

Stunning and Slaughter: Best Practices for Animal Welfare in Aquaculture



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Preface

The stunning and slaughter processes in aquaculture are relatively short in duration compared to other stages of rearing. However, these last moments of life can often be the most traumatizing for farmed aquatic animals. Humane methods of slaughter minimize suffering wherever possible, and in order to alleviate distress or discomfort prior to the killing procedure, effective stunning is required. The World Organisation for Animal Health (WOAH) 'Aquatic Animal Health Code' states that effective stunning should be verified by the absence of consciousness, and fishes should not regain consciousness before death. It is also necessary that we acknowledge pre-slaughter handling as an indispensable part of the animals' experience during the overall slaughtering process, which includes sudden disturbances, removal from water, withdrawal of food, crowding, and transportation, all of which impose stress on farmed aquatic animals.

Benefits

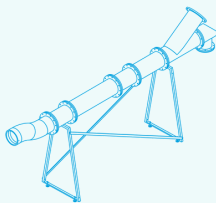

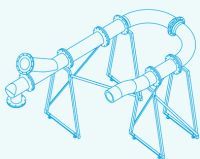

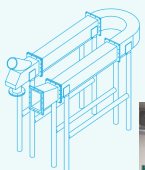

While aquatic animal welfare should be the primary consideration during stunning and slaughter, production benefits can also be observed when additional care is exercised. Precise stunning results in improved flesh quality, reducing the appearance of soft flesh, gaping, bruising and scale loss, in addition to an extended shelf-life relative to conventional harvesting methods where animal welfare is minimally prioritized. It should also be noted that successful stunning can improve working conditions for on-farm staff by reducing the chance of injury at the time of slaughter.

Summary

Featured below are several examples of 'welfare-friendly' stunning and slaughter equipment commercially available for some of the most predominantly farmed species in aquaculture. All stunning and slaughter equipment must be calibrated appropriately for the specific species to be processed in order to achieve immediate and irreversible stun. Therefore, additional research is required to create a more comprehensive stunning and slaughter guide for all globally farmed aquatic species.



Humane Technology Currently Available

Company	Species	Method/ Specifications	Photo	Benefits
Ace Aquatec	Salmon and Trout	In-water electrical stunner.	 	<ul style="list-style-type: none"> Salmon from well boats, pens or tanks are pumped into the A-HSU™, through a de-watering tube, and then into the stunner water, where they lose consciousness immediately. If salmon leaving the stunner are bled promptly, they stay unconscious until death. Can be installed on boats or rafts and land-based processing plants.
Ace Aquatec	Trout	In-water electrical stunner.	 	<ul style="list-style-type: none"> Trout are stunned in water with electricity while they flow through the stun tube. The electric field in the tube makes the fish lose consciousness immediately, without any movement, struggle, or suffering. Can be used at the side of a lake/pond, on a boat or barge, and inside or outside dedicated slaughter facilities.
Ace Aquatec	Tilapia	In-water electrical stunner.	 	<ul style="list-style-type: none"> Fish slide down a chute directly into the stun tube. Electrodes, embedded into the interior of the stun tube, pass an electrical current through the water and the fish. The electrical contact between the fish and water ensures that all fish, irrespective of size, are stunned reliably and without pre-stun shocks. The electric field in the tube is designed to ensure that the fish lose consciousness immediately without any movement, struggling, or suffering.

Tilapia A-HSU™ technical specifications

Fish species and size	Tilapia (up to 1.5kg)
Processing rate	Up to 15 t/hr
Fish entrance method	Fish are delivered by pump, elevator, or conveyor
Power supply	Single or 3-Phase power delivering approx. 30kW
Secure remote access	Ethernet, Wifi or 4G network
Safety systems	<ul style="list-style-type: none"> Multiple passive and active safety systems ensure that in the event of failure or misoperation, operator safety and fish welfare are preserved. To prevent accidental electrical contact, the voltage-carrying electrodes are buried deep inside the HDPE tubes. Earthing and guard electrodes at tube entrances prevent current leakage. Emergency stops, residual current monitoring and stun current monitoring systems shut down the system in the event of error. Contactor and E-Stop function is checked automatically on start-up. Clear operational instructions are provided.

