



# Feeding the World Fish

*Over the next 50 years, the world is expected to consume more food than has been produced over the last 10,000 years combined. The challenge will be to feed more people, while satisfying changing dietary requirements, without depleting the earth's finite resources.*

**Even by 2050 the world will require at least another 100 million tonnes of aquatic animal food annually, which aquaculture will have to provide. That means that yearly food production in the developing world will need to increase by almost 60 per cent to meet demand.**

One Australian company stepping up to the challenge is Mainstream Aquaculture. With a mission to become the world's leading provider of recirculating aquaculture food products, Mainstream is producing premium barramundi grown in pristine spring water extracted from geothermal basins well below the earth's surface.

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Mainstream's facilities are supported by an advanced selective breeding programme conducted in the world's largest barramundi hatchery – opened last year in Melbourne and currently the only one in the world producing fingerlings throughout the year. This programme underpins Mainstream's production process by supplying high quality juvenile barramundi that grow rapidly, are resistant to disease, and which deliver high fillet yields.

Initially established as a risk management tool to reduce the likelihood of the company being unable to access high quality fingerlings, the hatchery has become a profitable ancillary business in its own right. Fingerling sales are substantially ahead of expectations.



*The hatchery*



*CEO Boris Musa*



Having already invested more than \$5 million on research and development over the past five years, Mainstream recently increased its budget commitment to \$2 million per annum to boost development in selective breeding.

"We are now extremely confident that every month when we need to access a new batch of fish to run through our production system we will be able to obtain the requisite number of fish, and that those fish are going to be of exceptionally high standard," says Mainstream Aquaculture CEO Boris Musa.

"In effect, what we have is an assembly line with a biological output, and an assembly line doesn't work if you don't have a consistent supply of high quality raw materials. In the past, the availability of fingerlings was a major constraint for the business, so the hatchery was originally developed to support the commercialisation of our production assets. It has become apparent that the constraints that we faced also affect a number of our industry peers. As a consequence, we're finding it quite easy to engage in business development around our hatchery output.

"I think it's realistic from this vantage point to say that in the next five to seven years, the business here at Mainstream will be able to sell everything it has the capacity to produce from the hatchery. Significant sales will be made into international

markets, creating export revenue for our business and for Victoria. If we sell all the fingerlings we produce from the new hatchery, based on current industry size one in two barramundi consumed globally will have originated from our new hatchery in Melbourne."

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Since the hatchery opening Mainstream has rapidly become the largest barramundi fingerling producer in Australia, with some of its product being sold to another grant recipient, Urban Ecological Systems. Mainstream distributes its food fish into premium retailers and restaurants around Australia and exports juvenile barramundi to 17 countries across five continents.

Aquaculture is the fastest growing animal food producing sector in the world. It is providing for the increasing consumer demand for fish based products and serves to protect wild fisheries. Over the past 30 years, largely overexploited and fully exploited wild fisheries haven't

produced an increased volume of fish products. Aquaculture has offset this decline in natural fisheries by adding over 50 million tonne of annual production capacity over this period.

Surveys show in Australia, barramundi is the most popular fish for consumption at home and dining out, ahead of salmon and tuna. However, it is not available to the consumer consistently at the same volumes and price. Through over a decade of successful research and development, Mainstream Aquaculture has developed proprietary technology that is unique in enabling continuous (year round) high quality production of barramundi at scale. The company is a top 10 domestic producer of barramundi.

"Recirculating aquaculture is sustainable aquaculture," Musa says. "Mainstream Aquaculture does not discharge any waste directly into the environment and uses a renewable geothermal aquifer to provide water and heating for our plant."

He says Mainstream uses significantly less water than conventional aquaculture systems and its recirculating aquaculture system can produce a significant volume of fish on a limited land footprint. Mainstream can harvest 15 tonne of premium barramundi per year from a 25 square metre footprint, about the size of a typical suburban living room.





Musa says aquaculture is a far more complicated business than would appear at face value. The company has pioneered many aspects of its business, from recirculating technology, fish husbandry, selective breeding and the movement of fish through the facility.

“There has been no precedent to all these parameters so we have had to develop systems and processes. There are learnings that we hope we will get the opportunity to express in our new facility, planned in the short term. New technology will be more and more efficient and more and more profitable.”

