



World Organisation
for Animal Health

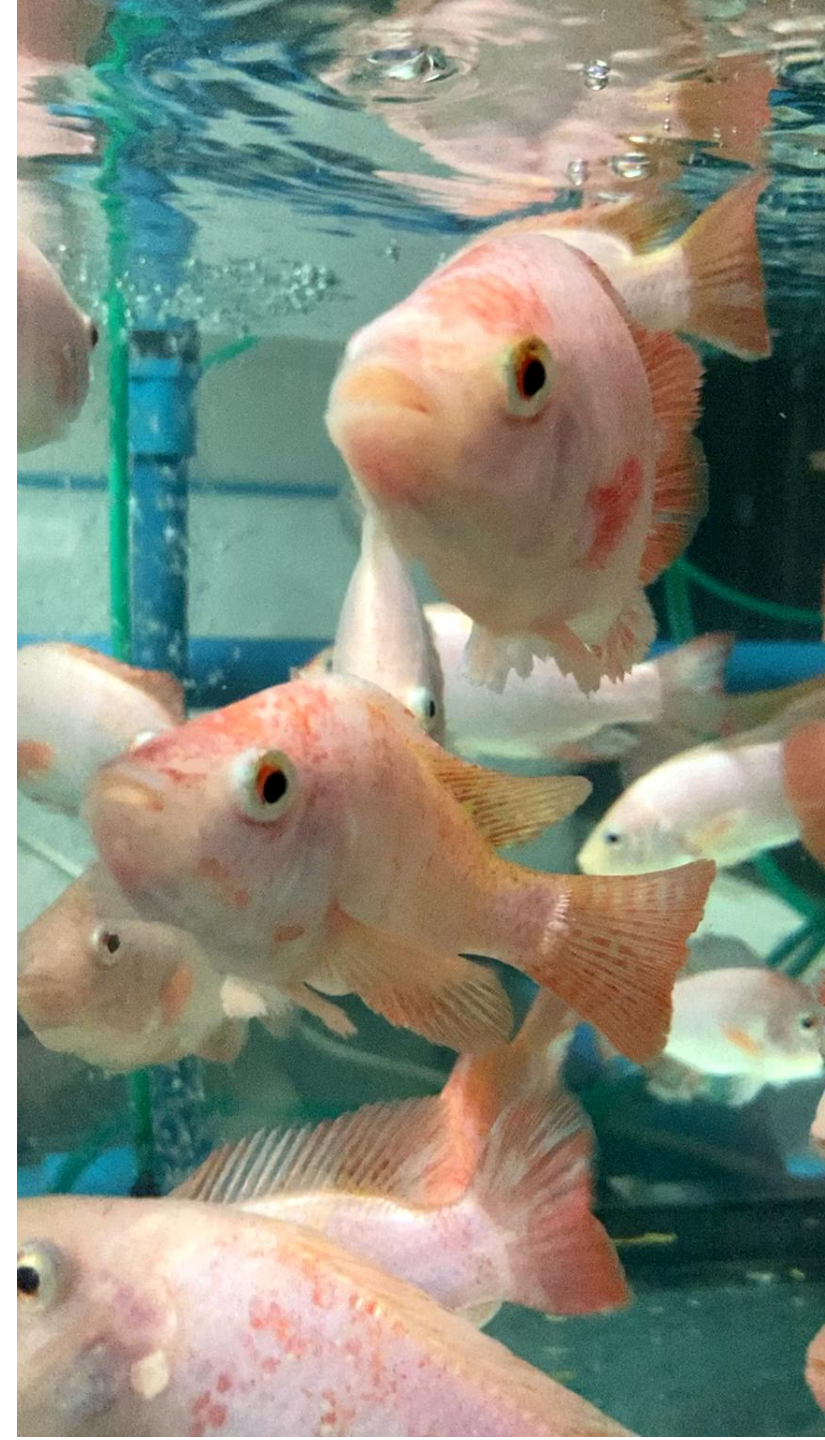
Interregional Webinar on Aquatic Animal Welfare
(Middle East and Asia-Pacific) 23rd July 2026

Building Tilapia Welfare in Thailand: Lessons from Research to Implementation

Asst Prof Dr Tuchakorn Lertwanakarn, DVM, PhD, Cert AqV

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Why Tilapia Welfare matters?



