AAC Recommendation on the draft Code of good practices on fish welfare and fish welfare indicators

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Background

The AAC welcomes the draft Code of good practices on fish welfare and fish welfare indicators, developed by the EU Aquaculture Assistance Mechanism for the European Commission. This Code is primarily intended for aquaculture producers and outlines **non-species-specific** best practices for fish welfare and indicators used in welfare assessment in the EU, applicable across different life stages and production methods.

The document notes that this is a response to the call in the "the Strategic Guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030", in Annex I, section 2.2.2, for the Commission to:

- "Support the development by EU Member States, the EU aquaculture industry, EU scientific bodies and non-governmental organisations (NGOs) of a code of good practice on fish welfare based on scientific research and evidence, covering farming, transport and killing".
- "Support the development by EU Member States and the EU aquaculture industry of common, validated, species-specific and auditable fish welfare indicators throughout the production chain, including transport and slaughtering".

We note that the document focuses on clear welfare issues, **excluding health concerns**, such as diseases, vaccination, etc.

Recommendations

Recommendation
To the European Commission

For simplicity, we have proposed amendments in a table which includes original text, amended text (amendments in bold) and justification.

- The AAC asks for the following amendments to be made to the draft Code of good practices on fish welfare and fish welfare indicators, based on the justification provided:

Text	Proposed amendment	Justification
4.1 "For the last 20 years, the scientific understanding and the research undertaken on fish welfare have evolved resulting in a significant improvement of fish welfare."	4.1 "For the last 20 years, the scientific understanding and the research undertaken on fish welfare have **significantly increased** and evolved, resulting in **the development of improved** fish welfare **practices."**	The statement may or may not be true; crucially, it is not backed up by independent research. We can see that there has been an increase in the number of studies in this area, but not that fish welfare in practice, overall, has been improved as a result of this. There will be many complicating factors, such as impacts of climate change, increased disease risk, and increased intensification in some sectors, which impact on welfare. It is safer to refer to improved practices, as is done later in the document.
4.2 <u>Feeding</u> General indicators 1.Feeding practices should be adapted to the biology of the species, life cycle stage, physiological state, and environmental conditions. These practices must ensure that feed is provided in sufficient quantity and rate, over a large enough area and spread at	4.2 <u>Feeding</u> General indicators 1.Feeding practices should be adapted to the biology of the species, life cycle stage, physiological state, **production method,** and environmental conditions. These practices must ensure that feed is provided in sufficient quantity and rate, over a large enough area	The existing text focuses on distribution and timing but does not acknowledge intra-group behavioural dynamics. In species such as trout, meagre, and some flatfish, dominant fish can monopolise food, leading to chronic underfeeding in subordinates.

regular intervals to maximise feed intake and minimise fish crowding and damage. Sudden changes in feeding practices should be avoided (IFA Aquaculture, 2017), (AAC, 2024), (Council of Europe, 2005), (Arechavala-López, Cabrera-Álvarez, Maia, & Saraiva, 2022) (Kristiansen, Madaro, Stien, Bracke, & Noble, 2020).	and spread at regular intervals to maximise feed intake and minimise fish crowding and damage. Sudden changes in feeding practices should be avoided (IFA Aquaculture, 2017), (AAC, 2024), (Council of Europe, 2005), (Arechavala-López, Cabrera-Álvarez, Maia, & Saraiva, 2022) (Kristiansen, Madaro, Stien, Bracke, & Noble, 2020) **Feeding practices should also minimise feed competition and allow subordinate individuals access to feed, particularly in species with established hierarchies or aggressive tendencies.**	
4.2 Handling General indicators 12. Live fish must never be held by the gill covers or tail only (EFSA, 2008a), (EFSA, 2008b), (EFSA, 2008c), (EFSA, 2008d), (RSPCA, 2020), (CIWF, 2023), (Council of Europe, 2005).	4.2 Handling General indicators 12. Live fish must never be held by the gill covers or tail only**, nor should gaffs be used on them** (EFSA, 2008a), (EFSA, 2008b), (EFSA, 2008c), (EFSA, 2008d), (RSPCA, 2020), (CIWF, 2023), (Council of Europe, 2005). **Where handling is necessary, sedation or anaesthesia should be used for procedures**	While physical restraint techniques are addressed, there is no reference to anaesthesia protocols. Including them would help align practices with minimum welfare standards for invasive procedures and reflect current recommendations from EFSA and WOAH

