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GUIDELINES ON AQUATIC ANIMAL WELFARE FOR THE AQUACULTURE INDUSTRY IN WESTERN AUSTRALIA

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1. Preface

This report was written in response to driving interest and concern from both the R.S.P.C.A and the public towards the humane treatment of aquatic animals. The industry hopes to develop recognized, acceptable and uniform practices for aquatic animal welfare with the due diligence of aquaculturists, fishermen, wholesalers, retailers and consumers.

2. Awareness

Fish and crustaceans experience pain and stress. For this reason, the humane treatment and correct and proper housing of these animals is legally enforced. Handling and killing of fish and crustaceans in the catering and restaurant trade, and holding for retail **must** be conducted humanely. The penalty for cruelty to animals is $6000 dollars or 6 months imprisonment.
All seafood offered for sale should:

- comply with government regulations,
- be safe for human consumption,
- be healthy and robust,
- not be suffering an illness that will compromise the safety of the seafood; and
- be handled and displayed in a humane manner

3. Handling

Fish and crustaceans must be transported in conditions that do not cause stress. This keeps the animals healthy and improves product quality. Healthy animals are especially important to the retailer or restaurateur who is dealing with expensive fish and/or crustaceans.

i) Sources of stress during housing include:

- Poor water temperature control
- Inadequate aeration
- Poor and unsuitable water quality
- Incompatible species kept together
- Container movement during transport

If the product dies in transit it frequently has little cooling therefore making it difficult to determine the quality and safety of the product. In this situation it is recommended that the product be disposed of in a landfill site (to prevent the possible transmission of disease carrying organisms, or the establishment of feral populations in waterways).

ii) Signs of unsatisfactory conditions in holding tanks include:

- Foam on water surface
- Cloudy water
- Slime and algal growth on the tank walls

iii) To maintain good conditions in holding tanks involves:

- Providing water purification and filtration systems
- Using suitable water testing procedures
- Avoid rapid change in temperature and water quality
- Keep seafood moist
- Adequate aeration
- Keep seafood out of bright light unless on display
- Monitor regularly, removing weak, damaged or dead individuals
- Do not feed the seafood, this can pollute the water
- Comply with any relevant animal welfare requirements

If you are in doubt about the optimum conditions to hold specific seafoods, consult your supplier.

4. Anaesthetising Fish

(i) Salt water / Ice slurry method

It is important to anaesthetize seafood before killing it. Chilling is a common method used and acts to;

- Prevent stress to the seafood and resultant loss of quality
- Make the seafood easier to handle and humanely kill

When the body temperature of crustaceans is reduced far enough the animal will die without suffering. The animal is assumed to be dead if no movement is detected when handled.

[This applies to all crustaceans for human consumption, whether eaten raw (sashimi) or cooked.]

(ii) How to make an ice slurry

Note – Australian research has shown that the immersion of crustacea in slush ice for up to 18 hours causes no loss in the edible quality of the tail flesh (NRE, 2000).

- Fill a container (such as an esky) with crushed ice, then add salt water with an ice to water ratio of 3:1 (consistency of wet cement) and a temperature of minus 1 degree Celsius.
- Make sure there is enough ice to maintain the correct temperature throughout the process.

If the above method is not practical it is suggested that the central nerves be quickly destroyed.

5. Humane killing of fish and crustacea

- All live animals to be used for food **must** be killed humanely.

Finfish and crustaceans should be killed before cooking. If not:

- the flesh can toughen;
- crustaceans may throw claws or legs when stressed;
- it is recognised as being inhumane and you could incur a fine.

(i) Finfish

Keep fish handling to a minimum prior to killing. For maximum product quality and minimum stress to a finfish the iki jime (live killing) method can be used. This instant killing method reduces the accumulation of waste products in the flesh, minimises physical damage (including loss of scales) caused by the animal's sometimes violent body movements and keeps the finfish intact apart from a small hole in the head.

