



One Health Approach: Animal welfare, Food security and Food Safety in Tilapia Farms

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23 November 2023

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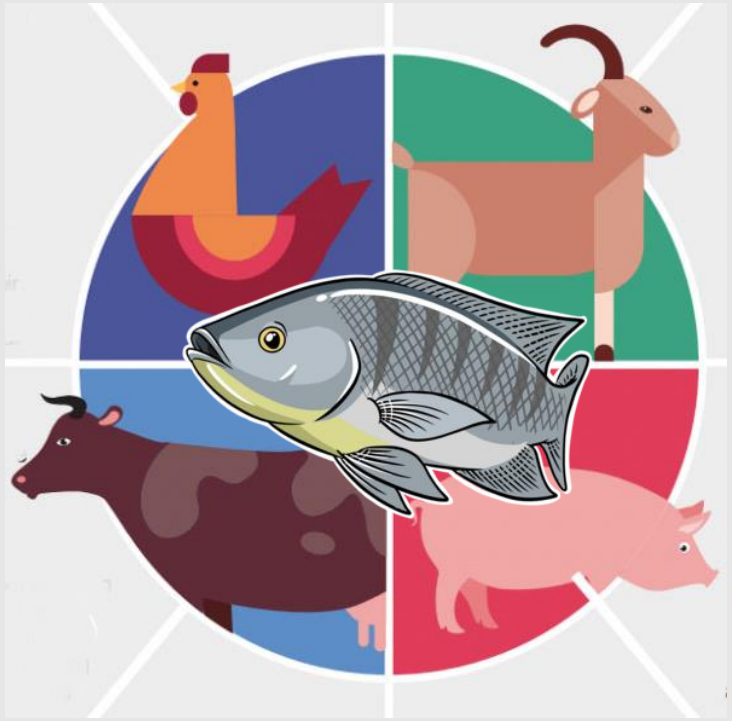
KNOWLEDGE OF THE LAND

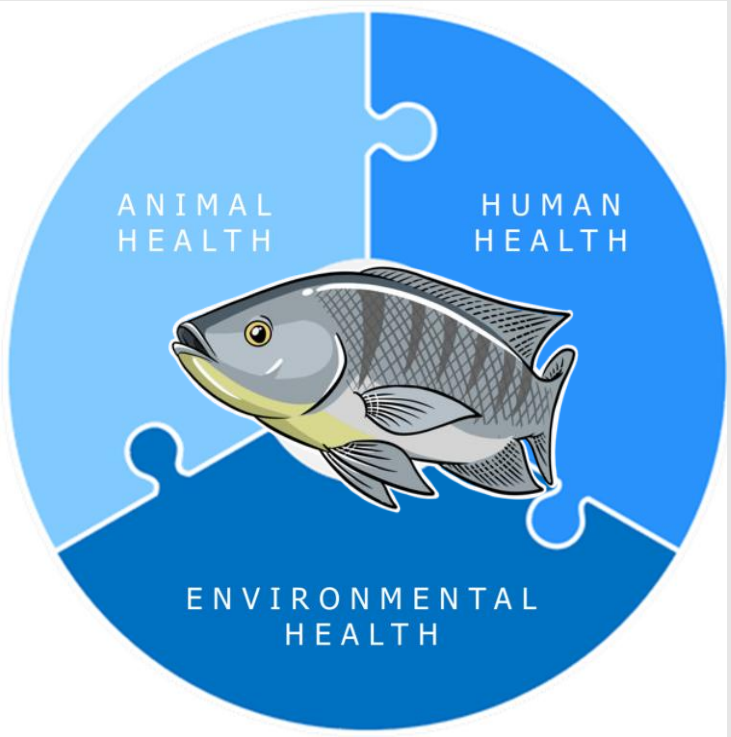
Welfare challenges in aquaculture farms



- Southeast Asia's rapid growth in aquaculture has made it one of the world's fastest-growing regions in this industry.
- However, ensuring sustainable production in terms of production efficiency, environmental impact, and disease control remains a challenge.
- The public interest and concern about the raising methods and their impact on the welfare of production animals has increased globally, and fish production is no exception.

https://fishhealthforum.com/combining-technology-and-knowledge-to-improve-aquaculture-in-southeast-asia/

Why ONE health approach?

