

The Australian Barramundi Industry

Addressing Cheap Imports

A report for



by Marty Phillips

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Foreword

Declining fish stocks and reduced rates of capture of wild fisheries catches and an increase in global demand for seafood has led to an increase in production from the Aquaculture sector. Many aquaculture species are experiencing exceptional growth (Figures 1&2). The Barramundi industry is no exception.

Barramundi farming in Australia is coming under increased pressure from cheaper imported product from South East Asia. Production in these countries is less regulated and has a lower cost of production. If Australian producers are to survive in this climate they will have to implement systems of differentiation and promote their product against the competitors. Underlying any promotion program there must be a high, consistent level of product quality. Some production systems in the Australian industry can have quality issues which must be overcome to ensure consumer confidence is always maintained throughout the industry going forward.

The aim of this project is to gain knowledge from other aquaculture sectors, globally, of how they overcome some of the abovementioned issues. Then, through the dissemination of this information, will hopefully provide some guidance for the Barramundi industry in Australia in dealing with the issue of cheaper imports.

We are not alone facing such challenges. Virtually every other global industry visited during this study has very similar issues to those experienced in Australia. A lack of action will result in our position being further eroded to a point where the production of Barramundi in Australia will no longer be commercially viable.

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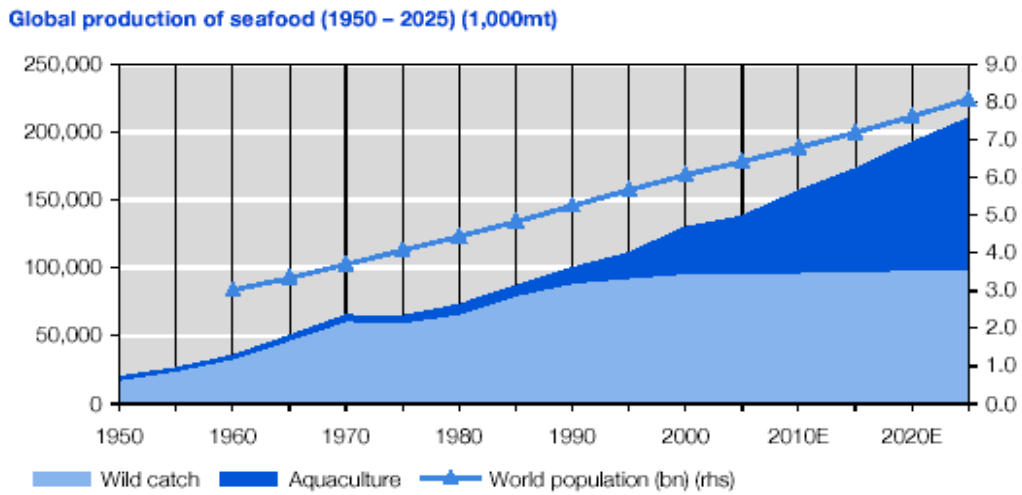


Figure 1: Global production and expected production of seafood 1950 to 2020

Source: Bransden, 2010

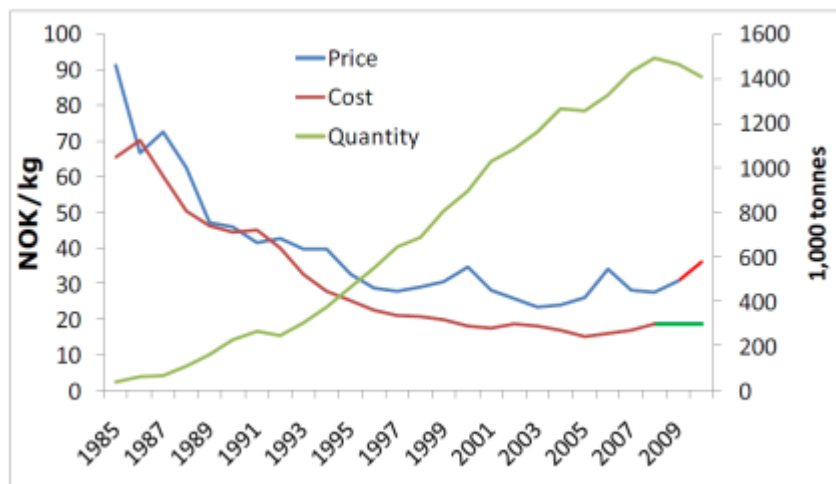


Figure 2: Norwegian salmon export price and costs, and global salmon production 1985 to 2010

Source: Bransden, 2010

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To my parents, Lew and Mari, my farm supervisor, Roberta Mizzi, staff and service providers who have kept the business prospering while I have been away; thank you for enabling me to gain the Nuffield experience.