Musa says receipt of an Australian Government grant was a “pivotal moment” for Mainstream.

“We had secured some external funding but we had not been successful in obtaining the amount required to execute on our commercialisation strategy. We received a level of funding from the Government that allowed us to execute the strategy in its entirety. The centrepiece for that was the development and successful commissioning of the hatchery, which has now been executed.

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“We are now in a position where we have a profitable enterprise — the business has gone from being a successful research and development organisation to a fully-fledged commercial operation. What we’re doing here has enormous potential for growth — we have aquaculture technology that can be transplanted successfully anywhere in the world. And we have a significant position in a species that I think is going to be a dominant consumer product on supermarket shelves in the decades to come.”

Musa describes Commercialisation Adviser David MacInness as “an exceptional operator who provided fantastic support” for Mainstream throughout the process.

“And as I communicated at our hatchery opening, the collaboration with the Department of Industry hasn’t simply been a capital-focussed partnership, we’ve also been able to leverage the Entrepreneurs’ Infrastructure Programme network and David is part of that network. He’s been a successful businessman and Chief Executive. I’ve derived a lot of insight from spending time with him and couldn’t be more effusive in singing his praises.

“In fact, all of the people I’ve had the pleasure of interacting with at the Department of Industry have added value along the way. We’re very grateful and hope it’s a long-standing partnership,” Musa says.

[www.mainstreamaquaculture.com](http://www.mainstreamaquaculture.com)

## Balancing the Scales

Mainstream Aquaculture customer and fellow grant recipient Urban Ecological Systems Australia is commercialising a polyculture food production system. With sites close to urban and periurban centres, the system is designed to have a low waste and energy footprint.

The NSW-based company used an Australian Government grant to co-fund a minimum commercial module pilot facility located on a green field site at Cobbitty, featuring integrated aquaculture and organic horticulture process systems. The system recycles water from the barramundi tanks, transforming biological waste into nutrients for herbs.

The facility secured a five-year contract with Coles Fresh for the supply of fresh produce following plant commissioning in 2013. Barramundi fingerlings are grown out for various retail and restaurant market segments into the local Sydney market.

“Our Commercialisation Adviser, John Grew, advised me at the commencement of the project that commissioning and process optimisation would take as long as the build, and that some of our R&D based unit processes would simply not scale,” says Urban Ecological Systems Australia Chairman Adam Steel.

“John has always challenged me with pertinent and sometimes difficult questions. These inevitably lead me to investigate alternatives and ultimately achieve better outcomes for the business. The Government’s and John’s impartial support, direction and experience are like having a trusted ally alongside you on the business battlefield.

“It was the little things; from optimisation of seedling production matrices, to determining nutrient cycling, to improving water quality management procedures. All our staff and advisers have put in an incredible amount of technical work and effort to better understand the very intricate inter-relationships of two individually complex biological growth systems of aquaculture and various horticulture crops.

“Importantly, we have also worked with our suppliers to ensure they know and meet our expectations of quality, supply timeliness and the impact on our business if this is not met. All this work has been foundational and very necessary. We now have more reliable and commercially scalable production systems than 12 months ago. We better understand the hurt points.”



*Urban Ecological Systems Australia Chairman Adam Steele*



Steel credits the diligence and tenacious commitment of his key operational team members, Levi and Andy.

“What the guys have achieved is truly outstanding, they are the reason we are where we are today. It is my opinion that to successfully commercialise something as challenging as our system requires a level of dedication that our shareholders are very fortunate to have.

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“Until we had reliable, ongoing data for raw material, labour, operating utility costs and impact on various product yields, we were working in hypothetical scenarios,” Steel says. “Now we have solid data and sound assumptions upon which to explore our next steps. We are continually humbled by the very real interest in our facility operation by both national and international enquiries.

“Like any business, methods change and improve as one learns the hard lessons of doing the wrong thing, particularly if it hasn’t been done before...with no guide book. Perhaps I am describing some of the steps to take a business through the adventure of commercialisation. We were fortunate enough to have the support of the Australian Government,” he says.

“On more than one occasion as we struggled with certain aspects of the business I would look at John and see a real sense of calm. I can’t be sure what he was thinking but my reading of this was ‘yep been here, seen that.’ For me this level headed experience of a Commercialisation Adviser provided a real comfort knowing we must have been at least partially on the right track.”