An AWF Case Study

Jellied Fish

THIS CASE CONSIDERS THE PRACTICALITIES AND WELFARE CONSIDERATIONS OF FARMED FISH

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Jellied Fish

You are called to a salmon farm which has suffered a major fish kill. The farming company is not one of your clients but the company’s vet is very concerned over the extent of the loss and the welfare of the surviving fish.

The farm comprises twelve net pens in a sea loch. Before the loss each pen had contained 30,000 fish with an average weight of 3.5kg.

When you arrive at the farm divers are removing hundreds of dead fish from each pen and it is estimated that 80% of the fish have died over the previous three days.

Underwater camera monitoring and diver observation have shown accumulated dead fish on the bottom of the pens and numbers of lethargic fish with extensive skin and fin damage ‘hanging’ at the surface of the water. Net fouling is quite extensive and there appear to be numerous small jellyfish in the water.

What should you do? (continue for answers)
Stakeholders and relevant considerations

• The surviving fish

There are 72,000 surviving fish. They have severe skin damage, are not feeding and not shoaling or swimming normally. Fish with this level of damage are very prone to osmoregulatory problems and secondary infections and it is probable that many more will die over the following few days.

What’s the problem (from the fishes’ perspective) with fish having skin damage, infections and not being able to swim normally? Can fish suffer? Researchers at the University of Liverpool have published the following:

“…empirical anatomical, physiological, and behavioural evidence supports the notion that fish could experience these two forms of suffering (i.e., pain and fear).” (Cooke and Sneddon, 2007)

• The fish farm’s vet

He has sought a second opinion. He wants to save as many fish as possible and return them to full health. He also wants to understand what has caused this and how it can be prevented in future.
Stakeholders and relevant considerations

• **Divers**

Have a job to do and are doing it. May be external to the company and may not want to see what they perceive as inhumane treatment of fish. The company should demonstrate high standards of animal welfare.

• **Attending vet**

Wants to save as many fish as possible and return them to full health. Needs to do adequate investigation to determine cause and how problem can be prevented from recurring.
Relevant legislation and professional guidance

Fish are covered by the **Animal Welfare Act 2006** and the **Animal Health and Welfare (Scotland) Act 2006** (much aquaculture of this type is based in Scotland). So duty of care to meet five welfare needs:

9 Duty of person responsible for animal to ensure welfare

(1) A person commits an offence if he does not take such steps as are reasonable in all the circumstances to ensure that the needs of an animal for which he is responsible are met to the extent required by good practice.

Could the farm be prosecuted for not having an early warning system in place for predicting the occurrence of blooms? Could they be reasonably expected to have had such a system in place when they are farming over 72,000 animals?

**The Welfare of Animals (Slaughter or Killing) Regulations 1995** application and exemptions:

3(1) These Regulations apply to the movement, lairaging, restraint, stunning, slaughter and killing of animals bred or kept for the production of meat, skin, fur or other products, to methods of killing animals for the purpose of disease control and to the killing of surplus chicks and embryos in hatchery waste.


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What could be done in practice?

• Take a full clinical history including any indication of developing clinical problems prior to the event.

• Look for detailed records of water quality up to and during the event including temperature, dissolved oxygen, weather, evidence of the presence of algal or jellyfish blooms.

• Carry out an appropriate post-mortem on affected fish to determine exact nature of the cause.

• Carry out water analysis particularly in an effort to determine any toxic episode.

• Ensure that all dead fish are removed as quickly as possible, bringing in extra help if necessary (this relies on bringing in diving resources to carry this out).

• Assess the condition of the surviving fish. Extent of damage? Feeding and shoaling behaviour? Do you consider that the fish are suffering?
What could be done in practice?

It is unlikely that any infectious agent would cause this level of fish loss over such a short period of time. The loss of fish was caused by a “bloom” of toxic jellyfish which have caused extensive gill and skin damage. The cause is determined by water analysis for the presence of the jellyfish and from post-mortem. Previous records of water quality and weather conditions will also help indicate the cause. The fact that the nets of the pens were fouled will have contributed to the problem, reducing water exchange and levels of dissolved oxygen.

