5.10 Tilapia Toolkit

Introduction

The name 'tilapia' is based on the Tswana word for fish. Tilapia are cichlid fish, and the culture of the Nile tilapia goes back to ancient Egypt. Tilapia were originally farmed in Africa and the Eastern Mediterranean, before their culture spread to Asia. Today, they are farmed across the world. Several species of Tilapia are farmed, but Nile tilapia (*Oreochromis niloticus*) dominates, with other species including Mozambique tilapia (*O. mossambicus*), Blue Tilapia (*O. aureus*), Three-spotted tilapia (*O. andersonii*) and Genetically Improved Farmed Tilapa (GIFT) also farmed. Farmed tilapia represent about 75 per cent of global tilapia production with about 6.5 million metric tonnes produced annually. (See figure: Tilapia farming cycle).

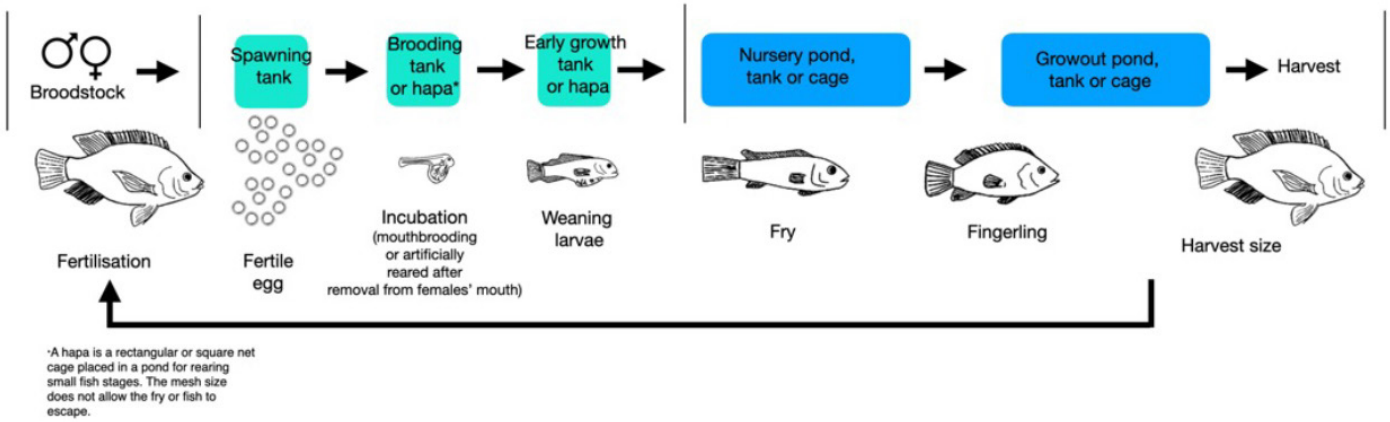
Tilapia production is often separated into two phases: production of fingerlings, and grow-out of fingerlings to marketable size. At the hatchery, brood fish are spawned, eggs are hatched, and fry reared to fingerling size. The Nile tilapia can grow up to 4kg in weight and 60cm in length. Commercially-grown tilapia are often male, this is achieved by adding a male sex hormone, methyltestosterone, to the food of the tilapia fry, causing young female tilapia to change sex to male, or reliance on YY male brood stock, used to produce all-male fingerlings. Males are preferred because they grow faster than females.

Tilapia are farmed in freshwater and brackish water ponds, cages and net pens, raceways, or water re-circulating systems. Tilapia require warm water (15 °C minimum) and so have not invaded temperate habitats. However, they have spread widely beyond their points of introduction in many fresh and brackish tropical and subtropical habitats, sometimes disrupting native species. In the US, Australia, South Africa and elsewhere, they are considered to be invasive species.

