

Spicing-up fish anaesthesiology

Clove oil found to be effective fish anaesthetic

by Jenny Tye and Greg Page

The discovery of a cost-effective, reliable and safe fish anaesthetic has long been sought by aquaculturists ...but the search may soon be over, thanks to U of G researchers.

Eugenol — the active ingredient found in clove oil — has been found to be highly effective at immobilizing rainbow trout for farming and research purposes. A study by M.Sc. aquaculture student Joel Keene, Profs. David Noakes and Richard Moccia, and research associates Christine Soto and Alison Holloway, showed that clove oil has a very low toxicity to humans and fish and works quickly to produce a quieting or sedative effect on fish.

And it's easy to use: it's simply added to a bath treatment into which fish are immersed.

If clove oil is approved for use in fish, it boasts many advantages for producers and researchers in the aquaculture industry.

"Aquaculture and fisheries research requires regular handling of fish, which can be stressful. It affects their health and vitality," says Moccia. "So, there's a need to improve the well being of these animals by

using cost-effective anaesthetics."

Anaesthetics are used in the aquaculture industry for a number of reasons, including sedation for transportation, gamete collection, weighing and tagging. However, chemicals currently in use are expensive or don't work consistently between fish species. Some

fish anaesthetics also have human safety and animal welfare concerns. But that's not a problem with clove oil.

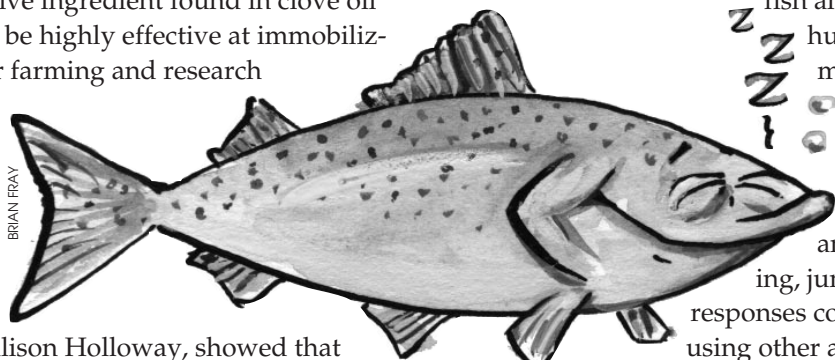
"It doesn't cause any significant darting, jumping, or thrashing responses common to fish when using other anaesthetics," says

Noakes. "Fish just quietly slow down, which means reduced stress and improved animal welfare."

In addition, clove oil is natural and safe. It's already approved for human use as a food additive and as a dentistry anaesthetic. This makes its potential for approval by Health Canada for use as an aquaculture anaesthetic easier than other novell chemical substances. Coupled with the expected low price, clove oil may well become the anaesthetic of choice for aquaculturists and fish researchers.

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BRIAN FRAY



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Bring on the sun

Solar heating works for aquaculture...but is it economical?

by Jenny Tye

Solar energy can increase fish production and be effective for aquaculture, if researchers find that costs are in line.

A two-year joint research effort between the University of Guelph, the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) and CANMET Energy Technology Centre (CETC) shows that economical, unglazed solar collector systems efficiently heat water for fish production without contributing to disease problems.

The research team — Prof. Richard Moccia, Animal and Poultry Science, David Bevan, technician at the Alma Aquaculture Research Station, and Gerald Van Decker, from CETC — are now awaiting an extensive cost-benefit analysis of the system. It's being completed by Prof. Glenn Fox and M.Sc. graduate Brad Rickard, Agricultural Economics and Business.

"We know that solar heating is much less expensive than using fossil fuel to heat water, but whether it has a positive net economic benefit for fish farmers remains to be seen," says Moccia, project leader. "If the system is cost-effective, we want to encourage farmers to adopt the system

... but if the system means producers will lose money, we obviously won't recommend it."

Typically, fish farmers collect water from a local lake, river or groundwater source and route the water into indoor or outdoor fish housing units. But fish growth occurs most productively within a certain temperature range. Growth is enhanced when water temperatures are regulated, providing fish with an optimal living and growing environment. As well, a steady water temperature minimizes pathogen growth, disease and mortality.

