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Hooked on Longline
Proceedings from a workshop on long-lining in Reykjavik October 19th and 20th 2010

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Summary:
In this report are published presentations held at an international workshop in Reykjavik on various aspects of longline fishing. Issues related to market conditions, different technological aspects regarding gear technology and handling of fish, profitability in fishing operations and fish processing as well as aspects of the management were presented. There are also proposals for follow-up of contributions from the participants.

Norsk sammendrag:
I denne rapporten publiseres presentasjoner holdt på en internasjonal workshop i Reykjavik om ulike aspekter ved linefiske. Problemstillinger knyttet til markedssforhold, ulike teknologiske aspekter når det gjelder redskapsteknologi og håndtering av fisk, lønnsomhet på sjø og land samt aspekter ved forvaltning ble presentert. Det legges også fram forslag til oppfølging av innspill fra deltakerne.

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Preface

The workshop “Hooked on Long-line” held in Reykjavik, Iceland October 19th and 20th 2010 was a result of cooperation between Faroese, Icelandic and Norwegian scientific institutions. The idea behind the workshop was that the scientific community as well as businesses involved in long-lining, ranging from the fishing fleet to retailers as well as ship builders and suppliers of all kinds of gear and equipment would benefit from international cooperation.

The fishing industry using longline has many positive aspects as well as a wide range of research and development (R&D) challenges. Longline is used worldwide and has adapted to local fish stocks, economy and traditions. It is energy efficient compared to other fishing methods and longline caught fish is often of high quality. Longline avoids both ghost fishing and damage to the sea bed. Thus, the fish processing industry often prefers longline caught fish, which is also of higher value in certain consumer markets.

However, higher costs, lower catch efficiency and the use of expensive bait are associated with longline as are problems with size and species selectivity and unwanted bycatch.

The workshop’s program was composed to address the spectrum of challenges that face the industry and its suppliers. In its nature an industry approach is multi disciplinary and so are the program and the presentations, as well as the suggestions for further work presented in this report.

The cooperation was made possible by funding from different sources and willing and well prepared lecturers. We like to thank the lecturers for their contributions as well as the following funding bodies:

- NORA: Nordisk Atlantsamarbejde, Torshavn, Faroe Islands
- Havstovan: Faroe Marine Research Institute
- LU: The Executive Committee for Northern Norway, Bodø, Norway. (Landselsutvalget for Nord-Norge)

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1 Why a workshop on longline?

There are many reasons why the parties involved in the cooperation want to establish a multidisciplinary international network aimed at R&D on long-lining. In the initial phase this initiative was strictly Nordic, but we chose to include participants from both sides of the North-Atlantic Ocean, for several good reasons, including:

- Similarity of fisheries, culture and challenges
- Opportunities to transfer knowledge and practices between countries and branches of science.
- Great potential in longline fisheries based on:
  - Energy efficiency.
  - Environmental friendliness.
  - High quality fish with additional potential for adding value through the processing chain.
  - Increased profitability through increased catch efficiency and improved handling of fish.
  - Manipulation of gear parameters such as bait type, hook shape, snood configuration, season and rigging (pelagic versus demersal) to influence size and species selectivity.

Based on the statements listed above the planning committee’s intentions were to put together a program that shed light on the status of the present and coming challenges related to longline and long line caught fish. Hence, we invited representatives from different businesses directly and indirectly involved as well as representatives from the scientific community. The expectation was that the presentations would give an overview of current knowledge and inspire new research and development projects and international cooperation in:

- Economics, business strategies and marketing
- Technology and fish handling
- Management
2 Short summary

A short summary of points and conclusions from the lectures is presented below. The intention was not to give exact minutes, but rather to highlight some interesting points and conclusions. The lectures are presented in Chapters 0 to 21.

2.1 Different market aspects for long line caught fish in some European markets

It is argued that longline caught fish has higher quality than fish caught on other gears and the fishing method is also claimed to be sustainable. These attributes are discussed in several lectures. It is a consensus amongst Icelandic (see Chapter 13 and 14), Faroese (see Chapter 15) and Norwegian (see Chapter 5) fish processors and fish exporters that long line caught fish normally has the best quality. This positive attribute is recognised throughout the value chain and explains the demand in the market for fresh fish as well as for salted fish.