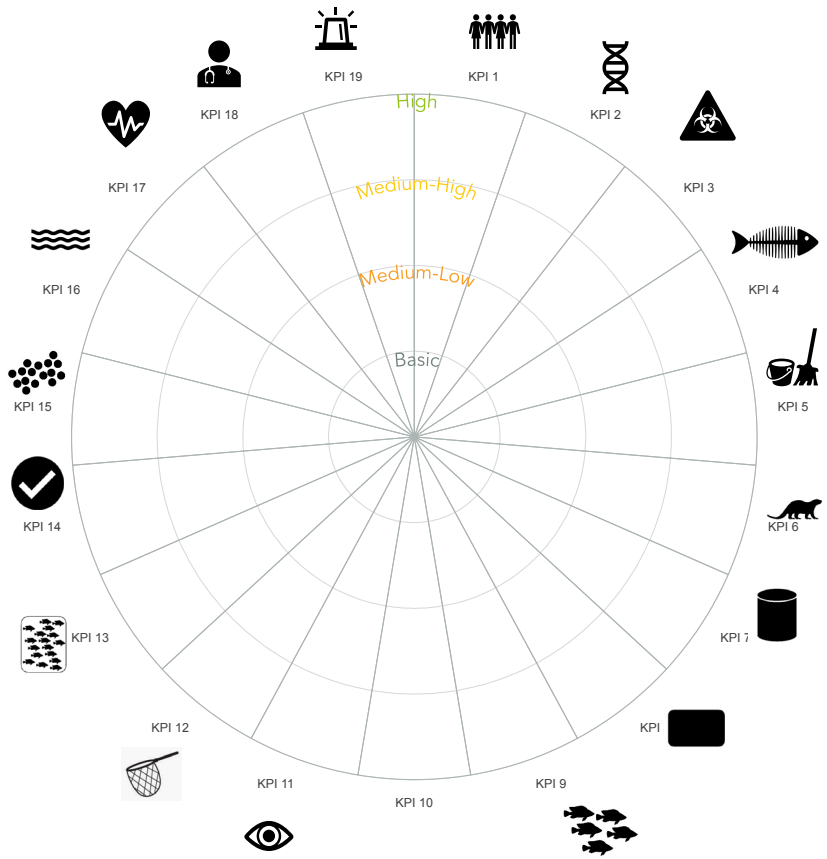
Key welfare concerns for Tilapia include: damage to their eyes, jaws, opercula, skin, fins and gills through physical contact with the cage, pond and net; ectoparasites; handling and crowding methods; and killing methods.

Fish have nerve receptors for noxious stimuli, and studies indicate they can feel pain. Assuming fish are sentient animals, and assuming they can suffer pain, best welfare practice is to minimise procedures that can potentially cause distress or pain.