	likely to induce substantial pain or strong aversion, such as vaccination or biopsy sampling.	
4.2 Stocking density General indications 2. Stocking density should be adjusted in line with the following criteria (Council of Europe, 2005): • The biological needs of fish with regard to environmental conditions in addition to health and welfare. • The farming system used, in particular the ability to maintain water quality, and the feeding technology.	4.2 Stock density General indications 2. Stocking density should be adjusted in line with the following criteria (Council of Europe, 2005): • The biological needs of fish with regard to environmental conditions in addition to health and welfare. • The farming system used, in particular the ability to maintain water quality, and the feeding technology. • **Welfare indicators should be evaluated, and management practices and production-controllable variables, including stocking densities, should be adjusted according to the result.** • **In the absence of species-specific data, stocking densities should follow the precautionary principle, erring on the side of lower densities**	A range of management practices, including choice of stocking densities affect welfare. The effects should be measured, and the practices adjusted accordingly as needed.

	until evidence shows no welfare compromise	
4.2 Post-transport 1.The person in charge of receiving the fish should closely observe them and keep appropriate records. Any fish showing abnormal clinical signs should be killed, isolated or examined by a veterinarian, and problems with transport should be evaluated. Appetite, behaviours, disease, and mortality should be monitored in relation to the transport for a week after unloading (AAC, 2022), (Saraiva, Arechavala-López, Cabrera-Álvarez, & Waley, 2021), (WOAH, 2012), (APROMAR, 2022), (Ministero della Salute, 2017), (GSA, 2023 (ITA).	4.2 Post-transport 1.The person in charge of receiving the fish should closely observe them and keep appropriate records. Any fish showing abnormal clinical signs should be examined by a veterinarian, **isolated or killed** and problems with transport should be evaluated. Appetite, behaviours, disease, and mortality should be monitored in relation to the transport for a week after unloading (AAC, 2022), (Saraiva, Arechavala-López, Cabrera-Álvarez, & Waley, 2021), (WOAH, 2012), (APROMAR, 2022), (Ministero della Salute, 2017), (GSA, 2023 (ITA).	This comes across as killing being the first and default action, reinforcing the common attitude that fish are disposable and they are rarely seen as individuals; rather they are seen as one big group (e.g. reporting weight rather than number of individuals). Even if changing the order of the words doesn't change anything in practice, we should try whenever possible to subtly shift the perception of fish being one group and instead to many individual sentient beings.
4.2. Stunning and slaughter General indicators 3.The choice of the stunning and killing method needs to be carefully designed to ensure that the process causes neither pain nor carcase damage and that regaining consciousness before death is not possible.	4.2. Stunning and slaughter General indicators 3.The stunning and killing method **should be** carefully **chosen and carried out** to **minimise suffering throughout the process and to** ensure that **the stunning method causes an immediate loss of consciousness. If the**	Carcase damage is not a welfare problem and may be unavoidable where percussive stunning methods or spiking are used. This reference should be deleted.

Therefore, species-specific and size information should be taken into account when available (AAC, 2019), (WOAH, 2015), (AAC, 2017), (UNE, 2016), (Humane Slaughter Association, 2016).	**stunning is not irreversible, fish should be killed before consciousness is recovered.** Therefore, species-specific and size information should be taken into account when available (AAC, 2019), (WOAH, 2015), (AAC, 2017), (UNE, 2016), (Humane Slaughter Association, 2016). 3.The choice of the stunning and killing method needs to be carefully designed to ensure that **fish are rendered immediately insensible and remain so for a sufficient period, allowing them to succumb to death either from the stun itself or through a subsequent killing method (EURCAW-Aqua, 2025).** Therefore, species-specific and size information should be taken into account when available (AAC, 2019), (WOAH, 2015), (AAC, 2017), (UNE, 2016), (Humane Slaughter Association, 2016).	Suffering is a wider term than pain covering all aspects of bad welfare. Suffering should be minimised. *The initial text reflects the reality and current challenges. As an alternative we could suggest the text cited from the EURCAW-Aqua report "blueprint for research to detect loss of consciousness".*
4.2. <u>Stunning and slaughter</u> General indicators 7. The use of electrical or mechanical stunning and killing is not always practical throughout	4.2. <u>Stunning and slaughter</u> General indicators 7.The use of electrical or mechanical stunning and killing is not always practical throughout	To facilitate the highest welfare standards throughout the European Union, the development of practical methods of slaughter in line with WOAH guidelines in all