Although the sustainability of longlining is used in advertising, a relatively small portion of the consumers (about 10% in the UK market) act on this information. Consumers trust the supermarkets to give them value for money and supermarkets are in turn under strong pressure from NGOs to supply only fish harvested sustainably (see Chapter 4). However, in the business to business market for fish, quality is still the primary selling point. This emphasis on quality is true for fresh fillets from Iceland and Norway (see Chapters 5 and 13) and salted fish from Iceland and the Faroese Islands (see Chapter 14 and 16).

Rising consumer attention to environmental issues, especially in the UK, German and Swedish markets, already has a small but significant impact on consumer behaviour. This impact might become stronger and could give the longline industry an advantage. As shown in a case study of the Norwegian auto line fleet involving Life Cycle Analysis (LCA) the main contributor to carbon footprint in the seafood industry is fuel consumption in the catch operation. Compared to alternative gears like bottom trawling, auto lining of longlines consumes less fuel and consumption when coastal long lining is even lower. This information, combined with additional information about environmental impacts, is actively used by a Norwegian firm further along the value chain in marketing (see Chapter 7). If the industry chooses to increase the use of the advantages of longline caught fish in marketing, one of the elements in such a strategy should be traceability (see Chapter 6).

2.2 Technology and fish handling

The basic longline design has centuries of history – nevertheless, major technological development in general gear parameters (main line, snoods, hooks, swivels), automation of hauling and baiting operations as well as in vessel design, fish finding, navigation and communication, has occurred. The next generation, further mechanised systems are under development. Several systems are on the market, varying in the degree of automation and the dependence on shore based operations. Systems are also available for smaller coastal vessels. However, more R&D effort is needed to develop smaller and more flexible systems with special attention to automating the onshore hand baiting process (see Chapter 8 and 10).
The most technically advanced systems disconnect the snoods from the mainline, store hooks and snoods in separate magazines and use drum spools to store the mainline. This system makes multiple choices possible in material and dimensions of mainline (including monofilament), snood material, and setting method. Catch rates with these systems are promising and typically higher than with traditional autoline. The gear can easily be adapted according to season, target species, depth and other conditions, much like hand baited longlines (see Chapter 10).

Specifications for modern vessel designs for longliners will vary a great deal depending on vessel size, fishing grounds (inshore or offshore), fish preservation (fresh or frozen), fishing method (automatic or hand-baited), propulsion and flexibility in choice of alternative gears. Offshore ship owners have paid special attention to reducing the very heavy workload of the crew, with special focus on their environmental health and safety (see Chapter 8 and 9). Designs for the less specialised coastal fleet require a greater flexibility to make changing to other gears time and cost efficient. The great variations in conditions and specifications will lead to a variety of design solutions including automatic hauling systems, diesel electric propulsion, varying degrees of automation and one or more hulls.

Improving fish quality can be achieved by different technological innovations or by building in quality handling procedures in the overall vessel design as well as in the fish deck design. Results from tests of hauling wells (moonpool and AHL\textsuperscript{8}) show several improvements compared to traditional hauling methods, including improved fish quality due to reduced gaff marks in fillets and increased catch rates and reduced unaccounted mortality due to reduced loss of fish in the hauling process. The most important improvement is increased safety and welfare for crew in rough weather from hauler rooms closed off from exposure to weather (see Chapter 9).

The important parameters when designing fish handling equipment are to ensure bleeding in water within minutes after the fish comes onboard and also to start the chilling process as soon as possible, as well as to store fish onboard in temperatures around -1 degree Celsius. These parameters result in a white fillet or salted fish, with reduced gapping thus providing the processing industry very good raw material. To monitor and secure quality through the value chain, traceability and data management systems can be used (see Chapter 11). By combining electronic logbooks, monitoring systems, reporting and communication systems, new opportunities are available to analyse, plan and manage both fish processing through the value chain as well as fishing operations. Combining these sources with historical data including geographical and seasonal variation in parameters influencing catch rates for different targeted species and fillet yield provides the industry with powerful new tools to plan fishing operations according to market demands (see Chapter 11 and 12).