Finally, and most importantly, to my wife Linda, and children Harvey and Emma; thank you for allowing me to go on this journey. Without your support, assistance and encouragement before, during and after my travels, none of this would have been possible.

Abbreviations

USA - United States of America

UK - United Kingdom

MIB - methylisoborneol

COL - Country of Origin Labeling

PGI - Protected Geographical Indication

EMS – Environmental Management Systems

EU - European Union

NIR - Near Infra Red

SQS - Scottish Quality Salmon Program

FCR – Food Conversion Ratio

QA – Quality Assurance

SEA -South East Asia

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Executive Summary

Barramundi farming in Australia is coming under increased pressure from cheaper imported product from South East Asia. Even the Basa (*Pangasius*) Catfish industry in Vietnam, a large source of much of the cheap imported product is struggling to remain profitable at the moment because prices are so low. Production in these countries is less regulated and has a far lower cost of production. If Australian producers are to survive in this climate they will have to implement systems to differentiate and promote their product, as being different from the competitors. Underlying any promotion program there must be a high level of product quality. Some aquaculture production systems in Australia can suffer flesh quality issues which must be overcome to ensure consumer confidence in this iconic Australian fish.

To address the issue of low cost imports I visited the Scottish Salmon Industry who experienced similar problems several years ago with cheaper product coming from Chile and Norway. The industry needed to promote the high quality product they knew they cultured compared to the imported fish and hence developed a program called Scottish Quality Salmon. This was the basis for developing the Tartan Quality Mark and Label Rouge Brand. This program has also been the basis for helping industry address the increasing pressure of Government regulators on their industry which is also a major issue to the Barramundi Industry in Australia. Cheaper imports are also a problem in the other industries visited, including the Trout industry in the UK; the Trout industry in Denmark; several recirculation industries (including Sturgeon, Eels, African Catfish, and Pike Perch) in the Netherlands; the Catfish industry in the USA; and several other smaller industries in the USA.

To examine the flesh 'off flavour' issue experienced by many aquaculture industries, I also visited a number of experts, in the abovementioned sectors.

Cheaper imports and off flavour were discussed with virtually every industry I visited. With the exception of the Scottish Salmon industry, all industries I visited were in a similar situation regarding having to deal with cheaper imported product at this point in time. However, Barramundi has the enviable position of already being well recognized in the market place. Bennett (2009) highlighted 'the product itself is more important than the provenance'. To maintain this positive position in the market place the issue of 'off flavours' in fish flesh must be resolved (USDA 2000, 2010). To overcome the problem of 'off flavours' in the fish flesh, one of two objectives must be met. The algal and bacterial species that produce the compounds geosmin and methylisoborneol (MIB) must be removed from the

production system. This could prove difficult for some production systems. Alternatively, purging the fish in clean water for a few days, or as long as necessary, prior to harvest, has been shown to reduce the level of ‘off flavours’.

To address the issue of imports, the Australian industry should continue to differentiate from the imported product. All such credentials would form the basis for a positive marketing program. This could possibly be the ‘Australian Quality Barramundi Program’. Country of Origin Labelling (COL) would also play an essential role in differentiating our product from the imported product.

The name ‘Barramundi’ would be an excellent candidate for Protected Geographical Indication (PGI) status. It has been used in Australia for approximately 40 000 years and is regarded as an iconic and premium product both here and overseas (Figure 3). I think this would be difficult to achieve in the Australian political climate of free trade. However, I feel it is worth pursuing with regulators and Governments at all levels, as industry time and resources permit. If this could be achieved it would have huge ramifications for the Australian Industry.

This report is a summary of findings from my investigation into global aquaculture, with similar problems currently facing the Australian Barramundi Industry. These include the increasing pressure from cheaper imports, and the issue of ‘off flavours’ in fish flesh. It is intended to provide a guide to all aspects of the industry as to how to combat these problems. This report would be beneficial to service providers, regulators, researchers and most importantly, farmers.

Introduction

I have been involved in Agriculture the whole of my life. I was raised on a sugarcane farm near Innisfail in North Queensland, Australia. I attended an agricultural boarding school during my secondary education. My tertiary education involved two years at Gatton Agricultural College (now University of Queensland, Gatton Campus) where I received an Associate Diploma of Applied Science and a further four years of external study, while working full time, through Charles Sturt University at Wagga Wagga, NSW, to receive a Bachelor of Applied Science.

My first employment after graduating was with the Bureau of Sugar Experiment Stations (BSES) at Tully, Queensland. I was a research assistant working with nutrition and pathology. I later become the Farm Manager of the station in Tully. After four years in Tully, I was transferred to Bundaberg, Queensland, and worked as an Extension Officer for two years.