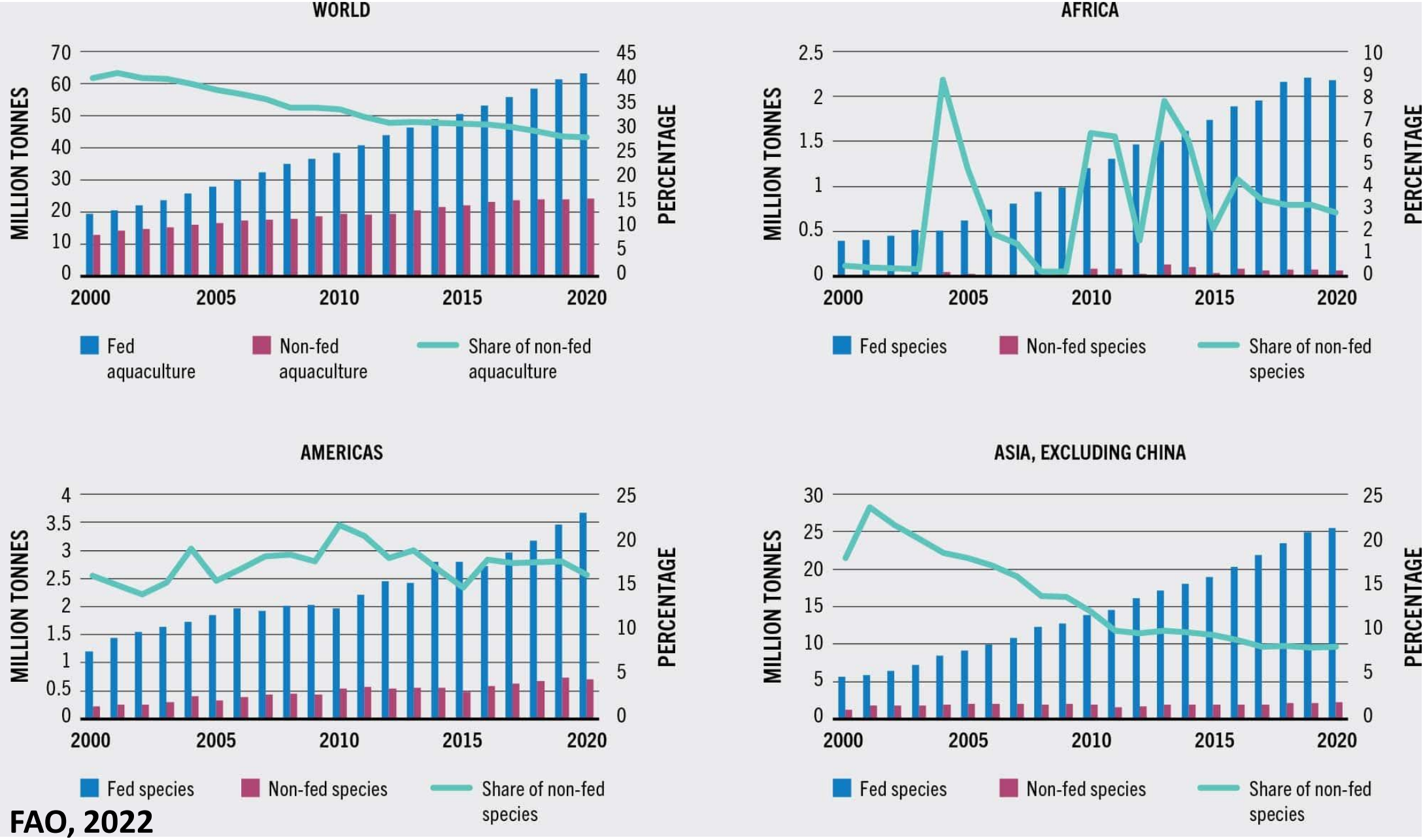


One Health Approach, the interconnection of human, animal, and environmental health.

In tilapia farming, integration of practices that address animal welfare and health.

