

AQUATAALK

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The white stuff

Pigmenting Arctic charr is unnecessary, say U of G researchers.

BY KERSTI KAHAR

Consumers are more concerned with the taste and freshness of a fish than they are with its flesh colour...and that could spell big savings for fish farmers.

Pauline Chan, M.Sc. aquaculture graduate, studied consumer awareness of Arctic charr, paying special attention to the consumers' knowledge of this new farmed species' flesh colour. Along with advisor Prof. Richard Moccia, Department of Animal and Poultry Science, Chan conducted more than 500 personal interviews with seafood shoppers at retail grocery stores in the Guelph area.

Her conclusion: even though red is the "in" shade for fish flesh right now in certain farmed-fish species like trout and salmon, colour is the least important criterion for consumers choosing a new fish like Arctic charr. Taste and freshness top the list of consumer's preferences.

For fish farmers who spend significant money purchasing pigmented feed to achieve a pink or red flesh colour in their stock, this is valuable news, and will



help reduce the cost of Arctic charr production.

"Arctic charr is still not a very well known fish species in the Ontario market, so consumer awareness of its natural flesh colour is very low," Chan wrote in her study. "Therefore, the potential for marketing non-pigmented, farm-raised Arctic charr in Ontario does exist."

Arctic charr has a mild salmon-like flavour and firm meat texture. In the wild, its flesh colour varies from pale yellow to pink to fire red, due to its diet of crustaceans

and other organisms that contain natural carotenoid pigments. But farm-raised Arctic charr fed cheaper, non-pigmented diets are more likely to have white flesh. This means producers must add costly pigment to the fish feed to obtain a pink or red flesh colour that more closely resembles a wild fish, or the farmed salmon or trout that's typically purchased.

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However, there are problems. Adding pigment to the feed can cause inconsistent flesh colour between fish, often downgrading its value at the processing plant. This creates quality assurance problems. Moreover, the cost of pigments add at least 15 per cent to the price of feed, significantly increasing the cost of production.

Producers must use the pigment in salmon and trout, because market acceptability is higher for dark red meat in these species. But this doesn't appear to be true for Arctic charr. According to Chan and Moccia, public awareness of this fish species is relatively low, so consumers have few expectations about the flesh colour of Arctic charr. This means the industry is in a position to define those expectations in a way that permits lower production costs.

"Few consumers know whether Arctic charr flesh is supposed to be white or pink or red, so they won't be surprised if we sell it as a 'pigment-free' product," says Moccia. "We think it's better to start selling charr as a white-fleshed product so that the industry doesn't have to shift the product's identity midstream."

In addition, the name Arctic charr is naturally associated with cold, clean and snow-white images, which may allow white flesh to be a natural marketing advantage. Some consumers have already taken the white-flesh versus pink-flesh challenge.

"At least two processors in Ontario are selling non-pigmented and pigmented charr for the same price, and report positive consumer response to the white-fleshed product," says Moccia. "Farmers raising white-fleshed fish will be making a higher profit margin because their production costs are lower."

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



An important and valuable species

Arctic charr is native to the Arctic waters of Canada, Greenland, Iceland, Scandinavia and the former Soviet Union. It has emerged as an important and viable alternative species for commercial aquaculture production for a number of reasons:

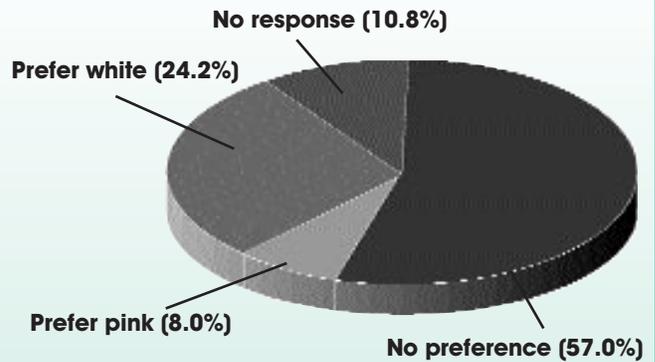
- It can grow in water that's colder than that required for a number of other salmonid species;
- Demand for Arctic charr exceeds existing supply; and
- Canadian consumers seem willing to pay top dollar for Arctic charr.

Specialty topic workshops coming



The Aquaculture Extension Centre is developing a new series of specialty topic workshops. Upcoming sessions will enhance and inform the Ontario aquaculture industry in such areas as reproduction and breeding systems, advanced recirculation

Beauty is not skin deep!



When making a decision to purchase an unfamiliar fish variety, 92 per cent of respondents prefer Arctic charr to be white-fleshed, or have no preference.

An issue of preference

Issue	Ranking*
Taste	6.6
Freshness	6.5
Smell	5.6
Boniness	5.3
Texture	5.0
Price	4.8
Flesh colour	3.9

*1 = not very important
7 = very important

When buying a new fish variety, flesh colour is the least important issue, while taste and freshness are the most important traits to consumers.