Tilapia is one of the world's most important farmed freshwater fish



Millions of tilapia are produced, handled and traded every year



Reaching local markets and global consumers



Providing affordable, nutritious and high-quality food for communities



Strengthening consumer confidence and opening doors to international trade



ANIMAL WELFARE

Reduces stress, disease and suffering, promoting healthy fish



PRODUCT QUALITY

Better welfare leads to better meat quality and food safety



FARMER INCOME

Healthier fish, lower losses and better efficiency improve profits



CONSUMER CONFIDENCE

Consumers increasingly value humane and responsible production

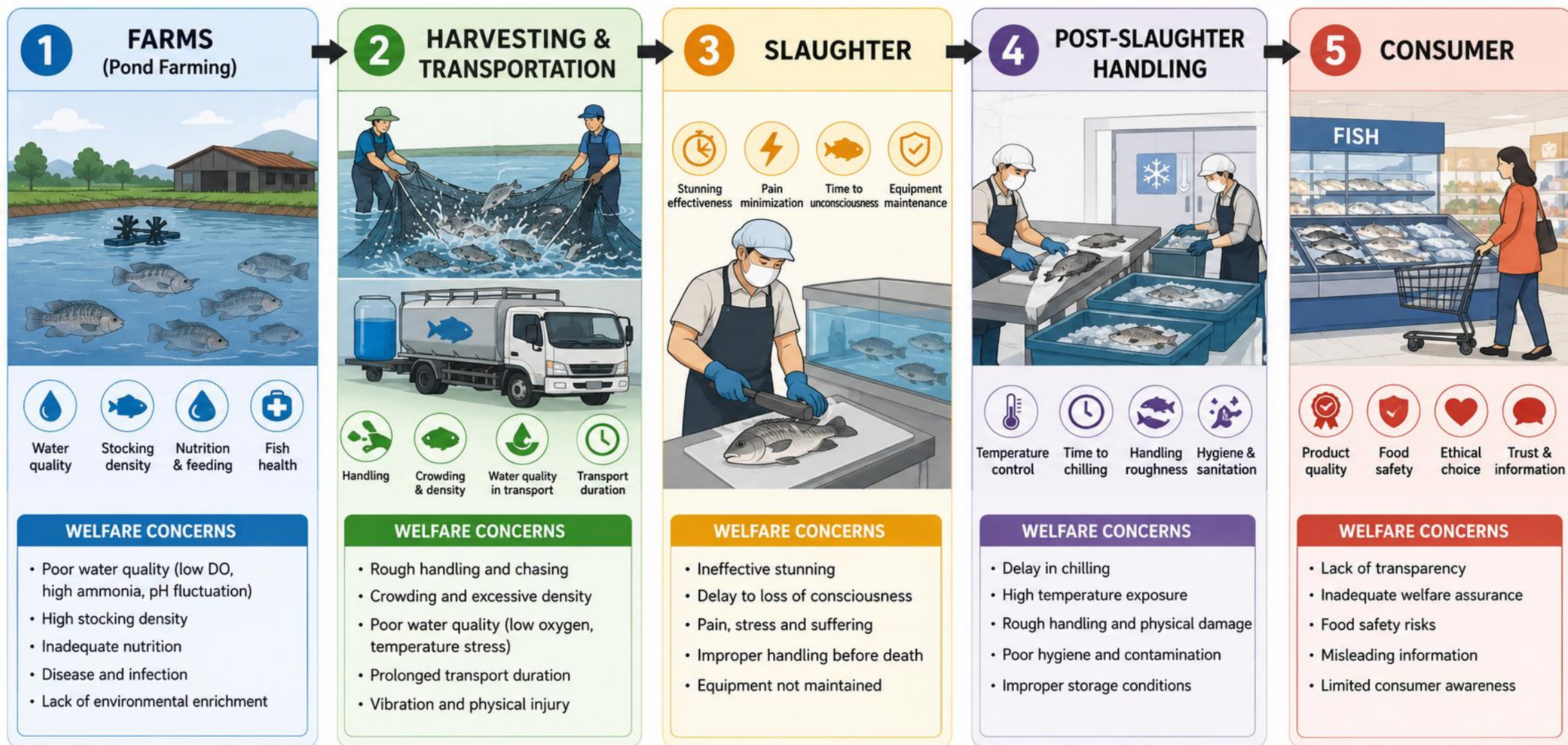


INTERNATIONAL TRADE

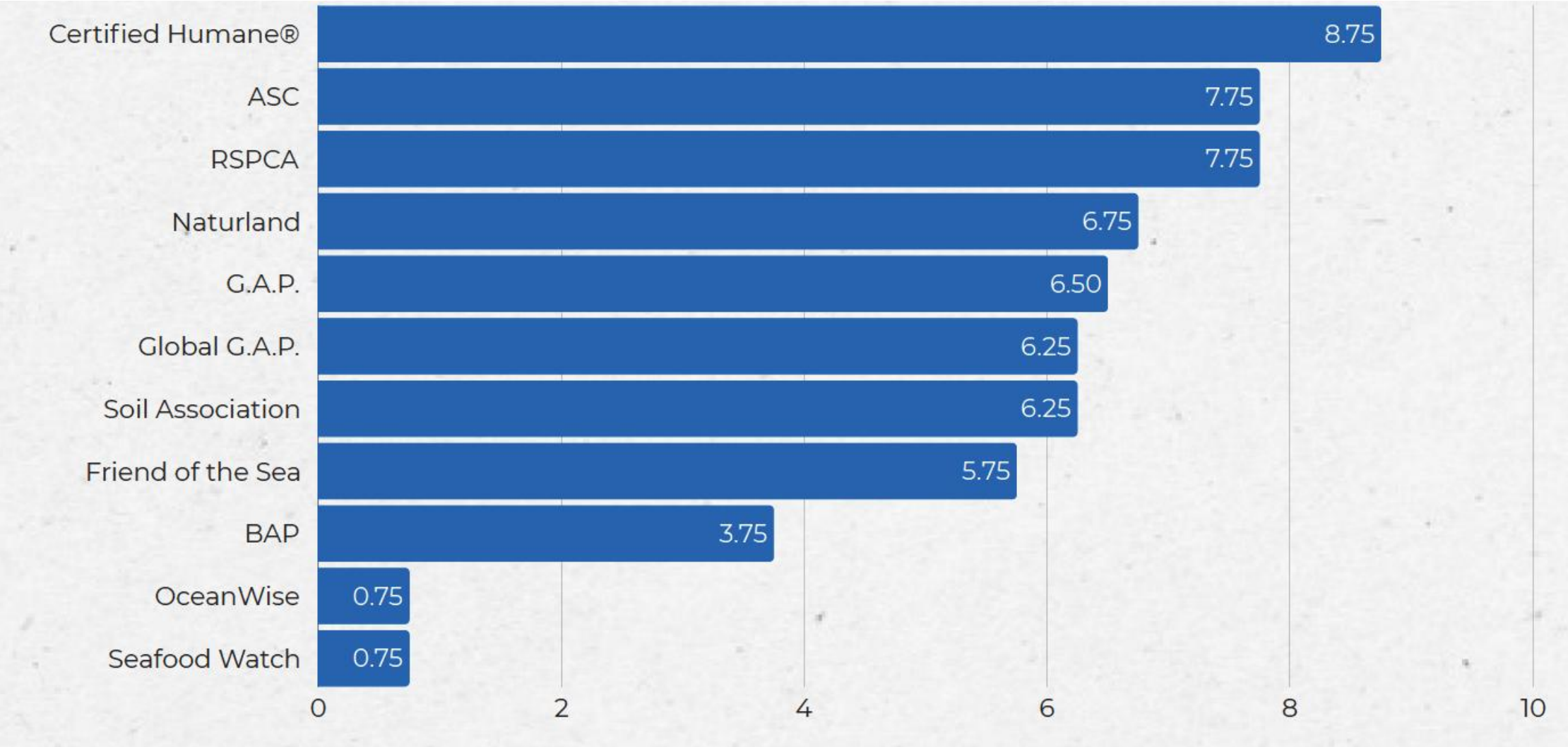
Meets global expectations and opens doors to new markets