Tilapia farming cycle



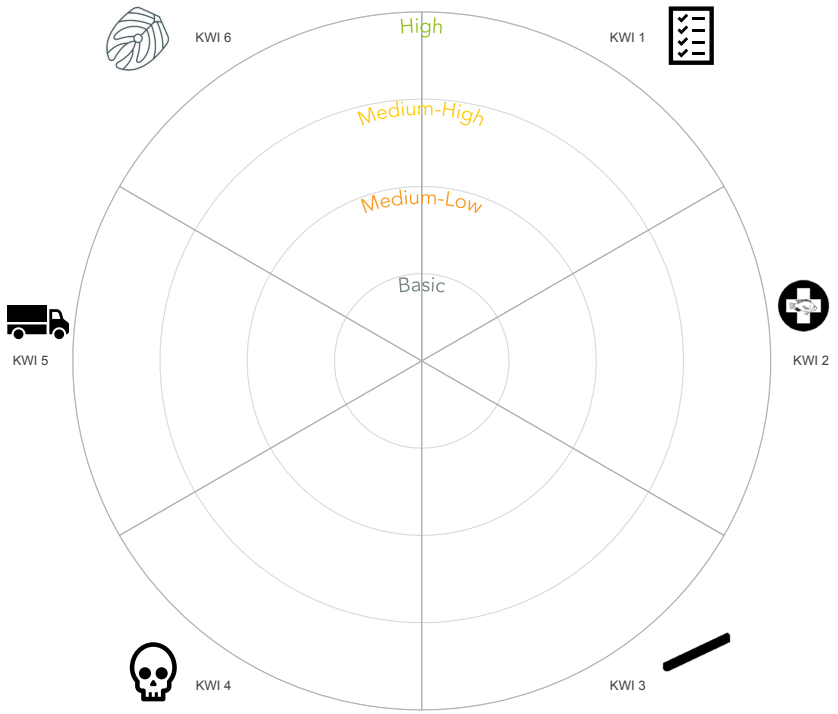
KPI	Achievement
KPI1: People, training - Links to P11	
KPI2: Genetics - Links to P2	
KPI3: Biosecurity - Links to P5	
KPI4: Removal of mortalities - Links to P5, P10	
KPI5: Cleaning and disinfection - Links to P5, P10	
KPI6: Control of other species - Links to P5, P7	
KPI7: Tanks - Links to P5	
KPI8: Enclosures, ponds, lagoons - Links to P5	
KPI9: Stocking density - Links to P6	
KPI10: Escapes - Links to P5, P10	
KPI11: Inspection - Links to P10	
KPI12: Handling - Links to P11	
KPI13: Crowding - Links to P4, P5, P6, P11	
KPI14: Grading - Links to P4, P5, P6, P11	
KPI15: Feed - Links to P3	
KPI16: Water quality - Links to P4	
KPI17: Health, and health planning - Links to P5	
KPI18: Medicines - Links to P5	
KPI19: Emergency - Links to P9, P10	



Basic level not achieved	
Basic (B)	
Medium-Low (ML)	
Medium-High (MH)	
High (H)	

Overall KPI achievement	

KWI	Achievement
KWI1: Animal records - Links to P10	
KWI2: Damage, disease - Links to P4, P5	
KWI3: Culls - Links to P5, P7	
KWI4: On-farm mortality - Links to P5, P7	
KWI5: Transport - Links to P5, P10	
KWI6: Slaughter - Links to P5, P11	



Basic level not achieved	
Basic (B)	
Medium-Low (ML)	
Medium-High (MH)	
High (H)	
Overall KWI achievement	

Overall achievement

Overall achievement	

KPI 1

People, training - Links to P11		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	All people responsible for the care of fish have received appropriate training by others with: experience in recognition of disease or health and welfare problems; administering and recording use of medicinal products and vaccines; handling; crowding; grading fish; culling fish; and humane slaughter.	○		○		
Medium-Low (ML)	Routine procedures should not cause injury, panic, lasting fear or avoidable pain or distress, and where painful procedures cannot be avoided, they should be carried out by competent and trained people.	○		○		
Medium-High (MH)	An animal welfare contact person or co-ordinator, responsible for animal welfare aspects within the farm or company, is identified.	○		○		
High (H)	People in the company or farm are supported to have higher-level training or to achieve professional qualifications in animal welfare and aquaculture.	○		○		

KPI 2

Genetics - Links to P2		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Fish species used are compliant with local and national legislation.	○		○		
	Use of non-indigenous species complies with introduction procedures of the regional, national and international importation guidelines.	○				
	The facility complies with all government regulations regarding importation of native and non-native stock (fish) of any age.	○				
	Wild juveniles are not deliberately stocked.	○				
Medium-Low (ML)	Genetic modification techniques are not used.	○		○		
	The facility maintains accurate records of the species produced – including non-native, specific pathogen-free, specific pathogen-resistant, sterile, hybrid, triploid, sex-reversed or genetically modified stock.	○				
Medium-High (MH)	Tilapia (non-African countries): demonstration that the tilapia species cultured were established and naturally reproducing in the receiving waters of the operation on or before 1 January 2008.	○		○		
	Tilapia (African countries): demonstration that the tilapia species and strain cultured were established and naturally reproducing in the receiving waters of the operation on or before 1 January 2008.	○				
	Use of all male tilapia has welfare benefits (no sex change modification required).	○				
High (H)	Methyltestosterone (MT) is not used to make females develop as male.	○		○		
	Use of oestrogen so that all XY females are produced is not used.	○				