After gaining some industry experience, I returned home to the family farm with my wife Linda. We continued to grow sugarcane, but also expanded the area of bananas that my father had recently begun cultivating. After approximately five years, we ceased growing sugarcane and produced mostly bananas and a few papaya which were introduced as a break crop from the bananas. Although the income per hectare was much higher with horticulture than sugarcane, we acknowledged we were at risk from having a less diverse income stream. Two tropical cyclones in three years certainly highlighted this. These horticultural crops are very sensitive to strong winds and our production was greatly reduced during this time.

These natural disasters encouraged me to explore further diversification options. Aquaculture, although very capital intensive and certainly not without risk, seemed attractive in that it is much less susceptible to the threat of cyclones. It would complement our existing enterprises. We started down the path of acquiring a site, applying for the necessary permits, which was not easy, and constructing the first stage of ponds, raising some Barramundi and finally sending some off to market. Eight years later the farm is fully developed and stocked so that next year we should be in full production of approximately 300 tonnes per year.

Unfortunately, we were not the only people who thought this was a good business plan. Production from within Australia and especially from overseas has seen the supply of Barramundi increase significantly over recent years. Production from SEA enjoys a lower level of input costs and regulation and therefore they can supply product cheaper than the Australian Industry.

I have been an active member in the executive of the Australian Barramundi Farmer's Association (ABFA) for the past five years. I am currently in my second year as President of this organisation.

I have spoken to many experts within Australia for advice on the issues I am investigating. Several trials have been conducted on our farm by industry suppliers and universities. I am participating in several programs working towards addressing the Barramundi Industry problems.

This report aims at trying to gain market share for the Australian product against the cheaper imports.

Objectives

The objectives of my Nuffield Scholarship are:

- To investigate various aquaculture industries, globally, and examine how they are dealing with the issue of cheaper imports.
- To study the Scottish Quality Salmon (SQS) program.
- To examine the issue of 'off flavour' in fish flesh and how various aquaculture industries deal with this problem.
- To explore the option of using a bacterial floc production system, to improve product quality.

Current Position of the Australian Barramundi Industry

Market Awareness

Barramundi (an Aboriginal word for ‘fish with big scales’) has the enviable position of already being well recognized in the Australian Market place. A recent market survey by the industry highlighted the following strengths of the Australian product. Barramundi (Figure 3) has a firm white flesh, succulent, fine grained texture and mild flavour. Barramundi’s moist texture makes it very versatile and well suited to all methods of cookery, including grilling, steaming, pan frying or Bar-B-Qing. Barramundi is low in fat, high in protein, low in cholesterol and contains the Omega 3 and Omega 6 fatty acids. Consumers consider Australian Barramundi to be a premium; great tasting, appealing, authentic and classy fish (Lawley, 2010). This research also mentioned some of the product quality issues the industry must deal with. These are mentioned later in this report.



Figure 3: Australian-grown Barramundi

Source: M. Phillips, 2010

Of seventeen fish species a group of participants were questioned about regarding fish consumption, Barramundi had one of the highest rates of awareness for these products. This report clearly illustrates consumer acceptance and underlying knowledge of the ‘Barramundi’ concept together with their preferences and trends. However, when questioned about its origin, the majority thought it was an Australian fish and were unaware of imported product (Lawley, 2010). Some industry information suggests that up to twice as much is being imported as is produced in Australia.

Barramundi is native to many parts of SEA, and has been farmed there for a number of years. In this region, it is commonly known as *Asian Sea Bass*. In 2007, the fish naming committee in Australia completed a review of seafood names so there was one name per species (Loveday & Palmer, 2007). The Asian Sea Bass coming into Australia had to be labelled ‘Barramundi’. Producers in SEA promote this nomenclature and gain sales on this clean, green positive Australian image (Figure 4). Much of the Asian Sea Bass leaving SEA for Europe and North America is also labelled ‘Barramundi’.



Figure 4: Barramundi Fillets sold in a large supermarket chain, imported from Thailand

Source: Fisheries Research & Development Corporation

Consumers in Australia thought they should be told where the product had been produced. Some had a strong loyalty preference to purchase seafood only produced from Australia. Food safety and environmental concerns were the main reason for this. The Australian industry has been able to use such claims to promote our product over the foreign product, and for the most part, these claims have been justified.

However, a favourable political environment and desire by relevant Government authorities to develop the sector in these countries has seen the quality of some of their product increase substantially (C. Foster, personal communication, May 25 2010). The Australian industry must continue to work in this area, as the imported products are certainly gaining ground on us on this front.