Improving welfare is no longer an ethical issues, **it is becoming as essential component of sustainable aquaculture.**

Tilapia Welfare in every single stage of the production chain



Certification Schemes Benchmark: Aquatic Animal welfare



Tilapia Welfare: The situation in Thailand



แนวปฏิบัติในการใช้มาตรฐานสินค้าเกษตร

มกษ. 7436(G)-2564

GUIDANCE ON THE APPLICATION OF THAI AGRICULTURAL STANDARD

TAS 7436(G)-2021

การปฏิบัติทางการเพาะเลี้ยงสัตว์น้ำที่ดีสำหรับ
ฟาร์มเลี้ยงสัตว์น้ำเพื่อการบริโภค

GOOD AQUACULTURE PRACTICES
FOR FOOD-AQUATIC ANIMALS FARM

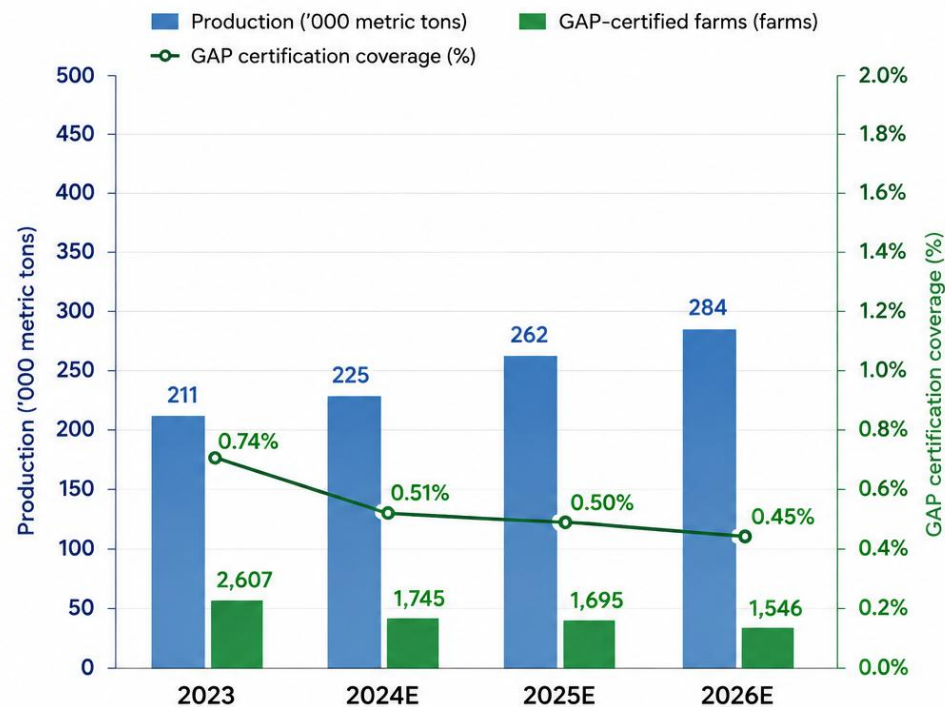
สำนักงานมาตรฐานสินค้าเกษตรและอาหารแห่งชาติ
กระทรวงเกษตรและสหกรณ์

ICS 65.020.30

ISBN

Tilapias and other cichlids production (2023–2026)

'000 metric tons



E = Estimated

Source: Department of Fisheries, Thailand

Thailand – Tilapia Sector (2023–2026)



Production
211 → 284
'000 metric tons
(CAGR 2.8%)



GAP-certified farms
2,607 → 1,546
farms
(–40.7%)



GAP certification coverage
0.74% → 0.45%
of registered farms
(–39.2%)



Key takeaway
Production is projected to grow,
while GAP certification coverage
continues to decline.

While the tilapia production is increasing,
the number of GAP-certified farms is decreasing.

1. On Farm Welfare assessment in Thailand



animals



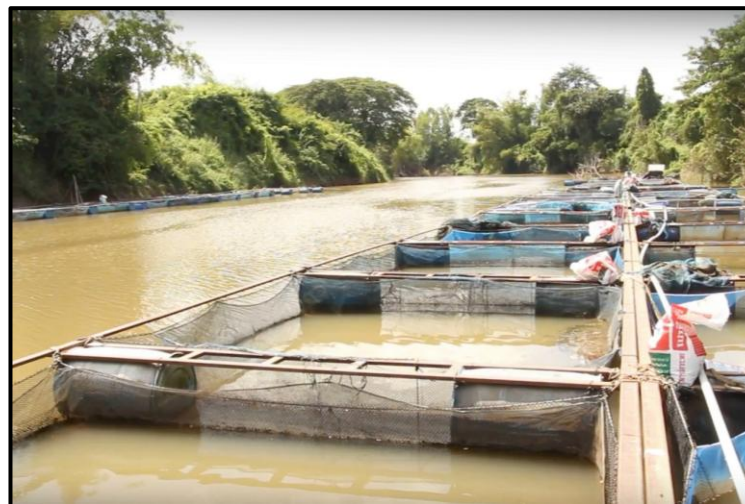
Article

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

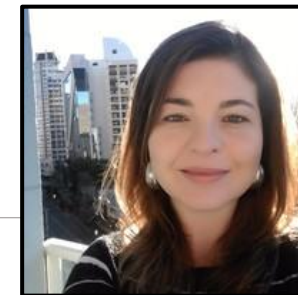
Tuchakorn Lertwanakarn ¹, Thitima Purimayata ^{2,3}, Thnapol Luengyosluechakul ², Pau Badia Grimalt ⁴, Ana Silvia Pedrazzani ⁵, Murilo Henrique Quintiliano ⁶ and Win Surachetpong ^{3,*}