If aquaculturists heat their water at all, they do it with fossil fuels like oil, natural gas or propane. In the Alma trials, ground water temperatures were elevated by about

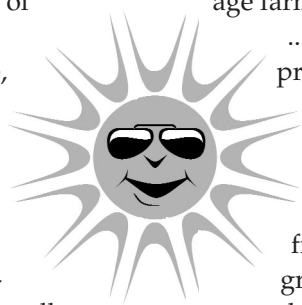
six degrees celsius to the optimal water temperature for fingerling rainbow trout growth. However, the cost can significantly outweigh any profits which may be earned by speedy fish production.

Solar heating was explored by farmers in the past, but solar collector units did not trap energy from the sun efficiently. As well, temperature regulators were very expensive or not designed for the task.

However, technology has increased the collector units' and control devices' efficiency and made them more economical. That prompted the researchers to study if solar heating could increase fish production in a cost-effective manner.

Fish growth trials were conducted on rainbow trout in the summer 1997, winter 1996/1997 and fall 1996. The researchers are now comparing the relative economic benefits of three water heating strategies: stand-alone solar heating that delivers a variable temperature, oil heating at a constant temperature, and no heating. The results will be available soon. CETC has recently promoted the use of solar energy

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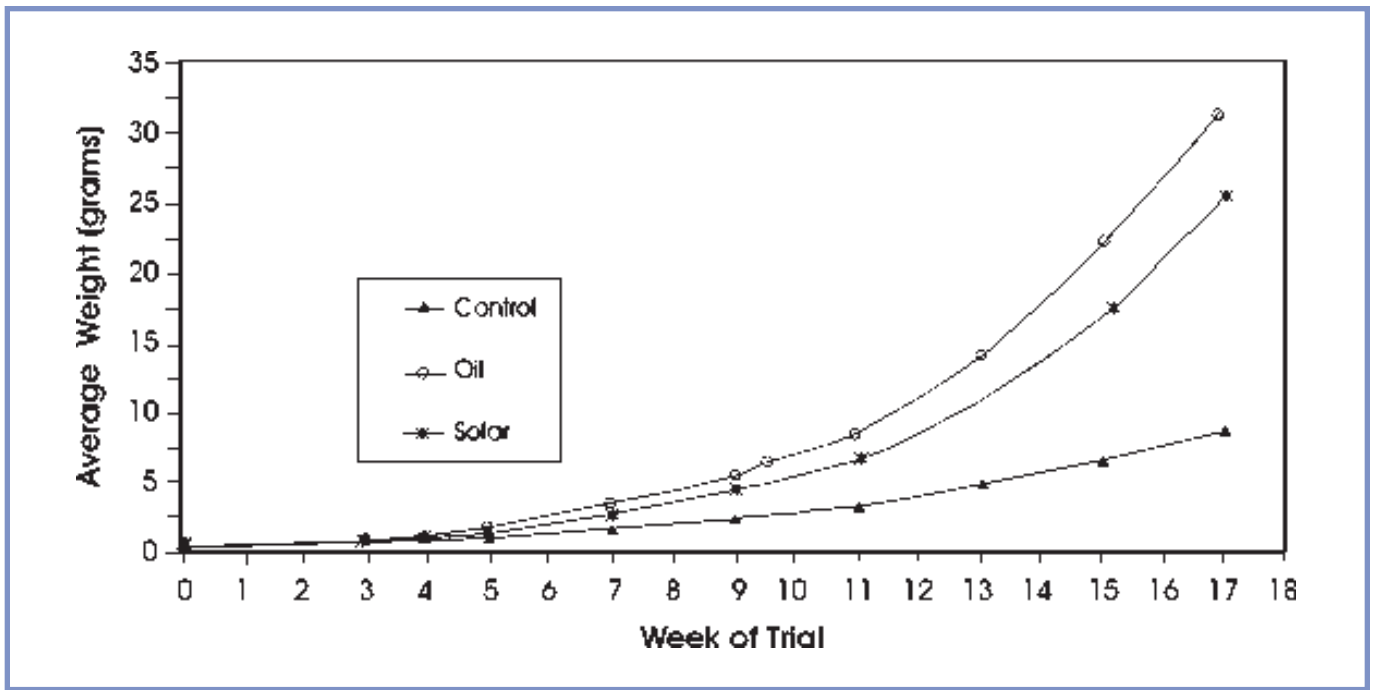
Workshops galore!