The Australian industry has a residue testing program that is compliant with European Union (EU) standards, some of the strictest in the world. All producers must comply with the appropriate food safety regulations.

Industry is currently undertaking an Environmental Management Systems (EMS) program, and already has some of the tightest environmental regulation conditions anywhere in the world. The latest permit issued by authorities' states there must be a zero net discharge. The water leaving the farm must be the same quality as the water entering the farm. It is unsure if this project will proceed because of these tight regulations. This is an indication of where regulation is heading in our part of the world.

Product quality

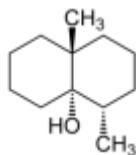
As previously mentioned, Bennett (2009) highlighted 'the product itself is more important than the provenance'. This illustrates why this topic possibly holds the key to the survival of our Australian industry.

Once a consumer has had a negative experience, it is very difficult to get them to try it again. This makes it important to all producers, even if their product does not suffer from quality concerns. It is imperative that industry as a whole addresses this problem.

- **Off flavours**

A significant issue affecting the aquaculture and water industries is the presence of off-flavour compounds in water, which cause problems by imparting an undesirable earthy/musty flavour and smell to water and fish. Two predominant off flavour compounds are geosmin and MIB (Figure 5). These compounds are produced by several varieties of cyanobacteria and algae (Lior guttman, 2008; Tucker, 2000). While this has no adverse health effects on either the consumer or the fish, it does have a profound effect on consumer acceptance and marketability (Robertson, 2006).

geosmin



MIB - methylisoborneol

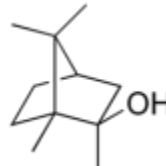


Figure 5: Compounds which produce the ‘off flavour’ in fish flesh

Source: Journal of Agricultural Food Chemistry, 2003

- **Consumer research**

The previously mentioned market report commissioned by the industry highlighted ‘noticeable off flavour’ as a negative correlation to overall liking, with some samples. This similar message has also been conveyed in other studies conducted previously on this topic.

- **Detecting off flavours**

Measuring the level of geosmin and MIB in fish flesh is a difficult task. Chemical analysis is generally unreliable and expensive. A replicated trained sensory evaluation panel is used as an assessment for research purposes (Glencross, 2007). Near Infra Red (NIR) technology has also been demonstrated to have the potential to accurately determine the content of compounds present (Smyth, 2006). These are not practical for on farm use. Simply, cooking a small piece of fish and taste testing it is the easiest form of on farm testing. Farm staff can be used as tasters to determine product quality. This is the most common method of detection used, observed in my travels.

Research overseas is also working on detecting the level of the compounds in the water. It is easier to detect in water than it is in fish flesh. As previously mentioned, if it is in the water, it is in the fish (N. Jorgensen, personal communication, June 23 2010).

The Barramundi Industry has recently engaged a team of scientists through the Seafood Cooperative Research Centre (CRC), Queensland, to develop a calibrated smell test. This would involve impregnating a set of felt pens, or creating a liquid with known levels of taint causing compounds. These could be used on farm to help determine the level of compounds present, prior to harvest.

- **Water Quality**

Several varieties of cyanobacteria and algae are known to produce geosmin and MIB. These compounds are common in both recirculation and freshwater production systems. It is rare to

find these issues where there is a high level of salt water used to produce the fish. Removal of geosmin and MIB from potable waters has proven to be inefficient using standard water treatment such as filtration, coagulation, flocculation, sedimentation and chlorination. Activated carbon and membrane processes can physically remove geosmin and MIB, but do not destroy them. Ozone treatment can be expensive (Bellu, 2007).

Research has shown the compounds are rapidly taken up through the gills of fish. It takes longer to deplete from the fish than it takes to be adsorbed (Glencross, 2007).

- **Purging**

One method of overcoming this problem is to purge (purify) the fish in water free of geosmin and MIB producing compounds. It has been shown the off flavour of the fish can be halved after 24 hours of purging and further reduced again with each successive day up to five days of purging (Glencross, 2007). During this time the fish are not fed and the geosmin is diffused out of the fish into the clean water. The rate at which this happens depends on a number of factors including temperature, level of geosmin in the fish, and the size of the fish.

For farms with a source of clean water this would be relatively easy to implement. This practice is routinely carried out by some producers, but not all. For those that have a problem, this practice should be implemented to improve product quality. For those who do not have a source of clean water, the problem is somewhat more problematic. Purging fish containing a high amount of 'off flavour' should have the problem reduced to a negligible level well within one week (Glencross, 2007).

Europe

There is a great deal of pressure from imported fish into the European market. Basa, from SEA, and Trout, from Eastern European countries, are readily available in this market. These industries enjoy a lower cost of production than the European industries visited. While governance is important to many Europeans, price is becoming an ever increasing consideration when purchasing seafood in the current economic climate.