2.3 Business and economy

Section 2.1 established that fish caught on longline have high standing in the market because of their quality. The industry is able to market a well bled (hence white) fish with longer shelf life and reduced waste compared to other fishing methods. Icelandic, Faroese and Norwegian firms have business strategies based on longline caught fish. However fish

\textsuperscript{8} Automatic Longline Hauler system
quality alone is not sufficient to ensure earnings and value. Integrated production and marketing strategies supported by more or less well developed traceability systems seems to be the common strategic choice across vessel ownership (see Chapters 5, 7, 13, 14 and 15). A vertically integrated company showed interesting examples of integration of electronic systems with production and market planning (see Chapter 14). The fish processing firms sharing their experiences at the workshop all emphasized that they had competitive advantages in their markets based on reliably high quality.

Earnings in longline vessels vary between vessel sizes and countries. The inshore Norwegian fishing fleet is reduced in numbers due to management policy; higher costs compared to alternative gears have reduced the inshore longline fleet's shares of the catch of important species (see Chapter 5). The important parameters to improve earnings are the same in all longline vessels. Analyses presented showed that increasing catch efficiency by increasing catch rates per hook and number of hooks set, and controlling costs, particularly for bait, are most important to improve profitability. This conclusion was confirmed by attending skippers and future R&D development aimed at bait development as well as other means for increasing efficiency and reducing cost was also emphasised (see Chapters 14 and 19).

The Greenland longline fishery is very different from Icelandic, Faroese and Norwegian fisheries. The main target species is Greenland halibut and use of smaller open boats are common. Less than 15 Greenlandic vessels are equipped with modern autoline systems. In northern areas, with solid ice during winter, longline is set from sledges using a “sliding wing”. Important R&D tasks for this fleet include developing abundant polar cod as bait; development/adjustment of mechanised baiting systems for polar cod is one necessary step (see Chapter 16).

2.4 Management

Longlining, compared to alternative fishing methods like trawl and gillnet, scores best by most responsible fisheries criteria. However, this superiority is not the case in all longline fisheries around the world. Bycatch of seabirds, marine mammals, reptiles (turtles), sharks (elasmobranchs) and negative impact on vulnerable marine ecosystems are problems in some fisheries. In these, room for further improvement clearly exists both in mitigation measures and in management regimes. In the North-Atlantic longline fisheries efficient mitigation measures have been developed to nearly eliminate bycatch of seabirds (mostly northern fulmar), the only serious bycatch issue in these fisheries. Bird deterrents also have a significant potential to increase catches by reducing loss of bait to bird predation during setting. Therefore, industry has an additional incentive to put these devices to use (see Chapters 18 and 19).

Quota allocation and management also affect the industry’s earnings. Although the main objectives of policies are often the same - responsible and sustainable fisheries - management systems differ. In the Norwegian and Icelandic management systems, quotas

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9 Increasing catch rates and selectivity and reducing costs. Reducing use of valuable fish and development of artificial bait
10 Bird-scaring line is the most efficient (see www.birdlife.org for factsheets on mitigation measures)
are allocated to vessels and fleet profitability is ensured by governmental structuring of the fleet. Although the systems differ, the Icelandic system is mainly an ITQ\textsuperscript{11} system, while in the Norwegian system, a wider spectrum of regulatory instruments is used to adjust overall fishing fleet size to available stocks (see Chapters 14 and 17). The fishing day system used in the Faroese fisheries is different from the quota allocation systems in Norwegian and Icelandic fisheries. The Faroese system is believed to offer a very good solution to the discard problems in a multi species fishery, but seems to be less effective when adjusting fishing effort to the actual stock situation (see Chapter 17).

Governments also can emphasize aspects other than stock management such as responsible fishing and overall fishing fleet profitability when implementing regulatory measures. Socio-economic aspects such as maintenance of rural fishing communities and regional and income distribution are often taken into account. These considerations are common in Norway, Iceland and the Faroese Islands where different tactics to stimulate longlining in the coastal fishing fleet were developed\textsuperscript{12} (see Chapters 17 and 20).