5 Earthen ponds



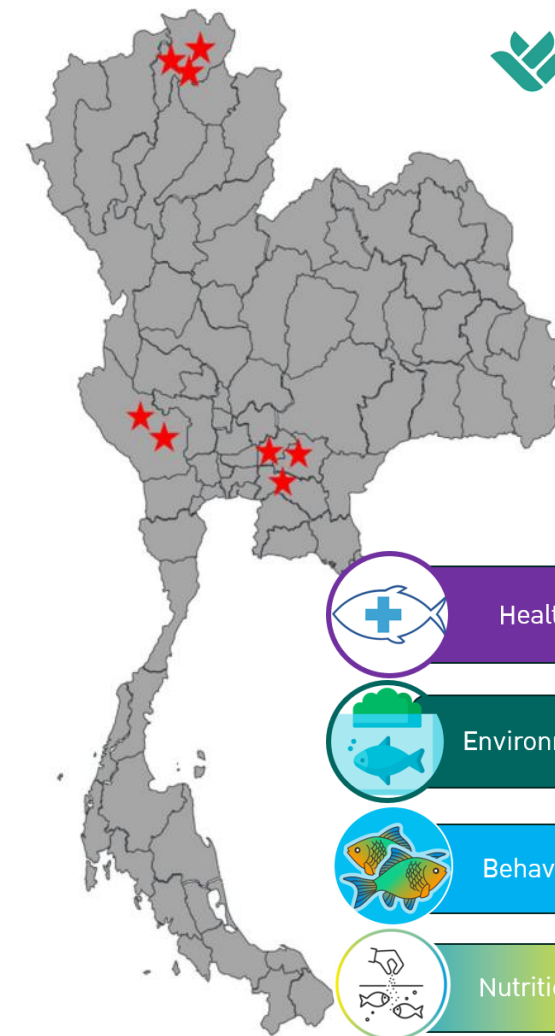
3 River-based caging systems



Ana Pedrazzani



Murilo Quintiliano



1. On Farm Welfare assessment in Thailand

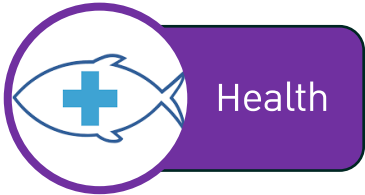


Table 3. The relative scores of the health indicators.

Raising System	Relative Score							
	Earthen Ponds					Cages		
Health Indicators	Farm A (n = 43)	Farm B (n = 26)	Farm C (n = 45)	Farm D (n = 31)	Farm E (n = 30)	Farm F* (n = 30)	Farm G (n = 30)	Farm H (n = 25)
Eyes ^a	1.02	1.00	1.00	1.00	1.00	2.30	1.07	1.00
Jaws ^a	1.05	1.00	1.00	1.10	1.00	2.00	1.03	1.08
Opercula ^a	1.00	1.00	1.00	1.00	1.00	2.40	1.00	1.00
Skin ^b	1.47	1.15	1.04	1.45	1.53	2.50	1.23	1.04
Fins ^b	1.21	1.08	1.13	1.48	1.27	2.30	1.20	1.40
Gills ^a	1.35	1.04	1.02	1.26	1.30	2.20	1.07	1.28
Spine ^a	1.00	1.00	1.02	1.00	1.00	2.00	1.00	1.00
Ectoparasites ^a	1.00	1.00	1.00	1.00	1.00	1.60	1.00	1.00
Mortality ^c	2	1	1	2	2	3	3	2

* Indicates *p*-value < 0.05 compared with other farms (using Dunnett's); ^{a, b, c} indicate statistically significant differences between health indicators.

* **Mortalities** were significantly different between **Earthen ponds** and **Caging system**

** **Skin and Fins** are two important health indicators reflecting injuries during harvesting with nets.

1. On Farm Welfare assessment in Thailand



Environment

Table 4. Environmental indicators

Raising System															Cages				
Environmental Indicator	Farm A		Farm B							Farm G		Farm H							
	Value	Score	Value	Score						core	Value	Score	Value	Score					
Temperature (°C)	28.4	1	28.4	1							1	27.8	1	28.2	1				
pH	8.5	1	8.0	1							1	7.5	1	7.2	1				
Transparency (cm)	20	3	21	3							1	30	1	25	1				
Dissolved oxygen (mg/L)	8.25	4	5.47	1							1	5.2	2	5.38	1				
NH ₃ (mg/L)	0.00	1	0.00	1							1	0.00	1	0.00	1				
NO ₂ ⁻ (mg/L)	0.00	1	0.00	1							1	0.00	1	0.00	1				
Alkalinity (mg/L of CaCO ₃)	102	2	85	1							2	119	2	51	1				
Shading (%)	0	3	0	3							3	0	3	60	3				
Predators	UP	3	UP	3							3	UP	3	CP	2				
Inhabitants	UP	3	A	1	A	1	A	1	UP	3	A	1	A	1	1				
Density (fish/m ²)	1.25	1	3.13	1	3.13	1	3.13	1	2.08	1	60.0	1	60.0	1	90.0	1			

A, absence; CP, controlled presence; UP, uncontrolled presence.

* **Stocking density** is an important different factors between two culturing systems and affect the fish welfare.

1. On Farm Welfare assessment in Thailand

Table 5. Behavioural assessment and scores.