In iki jime (pronounced "ick-ee jee-mee) a spike or awl is inserted directly into the brain causing immediate brain death and the cessation of all motion. Iki jime also prolongs the effects of rigor mortis if fish are then immediately chilled in an ice slurry.

Some practice is required to perfect the iki jime technique. The position and angle of the spike entry required differs between species and one example of each species may need to be cut lengthwise through the head to locate the position of the brain. When spiked correctly, a fish will exhibit a short but violent convulsion (due to the physical stimulation of the brain) before relaxing.

To use the iki jime technique:

1) Hold the fish firmly and insert a spike into the brain. This should be done as soon as possible after capture.
2) Bleed the fish in a manner appropriate to the type of fish species.
3) Place the fish in an ice slurry until core temperature reaches required
4) Remove fish from ice slurry and store or undertake further activities as required.

Iki jime is the preferred method to piercing the spinal cord with a knife or skewer, beheading or using a sharp blow to the head for finfish. Eels may be killed by piercing the spinal cord with a knife or skewer inserted through the back of the head or they may be beheaded.

(ii) Crustacea

It is not appropriate to behead the chilled crustacean to make sure it is dead and not just stunned. Western Rock Lobster may be drowned, however, the more humane method is by knifing.

(a) Crabs

1) Knife a chilled crab by lifting the abdominal flap (tail flap) with your hand and inserting the knife all the way through the brain.

Or

2) Alternatively, you can knife the chilled crab through the eye, however this option is not recommended and is hard to master in practice.

(b) Rock Lobster and Crayfish

1) Knife a chilled rock lobster or crayfish through the centre of the head.

Or

2) Alternatively, you can knife the chilled rock lobster or crayfish between the eyes.

Smaller crustaceans such as marron are best killed by splitting longitudinally with a single knife blow. Insert a knife between the eyes and then push down along the length of the body in one quick movement.

These procedures should not take more than 10 seconds and should only be done by a skilled operator.

(iii) Unacceptable methods

- Transverse sectioning of lobsters or crayfish, i.e. separating tail from head of live lobsters, crayfish or similar animals
- Cutting tissue or flesh from live animals
- Boiling crustacean before anaesthetizing or drowning.
- Serving live crustacean to diners

These procedures are not acceptable because they have the potential to cause prolonged or avoidable pain or distress to animals.

6. Storing live seafood (General)

Retailers should follow these general rules for storing live seafood:

(i) Out of water:

- Keep the seafood cool and moist. This reduces the stress associated with being stored in air. The temperature to which it is cooled depends on the tolerances of the species. Make sure you have a reliable thermometer.
- Keep the seafood out of bright light as this may cause stress and reduce survival rates.

- Do not disturb the seafood
- Do not cool the seafood so much that you kill it with cold. Different species have different cold tolerances.
- Do not allow the seafood to come into direct contact with ice.
- Comply with any relevant animal welfare requirements.

(ii) In water:

- Keep the seafood coolant the optimum storage temperature. This reduces the need for oxygen and allows large numbers of individuals to be stored in a small volume of water, lessen appetite and, in crustaceans, prevents cannibalism under crowded conditions.
- Operate the tank under conditions of controlled temperature, salinity, pH, dissolved oxygen level (aeration), and levels of excretory wastes that do not stress the seafood (filtration).
- Keep the seafood out of bright light unless it is on display. Bright light may cause stress and reduce survival rates.
- Check regularly and remove weak, damaged or dead individuals – do not consume them as the cause of their condition will usually be unknown, and they may pose a health risk.
- Do not try to store seafood with different requirements in the same tank.
- Do not put more stock into a holding tank than it is designed to hold.
- Do not feed the seafood. This can pollute the water and it is not necessary. Live seafood is not likely to starve to death before somebody buys it. Food in the intestinal tract (vein) of some crustaceans also detracts from their appearance.
- Comply with any relevant animal welfare requirements.

