Enhancement, Early-rearing & Recirculation for Better Profits.

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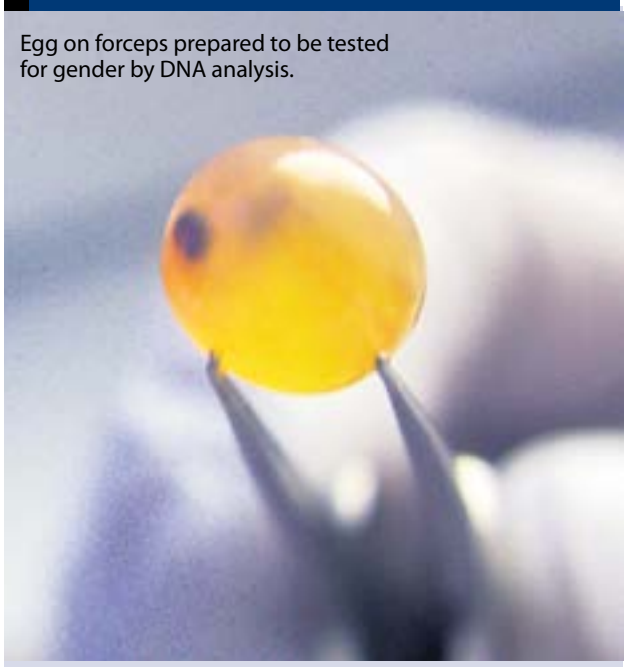
GENETICS



Egg on forceps prepared to be tested for gender by DNA analysis.

Genetic markers give salmon a 6% yield boost

University spin-off company hopes for similar results with trout and tilapia

BY COLIN LEY

Salmon fillet yield improvements of up to 6% have been achieved through the use of genetic markers say the founders of a new spin-off company from St Andrews University in Scotland.

They're now working to secure similar benefits in relation to rainbow trout and Nile tilapia, building on their salmon sector success, which has already earned them a licensing deal with Salmobreed in Europe and the prospect of an early entry into the Chilean market.

The new company, called Xelect Ltd., was launched in February this year by Ian Johnston, professor of physiology at St Andrews University, and Dr Tom Ashton, who obtained a PhD at St Andrews in 2011.

"Using our best two genetic markers, across all the salmon populations we examined, showed an average increase in fillet yield of about 3%, compared with unselected fish," professor Johnston told *Hatchery International*. "However, in some strains we achieved up to 6% which is clearly a massive advance.

"When we started work on this, we were told that 1% would be good, and 2% impressive, so to reach 6% is amazing and worth a lot of money to producers."