Raising System	Earthen Ponds				Cage			
Behavioural Indicators	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F	Farm G	Farm H
	Score	Score	Score	Score	Score	Score	Score	Score
Feeding	4	1	1	1	4	1	1	1
Capture	4	4	4	4	4	4	4	1

Table 6. Nutrition indicators and scores.

Raising System	Earthen Ponds								Cages							
Nutritional Indicators	Farm A		Farm B		Farm C		Farm D		Farm E		Farm F		Farm G		Farm H	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Fish weight (g) (mean $\pm$ SD)	710.6 $\pm$ 167.2	–	306.2 $\pm$ 39.0	–	151.5 $\pm$ 28.5	–	508.6 $\pm$ 116.2	–	246.9 $\pm$ 27.9	–	292.0 $\pm$ 72.6	–	106.6 $\pm$ 29.6	–	542.8 $\pm$ 142.3	–
Fish age (days)	213	–	115	–	90	–	180	–	186	–	75	–	75	–	243	–
Use commercial feed	Yes	–	Yes	–	Yes	–	Yes	–	No	–	Yes	–	Yes	–	Yes	–
Crude protein ratio (CP%)	25	2	30	1	30	1	30	1	ND	–	30	1	32	1	30	1
Feed conversion ratio (FCR)	1.1	1	1.3	1	1.3	1	1.2	1	ND	–	1.55	2	1.41	2	1.3	1
K factor (mean $\pm$ SD)	2.53 $\pm$ 0.27	3	2.22 $\pm$ 0.20	2	2.53 $\pm$ 0.21	3	2.26 $\pm$ 0.21	2	2.20 $\pm$ 0.17	2	3.7 $\pm$ 1.44	3	2.2 $\pm$ 0.34	2	2.75 $\pm$ 0.62	3

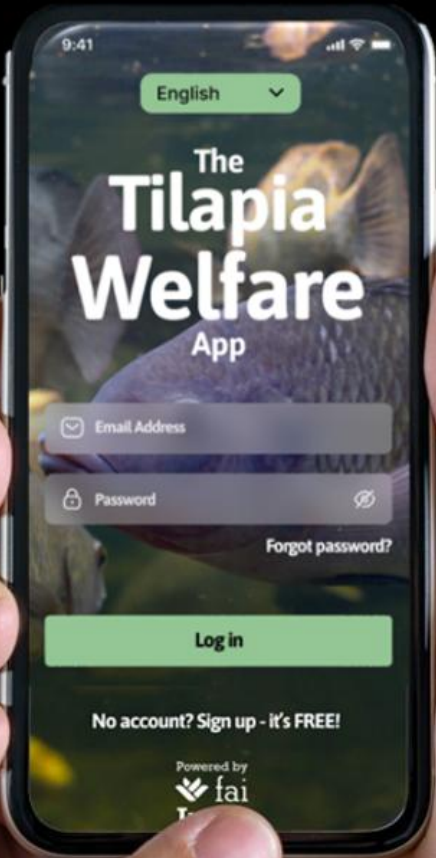
* Many Earthen ponds used **agricultural byproducts** from agriculture as the feed which slower the growth.

Challenges: Improving Tilapia Welfare in the Farms



Tilapia Welfare App
Welfare assessment in your hands











FAI Academy



2. Tilapia Welfare during Harvest and Transport



Challenges: Less is known about the operational welfare indices and stress related parameters.



Nathan Atkinson, AARC and SRU ERDA

* Poor harvesting techniques and stress-induced transportation are still occurred in Thailand and needs a huge investigation.

3. Tilapia Welfare in local markets



Open
Philanthropy



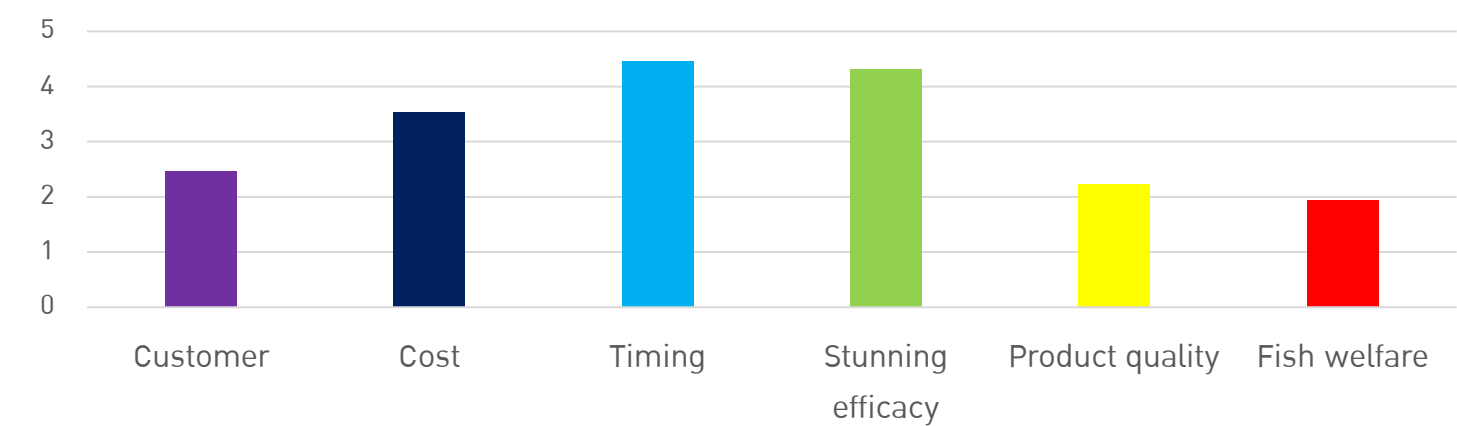
Asian
Fish
Welfare
Network



Fishmongers attitude towards Tilapia Welfare

Demographic info	Values (15 fishmongers; from 3 local wet markets)
Sex	Male (80%), Female (20%)
Age	38.07±10.40 (21 – 57) years old
Religion	Buddhism (100%)
Ownership	Owner (46.67%), Employee (53.33%)
Experience	8.44±7 (2 months – 20 years)
Welfare awareness	Aware (20%), Unaware (80%)
Preferred methods	Priest (53.33%), Asphyxiation (53.33%), Iced slurry (26.67%)

Factors influencing the selection of stunning techniques



David Little, Simao Zacarias, Win Surachetpong



Challenges: Best slaughtering practice?