- **Food security**
- **Economic impact**
- **Environmental considerations**

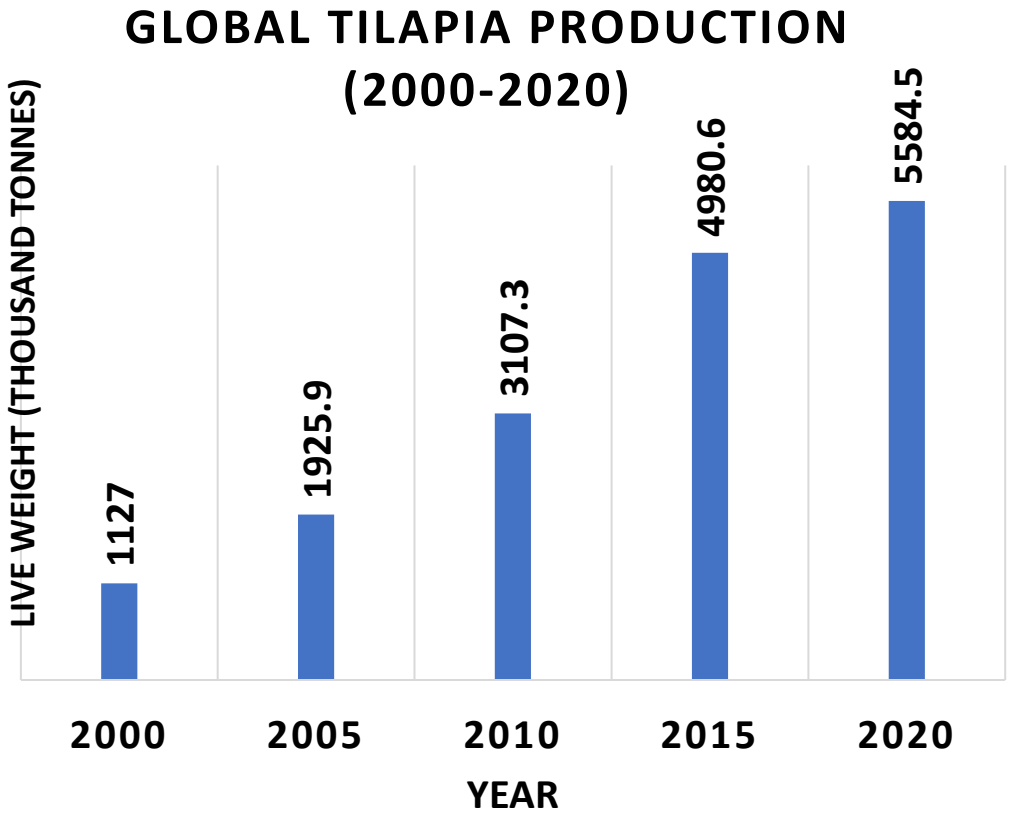
FED AND NON-FED AQUACULTURE PRODUCTION OF ANIMAL SPECIES BY REGION, 2000–2020



Source: FAO, 2022

Tilapia production

- Tilapia has become a popular choice in aquaculture due to its fast growth rate, high adaptability to environmental changes, and low cost as a source of protein with **stable market prices**.
- The global production of tilapia has consistently increased, from 1.13 million metric tonnes in 2000 to 5.58 million metric tonnes in 2020 (FAO, 2022).



Top tilapia-producing countries in 2022 (FAO, 2022)

Country	Production (tonnes)
China	1,241,410
Indonesia	**1,172,633**
Egypt	954,154
Brazil	343,596
Thailand	**205,971**

Southeast Asia

LATEST NEWS

Risk of Tilapia disappearing from dinner tables over virus

By TheBigIssue

Posted on May 30, 2017

http://www.thebigissue.co.ke/index.php/2017/05/30/tilapia-risks-disappearing-dinner-tables-virus/

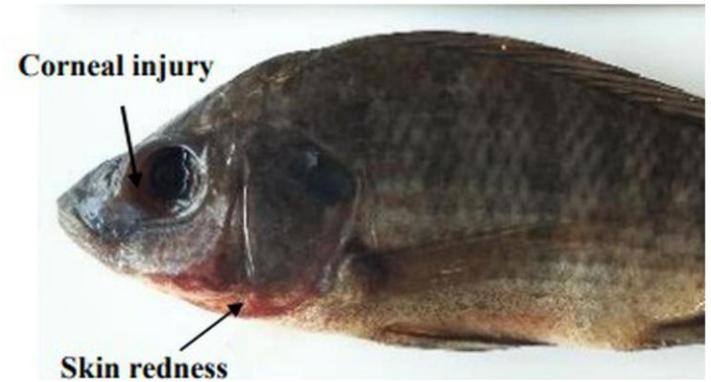
India's first tilapia parvovirus reported in Tamil Nadu

This DNA virus caused mortality ranging from 30 to 50% in the farm and 100% mortality in the laboratory, says expert

