

University of Notre Dame IACUC Policy on the Use of Clove Oil for Anesthesia and Euthanasia

Purpose

The IACUC, in consideration of the AVMA Guidelines for the Euthanasia of Animals: 2013 Edition, the Guidelines for the Use of Fishes in Research by the American Fisheries Society, American Institute of Fisheries Research Biologists, and the American Society of Ichthyologists and Herpetologists on the use of Clove Oil as an anesthetic and for euthanasia in the laboratory setting and in field studies.

Use as Anesthetic

The IACUC will review proposed Clove Oil use as an anesthetic on a case by case basis in fish that will not leave the laboratory and will not be used for human or animal food. The efficacy and safety range of Clove Oil varies according to age, size and species of fish in addition to the concentration and purity of the Clove Oil.

Clove Oil has been used at the following concentrations:

- 50 mg/L water for salmon¹
- 1 ml/gallon water for carp²
- 10 mg/L water for trout³

Commonly used and approved anesthetics for fish include⁴:

- Benzocaine – 1 ml stock solution (10g Benzocaine powder dissolved in 100 ml 95% Ethanol) per 1 liter tap water. Immerse to effect.
- MS-222 (Tricainemethanesulfonate) – 1 to 3 g /L tap water buffered to pH 7.0 – 8.0 with sodium bicarbonate (1 – 4 g/L). Immerse to effect
- 2-phenoxyethanol – 0.1 to 0.5 ml/L tap water. Immerse to effect.
- CO₂ from bottled soda water – For immobilization only, immerse to effect.

The IACUC recognizes that Clove Oil has been used as an anesthetic agent in fish. Clove Oil appears to be an effective anesthetic in some fish species,¹ but is not currently approved by the Food and Drug Administration as a fish anesthetic.⁵ Because it has not been approved by the FDA, the 2004 Guidelines for the Use of Fishes in Research states that Clove Oil in any form must not be used on any fish “that could possibly be consumed by humans, even if that treatment occurs in a laboratory setting. This includes endangered species or species that otherwise may be released into public waters where they would be available for human consumption.”⁶

Aqui-S®20E (eugenol) has been granted status as an Investigational New Animal Drug (INAD) by the United States Fish and Wildlife Service in freshwater fish. The use of Aqui-S®20E by organizations participating in the INAD program when they follow the U.S. Fish and Wildlife Service’s Aqui-S®20E Study Protocol will be permitted. Fish anesthetized with Aqui-S®20E may be immediately released provided the exposure time does not exceed 15 minutes.⁸ The Aqui-S®20E anesthetic solution will not be discharged on UNDERC property, but will be removed from the area and disposed according with local, state, and federal disposal regulations and in accordance with the manufacturer’s recommendations.

Use as Euthanasia Agent

Clove oil, isoeugenol, and eugenol are **acceptable** agents of euthanasia for finfish and are **acceptable with conditions** in field situations.

1. It is recommended that, whenever possible, products with standardized, known concentrations of essential oils (85-95% eugenol) be used so that accurate dosing can occur.
2. These agents are **not acceptable** means of euthanasia for animals intended for consumption.
3. Greater concentrations than used for anesthesia will be required for euthanasia.
4. Finfish should be left in the euthanasia solution for a minimum of 10 minutes after cessation of opercular movement.
5. Fish euthanized using Clove oil, isoeugenol or eugenol **MUST** be disposed in a manner that prevents their consumption by other animals or people. They **may not** be dumped back into the water or buried where any animals could scavenge them. These compounds are equivocal or known carcinogens according to the National Toxicology Program. The FDA has expressed concern that the use of clove oil

or its components in finfish may adversely affect human food safety and animal food safety. Because clove oil and its components have not been evaluated for target animal safety, the FDA is also concerned that the use of any of these compounds may adversely affect finfish, including endangered aquatic species.⁷

6. Clove oil solutions may not be disposed of by pouring into bodies of water or into public sewers. All Clove oil solutions must be returned to the laboratory for disposal through Risk Management and Safety.

1. Woody, C. A., J. Nelson, and K. Ramstad. 2002. Clove oil as an anesthetic for adult sockeye salmon: field trials. *Journal of Fish Biology* 60:340-347.
2. Koi Health, 2006, 2007. <http://www.koihealth.org/index.html>
3. Velisek, J., Svobodova, Z., Piackova, V. Effects of Clove Oil Anaesthesia on Rainbow Trout. *ACTA Vet. BRNO* 2005, 74: 139-146
4. UND IACUC Policy Guide for Anesthesia and Analgesia of Laboratory Animals, 2008.
5. U.S. Department of Health and Human Services, Food and Drug Administration, Center for Veterinary Medicine: FDA Guidance 150 Concerns Related to the Use of Clove Oil as an Anesthetic for Fish, April 24, 2007 www.fda.gov/cvm/Guidance/guide150.pdf
6. UFR (Use of Fishes in Research) Committee. 2004. Guidelines for the Use of Fishes in Research. American Fisheries Society, Bethesda, Maryland. pp 38-39.
7. AVMA Guidelines on Euthanasia: 2013 Edition. <https://www.avma.org/KB/Policies/Documents/euthanasia.pdf>
8. U.S. Fish and Wildlife Service Investigational New Animal Drug Program <http://www.fws.gov/fisheries/aadap/inads-available/sedatives/aqui-s/index.html>