KPI 3

Biosecurity - Links to P5		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	A biosecurity programme or plan (Resource 7) is in place.	○		○		
Medium-Low (ML)	High standards of biosecurity are maintained to avoid the spread of diseases between populations of fish.	○		○		
	People and vehicles go through disinfection and cleaning before and after entering the site.	○				
	Feed and probiotics are stored to prevent contact with outside vectors of disease, such as birds and rodents.	○				
Medium-High (MH)	The farm is protected (as far as is realistic), to prevent entry of wild animals, including crabs, which may carry pathogens.	○		○		
High (H)	The biosecurity programme includes a risk assessment (which may be based on hazard analysis and critical control point (HACCP) training) of the primary pathogens and parasites likely to pose a risk to the species farmed.	○		○		

KPI 4

Removal of mortalities - Links to P5, P10		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Frequent removal of dead/moribund fish from the surface or (if present) the mortality removal system.	○				
	Disposal of dead fish is in line with local and national legislation.	○		○		
	(In large pond systems, detection of individual sick, diseased or dead fish is a challenge, but significant numbers of moribund or dead fish will be detectable).	○				
Medium-Low (ML)	Records are kept showing that mortalities are removed consistently.	○		○		
Medium-High (MH)	Removal of dead/moribund fish from the surface or the mortality removal system occurs:	○				
	a) At least twice a week, unless adverse weather conditions mean this would involve danger to personnel.	○		○		
	b) At least daily for land-based systems.	○				
High (H)	The cause of death of fish is recorded, if feasible.	○				
	(In large pond systems, detection of individual sick, diseased or dead fish is a challenge, but significant numbers of moribund or dead fish will be detectable).	○		○		
	Veterinary advice is sought if the cause of death is not clear (if local veterinary expertise is available, or appropriate local non-veterinary expertise).	○				

KPI 5

Cleaning and disinfection - Links to P5, P10		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Vermin are controlled through appropriate and effective measures.	○		○		
	Only approved pest control substances and chemicals permitted by law are used.	○				
Medium-Low (ML)	Written cleaning and disinfection protocols are implemented.	○				
	Equipment can be thoroughly cleaned and disinfected.	○		○		
	Net cleaning does not unnecessarily compromise the welfare of the fish.	○				
Medium-High (MH)	A list of permitted disinfectants and detergents used on the fish farm, and their safety data sheets, is available.	○				
	The areas around the tanks, ponds and buildings are kept clear of debris and non-essential equipment.	○		○		
High (H)	The most humane effective baiting method is adopted, and pest control baits are only accessible to the targeted species.	○		○		

KPI 6

Control of other species - Links to P5, P7		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	If lethal predator control is used, it is compliant with local and national legislation.	○		○		
	No lethal methods are applied to predator species listed as endangered or critically endangered on the IUCN Red List, or those species protected by local or national laws.	○				
	A basic monitoring programme is in place for documenting the frequency of visits, variety of species and number of animals interacting with the farm.	○				
Medium-Low (ML)	Humane precautions are taken to protect fish from other animals that could cause them harm, including bringing in disease.	○		○		
	Staff are trained in humane control methods.	○				
Medium-High (MH)	The farm uses non-lethal methods of control to protect fish from other animals.	○		○		
	The farm has a predator control plan in place.	○				
	Any lethal methods used are only used as a last resort, when all non-lethal methods have failed.	○				
	The site maintains a list of species occurring within the vicinity of the site that are classified as endangered or threatened under regional laws and/or are on the IUCN Red List.	○				
	The site records the species and numbers of all avian, mammalian and reptilian mortalities resulting from predator control actions.	○				
High (H)	As previous.	○		○		