October 15, 2023 07:12 pm | Updated October 16, 2023 12:15 pm IST – CHENNAI

B. KOLAPPAN

COMMENTS SHARE READ LATER



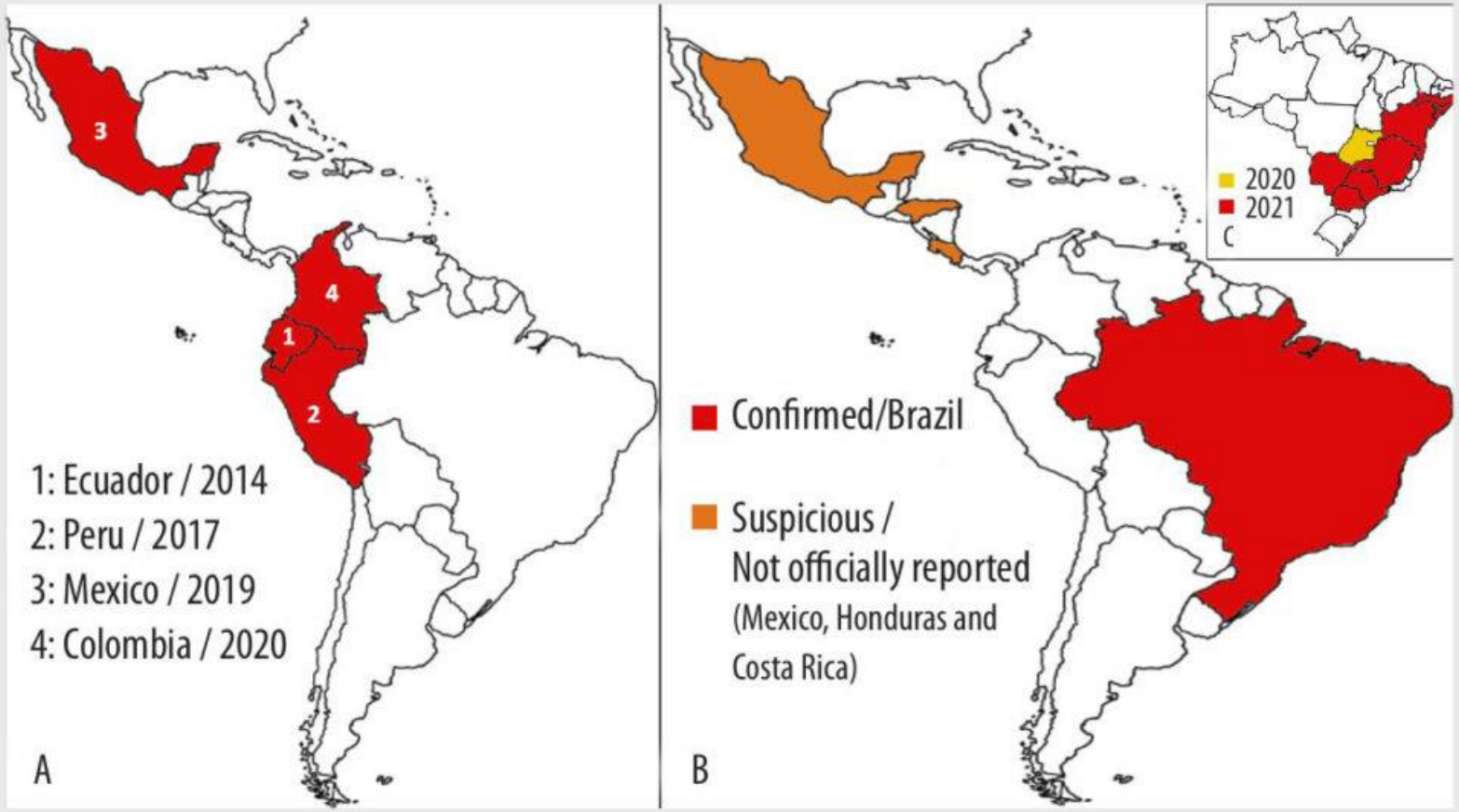
Ghanaian tilapia farms under virus attack

Naa Shormei Odonkor/GNA

Last updated: 2022/01/19 at 5:04 PM

Share 4 Min Rea

Figure 1. Status of main viral diseases in tilapia farms in LATAM: A-countries with positive diagnosis of TiLV; B-Countries with confirmed and suspicious cases of ISKNV; C- distribution of ISKNV cases in Brazilian states one year after the first report (2020/yellow).



Extensive use of disinfectants & chemicals

But not effective to improve fish survival

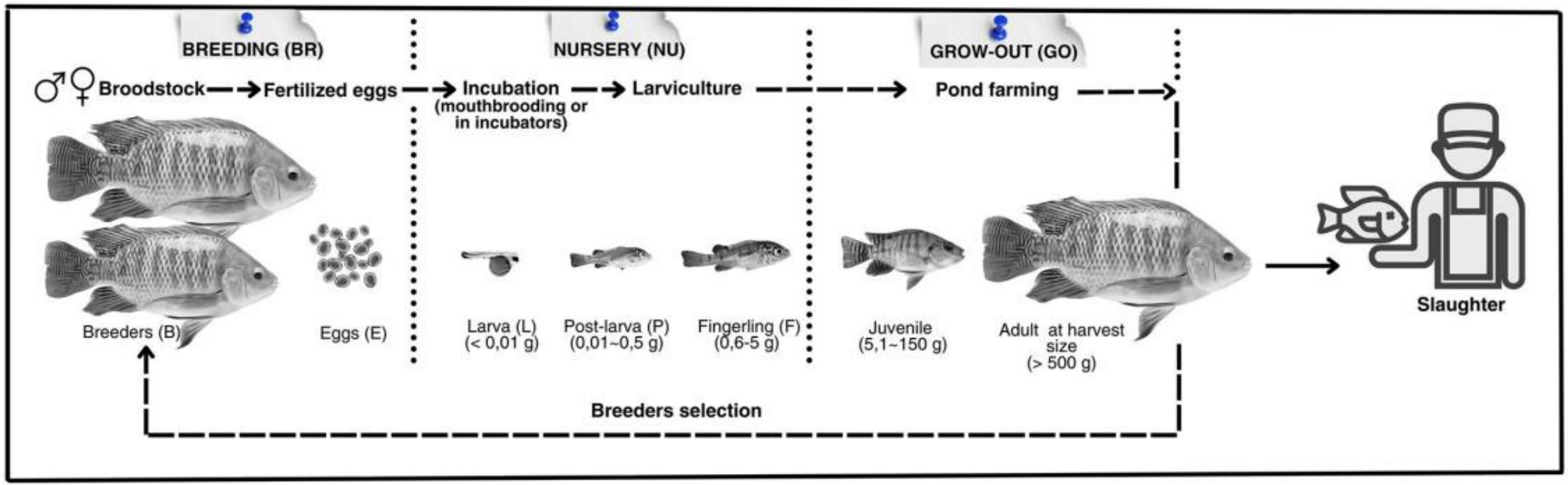


FIGURE 1
Cultivation stages (breeding, nursery, and grow-out) and development stages (breeders, eggs, larvae, post-larvae, fry, juveniles, and adults) of Nile tilapia, *Oreochromis niloticus*.

