

Aquataalk

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Aquaculture industry takes omega-3s to heart

Fish is being recognized as a 'heart-smart' food

BY CHRISTINA CLARK

Ontario rainbow trout isn't just rich in taste ... it's also a valuable source of 'good fats' that have been shown to improve cardiovascular health.

U of G nutritional science professor Bruce Holub says consuming docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) — omega-3 fatty acids found in many fish, including rainbow trout, Ontario's number one aquaculture species — have special properties that promote better heart health.

"There's growing evidence that a significant number of health problems in North America could be delayed or better controlled by the increased consumption of omega-3 fatty acids," says Holub. "And the sources of these nutrients are right here at our door."

Fish is the best natural source of omega-3s. In fact, Holub found that consuming the equivalent of up to five servings of rainbow trout per week can reduce blood triglycerides by an impressive 35 per cent, helping to stave



Gregor and Sheri Reid sit down to enjoy heart-healthy and great tasting grilled Ontario trout.

off one of the important risk factors for heart disease and heart attack.

DHA and EPA boast a number of other heart-smart properties:

- they make the blood more fluid;
- omega-3s reduce the "stickiness" of circulating blood platelets in arteries, a phenomenon involved in heart attacks;
- new research suggests that omega-3s exhibit an anti-arrhythmic effect in the heart — a heartbeat regulating

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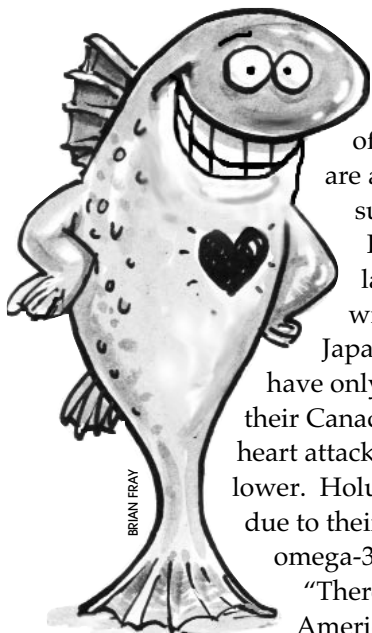
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effect that can protect against sudden cardiac death and enhances survivability from a heart attack.



It's no secret that farm-grade rainbow trout has a high nutrient value. But according to Holub, you could even say it's brain food. Besides reducing the risk of cardiovascular disease, DHA and EPA are also crucial for important brain functions such as learning, memory and visual acuity. Human populations that make fish a regular part of their diet appear to be rewarded with better heart health. For example, Japanese men between the ages of 45 and 54 have only slightly lower cholesterol levels than their Canadian counterparts, but the incidence of heart attack in these Japanese men is many times lower. Holub believes the difference could be partly due to their higher intake of fish, which is high in omega-3s.

"There is evidence suggesting that we North Americans underconsume fish," he says. "Two to three fish dishes per week have been found to lower the risk of death from heart disease and heart attacks."

Ontario's aquaculture industry stands to gain by taking Holub's message to heart. As Canadians become more health-conscious, they need to be made aware of the valuable nutritional attributes of quality aquaculture products. By exploiting the mounting health benefits of farm-grade rainbow trout, the fish-farming industry could see an important increase in the consumption of Ontario aquaculture products. Good news for the provincial aquaculture industry.

Holub's omega-3 research is being supported by the Heart and Stroke Foundation of Ontario and the Ontario Ministry of Agriculture, Food and Rural Affairs.



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Safety Issues

The Aquaculture Centre and the Farm Safety Association recently co-sponsored a workshop called Health and Safety in Aquaculture. This day-long program addressed a multitude of aquaculture safety issues relating to the use of pharmaceuticals, electricity, tractors and compressed gases. The program also covered basic Workplace Hazardous Materials Information System (WHMIS) employee training, farm-safety audits and relevant legislation affecting the aquaculture workplace. For questions concerning health and safety in aquaculture, contact the Aquaculture Centre or the nearest safety association office.

What's New?

Don't forget to check our Aquacentre website for regular updates on up-coming workshops and conferences, interesting seminars, new research projects and publications, aquaculture jobs and more. Regularly visit the 'What's New' section at www.aps.uoguelph.ca/~aquacentre.



The best of the in-betweens

Researchers fish for new lines of rainbow trout

BY ANDRES KAHAR

Easier year-round production of rainbow trout and economic savings could be the outcome of some in-depth breeding research that's being carried out at the Alma Aquaculture Research Station.

Spring spawning and fast growth is a rare combination in Ontario's domestic, farm-raised rainbow trout. But, it's a combination that could result in improved product marketing for fish farmers. Since 1994, Prof. Ian McMillan, U of G research associate Dr. Laura McKay and graduate student Cheryl Quinton, Centre for the Genetic Improvement of Livestock, have been trying to link

spring-spawning and fast growth traits from three different rainbow trout

lines, to create a genetically superior fish. They're applying a routine animal breeding technique to the rainbow trout gene pool. "After crossing the three original lines, our task is to closely evaluate the resulting genetic traits and genetic variations in the progeny and develop an ideal long-term breeding strategy to get to our goal," says McMillan.