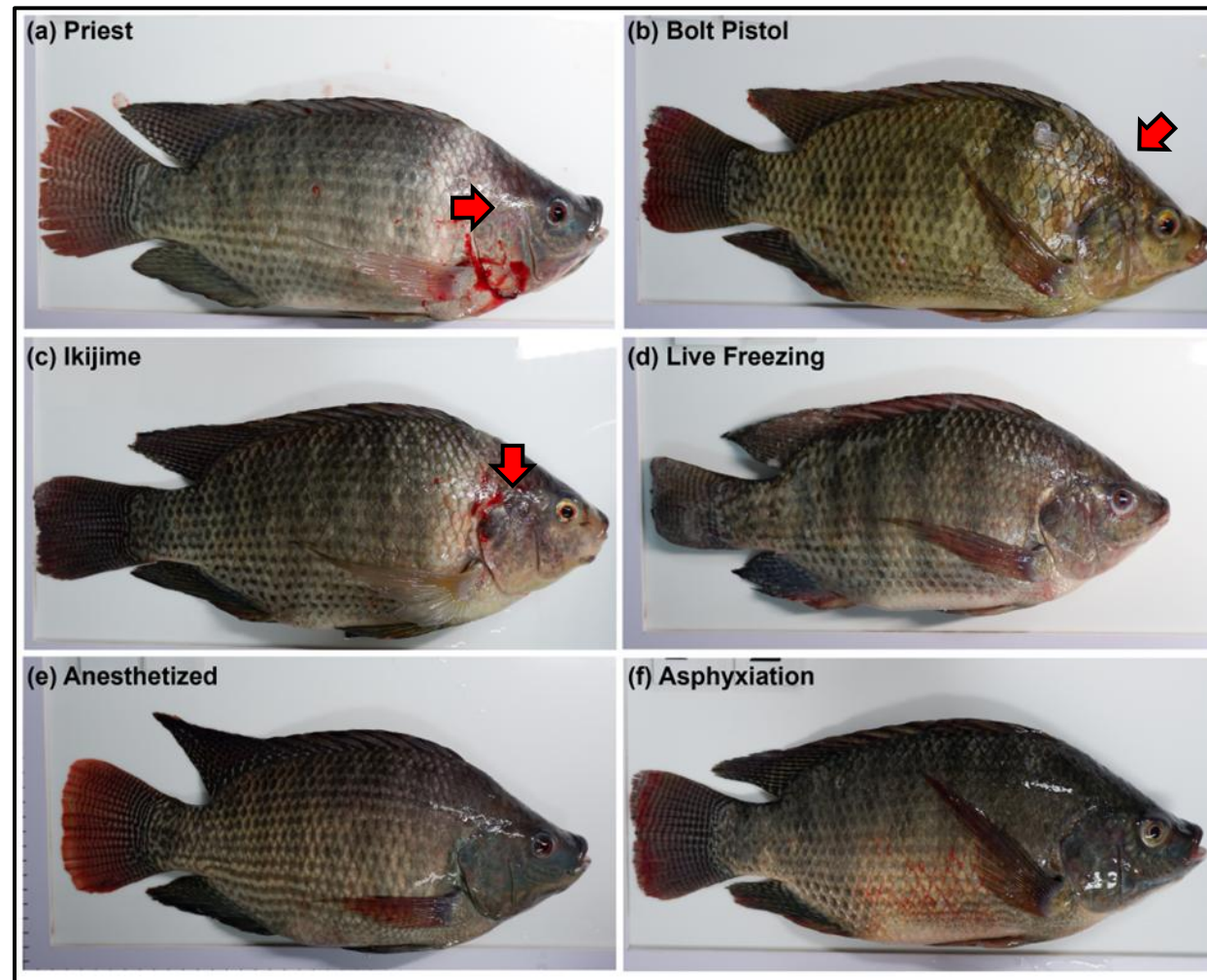
Arnan



frontiers
in Aquaculture

Effects of various alternative stunning techniques on welfare indicators and meat quality of Nile tilapia