Pedrazzani et al., Front. Vet. Sci. 2023

Tilapia cage culture

Chaopraya river Thailand

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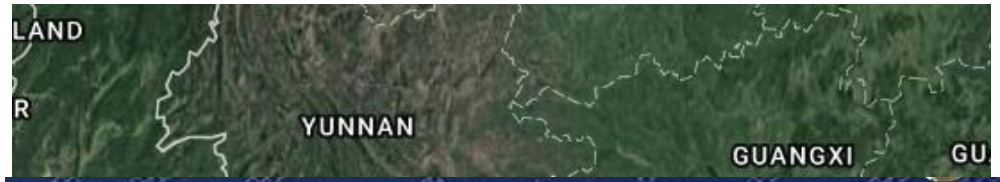
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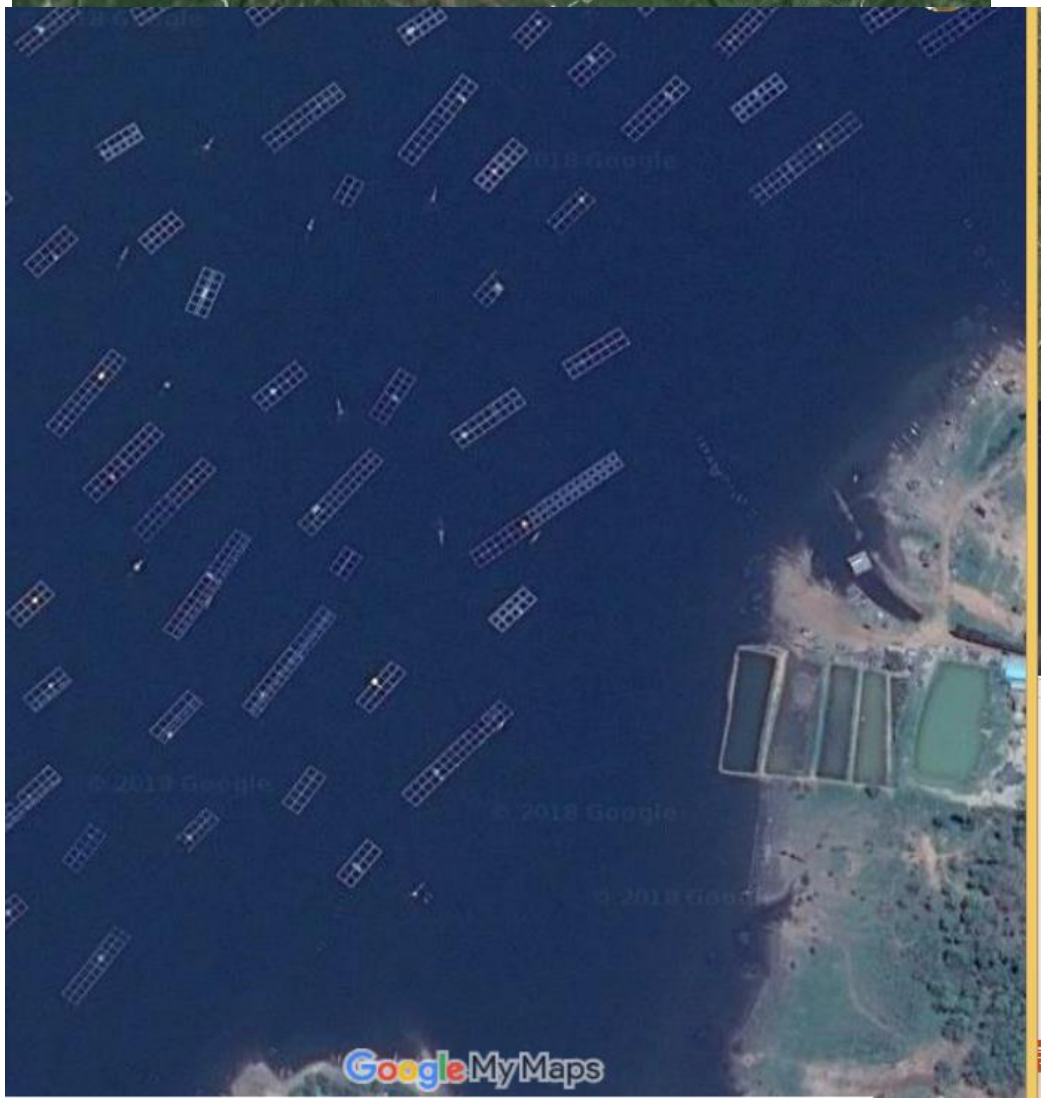
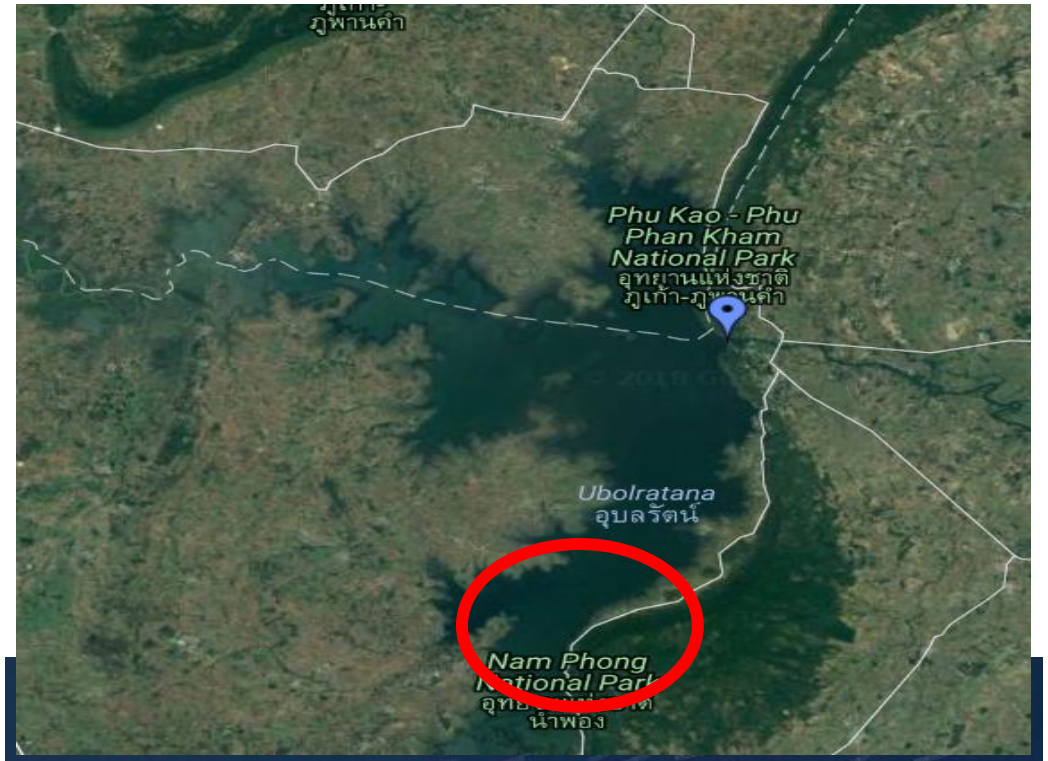