During travel through Denmark, the Netherlands and the UK, virtually all production systems incorporated a purging system to clean the fish prior to sale (Figure 6). Species encountered being cultivated include Trout, Eels, Pike, Perch, Sturgeon, Tilapia, African Catfish, and many ornamental aquarium species. These were all fresh water production systems. A substantial part of Australian barramundi is produced in salt water systems.

The fish in these systems are in either raceways or indoor recirculation production systems. The fish are kept at relatively high densities 50 to 150 per m³, and are used to being handled and are transferred between tanks easily (J. Van dooren, personal communication, 29 June 2010).



Figure 6: Sturgeon in a recirculation system in The Netherlands. These fish are purged for up to 6 weeks prior to harvest of its valuable caviar.

Source: M. Phillips, 2010

This is much different to how much of the Barramundi is produced in Australia. Here, it is grown extensively in ponds at densities of up to 4 kg per m³. Transferring these fish from the pond to a purging system would be a challenge, but I am sure achievable. Recirculation systems, similar to those in Europe, and sea cages are the other ways Barramundi are reared in Australia.

UK

Quality assurance systems have played a big part in the development of the aquaculture industries in the UK. It has been useful for marketing purposes to customers, and also for addressing the issue of Government regulation.

Salmon Industry

The Scottish Salmon industry is the only sector visited that was currently not receiving low product returns. This is due to the reduction in production of salmon from Chile, as a result of a disease outbreak. There is a global shortage of salmon at present and prices are very high. Total production in Scotland is around 140 000 tonnes. There are only four main producers. These are all obviously very large, vertically integrated companies farming multiple sites for all aspects of production. Each company is also aligned with a major retailer, who is the major outlet for their product (J. Smith, personal communication, 6 July 2010).

The main reason to travel to Scotland was to investigate the Scottish Quality Salmon Program (SQS). This program was developed in the late 1980s as competition from mainly Norwegian product increased. The main driver for its' development was to provide an increased level of quality assurance throughout the production cycle. It covers all aspects of production from the brood stock and the egg, through to harvest. This includes:

- Consumer Assurance
- Fish health
- Protecting the environment
- Welfare and Husbandry
- Feed and feeding (Strategic Framework for Scottish Aquaculture, 2003)

Marketing campaigns that were developed from the initial SQS include the Tartan Quality Brand and Label Rouge (Figure 7), a French accreditation that attracts a 25% premium, but does not take a lot of volume. There is little industry based promotion at present. Demand currently exceeds supply so there is little need to increase sales. Also, marketing programs developed between producers and the retailers are aligned with reducing the need for general product promotion. The SQS worked very well when it was first developed (I. Mitchie, personal communication, July 6 2010). Its' uptake was so successful that it was soon compulsory for all members of the Scottish Salmon Producers Association to have this program implemented if they wanted to be a member. The Scottish Salmon Industry also gained PGI status (Figure 7) in 2004. This was the first industry outside mainland Europe to achieve this level of accreditation which has especially benefitted exported product. It has little impact in the domestic sales. COL was of much greater benefit in the domestic market (J. Smith, personal communication, July 6 2010).

The industry has also taken up many other accreditation schemes. These include Freedom Food and Marine Stewardship Council. In some ways, these accreditations have rendered the initial SQS obsolete. They cover individual aspects of the production cycle and collectively do what the SQS program set out to do in the first place. This agenda is driven partly by retailers seeking to gain a competitive advantage over their competitors. Any gain is often short lived as others quickly adopt any new accreditation so they are not ‘left behind’ (J. Smith, personal communication, July 6 2010).

An interesting comment received from several people, both from within the Scottish Salmon Industry and outside it, was that Scottish Salmon is perceived to be of better quality than Norwegian Salmon. Time restraints meant there was no chance to ask the Norwegians about this topic, but this would have received a different point of view. Regulatory conditions in Scotland determine the tonnage of fish that can be stocked on a site. In Norway, they are regulated by the amount of feed they can utilize on a site. Therefore, they use a higher oil (energy) diet to obtain the best possible Food Conversion Ratio (FCR). The people involved thought the use of a higher amount of fish meal and lower oil content of feed in the Scottish Salmon industry delivers a better quality product (J. Van Dooren et al, personal communication, 29 June 2010).