Surviving fish have severe skin damage, are not feeding and not shoaling or swimming normally. Fish with this level of damage are very prone to osmoregulatory problems and secondary infections and it is probable that many more will die over the following few days. Removing large number of dead fish from the pens and dealing with net fouling will also cause stress to the surviving fish. As the fish aren’t feeding it would not be possible to use oral medication against any secondary infections.

This is one of the most difficult dilemmas facing the fish vet. In the wild, fish are able to escape from adverse environments such as toxic blooms of algae or jellyfish. We are deliberately confining fish and subjecting them to the risk of exposure to this and other adverse environments – directly conflicting with the need to express normal behaviour (and also compromising other freedoms (or needs) such as discomfort and pain and disease). The vet and farmer have a duty of care to try to prevent this situation happening (see below).

There is no simple answer to the questions of actions regarding the surviving fish. From their behaviour the fish do appear to be suffering from the damage and, due to the very poor prognosis, culling the remaining fish may be the preferred option.
What could be done in practice?

• Could the fish be humanely culled?

Mass culling of large numbers of large fish (these fish are 3.5kg) itself poses massive problems. In the past, in the face of mandatory culling, there have been unacceptable practices such as pumping the fish through mincing machines (rather like culling male chicks). If the fish are not to go into the human food chain then they can be pumped from the pens into an overdose of anaesthetic in a well boat. From a fish welfare point of view this would be the preferred option and large numbers of fish can be rapidly handled. If the fish are to go for human consumption then electric stunning equipment is available which could be used. To ensure no recovery from the stun the fish can then be pumped into carbon dioxide baths. Carbon dioxide baths by themselves are too aversive to use solely without a prior stunning step.

The condition of the surviving fish would probably mean that most would not, however, be suitable for human consumption.

Well boats are designed mainly for the transport of live fish either to transport fish to stock farms or to take fish to harvest. They have a number of large tanks (wells) within the hull which hold the fish (water is pumped through these wells). These boats can also be used to treat fish with bath medicines and also to grade fish using the on-board pump systems.

It is, however, possible that a reasonable number of fish could survive this event – skin damage in fish has a remarkable capacity to heal and there are still 72,000 animals surviving. This is very much a judgement call by the vet. It is possible that these fish will also have very badly damaged gills, which will further compromise their ability to recover (reduced water exchange from fouled nets will further reduce available oxygen to the fish). Removing and killing the remaining fish may pose welfare problems in itself. Consider the option of swimming the surviving fish into clean pens and monitoring their condition closely over the next few days.
What could be done in practice?

Could the fish be moved into clean pens?

‘Swim-through’ systems are frequently seen on salmon farms – these allow fish to be moved from one pen into an empty pen that has a clean net. The net on the original pen can then be changed or cleaned. In this situation is should be possible to set up a system of swim-through where all surviving fish end up in a small number of clean pens. If swim through is not possible then pumping surviving fish using well boat pump systems would be an alternative – this necessitates a ‘handling step’ but this can be done carefully using modern pumping techniques.

It may even be possible to put a grading step into this so that the worst affected fish can be graded out into an overdose of anaesthetic. Actions will need to be taken to prevent these fish being exposed to further jellyfish damage. Compressed air diffusers can be deployed to flush away the jellyfish and bring clean water up into the pens.
What could be done in practice?

It will be necessary to ensure that there is the capability of effectively removing and culling the surviving fish (method as described above) which, now having been moved into a small number if pens, will be easier to deal with.

There are a few options:

1. Get the dead fish out and leave the rest well alone to allow the surviving fish to recover. This may be the best option of all, depending on the assessment of the condition of the remaining fish. There are far fewer fish in the pens, so oxygen demand will be less and net fouling can be dealt with when the fish are in better condition to withstand moving them. Fish that have been damaged like this do have a remarkable capacity for recovery. But in the meantime there will be a proportion of fish that will suffer due to the damage present. They will suffer a gradual decline and death and it may be considered that this is unacceptable.