The main objective of their plan is to develop a spring-spawning line of rainbow trout that can supply farmers with fresh stocks in the spring, to complement those lines that spawn in the autumn season. Fast growth in these fish would be an added benefit, allowing farmers to get their fish to market size and weight as quickly as possible.

The alternative is to develop a female line with acceptable growth that spawns in the spring. This line would then be crossed with a fast-growing male line to produce the ideal market product.



Graduate student Cheryl Quinton and colleagues, Centre for the Genetic Improvement of Livestock, are working to link spring spawning traits with fast growth traits in Ontario rainbow trout.

The project also aims to develop a model for fish farmers that will allow them to predict the performance of rainbow trout stocks. Better predictions make for better management and marketing strategies.


The team is evaluating observable performance traits of each new trout line — such as viable egg production.

They found the second generation fish that they've bred so far have the desired spring spawning traits, but still exhibit poor growth rates. However, by crossing two of these lines, to create third and fourth generation lines, the progeny will possess spawning and growing traits in forms that are (genetically speaking) somewhere in between that of their parents.

McMillan and his team are looking for the best of the 'in-betweens' — those elusive synthetic lines that are the best compromise between spring-spawners and fast-growers. With every new generation they create, they'll cross out the less favourable traits, until they arrive at their goal: the perfect rainbow trout.

But this takes time. The researchers will be ready with the third generation progeny this year. The fourth generation will be produced by 2001, and then will be tested for genetic improvements.

"We think the wait is worthwhile," says McMillan. "When the new line is ready, it'll bring economic benefits to the aquaculture industry. Producers will be able to more effectively use their facilities year round, enabling more profitable, continuous product marketing."

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

Fish could get a longer life... on the shelf

Controlling oxidation could increase fish shelf life

BY: CHRISTINA CLARK

North Americans have been eating more fish over the last few decades, and the aquaculture industry would like to see that trend continue. But as fresh fish products age on store shelves, 'off' odours and flavours arise that can discourage consumers from future purchases.

To keep the industry competitive, University of Guelph researchers are trying to increase the shelf life of fresh fish products. Professors Yukio Kakuda and Richard Moccia and graduate student Katherine Tozer are studying the factors involved in initiating a chemical reaction called oxidation, which leads to changes in both odour and flavour that can decrease product palatability.

CONSUMERS: KEEP THEM COMING BACK

"We hope to increase the shelf life of fresh fish products by up to several days," says Moccia. "Significantly extending the shelf life and quality of aquaculture products will keep consumers coming back, and eventually increase the per capita consumption of fish."

Fish contains a relatively high amount of unsaturated fatty acids (a type of lipid) that are particularly susceptible to oxidation. By studying oxidation reactions in fresh fish, the researchers eventually hope to develop procedures that will inhibit or slow down this degradative reaction.

"Determining the extent of post-processing lipid oxidation is one of the goals of this project," says Kakuda. "This information will tell us how significant lipid oxidation is in limiting the shelf life of fresh fillets and other fish products."

GAINING A GREATER SHARE OF THE MARKET

In most cases, fresh fish products become unpalatable before they're unfit for consumption. But there's a pivotal point where the 'off' flavours and textural changes caused by oxidation decrease the products' appeal, even though they're still safe to eat. For the fish industry, it's a major obstacle to gaining a greater share of the meat market.



MARTIN SCHWABE

Professor Yukio Kakuda and graduate student Katherine Tozer are studying the factors involved in a chemical reaction called oxidation. Kakuda says that controlling oxidation might increase fish shelf life by preventing 'off' odours and flavours in fresh fish products.

To understand the extent and progression of oxidation, the researchers will study fresh fillets from three popular aquaculture species — rainbow trout, arctic char and tilapia — as well as deboned trout meat. The fillets will be placed in plastic packages and stored at 0 to -4 degrees C for 20 days. The researchers will then compare the extent and progression of oxidation in the different products, and design ways of slowing the process. For example, the researchers predict that antioxidants could be used to slow down the reactions, and changes to post-processing procedures could decrease the rate of oxidation.

CHALLENGES TO FISH FRESHNESS

Under optimal store display conditions, fresh fish products have a shelf life of only a few days, which is significantly shorter than for other fresh meat commodities. In addition, fish meat is more susceptible to changes in storage temperatures that don't affect other meats as quickly. This makes the marketing of Ontario's high-quality aquaculture products a challenge, and directly affects the long-term competitiveness of this industry.

Moccia says extending the shelf life of fresh fish will greatly benefit the aquaculture industry, both by aiding market expansion and enhancing customer satisfaction. Together, these could help to increase consumer demand for fresh fish even further.

This research is sponsored by the University of Guelph/OMAFRA Agri-Food and Rural Research Program.