Continued

Company	Species	Method/ Specifications	Photo	Benefits
Ace Aquatec	Prawn	In-water electrical stunner.		<ul style="list-style-type: none"> • Prawns are pumped or brailed into the entrance chute, where they flow directly into the water of the stun tube. • The electric field in the stun tube ensures that they lose consciousness immediately and are maintained in the fields in order to maintain long insensibility after removal from the water. • The whole process takes 40 seconds from start to finish and prawns are never removed from the water.
Ace Aquatec	Seabass and seabream	In-water electrical stunner.		<ul style="list-style-type: none"> • Fish are directly pumped from the sea into the stunner tube through a centrifugal pump. Electrodes embedded into the interior of the stunner pass an electrical current through the water and the fish
Askvik Aqua	Can be adjusted for various species	In-water electrical stunner.		<ul style="list-style-type: none"> • Fish never leave water thereby reducing stress. • Undergoes EEG testing in both test and production facilities by 3rd parties to verify rapid anesthesia according to EU and Norwegian laws.
Baader	Salmon	Combination of percussive stunning and bleeding.		<ul style="list-style-type: none"> • Induces immediate insensibility by administering a severe blow to the skull of the fish. As a result, the fish remains unconscious until death.
Optimar	Salmon and Trout. Additional species upon request.	Semi-dry electrical stunning machine.		<ul style="list-style-type: none"> • Several species have been tested for full unconsciousness using EEG, adhering to EU and Norwegian laws. Additional testing of crustaceans planned.
Optimar	Shrimp and several species of finfish (Salmon (farmed and wild), Trout, Cod, Sea Bass/Bream, Catfish)	Electrical stunner.		<ul style="list-style-type: none"> • In use and validated for more than 15 years on vessels and in onshore processing facilities.
Mitchell & Cooper	Crustaceans (Lobster, crayfish and crab)	Developed as an alternative to traditional methods of killing lobster, crayfish and crab, the Recognized as a humane method of stunning crustaceans ready for cooking.		<ul style="list-style-type: none"> • Crustastun is recognized by a the RSPCA as a humane method of stunning crustaceans ready for cooking.
Shinkei Systems	All finfish species	Automated ike jime (manual spiking) system using computer-vision to process the fish, recognizing different sizes and species.		<ul style="list-style-type: none"> • The automated system helps avoid human error and ensures precision spiking every time. Commands a price premium due to better quality, taste and longer shelf life.

Additional Resources



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Compassion in World Farming, Food Business: Humane Slaughter & Improving Welfare at Slaughter: Atlantic Salmon, Gilthead Sea Bream, European Sea Bass, Rainbow Trout, Pangasius.

These documents provide information on the humane slaughter of the aforementioned species, including:

- An overview of the welfare issues associated with pre-slaughter fasting and handling,
- An overview of the main methods of slaughter in use commercially,
- Recommendations for animal welfare policies and practices,
- Methods to assess welfare at slaughter.

Essere Animali & Animal Ask: Economic Evaluation of Humane Slaughter Methods for Farmed Fish in Italy

This report demonstrates how implementing humane stunning methods for fish at the time of slaughter would have minimal impact on production cost. With a focus on the three most commonly farmed finfish species in Italy: Rainbow Trout, European Sea Bass, and Gilthead Sea Bream, slaughter methods for improving welfare in Italy are identified, production costs and economic feasibility is analyzed, and details of a few manufacturers/suppliers of equipment are listed.

Welfarm: Farmed Fish Slaughter Report FARMED FISH SLAUGHTER METHODS REPORT Recommendations for Rainbow Trout, Atlantic Salmon, European Sea Bass and Gilthead Sea Bream Welfarm.fr.

Welfarm's animal welfare studies department provides a detailed description of different stunning and killing methods' characteristics in terms of animal welfare for Rainbow Trout, Atlantic Salmon, European Sea Bass, and Gilthead Sea Bream. The report is divided into four sections:

- A summary of scientific knowledge related to suffering capacity.
- Legal regulations surrounding farmed fish slaughter and the components that are necessary to deem a slaughter method “humane” are presented.
- Methodology used and the welfare hazards that were considered within the analytical framework. Stunning and killing methods are then described and reviewed.
- Recommendations resulting from the analysis of different stunning and killing methods are presented.