\section*{2.5 Feedback from representatives from the industry and scientists}

After each session and at the end of the workshop the audience were given the opportunity to comment and give feedback on the lectures. In addition the program committee had further discussions. In the following section a summary of these discussions is presented.

It is obvious that the quality of line caught fish has good standing in different markets and the longline industry also argue convincingly that it contributes to responsible fishing. However, the industry has high costs and developing more cost efficient operations requires R&D. Both factors suggest that the industry should benefit from an international strategic cooperation that includes the scientific community. Representatives from the industry gave positive response to the idea of further cooperation, but did not identify who should lead the necessary initiatives, nor define the scope of a possible initiative.

Scientists at the workshop and in the planning committee discussed an international multidisciplinary scientific network. Geographically, a network should include countries around the North-Atlantic, and subjects should include all essential factors concerning longlining. Initiatives will be taken to fund such a network through traditional sources. The longline network should be aimed at sharing knowledge and generating ideas for international R&D projects and could be assisted by reference groups from the industry.

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{11} Individual Transferable Quotas
\item \textsuperscript{12} Quota bonus, bycatch quotas, allocation of quotas, bait supply, allocation of fishing days
\end{itemize}
\end{footnotesize}
The planning committee also suggested two projects that should be planned, funded and started first:

A benchmarking project comparing the situation in the long lining industry in the participating countries, comparing:

- Fleet efficiency
  - Fleet groups
    - Catch per hook
    - Size and species selectivity
- Macroeconomic parameters
  - Revenues
  - Cost
  - Profits
- “Bottlenecks”
- Raw material quality
  - Proportions of fish to high value products
  - Vessel size

A bait development project:

- Preliminary study
  - Review paper
  - Planning international cooperation
- International cooperation on bait development to:
  - Reduce the use of valuable baitfish
  - Increase size and species selectivity
  - Reduce costs

Other areas suitable for international cooperation were also discussed such as:

- Relationship between price and quality
- Increasing catch per hook
- More hooks in water or/and more catch per hook
- More cost efficient vessels
- Preserving fish quality
- New or improved methods for fish handling
- Better educated fishermen or improving pride in profession
- Improving fishing crew working conditions
Faroese, Icelandic and Norwegian scientific institutions organize a workshop in Reykjavík to discuss the challenges facing longline fisheries. Representatives from governments, businesses, NGOs and other stakeholders as well as from the scientific community are invited.
Workshop on longlining

Longlining is used worldwide and has adapted to local fish stocks, economy and traditions. Longlining is energy efficient compared to other fishing methods and longline-caught fish is often of high quality. Longlining avoids both ghost fishing and damages to the sea bed. Thus, the fish processing industry often prefers longline-caught fish, which is also of higher value in certain consumer markets.

However, higher costs, lower catch efficiency and the use of expensive bait are associated with longlining as are problems with size and species selectivity and unwanted by-catch.

Further development of longlining is of interest, both for governments and the industry. Therefore, Faroese, Icelandic and Norwegian scientific institutions invite to a workshop in Reykjavík to address the challenges facing longline fisheries.

The objective is to channel information from the participants to the scientific community on the potential problems to address in future research and development projects. Also, an international association of interested parties will be formed.

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http://www.fosshotel.is/en/hotel/reykjavik_hotels.php
Ask for our special offer!

The workshop is financed by:
Program: Tuesday October 19th
Chair all sessions: Mike Pol, Department of Fish and Game; Mass.,
Opening session: 08:30 – 11:15

Why a workshop on longlining?
Edgar Henriksen, Nofima Market, Norway

The UK seafood market: where does longline-caught fish fit in?
Phil McMullen, Seafish, UK

What is so good about longline-caught fish?
Terje Kjølsøy, Ålesundfisk AS, Norway

Documentation of quality and environment issues – is that useful?
Kine Mari Karlsen, Nofima Market, Norway

From Seafloor to Consumer- a value chain project for longline fishing.
Bjørn Tore Rotabakk, Nofima Mat, Norway