Google My Maps


Phu Kao - Phu Phan Kham National Park
อุทยานแห่งชาติ
ภูเก้า-ภูพานคำ
Ubolratana
อุบลรัตน์
Nam Phong
น้ำพอง

Welfare in Tilapia farms in Thailand

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

Welfare assessments in tilapia farm in Thailand

(May 2022 to February 2023)

Earthen pond at Chachoengsao, East

Cage farm at Kanchanaburi, West

External appearance

TABLE 4 Health welfare reference values for tilapia nursery (NU) phase, more specifically during larvae (L), post-larvae (P), and fingerlings (F) stages.

Stages			Indicators	Score	Reference values	References
L	P	F				
✓	✗	✗	Hatching rate (% of eggs)	1	≥ 9	(77)
				2	75–89	
				3	≤ 74	
✓	✓	✓	Eyes	1	Normal and healthy appearance	(40, 80–82)
				2	Unilateral: malformation or absence; exophthalmos, redness, darkening, corneal opacity, impaired vision	
				3	Bilateral: malformation or absence; exophthalmos, redness, darkening, corneal opacity, impaired vision	
✓	✓	✓	Jaws/lips/head	1	Normal and healthy appearance	(63, 83, 84)
				2	Malformation without possible feeding restriction	
				3	Malformation with possible feeding restriction, injury, ulcers, necrosis	
✓	✗	✗	Skin	1	Fully pigmented (melanophores throughout the dorsal, ventral, and mediolateral region of the body)	(60, 63, 82, 83, 85)
				2	Partially pigmented (melanophores for some regions of the body)	
				3	Completely translucent or grayish-pale body; redness, paleness, darkening, ectoparasites, white or black spots, bleeding, swelling, ectoparasites, or	

Pedrazzani et al., Front. Vet. Sci. 2023

Win Surachetpong

Monitoring fish health by farmers

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Harvesting process & method

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

Harvesting method

Grading of fish

Transportation

PMP/AB Tool: 12-point active surveillance checklist (design and implementation) for multidisciplinary team

One Health

https://onlinelibrary.wiley.com/doi/full/10.1111/raq.12530

Detailed guidance document

Field application to aquatic pathogens TiLV, EUS, EHP

Angola, Colombia, Egypt, Ghana, India, Indonesia, Malawi, Malaysia, Philippines, Kenya, Uganda, Viet Nam