The University of Guelph Aquaculture Centre offers workshops on various industry-related topics throughout the year.

Recent workshops include: 'Getting Started in Aquaculture', sessions for novices, and others intended primarily for commercial producers.

The commercial workshops highlight aquaculture education-related topics like use of the Internet, farm and food safety and water chemistry. Check our website for upcoming workshops at:

WWW.aps.uoguelph.ca/~aquacentre.



Although oil is the best way to heat water and increase the growth rate of fish, it's expensive. University of Guelph researchers have found that less-expensive solar heating also works to increase fish growth.

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for aquaculture, encouraging the use of efficient heat capture units, inexpensive electronic control devices and the ability to reuse collected energy.

This fall, a technology transfer

workshop will be held at Alma to let producers know the final results and recommendations from the University of Guelph's solar evaluation study.

"We are excited by the opportunity to expand the usefulness of solar

heating systems into non-conventional industries, such as heating water for Ontario's ever growing aquaculture sector," says Van Decker.

This research was sponsored by OMAFRA and CETC. 

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"We hope that clove oil becomes an approved alternative for fish anaesthesiology because it's cost effective and safe for both fish and farmers," says Moccia.

Full results of this research were recently published in the journal: *Aquaculture Research* (1998, Vol. 29. p89-101).

This research was sponsored by the Ontario Ministry of Agriculture, Food and Rural Affairs.

What makes an ideal fish anaesthetic?

1. Quick induction time
2. Rapid recovery time
3. Nontoxic
4. Safe for fish and humans
5. No persistent effects of residues
6. Rapidly metabolized
7. No cumulative effects
8. Inexpensive



Industry projects at Alma

Several private sector companies have recently sponsored product testing at the Alma Aquaculture Research Station. These include Martin Feed Mills Ltd., Shur-Gain Research, Roche, and Elanco Division of Eli Lilly. The results of these studies help to improve products for the local and national aquaculture industry and make use of the state-of-the-art facilities and expertise found at the Alma Station.

Set the records straight

U of G epidemiologist advocates better record keeping on fish farms

by Kersti Kahar

Improved record keeping should spell higher profits for fish farmers. That's the conclusion of a University of Guelph fish epidemiologist who's spent nearly 10 years working with Ontario aquaculturists.

In 1989, Prof. Meg Thorburn, Population Medicine, began research at the U of G, exploring disease rates and frequency of drug treatment (chemotherapeutics) in Ontario fish farms. As the world's first Ph.D. fish epidemiologist, Thorburn was in a good position to analyze information gathered, and offer advice.

The ultimate aim of this research was to establish the kind of health programs and industry standards that exist in other fields of animal husbandry. Standardized levels of, for example, feed conversion, growth rates and mortality rates, from which fish farmers could evaluate their performance, would benefit producers and consumers alike.

But to do this, it was essential to collect and analyze industry-wide data. That's where the cooperation of local fish farmers came in.



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TRINA KOSIER



Prof. Meg Thorburn says that better record keeping could lead to higher profits on fish farms.

"For our initial survey, we obtained a lot of useful, descriptive information," says Thorburn. "Generally speaking, in Ontario we're using chemotherapeutic agents responsibly, and not very often at all. We have fairly healthy fish."

However, there was a lot of variability between farms. Thorburn found that some farms relied heavily on

"Generally speaking, in Ontario we're using chemotherapeutic agents responsibly, and not very often at all."

chemotherapeutics, either as a preventative strategy or because their fish populations were more affected by disease. Other farms — particularly smaller operations, or those run by more experienced farmers — were less likely to use chemotherapeutics on their fish.

To get detailed information, Thorburn and her team worked intensively with 20 fish farms in Ontario over a full production cycle of 18 months. The findings demonstrated there's room for improvement in the way fish farmers keep records on their fish populations. Without consistent information about population size, feed conversion, growth rates, mortality rates and other vital statistics from individual farms, it's difficult for the researchers to establish province-wide standards.

However, even with good records, Thorburn says the difficulty with conducting epidemiological studies on land-based fish farms is that the dynamic population makes for extremely complicated data collection and analysis.

But there's hope for future researchers. As fish farmers improve their record keeping, researchers will be in a better position to help establish industry standards. This in turn will mean consistent quality for consumers and improved profits for producers.

This research was sponsored by the Ontario Ministry of Agriculture, Food and Rural Affairs.