HOW NEW TECHNOLOGY AND INNOVATION IS DRIVING CHANGES IN
THE FISHING INDUSTRY

Presentation to MLAANZ Conference
Taupo, 11 April 2014

Introduction

At the end of a day filled with legal content, I will change tack and give a less legal and more practical presentation on how technology and innovation is driving change in the fishing industry.

I intend doing this by unashamedly cribbing from a number of presentations made on the subject by people that are far better qualified by me to deliver them, and I would like to acknowledge Dr Glenn Simmons, of the University of Auckland Business School who has recently completed his doctoral thesis on Re-thinking the New Zealand Fisheries Value Chain for some of the information that he has provided.

I would also like to acknowledge the assistance that I have been given by the Talley’s Group and the Sealord Group, both of which are based in Nelson, who have provided me with much of the material for this presentation.

Context

Let me provide you with a New Zealand context.

New Zealand has the fourth largest Exclusive Economic Zone (EEZ) in the world and the EEZ is divided into 10 different Fisheries Management Areas. The next slide shows the spread of areas traversed by New Zealand fishing vessels ranging from the Challenger Rise in the West to the Chatham Rise in the East.

The Total Allowable Commercial Catch (TACC) for all species in New Zealand is approximately 631,000 tonnes, of which (in 2011) 435,000 tonnes of product was landed. In effect therefore, 68% of the TACC was caught in that year and 197,000 tonnes left in the water. Of this amount, finfish landings accounted for 394,000 tonnes, with the balance being shellfish such as mussels, surf clams, oysters and crayfish.

Approximately 1/10th of the finfish landings (or 39,000 tonnes) was sold and consumed locally in New Zealand. Approximately 199,000 tonnes of fish and fish products were exported from New Zealand, with the total value of exports of approximately NZ$778.8 million.
Included in the 199,000 tonnes of exports, was 59,900 tonnes of fish waste that was exported. This amounts to approximately 600,000 tonnes of fish waste exported over the past 10 years – and I’ll explain bit more about fish waste later.

So if we exported 199,000 tonnes, sold 39,000 tonnes in the domestic market, what happened to the balance of 156,000 tonnes? Research by the University of Auckland would indicate that of this amount 59,420 tonnes of product was dumped at sea and the remaining 95,700 tonnes was processed into 21,000 tonnes of fishmeal. The average price for fishmeal is around NZ$2.10 per kilo.

My University of Auckland colleague points out that fishmeal exports represent the 6th largest ex-fisheries export by volume and the 8th largest by value. He concluded that over the last 10 years 1.67 million tonnes of fish waste could have earned $NZ1.87 billion instead of $370 million from fishmeal if it was dried and sold.

On the question of fish dumping, many of you will be aware of the actions that have been taken by the former crew on Korean-flagged Foreign Charter Vessels (FCVs) operating in New Zealand. In 2012 there were 24 FCVs licenced to fish in New Zealand. In the past two years, officers on the Oyang 77 and the Melilla 201 have been charged and convicted of offences including dumping under the Fisheries Act 1996 and their attendant regulations. Many of the crew that we have interviewed have spoken of continued and repetitive dumping, which has taken place over many years, and some estimates place the figures for fish dumped at around 60 to 80,000 tonne per year, or 800,000 tonnes over the past 10 years.

Interestingly, since the crew took action against these vessel owners for unpaid wages, and as a result of the intensive media scrutiny over the operations of these vessels over the past two years, the incidence of dumping has been dramatically reduced. As a consequence, I have heard anecdotally from Skippers of both Talley’s and Sealord vessels that they have seen recruitment of fish in the 2014 year group on a level that they haven’t seen for many years. I have also heard from the inshore operators that operate on the east and west coast of the South Island, that they are seeing increased abundance of inshore species such as Blue Cod, Red Cod, Snapper, Trevally and Terakihi.

**How efficient is our processing?**

The New Zealand fishing sector can usefully be divided into two main areas, namely the deepwater industrial fishery, which produces the largest volume of fish products using large stern trawlers that catch the fish and process it to various states on board the vessel. The older (typically foreign charter vessels) will head and gut the fish, and freeze these in to 20kg blocks place them in cartons and then export them to Korea or China to add value.

The more modern vessels have advanced filleting machinery that processes the product into fillet form, and much of the remainder of the fish is turned into fishmeal using a meal plant on the
vessel. For example Talley’s deep-sea factory freezer trawlers are all approximately 60 to 70 metres long and go to sea for six weeks at a time with a crew of around 35 men and women. They process fish into fillets within hours of catching them. The catch is processed onboard into frozen-at-sea fillets, blocks or head and gutted form according to the customers’ specifications. The onboard fishmeal plants process the waste product so that most of the fish is utilised.

