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Dr. Gary Egrie
USDA/APHIS/VS
4700 River Road, Unit 46
Riverdale, MD 20737

Re: OIE Aquatic Animal Health Code – Comments on Draft Animal Welfare Chapters

Dear Dr. Egrie:

As per the request of Dr. Michael David, the following are comments from the AVMA concerning draft OIE Code chapters addressing aquatic animal welfare.

A. General Comments

As suggested in proposed Article x.x.1.2., under “Scientific basis for guidelines” point 2, ‘pain’ and ‘sentience’ are particularly difficult concepts as applied to aquatic animals, and evidence obtained to date regarding the existence and degree of sentience in aquatic animals is highly controversial (Rose, 2002¹, 2003²; Chandroo, et al., 2004³). In addition, and as pointed out by Håstein, et al. (2005⁴), any standards developed to assure aquatic animal welfare are likely to be considerably influenced by non-scientific factors. Current OIE policy is that the contents of Code chapters should be based on sound scientific information. To ensure that standards development concurs with stated OIE policy, we recommend that the OIE organize an international conference on aquatic animal welfare in 2007 with the dual purposes of better defining and clearly conveying the state of the science. We recommend any decisions regarding the final contents of aquatic animal welfare chapters be deferred until such a global discussion takes place.

Note: Suggested changes to language in Code drafts are *italicized* with deletions ~~struckthrough~~ or additions underlined, where appropriate.

B. Chapter 1.1.1 – Animal Welfare Definitions

‘Aquatic animal carcass’ – Responsible utilization (e.g., rendered for feed, composted and use as fertilizer) may not be understood to be a reasonable approach to “safe disposal.”

¹ Rose J.D. (2002). – The neurobehavioural nature of fishes and the question of awareness and pain. *Rev. Fish. Sci.*, **10** (1), 1-38.

² Rose J.D. (2003). – A critique of the paper, ‘Do fish have nociceptors: evidence for the evolution of a vertebrate sensory system’ by Sneddon *et al.* (2003). *In* Information resources on fish welfare, 1970-2003 (H.S. Erickson, ed.). Animal Welfare Information Center (AWIC) Resource Series No. 20. AWIC, National Agricultural Library, US Department of Agriculture, Beltsville, Maryland.

³ Chandroo K.P., Duncan I.J.H. & Moccia R.D. (2004). – Can fish suffer? Perspectives on sentience, pain, fear and stress. *Appl. anim. Behav. Sci.*, **86**, 225-250.

⁴ Håstein, T., A.D. Scarfe & V.L. Lund (2005). Science-based assessment of welfare: aquatic Animals. *Rev. sci. tech. Off. int. Epiz.*, **24** (2):529-547.

For this reason, we recommend revision to read: “**Aquatic animal carcass** means the body/trunk of an aquatic animal subsequent to killing or death that requires safe processing and utilization or proper disposal.”

‘Fish’ – Depending on locality and audience, sometimes the common term ‘fish’ is used specifically to indicate fishes and sometimes it is used to refer to any type of aquatic animal, including crustaceans and mollusks. To ensure there is no ambiguity within Code chapters we recommend the consistent use of ‘finfish’ when referring to fishes and suggest the entry be replaced by “**Finfish** means vertebrate fishes, including primitive jawless hagfish and lampreys (*Agnatha*), bony fish (*Osteichthyes*) and cartilaginous fish (*Chondrichthyes*).”

‘Harvest’ – Revise as: “*Harvest* means the removal of [*fin*]fish from their environment for human or animal consumption.”

‘Humane killing’ – Unconsciousness consistently induced in the absence of pain, fear, or adverse behavior is a lofty goal, but appears to be unrealistic. We suggest instead that such pain, fear or adverse behavior should be minimized: “**Humane killing** means either immediate death, or death preceded either by immediate unconsciousness or by unconsciousness induced ~~without~~ with a minimum of pain, fear or adverse behaviour.”

‘Mass destruction’ – We recommend the term ‘mass depopulation’ as an alternative.

‘Stocking density’ – The use of ‘biomass’ would be more appropriate than “number or body weight” and we recommend this replacement as follows: “**Stocking density** means, in the case of aquatic animals, the ~~number or body weight~~ biomass of aquatic animals per unit area or per unit volume of water on a vehicle or in a tank.”