Local seminars with farmers, private sectors

Rev. sci. tech. Off. int. Epiz., 30 (1)

Rev. sci. tech. Off. int. Epiz., 2011, 30 (1), 241-256

The spread of pathogens through trade in aquatic animals and their products

C.J. Rodgers [1], C.V. Mohan [2] & E.J. Peeler [3]

Freshwater Biology

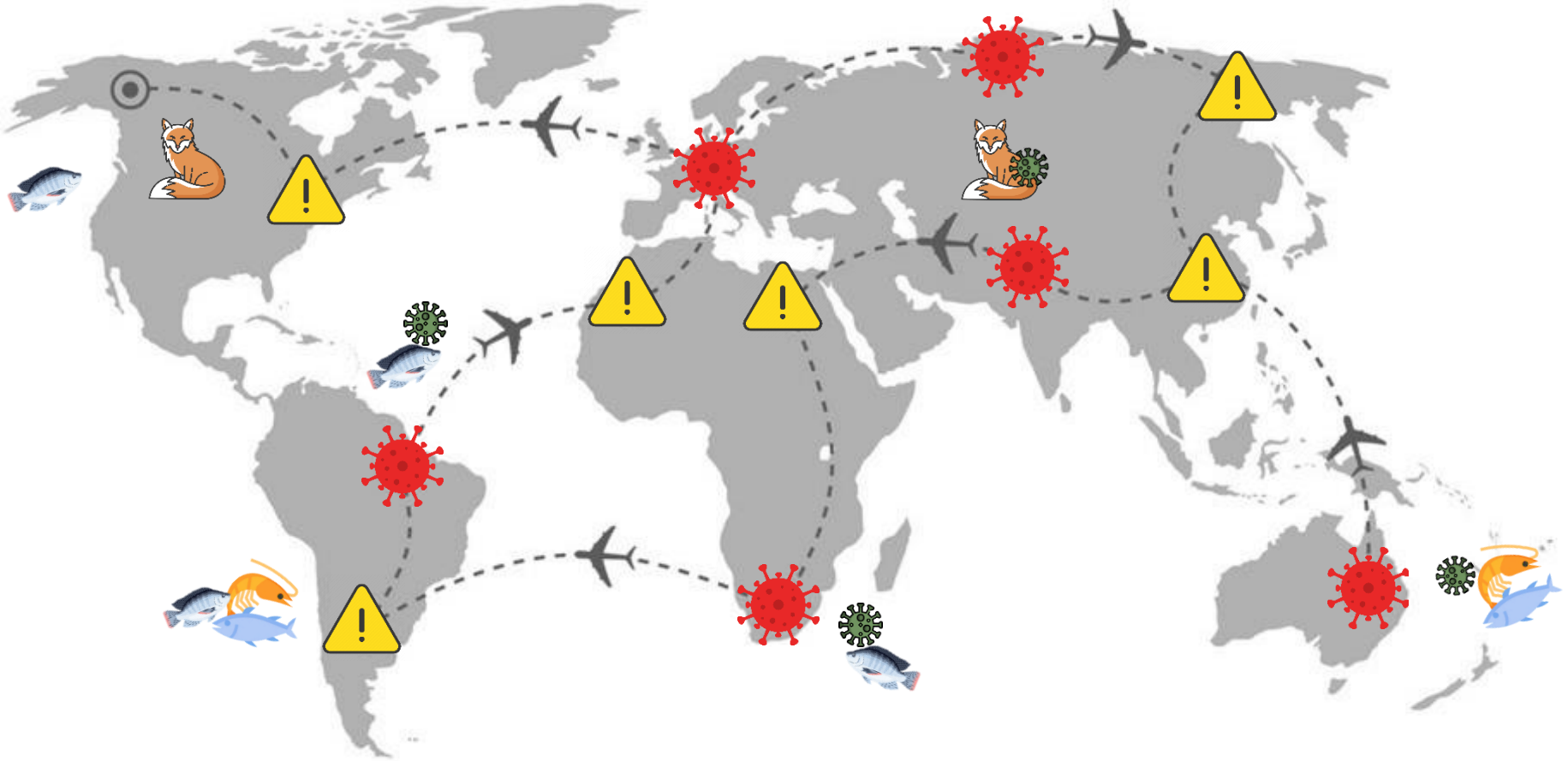
Freshwater Biology (2011) 56, 705–716 doi:10.1111/j.1365-2427.2011.02572.x

Human intervention in freshwater ecosystems drives disease emergence

EDMUND J. PEELER AND STEPHEN W. FEIST
Centre for Environment, Fisheries and Aquaculture Science, Weymouth, U.K.