Figure 7: Scottish Quality Salmon Industry Products

Source: www.scottishsalmon.co.uk

Trout Industry

The Freshwater Trout Industry also developed a Quality Assurance (QA) system. As with the salmon experience, it encompassed all aspects of production and had a great emphasis on product quality (Figure 8). It is a useful tool for both marketing and addressing Government regulation. There is an interesting recent history to trout production in the UK. ‘Scotttrout’ was a company established to market trout. It was a cooperative of Scottish producers. By utilizing their assets and capital collectively, a greater, more efficient outcome was achieved. It also allowed for a more streamlined supply of product to the market place. Production was able to be more closely matched to demand.

This helped to even out the boom and bust cycles that had been common place in the industry previously and also predatory pricing by the processors and retailers. Value adding of product was also developed by the business. Capital was raised from members to help set this up. The primary focus was to deliver a consistently high quality product. This was a key factor in the success of the program. Another key component in the program was the high level of farmer support. All production went through the cooperative. This program was so successful it had to be rolled out to the rest of producers in the UK to keep up with demand (M. Davis, personal communication, July 14 2010). Scotttrout has since gone into receivership for various reasons.

A processor has purchased many of the assets and production is continuing. Supplying a quality product is still an industry priority. Addressing the taint issue was certainly a key factor contributing to the success of Scotttrout when it was in production.



Figure 8: Fresh UK trout going to Market

Source: M. Phillips

Innovative Technology

One innovative approach is to clean water using Titanium dioxide (TiO_2) photocatalysis. Titanium dioxide (TiO_2) photocatalysis have recently been demonstrated to rapidly degrade geosmin and MIB. When the semiconductor catalyst is illuminated with ultraviolet light, simultaneously, oxidation and reduction reactions occur. Pollutants are broken down into mineral acids, carbon dioxide and water. A commercial trial using this technology will be started in the near future (L. Lawton, personal communication, July 9 2010). Time will tell if there is a place for this technology in addressing the problem of off flavours, however it may well be something that the industry in Australia should consider trialling.

USA

USA Catfish Industry

The production system used for Catfish is more like that used for Barramundi production in Northern Australia. Extensive earth ponds are used to raise the fish. Supplementary aeration is

required. Although many farms have adequate water to perform some water exchange, few of them do. As a result of this, they generally have much lower stocking densities than similar systems in Australia. Their diet contains less protein than a typical Barramundi diet.

Water surface acreage of USA catfish ponds has dropped 42% in the last ten years (USDA, 2000, 2010).



Figure 9: In front of one of the processing facilities owned by Heartland Catfish

Source: M. Phillips, 2010

The USA Channel Catfish industry is under enormous pressure at the moment. Cheaper imports have plagued the industry for a number of years now. They have more recently had to also deal with a substantial increase in production costs. The price of grain, the main component of their diet has risen substantially as a result of the mandate on ethanol production in the USA. The demand for the grain has increased, driving the prices up. Energy costs, another major input, have also risen (J. Steeby, personal communication, July 28 2010).

The Catfish sector is approaching the issue of imports on a number of fronts.

- **Country of Origin Labelling (COL)**

In 2004, the USA Catfish Industry successfully lobbied to have the Vietnamese Industry prevented from selling their exports as ‘Catfish’ even though it is a species of catfish. They thought by protecting the name they used for their product, it would help with the problem. This was not the case. Basa continued to sell in the USA. Now, the Industry is trying to have

this reversed so that the imported catfish has to meet the same food safety standards as the USA Catfish (A. Jones, personal communication, July 26 2010).

COL is also something the USA Catfish Industry is pursuing. It is law for retailers to display where the seafood is produced. This is not the case in the food service industry.

Over half of the Catfish produced in the USA is sold in the food service industry (Figure 9). The industry is working hard to change this. They believe that there is a percentage of the population that does care about where their food comes from and how it is produced and would choose the local product over an imported one. There is a lot of resistance to this from sectors in the food service industry, especially the fast food side of it. The food service sector is lobbying strongly against any such changes (A. Jones, personal communication, July 26 2010).

Time spent talking to industry people, indicated that there seemed to be the perception that Catfish is somewhat of a 'less than top shelf' fish. It is traditionally eaten in the south of the USA, but not widely consumed outside of this area. The industry has tried to overcome this market position, with limited results. They certainly seemed more concerned with consolidating their position in their more traditional market of the southern states of the USA where there is a large population of African Americans (J. Steeby, personal communication, July 28 2010).

Tilapia, another fish species, is making great inroads into the white flesh fish market. It is generally a good quality product and is somewhat of a newer trendy fish. We are very fortunate here in Australia that it is declared a noxious pest and thought of as vermin (or has a negative perception with the general public). If not, we would be facing similar pressure from this species. The COL is the only approach to addressing this threat. There is some Tilapia production in the USA. This is mainly sent live, or at least fresh and chilled, to high end restaurants in the North East of the nation (B. Martin, personal communication, August 20 2010). The vast majority of product coming into the USA is frozen fish fillets produced in Central and South America and SEA.