‘Visual evoked response (VER)’ – Insert ‘a’ to read: “**Visual evoked response (VER)** means a test that evaluates...”

C. Introduction to OIE Guidelines for the Welfare of Aquatic Animals

Article x.x.1.1

Section 2 – We recognize that the ‘five freedoms’ can serve as a useful tool when assessing the welfare of animals (including aquatic animals); however, they were developed with terrestrial animals in mind and their application to aquatic animals is not straightforward. As noted previously, data regarding pain, stress and distress, cognition, perception, and emotion in aquatic animals are currently limited and ambiguous. With respect to fear and distress specifically, nociception and avoidance behavior are not confirmation of an emotional response, although each has been used to support the existence of same. Although fear and distress in aquatic animals may currently be difficult to assess, we are comfortable there is an established relationship between chronic stress and health. Furthermore, it is unlikely that aquatic animals that are constantly immersed in water and that can maintain hydration through their gills will experience ‘thirst.’

We therefore suggest the following alternate language may be more suitable for aquatic animals: “*That the following adaptation of the ‘five freedoms’ for aquatic animals may provide valuable guidance in assessing their welfare:*

- ◆ *freedom to express normal patterns of behavior;*
- ◆ *freedom from injury and disease;*
- ◆ *freedom from chronic, long-term stress;*
- ◆ *freedom to occupy optimal osmotic, physiochemical, and thermal conditions; and*
- ◆ *freedom from malnutrition.*

Section 5 – We seek clarification whether “use of aquatic animals ... for recreation” will include angling? If so, then hooks typically used for that purpose inherently cause injury. It may be prudent to refer this question and related concerns to the Aquatic Animal Health Standards Commission for consideration?

D. Guidelines for the Slaughter of Farmed Fish for Human Consumption

Article 1

General Principles – Per its title, this article applies to finfish; therefore, the reference to “Other aquatic animals ... the principles ... also apply to those animals” appears to be irrelevant. We recommend deleting the referenced statement because it has the potential to create ambiguity for many countries where it may also apply to lower aquatic invertebrates.

Section 2 – We suggest modifying to include loading as: “Persons engaged in the loading, unloading, moving, handling...?”

Article 3

Section 1 – We are not sure what the welfare justification is for ensuring that facilities are designed to hold the maximum number of fish in relation to throughput? We believe this statement would be more appropriately worded as: “*Holding facilities should be designed and constructed to hold ~~the maximum~~ an appropriate number of fish...*”

Section 2 – “...without injury...” seems unrealistic? We suggest rewording as: “*To permit operations to be conducted as smoothly and efficiently as possible ~~without~~ minimal injury and ~~and~~ stress to the fish...*”

Section 3 a) ii) should be edited to read “*Containment nets should be of appropriate mesh size and type to minimize injury.*”

Section 3 d) i) should be edited to read “*For optimum welfare, fish should be ~~pumped~~ moved in a continuous flow from source to destination.*”

Article 6

Section 3 e) – Stunning is separate from and does not necessarily imply death; therefore, and based on the title of this section, 3 e) should be edited to read “*An effective ~~stun and kill~~ should be verified by the absence of consciousness...*”

Article 7

A method identified as ‘unacceptable’ in the Guidelines for Humane Killing of Finfish for Disease Control Purposes (Combination of CO₂/O₂ – live chilling, see section E of this letter) appears in this table with a notation of “competent personnel” under “key fish welfare requirements.” If this approach is deemed unacceptable when used for disease control purposes, we wonder why requirements would be specified for its conduct within the humane slaughter guidelines?

Article 8

We would prefer to err on the side of ensuring the welfare of animals, however as mentioned previously, data regarding perception of pain and distress in aquatic animals is limited, particularly for lower vertebrates—this makes it difficult to fully and accurately interpret the effects of the methods identified in Article 8 on these animals. We wonder whether classifying methods as ‘unacceptable’ based on limited information is appropriate? Furthermore, many of the methods listed are currently used by commercial harvest fisheries in various parts of the world. Because some countries where these methods are currently used rely on finfish as a basic dietary staple, labeling such methods as ‘unacceptable’ could negatively impact their ability to produce and/or obtain a needed protein resource.