The company has currently developed genetic

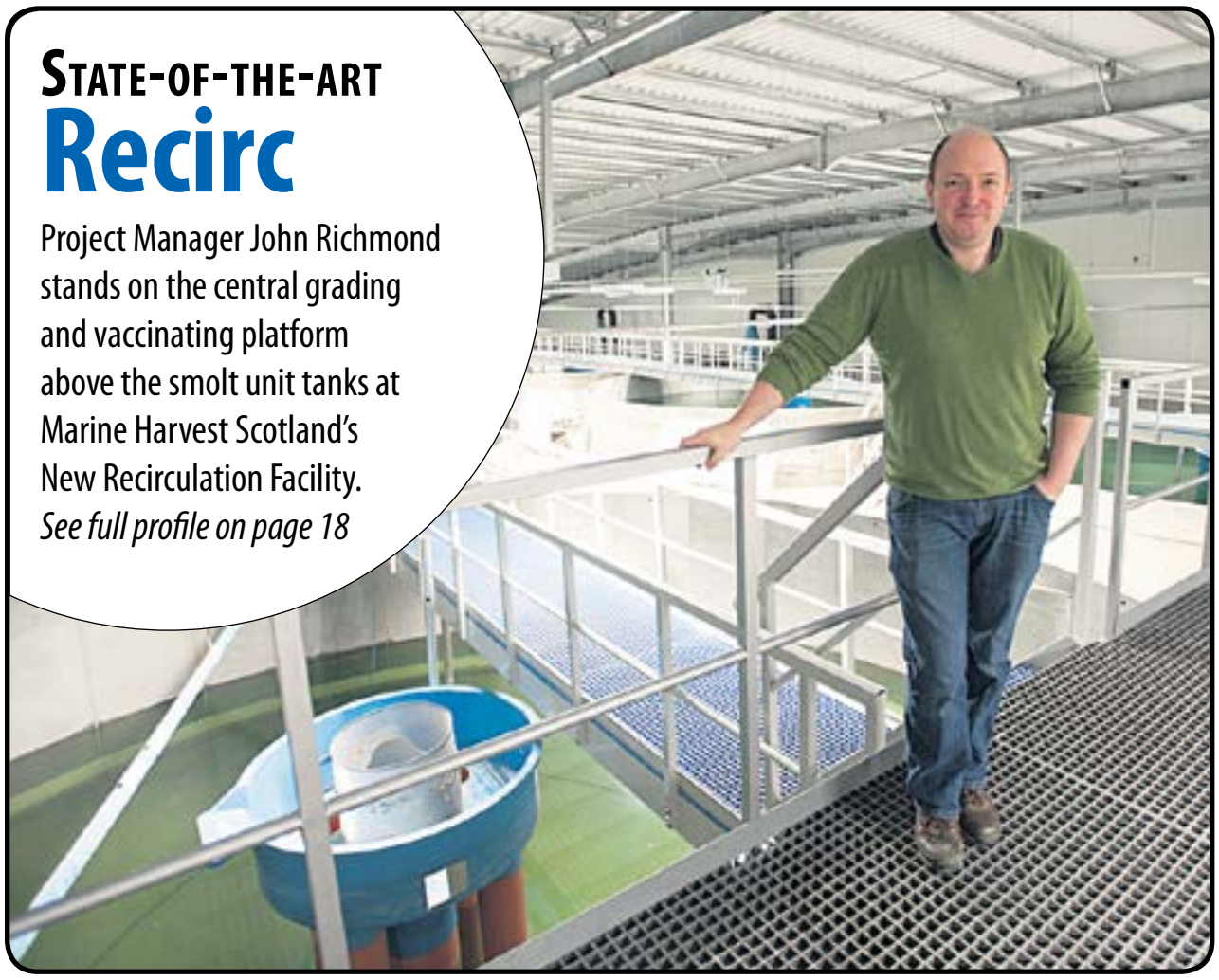
continued on page 7

STATE-OF-THE-ART

Recirc

Project Manager John Richmond stands on the central grading and vaccinating platform above the smolt unit tanks at Marine Harvest Scotland's New Recirculation Facility.

See full profile on page 18



INNOVATIONS

New bioreactor transforms algal production

Canadian inventors look first to shellfish hatcheries, but larval finfish opportunities not far behind….

BY KT PIRQUET

April 2013 marked the commercial debut of an innovative, new-generation algal production system from Industrial Plankton, Inc. of Victoria, British Columbia, in Canada.

The fully automated unit, a compact 4'x4'x7' high, will culture 1000L of "clean" algae from a 20L culture in about a week, automatically adjusting light levels and nutrients, filtering and UV-sterilizing the water, and periodically harvesting at set cell densities, all the while conserving energy by optimizing light levels for changing culture densities. The units even pressure-wash and sterilize themselves, becoming ready to reboot in about an hour.

Robert and Ashley Roulston set up one of their Industrial Plankton Algae Bioreactor units for a test run. The self-contained unit will produce 1000L of algal suspension to a pre-set cell density in about a week, using either batch or continuous culture. And it's self-cleaning!

According to company co-founder, Robert Roulston, who engineered and developed the technology, the IP bioreactor can accommodate continuous or batch production and will produce set densities of algae using an automated, gradual scale-up of water and nutrients as the culture grows. A unique, corrugated growth chamber doubles the surface area of light exposure, allowing cultures to achieve greater cell densities before self-shading begins to inhibit growth.

continued on page 8

COVER

New bioreactor transforms algal production

continued from cover

Hybrid T5 full-spectrum fluorescent plus red/blue LED lighting provides an efficient, evenly-spaced, high intensity light source with an optimum spectral composition for photosynthesis, along with automatic feedback to prevent photo-inhibition. The lighting and most other components of the system can be set or adjusted manually at any time to match species' requirements, harvesting needs and desired culture densities, Roulston adds.

Many of the components of the new system have been designed and fabricated in-house at the firm's location at the Marine Technology Centre, a small industrial park near the Victoria International Airport in Sidney, BC, and Roulston has numerous patents pending. These include a custom-built optical sensing system that monitors algal densities and cues the addition of water and nutrients, or harvesting, as required to keep the algae in the log phase of growth to maximize overall yield.

Another innovation filters and UV sterilizes water (fresh or saltwater) and nutrient mixtures on entry. Inoculant cultures are injected pneumatically from flasks or carbuoys, and the unit has an integral, magnetic stirring device to ensure uniform distribution of cells and nutrients.

Light, temperature, harvest densities and even CO_2 injection are all under computerized, touchscreen control, which allows fine-tuning for different species of algae, and flexibility around shellfish production requirements. The unit operates on a standard 15A, 120 Volt AC current.

Robert Roulston demonstrates touch-screen controls on his new algae production unit. Operations can be fully pre-programmed or adjusted manually, and even monitored remotely via internet connection with a computer or cell phone.

"The unit can be reprogrammed remotely via an internet link to a computer or cellphone," says Robert, "including alarms and set-up parameters."

"For shellfish seed producers, up to 40% of operating cost is tied up in algal feed production. We knew this was an area where our technology could really improve the economics of the shellfish industry worldwide," says IP co-founder Ashley Roulston, "and the costs associated with greenwater for feeding larval fish alone can run $30,000 a year in a big hatchery. "Are we thinking finfish, too, down the road?" asks Robert. "In short, yes! And we will probably work out a smaller unit for aquarium fish, too." Currently, Industrial Plankton algae bioreactors are leased out at $5,000 a year each.

Ashley and her brother, Robert, have made full use of their training, commitment to sustainable aquaculture and entrepreneurship. Early on, Ashley co-founded Roulstonite Industries, an industrial design firm. Initially, the siblings focused on developing a new system for breeding and rearing aquarium fish (Reef Safe Fish, Inc.), which then led to an adaptation for a closed-loop system that recycles fish waste nutrients into plankton-based fish food.

This won them a 2011 BC Innovation Council Regional New Ventures Competition award. The award, plus some NSERC (Canadian science and engineering research grant) funding along the way, enabled Robert to produce the prototype and first commercial models of an even more sophisticated adaptation of the technology, the algae bioreactor, while Ashley continued to look after business development, networking, funding and marketing.

With the first two units in place at Nova Harvest, Inc, a geoduck clam hatchery located on the west coast of Vancouver Island at Bamfield, BC, Ashley and Robert Roulston are now seeking investors, planning a mid-summer expansion of their fabrication facility, and considering future offshoot versions of the technology.

"This is what happens when you obsess on something for three years straight," laughs Robert.

For further information, Industrial Plankton, Inc. can be contacted through their website: www.industrialplankton.com.