Discussion

Technology and fish handling: 12:00 – 16:00

What do we need to know to design the next generation longline vessels.
Lasse Rindahl, SINTEF, Norway

Development of new hauling systems.
Roger Larsen, BFE, University of Tromsø, Norway

Challenges in further development of autoline.
Christian H. Engh, Mustad Longline, Norway

Challenges in designing systems for fish handling preserving quality and value through the value chain.
Sveinn Margeirsson, Matís, Iceland

How can IT improve the fleets over all efficiency?
Kolbeinn Gunnarsson, Trackwell, Iceland

Discussion
Is there a potential for improved earnings in the longline fleet and the value chain by marketing of the qualities of longline-caught fish?
Svavar Þór Guðmundsson, Sæmark Seafoods Ltd., Iceland

Optimizing profitability in the longline fleet. Which are the important parameters?
Erla Ósk Pétursdóttir – Visir hf, Iceland

Longline-caught fish in the Faroese fishing industry.
Páll Gregersen, P/F PRG Export, Faroe Islands

Challenges in developing a longline fishery in Greenland.
Alfred E.R. Jacobsen, KNAPG, Greenland

Discussion

Strength and weaknesses in the Faroese fishing days system in relation to boat owners economy.
Viberg Sørensen, the Faroese shipowners´ association.

Management regimes for fisheries with respect to efficiency and responsible fishing.
Dominic Rihan, Ireland, ICES working group on fisheries technology and fish behavior.

Importance of gear and bait parameters on catch rates and size and species selectivity?
Svein Løkkeborg, Institute of Marine Research, Norway

What are the effects of stimulating longline fisheries with special reference to
Summing up and closing: 14:15 – 15:30
4 Why a workshop on longlining?

Edgar Henriksen, Nofima Market, Norway

Our challenges

- Long-line caught fish is popular
- But has a higher cost, is less selective and has unwanted by-catch
- And needs international cooperation to increase R&D
- Hence - an international workshop
- To get input from the industry and form an international research network
Long-line caught fish is popular

- High quality fish
  - High quality and better yield in processing
  - A wide range of products with longer shelf life
  - In some markets caught by hook seems to add value.
- Environmentally friendly
  - Energy efficient partly due to valuable by catch
  - No ghost fishing and no damages to the sea bed
- Socioeconomically favourable
  - High activity on shore
  - Labour intensive
  - More by catch and longer seasons

But has higher cost, is less selective and has unwanted by-catch.

- A need and a potential to increase fleet efficiency and profitability
  - Improved catch rates and more hooks per trip
  - Reduced costs
  - Increased marketed value
- A need to influence size and species selectivity
  - Improvement of vessel profitability
    - Value of catch
    - Avoid overfishing quotas
- A better understanding of how management regimes should handle fishing with long-line.
And needs international cooperation to increase R&D

- Increased consumer popularity creates new challenges
  - Improvement of methods and documentation of environmental friendliness
  - A need to better understand market preferences
- Increased efficiency of the long-line fleet
  - Improvement of all gear parameters and fish handling
  - Autonomous systems also for smaller vessels
  - Efficiency of onshore baiting operations
  - Health and Safety
- Development of management models that support certain fishing methods
  - Environmentally friendly
  - Positive socioeconomic effects
  - Positive effects further up the value chain

Hence - an international workshop

- Idea "born" in Tromsø
  - Very easily sold to Iceland and the Faroe Islands.
- A common understanding that we very often share the same challenges
  - Similar stocks, markets and cultures
    - Around the North-Atlantic
  - Same technology
- Sharing of knowledge and common bigger R&D projects
  - "Profitable" for all
  - Cooperation to put together larger programs
To get input from the industry and form an international research network

- We think that we can benefit from broader cooperation
  - A multidisciplinary network aimed at the challenges facing long-lining (in the North-Atlantic)
    - The program reflects our understanding of the interesting topics
    - How should a network be organised?
    - And financed??
- Cooperation is always an appealing idea, but
  - Needs specific and fundable bigger projects
  - Interested parties and reasonable funding
    - From more than one source
- Our challenge to the industry
  - Are we presenting the most interesting topics
  - What are the most urgent topics we should address
4  The UK seafood market: where does longline-caught fish fit in?