Surprisingly there was a lack of branding of local product in the USA. There is not nearly the same degree of this as there is in the UK or even Australia for that matter. This did not only relate to seafood, but was across all product lines in supermarkets. This is not what I would have expected, given the level of patriotism in the USA.

- **Food Safety**

There is a strong movement to have imported product subjected to the same food safety regulations as the domestic industry currently does. Any beef, pork or chicken imported into the USA is administered by the United States Drug Administration (USDA) and has to meet the same food safety requirements as the internal industry does. This is not the case with seafood, including the Catfish industry. The industry is lobbying hard to have this situation changed. It is currently administered by the Department of Commerce and the FDA (Food and Drug Administration) which has a much stronger agenda on free trade than the USDA does (A. Jones, personal communication, July 26 2010).

This objective should be obtainable. A decision will probably be made by the time this report is published. The industry feels this will help them significantly as the imported product will struggle to meet these stricter food safety regulations that will be imposed on them as a result of the new regulations. I think any benefit gained from this course of action will be relatively short lived. The technology exists to overcome this issue. The imported product only has to adopt and implement it. It can, and probably with time, will be overcome.

- **Off flavour**

This is a big problem for the Catfish industry and a lot of work has been done on this topic. Most product ends up going through a handful of processors. Prior to harvest from the ponds, fish must be sent in for sampling three separate times and a positive outcome obtained for each prior to harvest. Fish are all harvested and transported live to the factory where another test is carried out prior to unloading from the truck (Figure 10). If this is tested negative, all the fish are sent back to the farm. The limitation in this process is that the degree of off flavour can vary within any one pond. Larger fish with more fat have a greater chance of having a higher level of 'off flavour'. To obtain a statistically sound sample approximately fifty fish would have to be sampled. So, by only testing one, some can occasionally get through the system (D. Walker, personal communication, July 27 2010).



Figure 10: Catfish are transported live to the Heartland processing facility. Four consecutive ‘on flavour’ tests are required prior to the fish being accepted for processing, the last test is done while the fish are still on the truck. Fish are sent back to the farm if they do not pass the test

Source: M. Phillips, 2010

The industry has at its disposal a few algacides that are effective in removing the algae that produce the off flavour. Management strategies have been developed that incorporate this into the farming system, and these have significantly reduced the incidence of this problem. Even with this, occasionally there are still issues. Farmers under great financial pressure will often try to cut costs by skimping on these preventative measures, hoping they will not have a problem. Most of them inevitably do. This will compound their financial position by forcing them to hold the fish for longer until they come ‘on flavour’, incurring extra feed costs (C. Tucker, personal communication, July 28 2010). These chemicals are not available to us in Australia, and probably will not be in the future. The vigorous testing is certainly something our industry could pick up on.

Purging has not been widely adopted by the Catfish industry. The extra cost is the main reason it has not been adopted. I met a Catfish farmer who does purge his product and market it directly to restaurants. The strategy of supplying consistently high quality product is

proving very successful and he is struggling to keep up with demand, and his product is selling for above the market price.

Bacterial Floc

The adoption of Bacterial Floc Farming systems might be a possible solution to the off flavour problem. Under a traditional farming system, nitrogen from the fish is taken up by algae in the pond. Using a Bacterial Floc system, carbon is added, usually in the form of molasses. With the correct carbon to nitrogen ratio and maintenance of other water quality parameters, bacteria will dominate over the algae and a Bacterial Floc will form. This is a much more intensive farming system than the traditional algal system. It may control some of the algae responsible for off flavour.

Initial trials at PEJO Enterprises have shown that the blue green algae species, *mycrosistis*, considered to be causing the problem, can be controlled by adopting this system. Initial samples of product show there was still a detectable amount of off flavour present in the fish, although its' presence can be variable. There are obviously other sources of geosmin and/or MIB in the pond. Experience overseas has shown off flavours can still be present in floc systems (A. Stokes, personal communication, August 17 2010).

This system requires a far greater level of management than the normal pond system. There is room for improvement on the first application of this system. There are however, other positive outcomes if applying this system. A reduced environmental footprint and increased stocking densities are the main ones. For these reasons alone, the system is worth exploring further.

This system is commonly used in prawn and tilapia production around the world (Y. Aunimelech, 2009). Prior to and during the Nuffield Trip, there was only one other person around the world who has tried this production system with a species other than prawns and tilapia. He tried it with cobia and it did not work so well (A. Stokes, personal communication, August 17 2010).