So how much of the fish is utilised?

1. Heads: (30% of fish weight) very little has been retained and most is mealed/oil extracted or dumped;
2. Backbones: (15% of fish weight) are mealed/oil extracted or dumped;
3. Fillet (32% of fish weight) is sold;
4. Trimmings (5% of fish weight) is minced, mealed or dumped;
5. Liver and roe (7% of fish weight). Roe is retained by a few but is mostly mealed, oil extracted or dumped;
6. Guts: mealed, oil extracted or dumped. Some swim bladders are dried but mostly mealed or dumped (5% of fish weight).

You may be wondering what the relevance of all of this is to how innovation is driving changes in the fishing industry. It is clear to me as a layman, that aside from the volume of fish that may be dumped, we are not extracting as much value as we can out of each fish caught.

In this slide, it shows that up to 70% of fish is turned into low value fishmeal, some fish oil or dumped.

The New Zealand Government has recognised this and has spent a total of $282 million over the past 10 years in innovation funding in the wild capture and aquaculture industry.

An example of this is some research that has been undertaken in Iceland. Researchers have analysed how Iceland has used innovation in order to extract more value from fish. Have a look at the next slide:

1. The fish heads are dried and sold to Nigeria;
2. Backbones are dried and sold to Nigeria;
3. Through the development of super-chilling technology, they have increased fillet yields by 10-15%;
4. Trimmings are minced into fish nuggets;
5. Gelatine is extracted from the skin and swim bladder for use in a wide range of products;
6. The swim bladder is dried, the guts are dumped and there is 100% utilisation of the liver and roe.

However, the Icelanders are not stopping there. Their aim is to utilise 96% of the fish, and the next slide gives you an indication of how this can be applied. Thus you will see that they are developing products such as fish leather, which is now increasingly being used by the shoe and fashion industry. Interestingly, they are using elements of the skin in pharmaceutical tissue and nerve regeneration products.

The cumulative effect of this development will result in more effective utilisation of the whole fish, better quality fish products. This will give rise to less pressure on scarce resources and an increasing range of markets and profitability for the companies concerned.

**Net technology**

A significant amount of work is being done in both New Zealand and elsewhere on the development of advanced net technology. We regularly hear complaints from inshore fishermen (as opposed to the deepwater industrial fishermen) that I referred to earlier, that they find themselves between a rock and a hard place when it comes to dumping portions of their catch, particularly where there are multiple species caught.

The newspaper *The Sunday Star Times* in New Zealand has estimated the total discard rate as being 280 million fish per year. Discards include the smaller fish which are caught in nets due to not being able to escape. They are then thrown back in the ocean, most of them being dead.

The Sunday Star Times says "Industry sources say research points to around 200 inshore trawlers dumping around 4000 fish every trip for 35 trips a year - 280 million discards".

This is driven partly by the difficulty in accessing quota to cover the fish that are caught. In the event that fishers do not have sufficient quota, or what is termed Annual Catch Entitlement, to cover the landings of the target species of bycatch, they are required to pay what is termed Deemed Value, or a financial penalty for catching and landing the fish. This is an amount set by regulation that must be paid to Government.

So fishermen are particularly interested in any technology that firstly, excludes juvenile fish which are of less commercial value to the fishermen, and secondly allows the fish to brought to the boat live, or thirdly allows the fish to be brought aboard the boat in a better condition than is currently the case.

There have been a number of initiatives to develop nets with exclusion mechanisms that allow small fish to escape. We have seen this for some time in the New Zealand fisheries with what are termed SLEDS, which is an acronym for Sea Lion Exclusion Devices, which allows Sea Lions,
particularly in the Squid fishery down near the Auckland Islands, to escape from fishing nets when hunting Squid caught by the trawlers.

Have a look at this short video, which shows how effective this technology can be. http://precisionseafoodharvesting.co.nz/

Conclusion

So whilst we have a world class quota management system that in most cases has shown itself to be supple enough to manage fish stocks in New Zealand, particularly in the deepwater areas, the industry recognises that there are a lot of things that they can be doing to preserve fishstocks and to extract more value from the fish that are landed.

Fishermen are notoriously conservative however the increasing international demand for protein, particularly protein that comes from unpolluted waters, will provide increased incentives to manage the stocks that we have more effectively.