Transportation

movement of live aquatic animals and exotic species



https://www.vectorstock.com/royalty-free-vector/world-travel-map-with-airplanes-flight-routes-vector-35995921

Project to enhance capacity on Tilapia Lake Virus (TiLV) kicks off in Nairobi, 23-24 October 2018

Some 34 delegates from Angola, Ghana, Nigeria, Uganda; delegat
of Kenya's Ministry of Agriculture, Livestock, Fisheries and Irrigatio
and producer sector representatives; officials of FAOR and FAOHQ
actively participated during the Project Inception Workshop (PIW)
GCP/RAF/510/MUL: Enhancing capacity/risk reduction of emerging

Food and Agriculture Organization of the United Nations

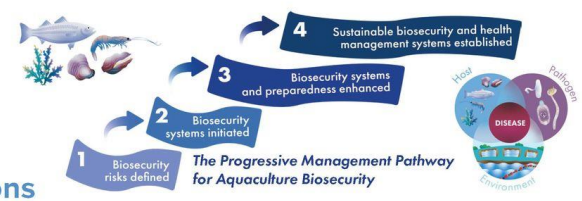
DEFINING AND IMPLEMENTING A TILAPIA WELFARE ASSESSMENT PROTOCOL IN BRAZIL

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.

The aquaculture industry, especially in the Global South, is at a similar stage of development as the pig and poultry sectors were 30 to 40 years ago. The sector's drive is to develop production systems that remove the animal from its environment and possible disease challenges, rather than meeting the animal's health and welfare needs.

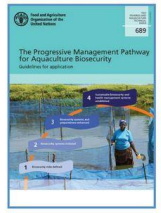
In the last 20 years many studies regarding anatomical, physiological, behavioural and pharmacological aspects have produced evidence that fish experience feelings such as pain and fear, in similar ways to other vertebrates (Broom, 1996, 2007). As evidence of fish sentience gains prominence, concern about animal welfare by society is showing parallel increases, affecting the consumer market and aquaculture regulations (Branson, 2008). If aquatic animals like fish and shrimp are capable of suffering, then their welfare must be

Food and Agriculture Organization of the United Nations

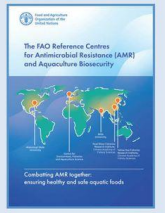


Health Management and Biosecurity-related Publications

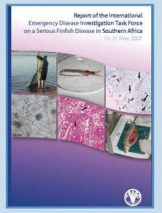
Second Annual International Conference and Exposition of the African Chapter of the World Aquaculture Society (WAS)
Lusaka, Zambia, 13-16 November 2023



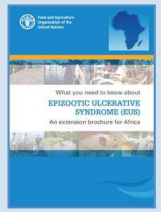
The Progressive Management Pathway for Aquaculture Biosecurity
Guidance for application



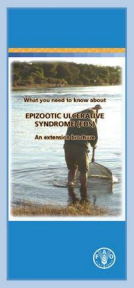
The FAO Reference Centres for Antimicrobial Resistance (AMR) and Aquaculture Biosecurity



Report of the International Emergency Disease Investigation Task Force on a Serious Finfish Disease in Southern Africa



What you need to know about Epizootic Ulcerative Syndrome (EUS)
An extension brochure for Africa



What you need to know about Epizootic Ulcerative Syndrome (EUS)
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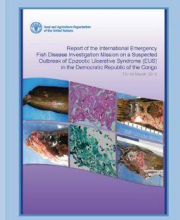
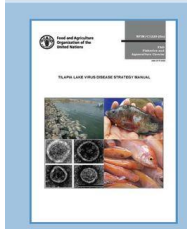


Report of the International Emergency Fish Disease Investigation Mission on a Suspected Outbreak of Epizootic Ulcerative Syndrome (EUS)in the Democratic Republic of the Congo



Tilapia Lake Virus (TiLV) Disease Strategy Manual

Tilapia Lake Virus Expert Knowledge Elicitation Risk Assessment

Development of a Regional Aquatic Biosecurity Strategy for the Southern African Development Community (SADC)

ARTICLE

Pathway to aquaculture biosecurity: Mitigating risks, managing progressively and engaging the value chain

Progressive management pathways (PMP) are a convergence of risk management and biosecurity to form an adaptive approach to aquaculture biosecurity (AB) that is responsive and relevant to the resources and capacity that is on hand. Read the article to learn more about the PMP/AB.

CONTACT
Food Safety, Nutrition and Health (NFIMF) Team | Melba.Reantaso@fao.org | Andrea.Dallocco@fao.org

Conclusion

- The **One Health Approach** integrating animal welfare, food security, and food safety is important for sustainable and responsible tilapia farming.
- **Commitments** to responsible and ethical practices that promote a balance between profitability and environmental responsibility.
- Together, through multiple collaboration among stakeholders, we can shape a future of tilapia farming for **sustainabilit welfare, and safety.**

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Thank you

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animals

MDPI

Article

Assessment of Tilapia (*Oreochromis* spp.) Welfare in the Semi-Intensive and Intensive Culture Systems in Thailand

Tuchakorn Lertwanakarn [1], Thitima Purimayata [2,3], Thnapol Luengyosluechakul [2], Pau Badia Grimalt [4], Ana Silvia Pedrazzani [5], Murilo Henrique Quintiliano [6] and Win Surachetpong [3,*]

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