Recommendations

As an industry, we need to continue to differentiate and promote ‘Australian Barramundi’ for its’ benefits over the imported product. Achieving different certifications would be an essential part of this process. These would include EMS; a high level of residue testing; and animal welfare considerations. This could be incorporated into a program similar to the SQS, possibly the Australian Quality Barramundi Program.

The expansion of COL into restaurants and the food service industry would be beneficial. This is currently law in the retail sector, where it has worked well. It is not compulsory in the food service or restaurant sector where much of the higher value product ends up.

The Industry needs to persist in working on protecting the ‘Barramundi’ label as being Australian. It would be an excellent candidate for PGI. The term Barramundi has been used in this region for approx 40 000 years. It would be difficult to obtain PGI status with the current free trade approach of mainstream politics.

Product quality must be optimised to maintain a premium product. The issue of off flavour must be addressed and overcome by each and every farmer if the industry as a whole is to be successful in combating imports. An industry standard must be developed and adhered to, to ensure that all fish going to market have the ‘on flavour’ and firm flesh that the Australian consumer demands.

The industry could expand the usage of the ‘Australian Grown’ scheme to these products. The green triangle is a widely recognized brand and can be tailored to suit a particular species.



The market place consists of many brands and accreditation schemes. Any new initiatives by industry must be kept as simple as possible.

The Australian Government Regulators need to consider the issue of food safety with regard to the imported product. The Australian consumer has a right to know that the food they consume is safe. This is a sensitive topic, and if not handled correctly could be potentially damaging, as it could have negative consequences across the entire sector. It would have to be done in such a way that it did not reduce demand for the Australian product, as well as the imported one.

Another idea that could be adopted is the issue of 'fair trade', as opposed to 'free trade'. Australian producers are required to operate in an environment that has limited use of chemicals, antibiotics, and are not detrimental to the environment. This is not always the case in SEA. By making the imported product meet the same strict regulations we are required to meet, would possibly help 'even the ledger' and have us on similar competitive fronts. Regulation could initially occur on the chemical residue front, as it is relatively easy to monitor. This would be difficult to adopt in the current political environment.

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Plain English Compendium Summary

The Australian Barramundi Industry Addressing Cheap Imports	
Project Title:	The Australian Barramundi Industry Addressing Cheap Imports
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Scholar:	Marty Phillips
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Objectives	To investigate various aquaculture industries and examine how they have dealt with the problems of addressing cheaper imports and off flavour in fish flesh
Background	Barramundi farming in Australia is coming under increased pressure from cheaper imported product from South East Asia. Even the Basa industry in Vietnam, a large source of much of the cheap imported product, is struggling to remain profitable at the moment because prices are so low. Production in these countries is less regulated and has a lower cost of production. If Australian producers are to survive in this climate, they will have to implement systems to differentiate and promote their product, as being different from the competitors. Underlying any promotion program there must be a high level of product quality. Some production systems in Australia suffer quality issues. These must be overcome to ensure consumer confidence going forward. Barramundi has the enviable position of already being well recognised in the market place.
Research	Several aquaculture sectors and industry experts were visited to learn how they address the issue of cheaper imports and 'off flavours' in fish flesh. These included the USA Catfish, Scottish Salmon, UK Trout, Danish Trout, and various other smaller industries in the Netherlands, UK and USA.
Outcomes	<p>With the single exception of the Scottish Salmon industry, all other aquaculture industries I visited are in a similar situation to that of the Australian Barramundi Industry; they are struggling to compete with cheaper imports. At present, the Salmon industry is doing well because of a disease outbreak in Chile, which has greatly reduced their production, resulting in a global shortage of this species. The Australian Barramundi Industry needs to address the following issues:</p> <ul style="list-style-type: none"> • Maintain excellent product quality by addressing the issue of 'off flavour'. Testing prior to harvest to prevent this product going to market must be implemented into a quality assurance program. Removal of compounds in the production system and purging are the two methods of controlling this problem. • Expansion of Country of Origin Labelling (COL), which is currently law in the retail sector, where it has worked well. It is not compulsory in the food service industry where much of our higher value product ends up. This plays an important role in differentiating our product from imported product. • Positive marketing to follow on from this. Product differentiation through obtaining various accreditations such as EMS, a high degree of residue testing and possibly, the animal welfare issue. • A sustained effort to have the name 'barramundi' protected as much as possible. This may include Protected Global Indication (PGI) and promoting the concept of <i>fair</i> trade. • Forming an Australian Quality Barramundi program
Implications	The Australian Barramundi Industry is not alone in having to deal with the threat of cheaper imports. Failure to address the quality issues and continue to improve our marketing efforts will see our position further eroded to a point where the growing of Barramundi in Australia will no longer be viable.