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HOW NEW TECHNOLOGY AND INNOVATION ARE DRIVING CHANGES IN THE FISHING INDUSTRY

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2011 Total Allowable Commercial Catch (TACC) = 631,787 tonnes

Total marine landings = 435,000 tonnes

Finfish landings = 394,000 tonnes*

Finfish domestic sales = 39,000 tonnes

Finfish exports = 199,000 tonnes, $778.8m

Finfish waste 156,000 tonnes

197,000 tonnes of TACC not caught

Includes 59,900 tonnes of fish waste exported (600,000 tonnes during past 10 years)

59,420 tonnes dumped at sea

95,700 tonnes = 21,000 tonnes ($44m) of fishmeal. 2011 average export price for fishmeal was $NZ 2.10kg or $NZ 0.38kg greenweight. (6th largest export by volume; 8th largest by value)

Fish waste if dried could have earned $NZ173.7 million in 2011

Over last 10 years 1.67 million tonnes of fish waste could have earned $NZ1.87 billion instead of $370 million from fishmeal (if dried and marketed as by Iceland)

Sources: Compiled and calculated from Ministry for Primary Industries and Statistics New Zealand data

*Does not include illegally dumped fish, estimated at between 79,000 and 197,000 tonnes
How much of the fish is wasted?
Up to 70% of the NZ fish is turned into low value fishmeal, some oil or wasted

Heads (30% of fish weight) very little retained most mealed/oil extracted or dumped
Liver and roe (7% of fish weight) roe retained by a few - mostly mealed/oil extracted or dumped
Backbones (15% of fish weight) mealed/oil extracted or dumped
Fillet (32% of fish weight) sold
Skin (6% of fish weight) mealed/oil extracted or dumped
Guts mealed/oil extracted or dumped, some swim bladders dried but mostly mealed or dumped (5% of fish weight)
Trimmings (5% of fish weight) minced block, mealed or dumped

“There is industry awareness of the potential to use the whole fish, some boutique players playing with some byproducts, but no proper commercialisation of the opportunities” (pers. comm. 2012).
Iceland currently utilises 97% of the fish. Development of own technology (superchilling) increased fillet yields by 10-15%. Heads dried and sold to Nigeria. Backbones dried and sold to Nigeria. Guts dumped (4%). Swim bladder dried. Gelatin extracted from skin and swim bladder for use in a wide range of food products. Trimmings are minced into fish Nuggets. 100% utilisation of liver and roe. Nigeria buys dried heads for FOB US $5.50/kg and frames/bones for US $2.50/kg.
Advanced derivatives: aims to create new industries using 100% of the fish

- Canned fish liver products
- Fish liver oil
- Enzymes used for natural fish flavourings
- Roe, caviar and spreads
- Fish leather used by shoe & fashion industry
- Dried products
- Enzymes from the gut used for cosmetics, hygiene & pharmaceutical products
- Beauty collagens (anti-aging products)
- Gelatin pharmaceutical capsules
- Pharmaceutical tissue and nerve-regeneration products
- Hand & foot creams for preventing and treating diabetic ulcers
DISCARDS
Fury over fish dumped at sea

Wellington had no idea his foliage of fish dumping would generate such fury.

The ITM Fishing Show star is passionate about fishing and the health of fish stocks so he was devastation to see tonnes of dead fish floating on the water during a fishing tournament he was hosting in the Hauraki Gulf in November last year.

"The first fish we saw were dead fish floating on the ocean. Among them was an 8kg snapper — what that would have meant to a recreational fisher," he says.

"And there it was, an example of what we've all seen. Thousands of tonnes of fish are trashed like this. It's not normal."

His foliage aired on National and he has been in correspondence with Fisheries about the practice.

He says he is not against commercial fishing and feels the majority are "very hard working, law abiding citizens."

"It's just an issue with bad practice and poor management by the ministry. Dumping has been going on for years."

"What's upsetting people is the lack of enforcement. We have a good system but a good system is worth nothing if there is no enforcement and compliance," he says.

"Well doesn't hold out hope for a quick fix."

"The trouble is that I and other people have reported incidents before and nothing happens. Once I alerted the ministry and said I had footage of them dumping it they did nothing."

He says although nobody likes being a nark, commercial fishers would be doing themselves a favour if they did hold offenders accountable.
Fishing boats ordered to use sea lion exclusion devices

7:42 PM Thursday Sep 5, 2013

Fishing Industry
Ministry for Primary Industries

A diagram of a sea lion exclusion device inside a trawl net. Image / Deepwater Group

An immediate stop to trawling is needed to end a spate of sea lion deaths around the subantarctic Campbell Islands, conservationists say.

Conservation Minister Nick Smith today revealed 16 endangered New Zealand sea lions have been killed in the southern blue whiting fishery in the last few weeks.

He said the deaths were unacceptable, and efforts to protect the marine mammals should be stepped up.
Precision Seafood Harvesting
Catalyst for Change