With these thoughts in mind, and until more information on the sentience of various aquatic animals is obtained, we suggest the following compromise language for Article 8:

“Ineffective methods of inducing rapid unconsciousness

The following are considered ineffective in rapidly eliminating signs of consciousness (opercular respiratory activity; visual evoked response; vestibulo-ocular reflex; tail movements; aversive behavior):

- ◆ *Inadequately positioned or insufficient depth of mechanical stunning;*
- ◆ *Insufficient current or voltage in electrical stunning;*
- ◆ *Carbon dioxide (CO₂) in holding water;*
- ◆ *Chilling with CO₂ in holding water;*
- ◆ *Salt or ammonia baths;*
- ◆ *Asphyxiation by removal from water; and*
- ◆ *Exsanguination.”*

E. Guidelines for the Humane Killing of Finfish for Disease Control Purposes

General Comments:

In addition to our specific comments on existing draft language (which follow by Article), we believe this chapter should also:

- ◆ Address disease outbreaks in finfish where humane slaughter and use for human or animal consumption may be possible if appropriate precautions are taken.
- ◆ Acknowledge that sometimes it will be necessary to balance the risk of spreading a highly contagious aquatic animal disease with compromises to animal welfare.

Article 1

Section 2 – We were not clear on the meaning of this statement. We suggest it be rewritten or deleted.

Section 3 – Based on this statement, it appears that sections 4 through 11 are actually subpoints of Section 3? This should be reformatted appropriately or section 3 should be deleted.

Section 6 – We assume the phrase “normal farming procedures should be maintained” suggests that appropriate husbandry should be maintained? Some may interpret “normal farming procedures” to include transport and processing for human or animal consumption; this may or may not be appropriate for a particular disease outbreak.

Section 7 – “The handling and movement ... guidelines described below.” Limited handling and no movement guidelines appear to be included in this chapter?

Article 2

We recognize that this Article (as well as Articles 3 and 4) concerning the organization and operations of teams of personnel necessary to humanely kill large numbers of animals rapidly, are emulating those in the Terrestrial Code, but many of the concepts and principles are new to aquaculture and wild finfish management. In our opinion, a more detailed explanation of why these are necessary and generally how they would operate is required. Also, the last sentence of this Article states that “responsibility and competencies...are described in Article 4”; we believe the article that should be cited is Article 3? Article 4 provides operational guidelines.

Article 4

Section 1 b) – Referenced appendix was not available for review. We assume this will be included in future iterations of the guidelines.

Section 2 a) – “Only anaesthetics registered for use in finfish should be used.” In many countries no anesthetics are registered or approved by regulatory authorities for finfish; in other countries regulatory approval only applies to finfish used for food with explicit withdrawal periods or minimum residue limits. We therefore recommend revising this to “*Anaesthetics used to anaesthetize finfish before slaughtering for food should be administered such that residues are avoided.*”

Section 2 a) – “No finfish should die by asphyxiation.” (Also see Article 8) We find this statement confusing and inappropriate, and recommend its deletion. By definition ‘asphyxiation’ means “to be deprived of oxygen, usually leading to unconsciousness or death.” Deep (stage 5) anesthesia/terminal anesthesia invoked by anesthetic overdose results in the animal being unable to respire and death is primarily a result of oxygen deprivation. Rotenone (deemed acceptable – Article 7, 1 e)) disrupts oxygen uptake across finfish gills. Decapitation (deemed acceptable – Article 9, 1e)) results in death by cerebral ischemia, and ischemia (“the inadequate supply of blood”) causes death primarily through oxygen deprivation. This also has significant implications for sport fishing.

Article 5

Section 2 a) – ‘Spike’ and ‘bolt’ appear to be used interchangeably? It may be advisable to use one term consistently.

Section 2 c) – Grammatical error: “*Immediate onset of unconsciousness occurs when the spike is...*”

Section 2 d) ii) – This statement seems awkward. We suggest: “*Inaccurate positioning and orientation of the spike may result in injury rather than humane death.*”

Article 6

Sections 2 b) and 2 d) appear to be redundant.