KPI 7

Tanks - Links to P5		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	The tanks on the farm are compliant with local and national requirements on land and water use.	○		○		
Medium-Low (ML)	Tanks have no sharp protrusions which may injure the fish.	○		○		
	Inlets and outlets are designed to prevent both fish escape and ingress of wild stock.	○				
	Tanks have lids or are covered with appropriate netting to prevent fish escaping.	○				
Medium-High (MH)	If nets are used, they are a suitable size for the fish in the tank to prevent escapes and to prevent fish from becoming entangled.	○		○		
	Flow rate is suitable for fish to hold their position in the water column.	○				
High (H)	Tanks measuring over 5m in diameter have oxygen and/or water level alarms fitted.	○		○		

KPI 8

Enclosures, ponds, lagoons - Links to P5		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Enclosures or ponds on the farm are compliant with local and national authorities on land and water use.	○		○		
Medium-Low (ML)	The location of enclosures allows an adequate flow of clean water.	○		○		
	Enclosures are designed and sited so they are not likely to be damaged by adverse weather conditions.	○				
Medium-High (MH)	The current is suitable for fish to be able to hold their position in the water column.	○		○		
	Netting used in the construction of enclosures has smooth and non-abrasive surfaces to reduce injuries to the snout, fins and scales of fish.	○				
	Enclosure nets are regularly checked for holes and fouling, and are well maintained.	○				
High (H)	Biofouling is not allowed to build up on enclosure nets.	○		○		

KPI 9

Stocking density - Links to P6		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Where stocking density is legislated, local and national legal specification is followed.	○		○		
Medium-Low (ML)	If no local permitted stocking density is specified, suggested stocking (Resource 3) is followed, subject to suitability for local variables, fish size, nutrition, and water quality conditions.	○		○		
Medium-High (MH)	As previous requirement.	○		○		
High (H)	As previous requirement.	○		○		

KPI 10

Escapes - Links to P5, P10		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Effective screens, nets or barriers of appropriate mesh size are used for the smallest animals present, and are double-screened when non-indigenous species are present.	○		○		
Medium-Low (ML)	A fish escape plan is in place.	○		○		
	Perimeter pond banks or dykes are of adequate height and construction to help prevent breaching if exceptional flooding occurs (it is recognised that in exceptional flooding it may not be possible to contain fish).	○				
Medium-High (MH)	Trapping devices to sample for escapes are in place, and the results recorded.	○		○		
High (H)	As previous requirement.	○		○		

KPI 11

Inspection - Links to P10		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	The farmer inspects the fish at a frequency which is at least the legal base requirement.	○		○		
Medium-Low (ML)	Fish are inspected at regular intervals, at least twice daily, weather permitting. If fish cannot be seen, the condition of equipment and containment is still inspected.	○		○		
Medium-High (MH)	Fish are observed at least once a day during feeding.	○		○		
High (H)	As previous requirement.	○		○		

KPI 12

Handling - Links to P11		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Handling of fish prior to transport is kept to a minimum and done in ways which minimise distress to the fish.	○		○		
Medium-Low (ML)	Changes in water temperature and pH during handling, which could compromise fish welfare, are avoided.	○		○		
	When hand nets are used they are:	○				
	a) of a suitable size;	○				
	b) designed to avoid physical damage; and	○				
	c) kept clean, in good repair and disinfected before use.	○				
Medium-High (MH)	Live fish are not held by the tail only, or thrown onto solid objects or surfaces.	○		○		
	Handling of fish prior to transport does not result in fish being out of water for more than 15 seconds (unless anaesthetised).	○				
High (H)	Where pumps and pipes are used, they do not unnecessarily stress fish and are free from sharp protrusions, kinks and bends that are likely to injure fish.	○		○		
	Checks are made that all fish have been removed from the pipe at the end of any operation, or if the equipment fails.	○				