all farming systems and farms' size in the European Economic Area (EEA) (European Commission, 2017).	all farming systems and farms' size in the European Economic Area (EEA) (European Commission, 2017). **Where this is considered to be the case, suitable methods and equipment should be identified, adapted or researched, and implemented as a matter of priority.**	farming systems should be treated as a matter of priority.
4.2 Stunning and slaughter General indicators 8. To avoid unnecessary suffering and pain, electrical or mechanical stunning methods are used prior to slaughter. Unconsciousness of the fish must be ensured until the time of slaughter (conclusions drawn from the online survey (from 22nd October to 6th December 2024) sent to the EU MS, Norway, UK, AAC's members, WestMed Aquaculture Mechanism and European Partnership on Animal Health)	4.2 Stunning and slaughter General indicators 8. To avoid unnecessary suffering and pain, electrical or mechanical stunning methods**, following the latest best scientific practices for the relevant species,** are used prior to slaughter. Unconsciousness of the fish must be ensured until the **fish have been slaughtered** (conclusions drawn from the online survey (from 22nd October to 6th December 2024) sent to the EU MS, Norway, UK, AAC's members, WestMed Aquaculture Mechanism and European Partnership on Animal Health).	Given that knowledge about the effectiveness of different stunning and killing methods is always being updated, it is important to keep up with the latest "Best Practice" methods. It is important that the animal remains unconscious until death which is the **end** of the slaughter process. For example, it is important that fish do not recover consciousness while they are bleeding out after the gill cut. Therefore, it should say either "until the animal has been slaughtered" or "until the time of death." Elsewhere we have said "until the animal has been killed".

4.2 Stunning and slaughter Pre-slaughter handling 3.As recommended for fish in transport, they should starve before slaughter. The duration of fasting must be always adjusted to the fish species, weight, life stage and temperature, and kept as short as possible, as the immune response is negatively affected already after a short fasting period	4.2 Stunning and slaughter Pre-slaughter handling 3.As recommended for fish in transport, **~~they should starve before slaughter.~~ where fish are deprived of food before slaughter,** ~~T~~the duration of fasting must be always adjusted to the fish species, weight, life stage and temperature, and kept as short as possible, as the immune response is negatively affected already after a short fasting period	Since the reasons for fasting may not always include welfare benefits, it may not be appropriate to recommend fasting as a welfare recommendation. Therefore, the recommendation should just apply to circumstances where fish are fasted rather than recommending whether or not they should be fasted.
	4.2 Stunning and slaughter Stunning **(new)** **3.2 Stunning equipment should first be tested in the laboratory by an approved**	To ensure that stunning equipment is effective. The 2017 European Commission report "*Welfare of farmed fish: Common practices*

	institution using established protocols, to ensure that it delivers the parameters necessary to achieve unconsciousness for a given species. Secondly, the equipment should be tested for effectiveness in the field, with data from the tests made public [1]. As new methods become available to detect consciousness in fish that have been stunned, such equipment should be tested again to ensure that stunning is effective according to the most up-to-date scientific understanding.	*during transport and at slaughter"* insisted on the importance of slaughter equipment being properly tested. It was unable to draw conclusions for the effectiveness of stunning for a number of countries for which manufacturers of the stunning equipment did not appear to have collaborated with research institutes. The process recommended by EFSA (2013) - https://efsa.onlinelibrary.wiley.com/doi/pdf/10.2903/j.efsa.2013.3486 - for testing the effectiveness of stunning includes both laboratory tests, testing of equipment and of slaughterhouse practice.
	4.2 Stunning and slaughter Stunning **(new)** **3.1 As new methods for detecting consciousness in fish become available, especially for fish that appear to be unconscious using the signs above, they should be evaluated and adopted for use in**	Science suggests that fish that are not showing behavioural sign of consciousness do show such signs when measured using Electroencephalography (EEG). New equipment for testing EEGs is likely to become available that can be used in the field for testing the effectiveness of the

	the field where possible and appropriate to assess the effectiveness of stunning equipment and processes. It will also be good practice to recheck methods and equipment used regularly.	equipment, the protocols followed and the effectiveness of the stunning process. It should be noted that this is not designed for everyday slaughter – just for checking the effectiveness of slaughter practices.
4.2 Stunning and slaughter Killing 3.According to the recommendations of these organisations: WOAH (2015), Humane Slaughter Association (2016), and FAWC (2014), and whenever feasible, the following methods of killing fish should not be used: chilling with ice in holding water; using carbon dioxide (CO_2) in holding water; chilling with both ice and CO_2 in holding water; salt or ammonia baths; asphyxiation by removal from water; and exsanguination without stunning. Percussive and electrical stunning (followed by gill cut), shooting, and mechanical spiking and coring are acceptable slaughter methods for some species, with the	4.2 Stunning and slaughter Killing 3.According to the recommendations of these organisations: WOAH (2015), Humane Slaughter Association (2016), and FAWC (2014), and whenever **it is technically** feasible **to use approved methods which achieve an effective and lasting stun**, the following methods of killing fish should not be used: chilling with ice in holding water; using carbon dioxide (CO_2) in holding water; chilling with both ice and CO_2 in holding water; salt or ammonia baths; asphyxiation by removal from water; and exsanguination without stunning. Percussive and electrical stunning (followed by gill cut), shooting, and mechanical spiking and coring are acceptable	The purpose of the edit compared with the WOAH wording is to allow for changes in knowledge about the effectiveness of stunning since the original WOAH (then OIE) formulation.