Article 8

Point a), use of CO₂ – We are aware that limited research performed to date suggests aversive behavior when CO₂ is used alone to induce narcosis in finfish. In addition, concerns alluded to in the draft guidelines regarding use of cooling are echoed in the *2000 Report of the AVMA Panel on Euthanasia*. However, given wide variation in the responses of terrestrial animals to CO₂ (depending on concentration and how CO₂ is or is not combined with other gases and methods used to induce loss of consciousness), and limited data available regarding sentient responses in finfish, we are concerned that comments in this section may imply that the use of CO₂ for humane killing of finfish is, in general, not acceptable. We would appreciate confirmation that this is not the intent and that other options for the use of CO₂ may be explored.

Article 9

Section 2 b) – We suggest appending the following phrase “*or revolutions per minute (rpm) of the rotating blades do not fall below the manufacturer-defined critical speed*” to “The rate of introducing material...does not jam.”

F. Guidelines for the Land Transport of Fish

G. Guidelines for the Transport of Fish by Boat

Many elements contained in the “Land” and “by Boat” chapters are identical; therefore, we have chosen to respond to these chapters in tandem.

General Comments

We assume the intent of the guidelines is to first address the needs of larger (in size) species that are commercially farmed for food; however, it is important to recognize that cyprinids include a large number of small species used as bait and in ornamental displays. These guidelines would thereby seem to apply to them as well.

Article 1

We believe a word may be missing from the guidelines: *“The length of time fish spend on a transport vehicle should be as short as possible.”*

Article 2

Section 5 e) – Typographical error: *“providing facilities and veterinarians, fish health biologists or other aquatic animal technicians ~~be~~ to enable killing of the fish humanely if required.”*

Section 7 – Within veterinary medicine in the United States, use of ‘specialist’ is understood to be restricted to those board-certified by a college/specialty board that is a member of the American Board of Veterinary Specialties, under the auspices of the AVMA. We therefore request that this statement be modified to: *“Private veterinarians and fish health biologists involved in transporting fish and the associated handling procedures should have ~~specialized~~ training in such matters.”*

Article 4

Formatting between the two documents is inconsistent (e.g., in “Land” 1 a) and b) are separate items, in “Boat” these are combined).

Section 1 c) i) (“Boat) and 1 d) i) (“Land”) – “antimicrobials should not be used prophylactically, if used therapeutically...” is unnecessary as it is stated that infected or exposed animals should not be transported (Article 4, section 6 “preparation of fish...”) and all animals moved should be required to have a Certificate of Veterinary Inspection (health certificate, Article 4, Section 5). We recommend deleting this item.

Section 5 b) – Should item vi) “veterinary certification, when required” found in “Land” be included in “Boat” as well? This is listed as separate item 5 d) in both documents so perhaps this is redundant?

Section 6 – The “Boat” document acknowledges a role for the aquatic animal technician, whereas the “Land” document does not. We are not clear as to the reason for this difference?

Section 7 – With respect to “Recommendations for specific species ... in Appendices XXX,” the appendices are absent so we assume these are to be developed with future iterations of the guidelines?

Consideration of physiologic acclimation is important for all species and we therefore recommend the second sentence of this section be revised as: *“All species need to be physiologically acclimated prior to entering a new environment and acclimation may require food deprivation.”*

Article 5

Section 2 – We believe this statement “The density ... maximum load ... for a given situation” is more appropriately worded as: *“The biomass of finfish in a container or compartment should not exceed the physiological carrying capacity of the container or compartment for the period and conditions of transit.”*

Article 6

Article 6, Section 2 b) – The statement “If the killing of fish is necessary during the journey...” appears to require that an aquatic animal health technician be immediately available to oversee/conduct the killing of fish. This may not always be the case and delaying the process until that person’s arrival could be detrimental to fish welfare. We therefore suggest the following alternate wording: *“If euthanasia of finfish during travel is necessary, methods used must be in accord with OIE guidelines for the humane killing of fish for disease control purposes and carcasses disposed of in accord with relevant animal health and environmental requirements.”*

We appreciate the opportunity to comment and hope you find our thoughts useful.

Sincerely,

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