7. How to store specific types of live seafood;

i) Finfish

How to store

In water

Maximum time	**Temperature**	**Salinity**	**Other conditions**
Several days/weeks	**Barramundi** 22-25°C **Silver perch** 15-18°C **Reef fish** 23-25°C	**Barramundi and silver perch** Ideally 3-5 ppt, but they do tolerate a wider range Low salinities are recommended for native freshwater finfish to reduce stress. **Reef fish**	• avoid rapid changes in temperature and salinity (see below). Salinity should not vary more than 2 ppt. • Do not overstock the tank otherwise the capacity of the filtration system may

		35 ppt	be exceeded and deaths could occur.

Things to note:

It is very important to respect the appropriate temperature and salinity and to filter and aerate tank water.

Delivered finfish may be in water considerably colder than the display tank, and they may well be heavily stressed. On arrival you need to:

- open the bags and immediately remove dead individuals (that is those not breathing);
- aerate the bag water;
- gradually add water from the holding tank to acclimatise the finfish.

Warning

Disease outbreaks may occur in tanks because of stress imposed during transport. One common disease, "white spot", is readily identified from small (1-2mm), white spots on fins and body. Bacterial diseases may occur if finfish are badly damaged and the skin is broken; they usually appear as red ulcers on the body of the fish.

Diseased fish should be removed and treated separately or discarded. Remaining fish should be monitored closely and tanks sterilised. Veterinary assistance may be required.

(ii) Bugs and Rock lobsters

How to store

Out of water			**In water**		
Maximum time	**Temperature**	**Other conditions**	**Maximum time**	**Temperature**	**Other conditions**
Bugs 12 hours **Rocklobsters** 6 hours, and longer for some species	Generally cool, but do not place in chiller as it is too cold **Balmain bug** 6°C **Moreton Bay bug** 12-15°C	- open packaging, check and replace coolant if necessary. Store in appropriate containers. - keep moist,	1 week (may survive longer but will lose condition if not fed)	**Balmain bug** 4.5-10°C **Moreton Bay bug** 17-20°C **Southern rock lobster** 6-10°C	Usually about 3 ppt • aerate and filter • check daily and remove dead and weak individuals

	Southern rocklobster 6-10°C **Tropical rock lobster** 20-25°C **Western rock lobster** 15°C	e.g. by covering with damp hessian sack - keep in single layer - keep from direct contact with ice, ice packs or melt-water. Wrap or tightly seal the ice/ice packs		**Tropical rock lobster** 20-22°C **Western rocklobster** 15°	

Things to note:

Do not store if badly damaged, weak (limp legs and tail), dead or recently moulted (that is, if shell flexes easily when pressed).

Bugs are reasonably tolerant of handling and easily kept alive in tanks.

Individuals found dead should not be eaten.

(iii) Crabs

How to store

Out of water			**In water**			
Maximum time	**Temperature**	**Other conditions**	**Maximum time**	**Temperature**	**Salinity**	**Other conditions**
Mud crabs 3 days **Other crabs** Up to 6 hours	**Mud crabs** 16-25°C (they live linger at the lower end of the temperature	- open packaging, check and replace coolant if necessary. Store in appropriate	1 week	**Mud crabs** 17-25°C (but 2-3°C higher in very northern areas of	**Mud crabs** 15-35 ppt **Other crabs** 35 ppt or	- do not submerge rapidly (see below) - avoid

depending on the species	range) **Other crabs** Varies with species- generally cool, but do not place in chiller as it is too cold	containers. - high humidity, (80-90%) - make sure the box is not airtight. If in doubt, lift lid often or remove lid and cover with clean, damp sack. Remove dead or moribund individuals. - keep from direct contact with ice, ice packs or melt-water. Wrap or tightly seal ice and ice packs.		Australia) **Other crabs** Varies with species	close to natural environment	strong light - very efficient filter needed - aeration needed - check often

Things to note: To help avoid drowning crabs that have been stored or transported in air, fully dip crabs (face up) in the tank a couple of times, letting air bubbles emerge, before leaving them in the tank.