KPI 13

Crowding - Links to P4, P5, P6, P11		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	During crowding and handling, the crowding time and the time out of water is kept to a minimum.	○		○		
Medium-Low (ML)	During crowding, the farmer monitors crowding distress by fish behaviour (colour changes, escape behaviours, fish gasping).	○		○		
	Sweep nets are of a knotless construction and an appropriate mesh size for the fish.	○				
Medium-High (MH)	Sweep nets crowd a portion of the population rather than crowding the whole enclosure.	○		○		
High (H)	No enclosure is crowded more than twice in any week or 3 times in any month.	○		○		

KPI 14

Grading - Links to P4, P5, P6, P11		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Grading is only performed when absolutely necessary.	○		○		
	Only healthy fish are subjected to grading.	○				
Medium-Low (ML)	People grading the fish are both trained and fully competent and aware of the welfare risks to the fish.	○				
	Grading equipment is designed and maintained in order to prevent damage or stress to the fish.	○		○		
	Fish are not crowded for grading for more than 2 hours.	○				
	The grading is completed in one continuous operation.	○				
Medium-High (MH)	Fish are monitored during the grading by a designated person who can recognise welfare issues and take appropriate action if necessary.	○				
	Oxygen levels are monitored and recorded during grading.	○		○		
	Supplementary oxygen and/or aeration is available for the duration of the crowding procedure if the oxygen level falls.	○				
High (H)	As previous.	○		○		

KPI 15

Feed - Links to P3		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Feeding is of a quality, quantity and feeding frequency suitable for the fish stage of development.	○		○		
	Feeds and feeders meet manufacturers' recommendations, good aquaculture husbandry practices and local regulatory requirements, and must provide adequate access for all fish.	○				
Medium-Low (ML)	Probiotics are used at the appropriate nutrition and growth stage, to prevent overuse.	○				
	All feeding systems are checked for proper operation daily.	○		○		
	In the event of a supply failure, the farms can provide feed within 24 hours.	○				
Medium-High (MH)	Food is fed in such a way that fish can eat without undue competition.	○		○		
High (H)	A documented chain of custody and traceability for fisheries products in feed is kept.	○		○		
	Food type and presentation provides interest and occupation for the aquaculture species.	○				

KPI 16

Water quality - Links to P4		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	The site is compliant with regulations or permit requirements concerning water quality and water quality impacts.	○				
	If pesticides or fish treatments are used, the use is compliant with local and national requirements.	○		○		
	The site is compliant with local and national requirements for discharges, including hazardous chemicals, sludge or aquaculture waste.	○				
Medium-Low (ML)	The farmer recognises visual indicators of poor water quality as well as fish behavioural indicators of poor water quality.	○		○		
Medium-High (MH)	Water quality is monitored sufficiently frequently (and if necessary, daily) for the time of year, the system, and the lifecycle stage of the fish.	○		○		
	If water quality departs from the local accepted range (Resource 7b) for the species farmed, investigation and rectification takes place.	○				
High (H)	Equipment used to test water quality is calibrated, for example, by using a dissolved oxygen (DO) meter, pH meter, refractometer and/or chemical test kits.	○		○		

KPI 17

Health, and health planning - Links to P5		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	A procedure is in place to inform the relevant authorities of an outbreak of important transmissible disease, including geographically appropriate OIE-listed diseases.	○		○		
Medium-Low (ML)	Infectious, parasitic and metabolic diseases, injury, and conditions causing distress, are prevented and controlled through good management, good animal care, biosecurity, vaccination and genetic selection.	○		○		
	The aquaculture system does not depend on prolonged or routine use of pharmaceuticals.	○				
Medium-High (MH)	A H&W plan is in place (Resource 6).	○		○		
	Broodstock have appropriate disease-free status and meet regional, national and international importation guidelines.	○				
High (H)	The H&W plan is reviewed and updated annually, and is authorised by a specialist aquaculture veterinarian (if local veterinary expertise is available, or appropriate local non-veterinary expertise).	○		○		

