

## **A BASIC INTRODUCTION TO ANESTHETICS**

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The effects of stress on fish during handling for vaccination, tagging, weight sampling and spawning are important considerations in health and production management. Stress on the fish should be minimized so that they can properly recover from the procedure, respond to the vaccine and return to normal feeding and growth as soon as possible. Anesthetics play a large role in reducing stress during any handling.

The anesthetic procedure must be planned and conducted so that minimal additional stress is produced. Stress during anesthesia can come from a number of sources. The main source of stress comes from handling the fish to move them into the anesthetic bath. Fish should be kept off feed for 24 hours before the anesthesia to lower the metabolic rate and to reduce contamination of the water by feces. The water level in the rearing tank should be reduced to a level where it is easy to catch the fish. Adequate oxygen levels should be maintained at all times, using oxygen and diffusers if necessary.

Anesthetics for fish are prescription drugs in Canada. There are currently only two legal approved anesthetics in Canada: TRICAINE-S and AQUACALM. TRICAINE-S (Tricaine-S or MS-222" Syndel) is approved for use in salmonids and is available by prescription from your veterinarian. AQUACALM (Metomidate, Wildlife, Syndel) is approved for use in some non-food fish species.

TRICAINE-S doses must always be determined by observing the response of a small number of fish to the anesthetic. In other words, test a small batch of fish first. The doses given here are for guidance only. TRICAINE-S is usually used at label doses and up to 50 to 80 mg / litre of water. This dose range usually anesthetizes fish in 3 to 4 minutes and results in recovery in 3 to 4 minutes. Always make sure that the fish in the bath are moved along to handling or vaccination and recovery as soon as they reach the appropriate level of anesthesia. Don't let the fish stack up. The dose of TRICAINE-S and the time in the anesthetic bath should be adjusted so that the fish are anesthetized only as much as is necessary for handling and vaccination. At these levels, TRICAINE-S has been proven to be safe in laboratory and field trials.

The anesthetic baths should not be overloaded with fish. The anesthetic dose should be adjusted so that the fish are anesthetized quickly and are moved along smoothly to the handling or vaccination station. If large numbers of fish are placed in the anesthetic, water quality suffers, monitoring the fish for depth of anesthetic is more difficult and the flow of fish to the handlers is not smooth. The accompanying table and graph of doses and induction and recovery times shows the effects of increasing the anesthetic dose.

TRICAINE-S acts on the peripheral nervous system, Afreezing@ the fish, while AQUACALM acts on the central nervous system, causing the fish to be Ahypnotized@ or Asleepy@ while still able to react. They can be used together in some situations to achieve dual anesthesia, a similar idea compared to human anesthesia.

Some fish culturists have had good success with the use of AQUACALM as a sedative in the rearing tank. Once the water level is lowered, AQUACALM is added at 0.1 to 0.3 mg/litre of water. This dose sedates the fish, making them much easier to catch for moving to the anesthetic tank. If AQUACALM is used as a sedative the dose of TRICAINE-S may need to be lowered. A small number of fish should be captured in the net and quickly placed into a nearby anesthetic bath containing TRICAINE-S.

AQUACALM and TRICAINE-S have been used together in grading operations. AQUACALM is often used to calm fish during smolt transfer. Either or both might be used for broodstock handling or fish surgery / tagging.

Stress can also come from the anesthetic bath and the anesthetic itself. It is important that the water in the anesthetic bath be the same temperature as the rearing tank. The water in the bath should be well oxygenated, and should be changed frequently to reduce foaming and mucus build-up and to minimize the amount of debris in the water. Under some water conditions, addition of VIDALIFE may prove beneficial. Fresh anesthetic baths also ensure that the anesthetic dose is maintained. With each batch of fish, TRICAINE-S levels in the anesthetic are reduced. Lower doses of TRICAINE-S in over used baths mean longer times before the fish are anesthetized, resulting in increased stress and prolonged procedure times. Long periods of exposure to UV rays from sunlight can reduce TRICAINE-S levels. Anesthetic totes should be plastic or fibreglass. Metal containers must not be used: they react with tricaine to produce harmful byproducts.

TRICAINE-S decreases the pH of the anesthetic bath, especially in soft freshwater. The amount of the change depends on the water that is used; some water can buffer against pH changes, other water will show large pH changes with TRICAINE-S. Anesthetic baths can be buffered with sodium bicarbonate to maintain a steady pH from the rearing tank, through anesthesia and into recovery. Each water source has unique characteristics, so the amount of sodium bicarbonate to be added must be determined by measuring the pH.

Sodium bicarbonate can be added to the anesthetic bath as a powder or as a stock solution. As a starting rule-of-thumb, adding twice as much sodium bicarbonate as TRICAINE-S should bring most anesthetic solutions back to near normal pH. Alternatively, a saturated sodium bicarbonate solution, which usually contains about 10% sodium bicarbonate, can be added at the rate of about 5 ml to each litre of TRICAINE-S bath solution. Measure the pH of the TRICAINE-S solution, add sodium bicarbonate solution and measure the pH again. If the pH is still lower than the rearing tank pH, add more sodium bicarbonate. Once the amount of sodium bicarbonate needed has been established, the same amount can be added each time the anesthetic bath is changed. Check to confirm that the bath is at the right pH. Never mix the sodium bicarbonate with TRICAINE-S before adding to the anesthetic bath. Add the TRICAINE-S first, then add the sodium bicarbonate separately, do not pre-mix. So: measure the pH before you add the TRICAINE-S (start level). Measure it after you add the TRICAINE-S. Add sodium bicarbonate until you return the pH to the start level, keeping track of how much you added. Note the amount of bicarbonate you need to add with your dose of TRICAINE-S, and how much water you have, to simplify making up the next bath that day. Until you get going, always check the pH before you put the fish in.

Fish should be closely monitored for recovery from anesthesia. The recovery tank should be at the same temperature as the source water, and should be well oxygenated. Care should be taken to prevent immobilized fish from stacking up on the bottom. Within minutes, fish should be swimming in the recovery tank. If recovery time is prolonged, the anesthetic dose should be reduced and/or the amount of time in the anesthetic baths should be reduced.

After anesthesia and handling, the fish should not be disturbed until they have resumed normal feeding. High quality feed should be offered and water quality should be kept at optimal conditions. The point is that you can use anesthetics in combination with good handling procedures to reduce stress in your fish. Fish don't like abrupt changes. When you're moving fish around for grading, vaccinating, etc., try to keep the temperature, oxygen and pH the same through all steps.

Care during handling and anesthetizing fish can assist in making your fish rearing program a success. Please contact us if you require any further information.