Other than mud crabs, local species do not survive well out of water, so are rarely handled live. For mud crabs, keep claws tied at all times (until the crab is dead). This allows easier handling and prevents possible cannibalism.

(iv) Freshwater crayfish

How to store

Out of Water			**In Water**			
Maximum	**Temperature**	**Other**	**Maximum**	**Temperature**	**Salinity**	**Other**

time		**conditions**	**time**			**conditions**
3 days	**Marron and yabby** 12-20°C room temperature is suitable, but less stress results if cooled may be stored in a chiller but temperature must be monitored closely	- open packaging, check and replace coolant if necessary. Store in appropriate containers. - keep moist (add damp material to bottom of box or cover with clean, damp sack) - do not suffocate, but keep lid on for darkness and to prevent escape - keep from direct contact with ice, ice packs or melt-water; wrap or tightly seal the ice/ice packs	A few weeks	**Marron and yabby** 12-25°C **Redclaw** 20-25°C	3-5 ppt	- aerate and filter - no light is best, but for display purposes fluorescent light is acceptable and illuminates them brilliantly

Things to note:

They are very hardy, but do not mishandle.

Check conditions daily; remove dead or weak individuals.

Beware of claws.

(v) Abalone

How to store

Out of Water			In Water			
Maximum time	**Temperature**	**Other conditions**	**Maximum time**	**Temperature**	**Salinity**	**Other conditions**
3-7 days	Cool (actual temperature depends on tolerance of individual species)	- keep moist - pack on edge	7 weeks	Cool (varies). Temperature for temperate species such as blacklip should never exceed 20°C.	35 ppt (close to natural habitat)	- very efficient filter needed - avoid bright lights - check daily

Things to note:

In general, small individuals last longer in storage than large ones.

When stored out of water, abalone may lose flavour or develop abnormal flavours.

(vi) Mussels

How to store

Out of water			In water			
Maximum time	**Temperature**	**Other conditions**	**Maximum time**	**Temperature**	**Salinity**	**Other conditions**
5-6 days	Cool (5-10°C). depending on the species	- keep moist - in packaging received in, in a purpose-built display cabinet or in a coolroom in a wet hessian sack (off the floor)	1 week or more	5-12°C, depending on the species	varies	- the water used must be from an approved area or treated in order to comply with food safety standards - filter water - ensure that water pH is appropriate for species

Things to note:
For food safety reasons, storing mussels out of water (dry storage) is preferable to storing them in water (wet storage).

Using ice to cool live mussels in a coolroom or placing them in a chiller below 5°C may be too cold to keep them alive.

Bivalve stock to be kept live must come from approved areas only. Batches of product should not be mixed and each should be labelled with the following:

- where they were cultivated (e.g. which river or estuary);
- the harvest and packaging dates;
- the name of the supplier;
- relevant post-harvest treatment.

This source identification is part of a recall system to allow rapid notification or product defects or food contamination problems.

Warning:
Poor quality or contaminated mussels can cause food poisoning. Discard if damaged.
Gaping shells (exposing the soft tissue inside) should be treated with caution – gently tap shell and observe whether the animal is capable of closing; discard those that do not close.