KPI 18

Medicines - Links to P5		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Any drug or other agent used to treat fish is compliant with all local guidelines and applicable local legislation.	○		○		
	Medication is only administered strictly in accordance with the prescription instructions.	○				
	Hormones and antibiotics are not used as growth promoters.	○				
	Preventive (prophylactic) use of antimicrobials is not permitted.	○				
Medium-Low (ML)	If there is no local legal requirement to have written prescriptions for aquatic animals, a voluntary policy of recording of medicines used is adopted.	○		○		
	Vaccines and medicines are stored securely and in the recommended conditions (label instructions).	○				
	Medicine use is recorded (Resource 5).	○				
	Where possible (if specialist vets are available) the company has access to a veterinarian experienced in aquaculture.	○				
	Any antimicrobial classified as being of 'high' or 'medium' importance for human medicine, defined as Highest Priority Critically Important Antimicrobials (HPCIA) is not permitted for use in aquaculture unless under veterinary advice.	○				
Medium-High (MH)	Persons using medicines have relevant experience and training.	○		○		
	The number of treatments of antibiotics over the most recent production cycle ≤3.	○				
High (H)	An antimicrobial stewardship plan is in place, and is complied with (see OIE 2016, Resource 10).	○		○		
	The plan is reviewed annually, and is linked to existing regional or national antimicrobial stewardship schemes.	○				

KPI 19

Emergency - Links to P9, P10		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Written plans are in place to deal with emergencies such as power failure, flooding, failure of feed supply, or chemical or effluent spillage.	○		○		
Medium-Low (ML)	Contacts and emergency phone numbers, and contact numbers in cases where the emergency can affect animal and human health, are available at each site.	○		○		
Medium-High (MH)	The emergency plan includes approved methods of humane killing. The methods proposed are consistent with national law.	○		○		
	If generators (generators may not be present on many farms) are used for back-up power, they are tested under conditions of load at least 4 times a year.	○				
High (H)	Plans have been developed in consultation with a specialist veterinarian (if local veterinary expertise is available, or appropriate local non veterinary expertise).	○		○		
	Plans are updated annually to cover circumstances such as potentially zoonotic or notifiable disease.	○				

KWI 1

Animal records - Links to P10		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Records are kept of disease events (in large pond systems, detection of individual sick or diseased fish is a challenge, but significant numbers of moribund or dead fish will be detectable).	○		○		
Medium-Low (ML)	Records are kept of:	○		○		
	Runts	○				
	Predator damage	○				
	Other damage (handling, grading, net)	○				
	Bacterial disease	○				
	Parasites	○				
	Fungus	○				
Medium-High (MH)	Records are kept of:	○		○		
	Eye damage/loss	○				
	Snout injuries	○				
	Fin damage (dorsal, pectoral, pelvic, tail)	○				
	Deformities (jaw, operculum, spine)	○				
	Scale/skin damage (due to abrasion, parasites)	○				
High (H)	Scoring scales are used to monitor fish welfare outcomes at harvest (a possible set of scoring scales is presented in Resource 1). The science of welfare outcome scoring in Tilapia is not yet well developed, and companies and farms showing leadership in this area will work with local expertise to ensure the metrics they use are realistic and practical.	○		○		
	The company sets high targets, measures performance and reports on welfare outcomes measured at harvest.	○				

KWI 2

Damage, disease - Links to P4, P5		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	The farmer and/or carer is aware of damage and disease as welfare issues.	○		○		
Medium-Low (ML)	Fish suffering from overt physical damage, or disease symptoms are (if observed, or observable):	○		○		
	a) segregated;	○				
	b) treated/humanely; and	○				
	c) euthanased without delay if they are likely to be non-responsive to treatment.	○				
Medium-High (MH)	Farms take all reasonable steps to minimise ectoparasite populations.	○		○		
	Stock-keepers are able to recognise symptoms of ectoparasite infestation and damage.	○				
High (H)	There is no recurring physical damage occurring on the fish attributable to environment, husbandry procedures or unrecognised disease.	○		○		

