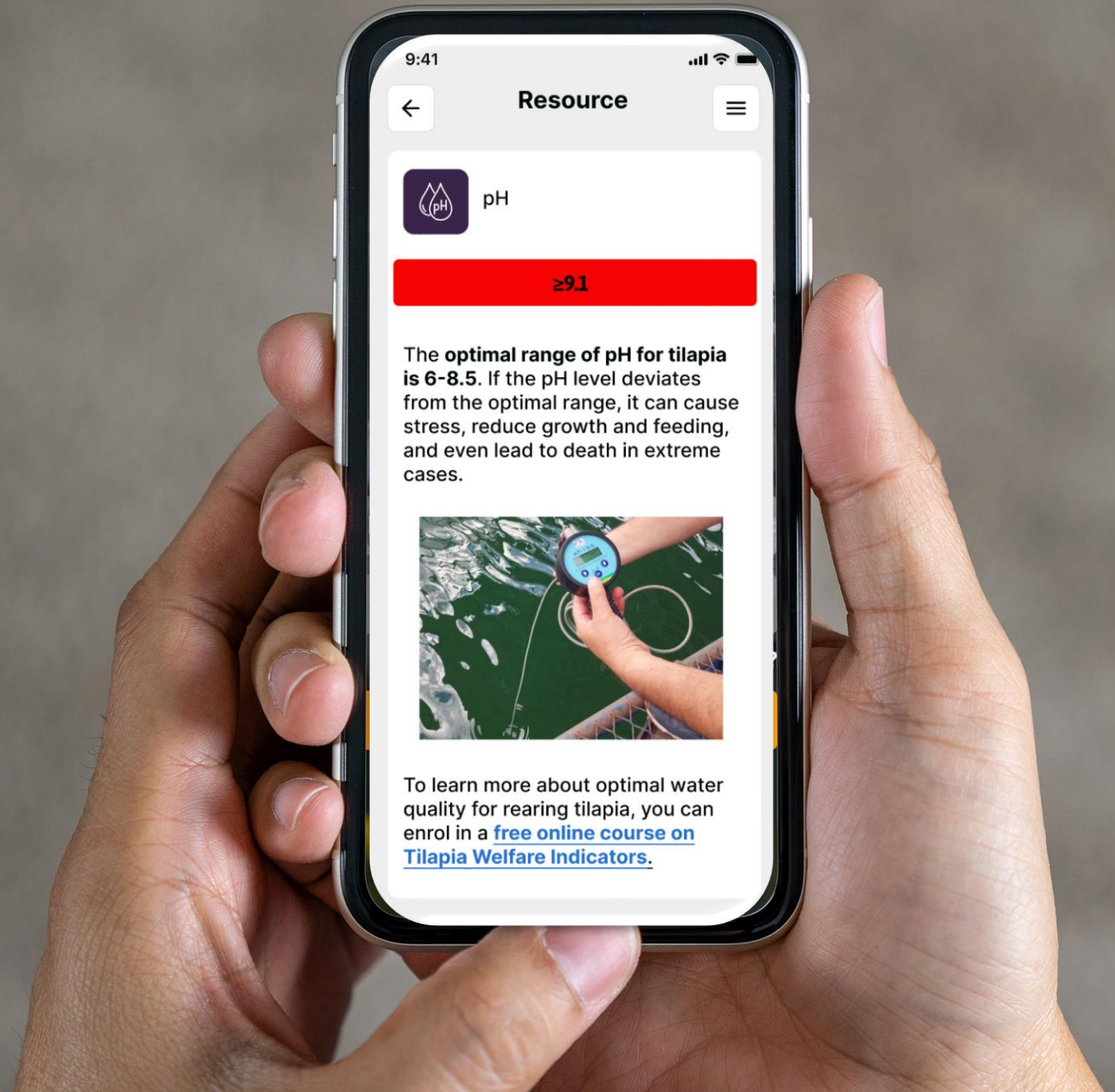
A free welfare toolkit for any farmer.

The app users can dig into the report to look at **individual indicator score ...**

A free welfare toolkit for any farmer.

.... And can have access to a **feedback** with links to **resources** available to help farmers find a solution to improve their animal welfare
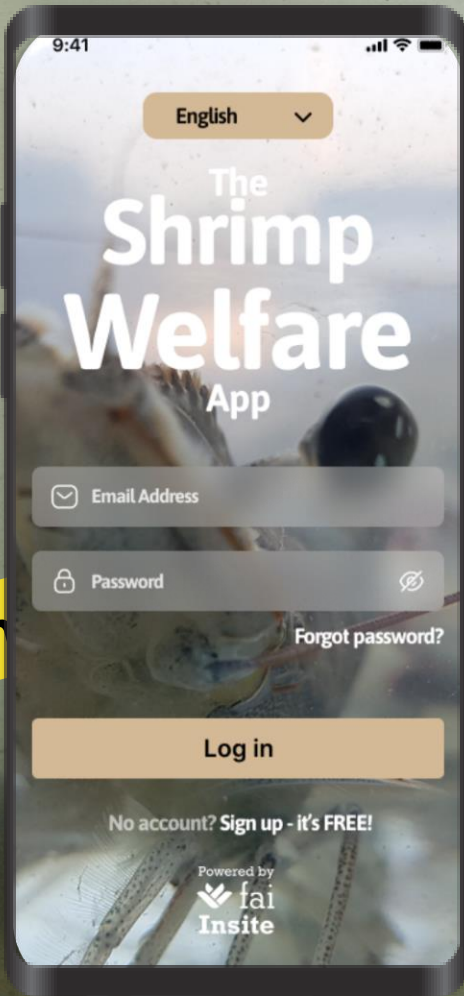
Tilapia Welfare App

About   Events   Contact Us   in   🇬🇧 English ⌄

Improve production

Reduce costs

Increase profitability

Assess fish welfare

Learn More

NETWORK OF
AQUACULTURE CENTRES
IN ASIA-PACIFIC

NETWORK ▾   PUBLICATIONS ▾   THEMES ▾   🔍

Health and welfare

80744 views

The Aquatic Animal Health Programme assists members to reduce the risks of aquatic animal disease impacting the livelihoods of farmers, national economies, trade, environment and human health by:

- Improving regional cooperation in aquatic animal health and welfare.
- Developing and implementing national strategies on aquatic animal health.
- Improving surveillance, reporting and response to disease emergencies.
- Promoting harmonisation of diagnostic procedures and risk assessment.
- Widespread promotion of better aquatic animal health management practices at the farm level.

Key activities

Key activities of the programme include:

- Convening the annual meeting of the Asia Regional Advisory Group on Aquatic Animal Health, coordinating the Quarterly Aquatic Animal Disease Report and bringing regional issues to the attention of global standard setting bodies such as the Office International des Epizooties.
- Establishment and expansion of a three-tier shared resource in aquatic animal health.
- Development of farm-level health management tools for key aquaculture commodities.
- Supporting regional disease surveillance and reporting.
- Strengthening aquatic animal health and biosecurity in the region.
- Facilitating harmonisation in disease diagnostic techniques.
- Developing resource material in support of diagnosis and surveillance.

Contacts

- National Aquatic Animal Health Coordinators and OIE National Focal Points for Aquatic Animals.

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Related

Social media

English

Thai

Portuguese

Technical workshops and trainings

→ Tilapia welfare assessment

→ Shrimp welfare assessment

☑ What do we assess
☑ How do we assess
☑ Results and feedback

THANKS
& QUESTIONS

- Next steps