(vii) Oysters
How to store

Out of water			**In water**			
Maximum time	**Temperature**	**Other conditions**	**Maximum time**	**Temperature**	**Salinity**	**Other conditions**
Pacific oyster 6-7 days **Sydney rock oyster** 9-10 days Quality deteriorates markedly if kept longer.	5-10°C Sydney rock oysters are more tolerant of warmer temperatures than Pacific oysters and can be stored at 15°C or higher.	- keep moist - can be kept in a purpose-built display cabinet or in a coolroom in a wet hessian sack (off the floor)	1 week or more	**Pacific oyster** 5°C **Sydney rock oyster** 15°C Oysters will tolerate a range of temperatures but not sudden temperature changes.	Seawater (the salinity level needed depends on the origin of the oyster)	- the water used must be from an approved area or treated in order to comply with food safety standards - can be kept

		- store with cupped half of shell downwards				in purpose-built cabinet in cool seawater

Things to note: For safety reasons, storing oysters out of water (dry storage) is preferable to storing them in water (wet storage**).**
Using ice to cool live oysters in the coolroom or placing them in the chiller below 5°C may be too cold to keep them alive.
Oyster stock to be kept live must come from approved areas only. Batches of product should not be mixed and each should be labelled with the following:

- where they were cultivated (e.g. which river or estuary);
- the harvest and packaging dates;
- the name of the supplier;
- relevant post-harvest treatment.

This source identification is part of a recall system to allow rapid notification or product defects or food contamination problems.

Warning: Poor quality or contaminated oysters can cause food poisoning. Discard if damaged. Gaping shells (exposing the soft tissue inside) should be treated with caution – gently tap shell and observe whether the animal is capable of closing; discard those that do not close.

8. Legislation

i) Amendments

The **Victorian Prevention of Cruelty to Animals Act (1986)** was amended in 1995 to include protection of fish and crustaceans once they are caught and delivered to wholesale traders. The penalty for cruelty to animals is $6000 or 6 months imprisonment. The Fish Resources Management Act (1994) was amended to give additional powers of fisheries officers in relation to cruelty. These powers are presented in the **Animal Welfare Act 1999.**
For subsequent amendments see 1998 Index to Legislation of Western Australia, Table 1, p.95. and Table 1.p.228.

ii) Current Issues

WA Department of Fisheries in close consultation with the industry, is developing a specific guideline for the handling of live seafood that will allow industry members to comply with their

obligations under the Animal Welfare Bill, currently before parliament. When these have been finalised copies will be sent to all purveyors of live and fresh seafood whether directly or via the Seafood Marketing Group, Westfish. In the interim, the guidelines laid down in the Seafood Users Manual (enclosed) have been adopted.

iii) **Codes of Practice for Aquatic Animals**

The Fish Health Management Committee's involvement with aquatic animal welfare issues.

The European Union is becoming increasingly concerned about animal welfare issues both in livestock/aquaculture production as well as research. In the future this may effect overseas trading.

Because of international developments in animal welfare, the OIE as part of the OIE 2001-2205 Strategic Plan aims to set up a working group to investigate the scientific aspects of animal welfare.

The AFFA's Aquatic Animal Health Unit (AAHU) put forth a paper to the Fish Health Management Committee (FHMC) at their May 2000 meeting, requesting that FHMC endorse the proposed extension of it's Terms of Reference to include aquatic animal welfare issues.

The FHMC suggested that a review of existing Codes of Practice would be useful in identifying gaps with regards to animal welfare and deciding whether animal welfare could be incorporated into existing Codes. This process should also indicate whether national industry Codes of Practice addressing issues of animal welfare will be necessary. The Animal Welfare Committee (AWC) supported this approach and agreed to review existing Codes of Practice in Australia relating to aquatic animals before considering a further expansion of its Terms of Reference to include aquatic animal welfare.

A list of the current Codes of Practice for aquatic animals is shown in Table 1.

- Some States have developed or are developing Codes of Practice regarding aquatic animal welfare issues. These activities indicate the level of interest within the individual State, their concerns and the realisation of the importance of these issues.
- Several aquatic animal industries and industry groups have developed Codes of Practice for their specific industry. Some of these Codes have sections on the welfare of animals, with varying levels of detail. The most thorough coverage on welfare is found in the Australian Seafood Users Manual.