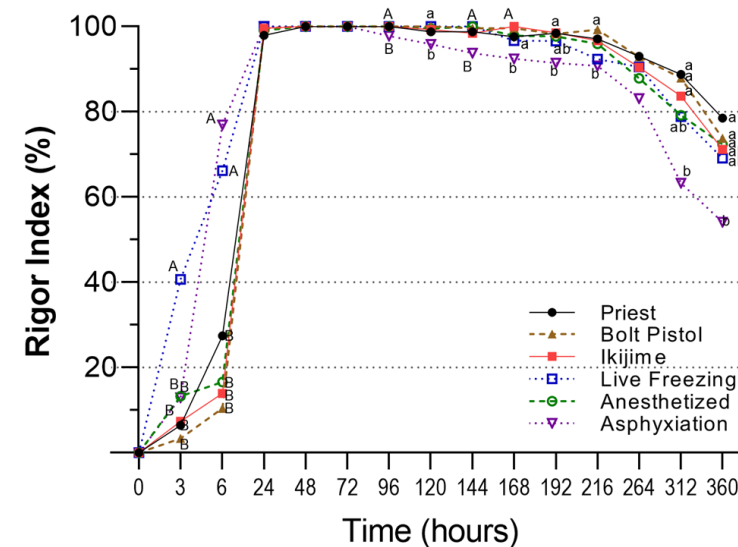
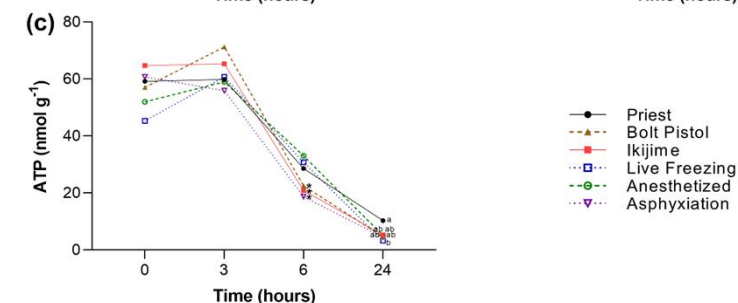
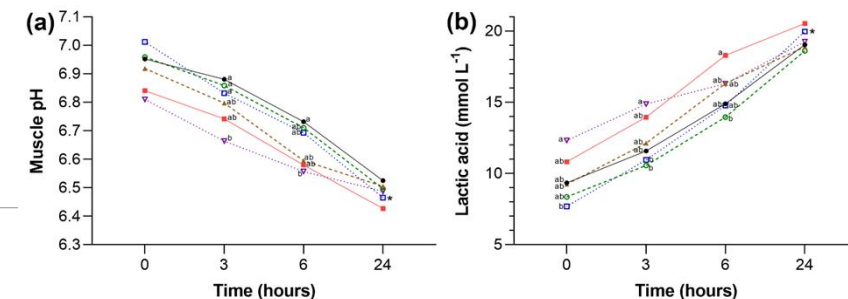
Arnan Hirunratanakorn^{1,2}, Jidapa Yamkasem²,
Natthakul Youngnoi², Piyathip Setthawong²,
Win Surachetpong^{3*} and Tuchakorn Lertwanakarn^{2*}



Stunning vs Welfare vs Meat quality

- Anesthetic overdose gives the best MD & BR score
- Asphyxiated fish shows the worst BR score

Stunning methods	Score	Morphological damages (% MD)					Average MD Score	Behavior responses (% BR)				Average BR Score
		Skin/scale	Eyes	Operculum	Fins	Gills		Flopping	Opercular movement	Eye movement	Tail Pinching	
Priest	0	11.1	—	55.6	55.6	11.1	0.333	11.1	—	100	55.6	0.056
	1	88.9	100	33.3	44.4	—		88.9	100	—	44.4	
	2	—	—	11.1	—	88.9		—	—	—	—	
Bolt Pistol	0	—	11.1	88.9	100	100	0.159	—	11.1	100	100	0.000
	1	77.8	88.9	11.1	—	—		77.8	88.9	—	—	
	2	22.2	—	—	—	—		22.2	—	—	—	
Ikijime	0	—	11.1	55.6	100	100	0.230	—	11.1	66.7	100	0.222
	1	22.2	88.9	33.3	—	—		22.2	88.9	22.2	—	
	2	77.8	—	11.1	—	—		77.8	—	11.1	—	
Live Freezing	0	88.9	33.3	88.9	66.7	66.7	0.111	88.9	33.3	100	66.7	0.028
	1	11.1	66.7	11.1	33.3	33.3		11.1	66.7	—	33.3	
	2	—	—	—	—	—		—	—	—	—	
Anesthetized*	0	100	66.7	100	100	100	0.024	100	66.7	100	100	0.000
	1	—	33.3	—	—	—		—	33.3	—	—	
	2	—	—	—	—	—		—	—	—	—	
Asphyxiation**	0	22.2	33.3	88.9	22.2	88.9	0.175	22.2	33.3	—	22.2	1.000
	1	77.8	66.7	11.1	77.8	11.1		77.8	66.7	—	77.8	
	2	—	—	—	—	—		—	—	100	—	



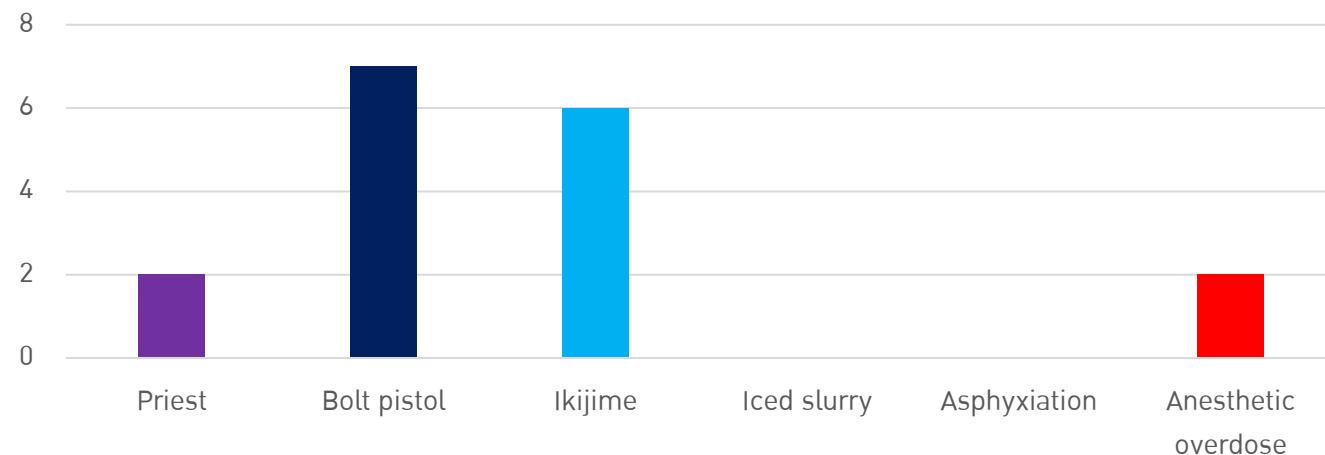
- Asphyxiated fish has the poorest pre-slaughter stress and shortest shelf-life