potential to enable a humane death (WOAH, 2015), (CIWF, 2018).	slaughter methods for some species, with the potential to enable a humane death (WOAH, 2015), (CIWF, 2018).	
4.2 <u>Stunning and slaughter</u> Electrical stunning 1.An electric stun must cause unconsciousness within one second of application and it must last long enough to ensure that the animal does not regain consciousness before applying an effective slaughter/killing method (Humane Slaughter Association, 2016)	4.2 <u>Stunning and slaughter</u> Electrical stunning 1.An electric stun must cause unconsciousness within one second of application and it must last long enough to ensure that the animal does not regain consciousness **before death supervenes** (Humane Slaughter Association, 2016) 1.An electric stun must cause **immediate** unconsciousness ~~**within one second of application**~~ and it must last long enough to ensure that the animal does not regain consciousness before applying an effective slaughter/killing method (Humane Slaughter Association, 2016)	There may be a gap between applying a killing method and death. Death does not always occur until some time after the application of a stunning or killing method – for example, a death from bleeding takes time - and it is vital that the animals do not recover consciousness after the application of the killing method. This should therefore say "until the animal has been slaughtered" (industry preferred formulation) or "before death supervenes" (Animal Welfare groups preferred formulation in line with EFSA and WOAH). Either formulation will address the error in the current text.
4.2 <u>Environmental enrichment</u>	4.2 <u>Environmental enrichment</u>	Flatfish species such as turbot and sole are highly sensitive to lighting conditions.

Lighting 3.Fish stress responses are strongly affected by the stressor exposure time (e.g. day/night) according to their daily pattern of behaviour (diurnal/nocturnal) (Sánchez-Vázquez, López-Olmeda, & Vera, 2019).	Lighting 3.Fish stress responses are strongly affected by the stressor exposure time (e.g. day/night) according to their daily pattern of behaviour **which will vary between species** (diurnal/nocturnal) (Sánchez-Vázquez, López-Olmeda, & Vera, 2019) and stage of development.	Misaligned photoperiods can disrupt behaviour and welfare. Adding this clarification aligns with EFSA (2008) and species-specific studies (e.g. Boluda Navarro et al., 2009 on Senegalese sole). Additionally, some species may require darkness for rest or security; nocturnal species may require darkness to be active. Continuous light may interfere with behavioural requirements in both cases.
5.3 Selection of general fish welfare indicators Table 2.List of general fish welfare indicators and topics for which they have been selected	5.3 Selection of general fish welfare indicators Table 2.List of general fish welfare indicators and topics for which they have been selected **(new)** **13. Skeletal/vertebral deformities** **14. Eye damage or lesions** **15. Opercular and gill condition** **16. Changes in behavioural pattern (e.g. lethargy, excessive surface activity, abnormal shoaling)**	These indicators are commonly observed in flatfish aquaculture (e.g. EFSA, 2008) and reflect critical welfare concerns. Their inclusion supports broader species coverage and aligns with existing literature on physical condition as a proxy for welfare. Suggestions for how these indicators should be incorporated are inserted in the proposed amendment below. They are included in industry recommendations such as Apromar's Spanish Guidelines.