Table 1. Codes of Practice for Aquatic Animals[1]

#	Name of Code of Practice	Developed by…	Target at…	Animal Welfare issues addressed (Yes/No - notes)
1.	Code of Practice For the post import handling of Aquatic Animals & their Products	AQIS	Users of aquatic animals and their products	No - aims to promote the adoption of practices that reduce the risk of disease introduction and minimise the impact of any adverse effect on aquatic environments
2.	Code of Conduct for Australian Aquaculture	Australian Aquaculture Forum (with funds from FRDC and Environment Australia's Coastal and Clean Seas Program)	Aquaculturists	Yes - general statements on how to treat aquatic animals humanely.
3.	Environmental Code of Practice for Australian Prawn Farmers	Australian Prawn Farmers Association	Australian prawn farmers	No
4.	Code of Practice for handling, grading, packing and freezing prawns on catcher/freezer trawlers at sea	Australian Prawn Promotion Association	The Code has been distributed for use on all export registered trawlers	No
5.	A Code of Conduct for a responsible Seafood Industry	Australian Seafood Industry Council	Wild-catch fishing sector, aquaculture and processors and marketeers of seafood and seafood products	No - sets out the principles and standards of behaviour for responsible practices to ensure effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity
6.	Fact Sheet 18 - Fish Handling	Dept of Primary Industry and Fisheries Tasmania	Fishers	Describes humane killing of fish
7.	A Guide to acceptable Procedures and Practices for Fish and Fisheries Research	NSW Fisheries Animal care and Ethics Committee	researchers	Yes - a guide to procedures and practices for maintaining and collecting fish for the purposes of scientific research that are consistent with the objectives of the Australian Code of Practice

#	Name of Code of Practice	Developed by…	Target at…	Animal Welfare issues addressed (Yes/No - notes)
				for the Care and Use of Animals for Scientific Purposes.
8.	Code of Practice for Aquarium Operations	PIJAC Australia	aquarium owners	Yes - generalised but covers diet, appropriate care, and humane treatment of aquatic animals.
9.	The National Code of Practice for Recreational and Sport Fishing	RecFish Australia	recreational fishers	Yes - a section on treating fish humanely.
10.	WA Fishing Code of Practice	Recreational Fishing Advisory Committee	recreational fishers	No
11.	Seafood Catering Manual	Seafood services funded by FRDC & QDPI	Anyone interested in buying and eating seafood	Yes - has a reasonably detailed section (Chapter on Storage) on keeping fish and other aquatic animals alive and another brief section (in Chapter on Preparation) on killing them quickly and humanely.
12.	Code of Practice for the Welfare and Husbandry of Farmed Southern Bluefin Tuna in South Australia	Tuna Boat Owners Association	Marine farmers - to encourage them to adopt the highest standards of fish husbandry for product quality and the environment	minimal comments made
13.	Guidelines on Fish and Crustacean Welfare	Victorian Department of Natural resources and Environment	Marketeers and preparers of fish and crustaceans for human consumption	Yes - describes appropriate handling and humane killing of aquatic animals.
14.	Code of Practice for the Farming and Handling of Yabbies	Yabby Producers Association of WA	yabby farmers	Minimal - covers health issues with regards to production issues.
15.	**Rock Lobster Code of Practice**	**WRLDA**	**rock lobster industry**	Codes for live lobster and boiled lobster in regard to handling, processing, and shipping of WRL.
16	**Code of Practice for marine finfish farming in Tasmania**			**Not obtained**

#	Name of Code of Practice	Developed by…	Target at…	Animal Welfare issues addressed (Yes/No - notes)
17	Seafood Handling Guidelines	Sydney Fish Market	Anyone interested in buying and eating seafood	Minimal comments made

[1] **Note: This list is not exhaustive and is incomplete in some areas.**

* Fish Health Management Committee, 2000.

9. Acknowledgements

Many thanks to Linda Walker, Don Nicholls, and Richard Stevens for their extensive input into this report and to Dianne Watson for her assistance in compiling the report.

10. References

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