KWI 3

Culls - Links to P5, P7		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	The farmer is aware of culling as a humane action for distressed or diseased fish.	○				
	Animals are euthanased by adopting local legally-approved methods.	○				
	Methods of euthanasia induce immediate loss of consciousness, for example, manual stunning using a priest/bonker or blunt implement if advanced equipment is not available.	○				
	Sick or distressed fish are treated promptly, or euthanased humanely without delay, if treatment is not feasible or recovery is unlikely. (In large pond systems, detection of individual dead fish is a challenge, but significant numbers of moribund or dead fish will be detectable).	○		○		
	People responsible for killing have received appropriate training.	○				
Medium-Low (ML)	Daily cull number is collected and recorded. Cull is defined as 'actively, humanely killed for health or welfare reason', whereas mortality is defined as 'found dead'.	○				
	Any equipment used for euthanasia (if more complex than a priest) maintained in good working order, and records documenting maintenance and methods used are kept (see Resource 4).	○		○		
Medium-High (MH)	Cull data is analysed, and the cause of adverse trends is investigated and acted upon.	○				
	A written policy for euthanasia is produced by working with a veterinarian (if local veterinary expertise is available, or appropriate local non-veterinary expertise) and is based on recognised best international practice.	○		○		
High (H)	A written plan is in place to respond to sudden increases in culling.	○				
	The plan includes specialist aquaculture veterinary consultation and actions to address the problem where necessary.	○		○		
	Best practice culling methods are adopted (see Resource 4).	○				

KWI 4

On-farm mortality - Links to P5, P7		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Overall survival data is recorded if this is practical (in large pond systems, detection of individual dead fish is a challenge, but significant numbers of moribund or dead fish will be detectable).	○		○		
Medium-Low (ML)	If morbidity and mortality (survival) levels increase, and other signs indicate that the fish have been affected by disease, a diagnostic investigation is conducted (in large pond systems, detection of individual dead fish is a challenge, but significant numbers of moribund or dead fish will be detectable).	○		○		
Medium-High (MH)	If the mortality (calculated from survival) level is above 0.5% a week (excluding pre-swim up fry) a vet or trained and experienced fish biologist or veterinarian (if local veterinary expertise is available, or appropriate local non-veterinary expertise) is involved, and an investigation carried out if appropriate.	○		○		
High (H)	As previous requirement.	○		○		

KWI 5

Transport - Links to P5, P10		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Excessive changes in water temperature, pH and salinity are avoided during transport.	○		○		
Medium-Low (ML)	A written plan is in place to respond to negative changes in transport mortality.	○		○		
Medium-High (MH)	As previous requirement.	○		○		
High (H)	The company sets high targets, measures performance and reports on outcomes.	○		○		

KWI 6

Slaughter - Links to P5, P11		Observed?	Comment on observation	Achieved level?	Progress	Evidence/comment
Basic (B)	Where there are legal requirements, fish are slaughtered by adopting local legally-approved methods.	○		○		
	People slaughtering fish are competent in handling and are trained in the slaughter methods used.	○				
Medium-Low (ML)	Fish are not left to die in air.	○		○		
	Ice and gill slitting may be the method used in this tier.	○				
Medium-High (MH)	Fish are stunned before killing. This could include mechanical stunning (use of a priest/bonker) followed by exsanguination.	○		○		
	Records are kept of;	○				
	a) Percentage of fish effectively stunned at first attempt (determined by indicators such as body movement, eye roll or reaction to tail pinch).	○				
	b) Percentage of fish rendered insensible	○				
	c) Percentage of fish with bruised carcasses	○				
	Records are kept of the time period the fish were fasted before slaughter.	○				
High (H)	Internationally recognised best practice methods, such as electrical stunning at slaughter are adopted (see Resource 4).	○		○		
	This would most likely involve electrical stunning followed by gill slitting.	○				

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