Mapping the future of aquaculture

By JOSEPH BRIANTE

Accurate DNA maps — navigational guides for geneticists — will help take the guesswork out of fish breeding programs and increase aquaculture profits, say University of Guelph zoologists.

Profs. Roy Danzmann, Moira Ferguson and Terri Crease, and post-doctoral fellow Takashi Sakamoto, Zoology, are using tools — called microsatellite markers — to identify and tag specific rainbow trout genes.

Rainbow trout is the most commonly cultured inland fish species in Ontario. By identifying and marking the genes for traits that are economically important, producers can selectively breed for characteristics such as disease resistance, maturation timing, spawning time, growth rate and temperature tolerance.

The team is part of an international research initiative hoping to completely map the DNA of several salmonid species that have an economic significance in the aquaculture industry — Atlantic salmon, Arctic charr, brown trout and rainbow trout.

During ongoing research at the Rainbow Springs Trout Hatchery in Thamesford, ON, and at the Alma Aquaculture Research Station (AARS), the researchers identified and marked the genes for 100 heritable traits.

“We’ve placed 100 microsatellite markers on the genome of rainbow trout,” says Danzmann. “And we hope to identify and mark about 200 more places on this species’ DNA by the time our research is complete. Hopefully this will give us evenly spaced markers along all the chromosomes in each species.”

Microsatellite markers are little pieces of DNA that have been amplified. These markers act as “internal genetic tags.”

Researchers use these genetic tags to identify the location of specific genes of interest in fish DNA — for example, the gene or genes that lead to faster growth. Then, the researchers can easily choose two fish with the same genetic potential and breed them. This accelerates the rate of domestication that might otherwise take several generations using conventional breeding strategies. DNA mapping will offer many benefits to aquaculturists when the project concludes.

Besides breeding for economically important traits in fish, genetic markers will also allow producers and researchers to analyse fish pedigrees (family trees). Fish produce a high number of offspring and it’s virtually impossible to trace individual fish back to their parents. But microsatellite markers will eliminate this problem, says Danzmann.

CHRISTINE COWAN



Zoology Prof. Roy Danzmann and post doctoral fellow Takashi Sakamoto are using special tools, called microsatellite markers, to develop accurate DNA maps that will help take the guess work out of fish breeding programs.

Accurate pedigree analysis of fish will also reduce the incidence of inbreeding. Danzmann is confident this genetic research will benefit fish production by giving farmers and geneticists more control when breeding for economically important traits.

“We’re now more aware of the benefits of molecular genetics for doing selective breeding,” says Danzmann. “And by understanding how genes interact to produce certain characteristics in fish, we can improve breeding techniques and produce fish more quickly, with traits that will improve aquaculture economically.”

This research is sponsored by a Natural Sciences and Engineering Research Council strategic grant and the Ontario Ministry of Agriculture, Food and Rural Affairs.



Building partnerships

Industry-gear research and education welcomed at Alma Aquaculture Research Station

By SUSAN CONNELLY

There's a welcome sign on the front gate of the Alma Aquaculture Research Station (AARS): it reads "Open for business!"

AARS is branching out its services to industry, educational institutions and researchers.

Prof. Richard Moccia, director of the AARS and a University of Guelph researcher, is inviting the business sector to come to AARS for its aquaculture needs.

"This is a win-win arrangement," says Moccia. "Alma's resources and its staff's expertise are unique in Canada. Companies and educational institutions can benefit substantially from using this high-quality facility for their research."

Projects that are conducted collaboratively with industries have been diverse and geared towards application on fish farms.

Examples include:

- A study to determine alternate protein sources for fish feed.
- An evaluation of a solar water heating system for fish farmers.
- A project to develop feed additives to enhance fish growth.
- Evaluation of newer, stable forms of vitamin C.
- Evaluation of pigment additives.
- Advanced training programs for fisheries professionals.

Government and industries work with AARS for employee training. The station also conducts work-training programs for high schools and community colleges, such as the Wellington County Co-operative Education Program. This is where senior high school students work for up to eight months developing technical and social skills in a work environment.

Any type of research project that satisfies AARS's mandate — that is, to further the research development of technology for aquaculture — can be conducted at the station. Each project is negotiated on a case-by-case basis. Research can include open access projects where the results are public, proprietary projects where the sponsoring industry has sole access to the research results, and projects that are combinations of the two.

"AARS offers invaluable resources to the aquaculture industry," says Moccia. "We're encouraging the business sector to take advantage

of this resource, and of the expertise and skills of university staff and faculty."

To conduct research at AARS, contact (519) 824-4120 ext. 6216.



BRIAN FRAY



Web Crawling!

The Aquaculture Extension Centre has established its own website. You can access the latest publications and fact-sheets produced by the Centre, as well as find out about the numerous educational and research programs offered there. There's also information about aquaculture workshops and seminar programs and a link to other fisheries and aquatic groups at the University of Guelph. Log on and let us know what you think. The address is: <http://www.aps.uoguelph.ca/~aquacentre>.



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