2. Get all surviving fish out rapidly and cull them humanely. This should be possible using well boat technology and anaesthetic overdose (or electric stunning if necessary). It should be possible to achieve this relatively rapidly and with little further stress or damage to the fish. This does ensure that there will be no long term suffering.

3. Move the remaining fish into a small number of clean nets if possible. This gives them the best conditions for recovery and may give you the opportunity to grade out and cull the worst affected. But the fish will probably need to be handled and possibly stressed/further damaged to achieve this.

There is no straightforward answer, however, the second option would probably have the smallest overall effect on individual fish suffering, but it may be considered that there is merit in giving the remaining fish a chance to recover. Option 3 gives the possible option of culling the very badly damaged fish, but, at the same time probably increasing the short term suffering of other individuals while improving their chances of survival in the long term.
What could be done in practice?

• Is it possible get rid of the jellyfish once a bloom is established?

Usually the blooms go away quite quickly – but they can be washed away by using air compressors diffusing air under the cages to bring up new water. Or even outboard engines can be used to flush the cages.

• Has the farmer or his vet been negligent in allowing this situation to occur?

Jellyfish blooms are often an unexpected event and sometimes difficult to predict. They are a relatively recent phenomenon affecting aquaculture and there are a limited number of actions that can be taken to prevent them or to protect the fish. The level of net fouling certainly contributed to the problem. There should be a procedure in place and documented in the veterinary health plans (VHP) so that monitoring is carried out – a basic system using a ‘sechii’ disc to determine the turbidity of the water can give early warning. Basic procedures can be to stop feeding the fish, keep off the pens so that the fish stay low in the water (most blooms are in the top metre or so).

More sophisticated equipment can be in place if there is a risk of blooms e.g. tarpaulin curtains, diffuser systems producing a ‘bubble curtain’ around the pens – some companies have even used a technique of sinking the fish pens below the level of the bloom.
What could be done in practice?

• **What recommendations should be made?**

The farmer should look to put in place procedures for early warning systems for predicting the occurrence of blooms, this involves constant water quality monitoring and predictive analysis for the presence of jellyfish.

Also, management agreements with other farms to include correspondence regarding evidence of blooms for early warning.

Ensure better net cleaning or changing procedures are in place.

Put in place procedures to reduce the impact of the bloom if one is suspected. This would involve immediate cessation of feeding and deployment of systems to screen pens (as described above) and to pump clean water into the pens to eliminate the jellyfish.
What could be done in policy?

The RSPCA Freedom Food scheme includes welfare standards for farmed Atlantic salmon. These were co-authored by Pete Southgate MRCVS.

Consumers should be encouraged to look for the Freedom Food logo when purchasing farmed salmon to eat. Vets may wish to ensure that fish farming clients are aware of the FF standards, and offer their support in helping to convert to them.

The Soil Association (SA) caused controversy when it first licensed organic fish farms in 2006. Some questioned the ethics of introducing organic standards for salmon, trout, char, shrimp, carp and bivalve shellfish. However, the SA's view that aquaculture is here to stay and that it's better to reform from the inside has prevailed. Its standards are the toughest in the world and it demands stocking densities 30 per cent lower than the RSPCA's Freedom Food standards. Compassion in World Farming welcomes most but not all of its requirements for organic certification.

Vets may wish to ensure that fish farming clients are aware of the potential welfare and environmental benefits of organic standards, and offer their support in helping to convert to them.

Further information on farmed fish welfare can be found on CIWF website.
About AWF

The Animal Welfare Foundation (AWF) aims to alleviate unnecessary pain and suffering in all animals including working and livestock animals, wildlife, and pets. We do this by focusing out charitable activities on three main areas:

- **Research**: Grant funding research which has a direct impact on animal welfare.
- **Education**: Investing in education for the public and veterinary professions, particularly students, on animal welfare issues.
- **Debate**: Providing a forum for discussion to highlight and promote animal welfare best practice.

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