	17. Feed rejection or reduced intake	
5.4.1 Feeding, Feeding Behaviour, Comments and rationale Feeding behaviour refers to foraging behaviour and food intake during feeding. Feeding response may be an indicator of both positive and negative welfare. An appropriate feeding strategy adjusted to the biological needs of each species, life-stage and water temperature can help control foraging behaviour and food intake, reducing undesired behavioural responses and social interactions as well as food waste. Non consumption of the feed offered on the basis of feeding tables should serve as a warning sign to monitor other welfare indicators.	5.4.1 Feeding, Feeding Behaviour, Comments and rationale Feeding behaviour refers to foraging behaviour and food intake during feeding. Feeding response may be an indicator of both positive and negative welfare. An appropriate feeding strategy adjusted to the biological needs of each species, life-stage and water temperature can help control foraging behaviour and food intake, reducing undesired behavioural responses and social interactions as well as food waste. Non consumption**, or reduced intake,** of the feed offered on the basis of feeding tables should serve as a warning sign to monitor other welfare indicators.	
5.4.2 Handling, Body Injuries, Comments and Rationale Inadequate handling may result in physical injuries, particularly to the fins and skin, but also to eyes or gills. Inadequate handling implies poor maintenance of operating tools,	5.4.2 Handling, Body Injuries, Comments and Rationale Inadequate handling may result in physical injuries, particularly to the fins and skin, but also to eyes or gills **and may contribute to skeletal or vertebral deformities**. Inadequate handling implies poor	

such as nets, pumps, etc., but also their improper use. Fins and gills can get entangled, skin and eyes can be rubbed, causing, in all cases, external wounds and injures that are easily and quickly visible. These wounds can also lead to the entry of infections and diseases, or even mortality.	maintenance of operating tools, such as nets, pumps, etc., but also their improper use. Fins and gills can get entangled, skin and eyes can be rubbed, causing, in all cases, external wounds and injures that are easily and quickly visible, **including eye damage or lesions**. These wounds can also lead to the entry of infections and diseases, or even mortality.	
5.4.2 Handling, Use of Space, Comments and rationale Observing the fish distribution or use of space after handling is crucial to understand how they recover from the stress induced by handling. Monitoring the spatial use or distribution of fish within the rearing environment, during and after handling, indicates the reaction of fish to the stress. After handling, stressed fish may concentrate in certain parts, only using some parts of the rearing unit. If fish are widely distributed and use most of the space of the rearing unit in short time it is a sign of good welfare conditions which means that handling procedure was carried out properly.	5.4.2 Handling, Use of Space, Comments and rationale Observing the fish distribution or use of space after handling is crucial to understand how they recover from the stress induced by handling. Monitoring the spatial use or distribution of fish within the rearing environment, during and after handling, indicates the reaction of fish to the stress. After handling, stressed fish may concentrate in certain parts, only using some parts of the rearing unit, **including excessive surface activity.** If fish are widely distributed and use most of the space of the rearing unit in short time it is a sign of good welfare conditions	

	which means that handling procedure was carried out properly	
5.4.3 Water quality, swimming activity, comments and rationale Observing group swimming behaviour is a sign of good welfare conditions. Poor water quality may cause stress in fish, and therefore, alter group swimming behaviour. Fish can shoal, school or disperse, but alterations of their natural or regular behaviour may indicate some detrimental in the water quality.	5.4.3 Water quality, swimming activity, comments and rationale Observing group swimming behaviour is a sign of good welfare conditions. Poor water quality may cause stress in fish, and therefore, alter group swimming behaviour. Fish can **abnormally** shoal, school or disperse, but alterations of their natural or regular behaviour may indicate some detrimental in the water quality.	
5.4.4 Stocking density, Skin and/or fin condition, operational recommendations In case of observing high erosion of fins or physical injures in the fins and skin of some fish, adjust the stocking density by reducing the number of fish within the affected rearing unit. Consult with the veterinarian to prevent or palliate potential health issues. Checking other indicators listed in this table may add valuable information.	5.4.4 Stocking density, Skin and/or fin condition, operational recommendations In case of observing high erosion of fins or physical injuries to the fins and skin**, as well as signs of skeletal or vertebral deformities, eye damage or lesions, or poor opercular and gill condition,** adjust the stocking density by reducing the number of fish within the affected rearing unit. Consult with the veterinarian to prevent or manage potential health issues. Checking other indicators listed	

	in this table may also provide valuable information.	
5.4.4 Stocking density, Skin and/or fin condition, comments and rationale High stocking density reduce the available space and affect social interactions, inducing physical interactions, high competition and other agonistic behaviours, thereby increasing fin erosion and dangerous or lethal injuries in the skin and fins of the fish.	5.4.4 Stocking density, Skin and/or fin condition, comments and rationale High stocking density reduce the available space and affects social interactions, inducing physical interactions, high competition, and other agonistic behaviours, thereby increasing fin erosion and dangerous or lethal injuries in the skin and fins of the fish. **Additionally, such conditions may contribute to the development of skeletal or vertebral deformities, eye damage or lesions, and poor opercular and gill condition, all of which are important indicators of compromised fish welfare.**	

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