Challenges: Improving Fishmongers awareness in Welfare

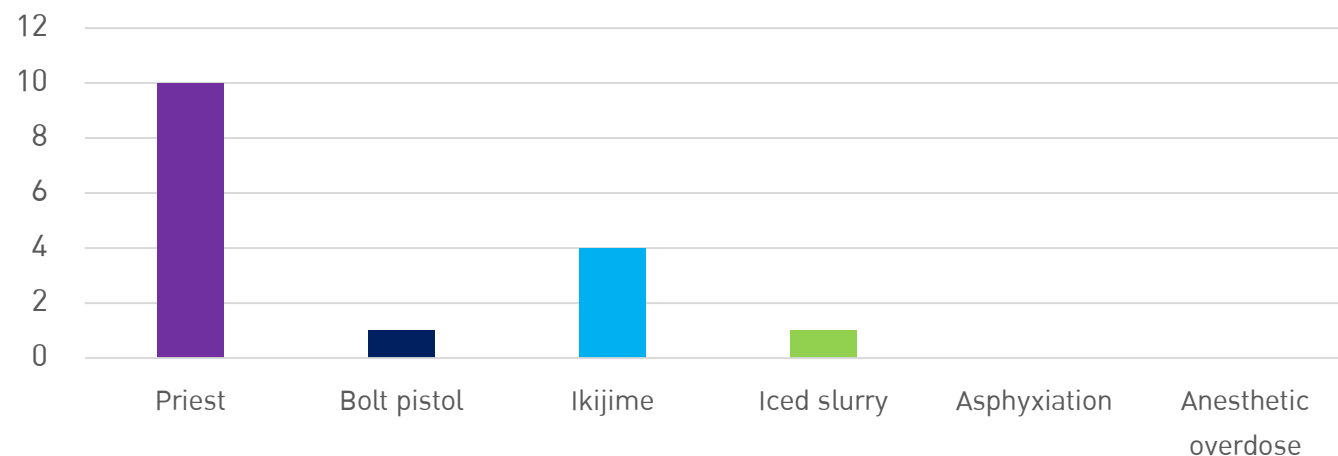


- All participants had improved their awareness of Poor welfare with the asphyxiation
- However, they still chose to work with **Priest stunning**, as it is still effective, time-efficient, and cost-saving.

Perceived best stunning method for fish welfare

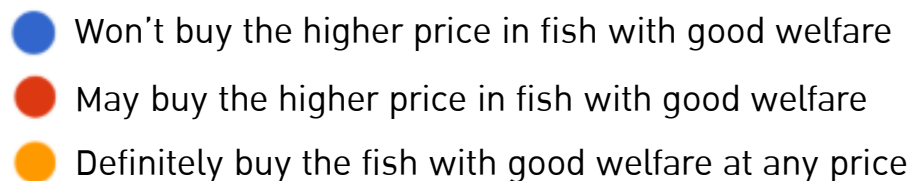
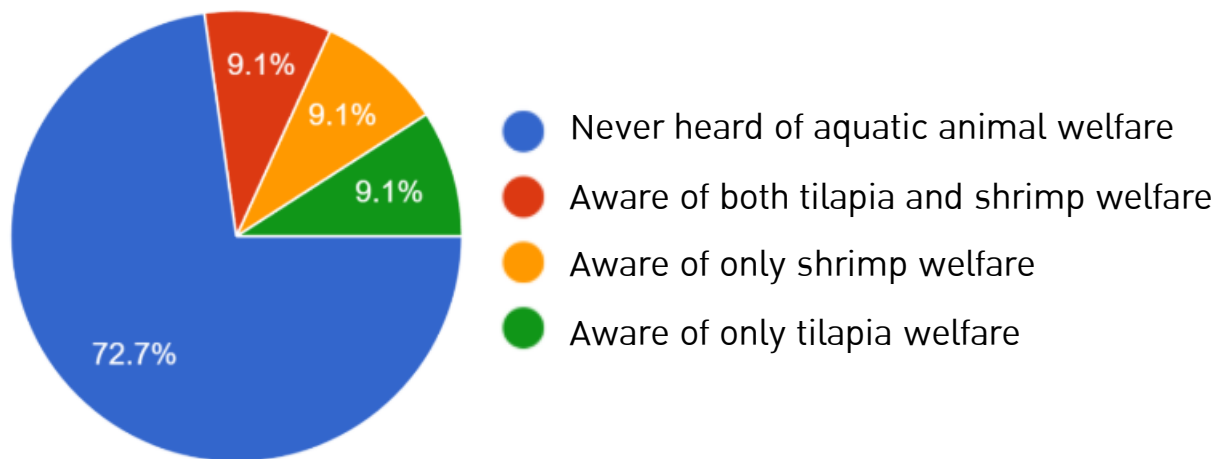


Practically stunning methods of the tilapia by respondents



4. Consumers attitude towards Tilapia Welfare

(Primary survey 11 responses)



- If consumers know that the fish they purchase were produced under good animal welfare practices, they are more likely to pay a premium for those products.



Napatsorn

Pau Badia



Take home messages



1 WELFARE MATTERS

Good welfare improves fish health, product quality, farm performance, and market opportunities.



2 GAPS REMAIN

Despite growing production, welfare implementation and GAP certification are still limited.



3 SCIENCE DRIVES SOLUTIONS

Research helps us understand welfare risks and develop practical, evidence-based improvements.



4 COLLABORATION IS KEY

Improvement requires partnerships across farmers, industry, government, researchers and consumers.



5 BETTER FOR ALL

Better welfare leads to better fish, better food, better livelihoods, and a better future.



FARMS



HARVEST & TRANSPORT



SLAUGHTER



POST-SLAUGHTER HANDLING



CONSUMERS



FROM RESEARCH TO IMPLEMENTATION,
EVERY IMPROVEMENT IN WELFARE IS AN INVESTMENT IN
 HEALTHIER FISH, MORE RESILIENT FARMING SYSTEMS, AND A MORE SUSTAINABLE FUTURE FOR AQUACULTURE.





Open
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Asian
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Thank you

— for your attention —



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