Philip MacMullen, Seafish, UK
changing times

```
market expectations

IUU  legal  responsible  sustainable

market-based risk assessment
```
The magic ‘S’ word
How many consumers know about sustainability?

75% of consumers are familiar with sustainability in regards to food

How many act on this knowledge?

22% think more and change the products they purchase

Who wants sustainable seafood?

- Seafood Choices Alliance: 75-80%
- consumers who act: ~10%

MSC recognition?

- recent MSC claim: 25%
- reality: ~10%
Salmon?

Line-caught?
line-caught?

what does the chilled supply chain look like for consumers?

Caught at sea ➔ Docked ➔ Sent to store & filleted

“...comes off the boat and goes straight to the store in refrigerated lorries.”

“When you think about it, how does the overseas fish get here fresh?”

> When prompted to think about the ‘fresh’ supply chain, respondents got very confused and concerned
lack of awareness of the supply chain

"I don't like thinking about any of that for any of my food"

"I have never really thought about it"

"Frozen fish - I wouldn't have a clue where that came from"

"The only thing I know is that fishermen don't get it on a Monday do they?"

supporting the seafood industry for a sustainable, profitable future

where do consumers place their trust?

I don’t understand what I could do.

The supermarkets must check these things

Surely it wouldn’t be on the shelf if it wasn’t ok to buy

Why should I worry about it?

supporting the seafood industry for a sustainable, profitable future
changing times

market-based risk assessment

IUU legal responsible sustainable

CSR/Investors, agencies, eNGOs, etc

So, who is in the driving seat?
- the large retailers
what do they want?

• value for money for consumers
  (= low prices & margins)
• increasingly high product specification
• maximum shelf life to reduce waste
• certification and supply chain audit
• complete traceability

All as conditions of supply
- and what do you offer?

- niche product
- top quality
- low bycatch and discards
- low environmental impact
- low energy use

- and what do you offer?

- niche product
- top quality
- low bycatch and discards
- low environmental impact
- low energy use

do you? can you prove it?
threats to reputation & market strength

- niche product
  - for how long?
  - demand is finite
  - what if supply increases?
- top quality
- low bycatch and discards
- low environmental impact
- low energy use

threats to reputation & market strength

- niche product
- top quality
  - handling and icing
  - temperature & time records (shelf life)
  - full traceability
  - complex supply chain, feature fishermen
- low bycatch and discards
- low environmental impact
- low energy use
threats to reputation & market strength

- niche product
- top quality
- low bycatch and discards
  - need to benchmark?
  - agree protocols for birds and turtles
  - keep records
- low environmental impact
- low energy use
threats to reputation & market strength

- niche product
- top quality
- low bycatch and discards
- low environmental impact
  - ? check
- low energy use

---

threats to reputation & market strength

- niche product
- top quality
- low bycatch and discards
- low environmental impact
- low energy use
  - not just diesel
  - full life cycle analysis
  - processing & transport
  - bait
typical supply chains to the UK...

![Bar chart showing GHG emissions (t CO2 eq.)](chart.png)

threats to reputation & market strength

- niche product
- top quality
- low bycatch and discards
- low environmental impact
- low energy use
conclusions

- currently enjoy strong position – work together to maintain it
- focus on quality – record it, demonstrate it
- agree handling protocols
- adopt conservation protocols
- increase retail shelf life
- niche identity – co-operate and use smart marketing
- improve traceability

**do not be complacent!**
5 What is so good about longline-caught fish?

Terje Kjølsøy, Ålesundfisk AS, Norway

LONGLINE QUALITY - ADVANTAGES

Why Long lining?

- Freshness upon landing, 1-24 hrs
- Optimal handling of the fish (bleeding, gutting, etc)
- Year around fishing possible
- Maximum product mix in production (HVP)
- Environmentally friendly fishing (seabed, etc)
- Market demand
Long lining

- Long lining is no guarantee for 100% good quality – quality can be ruined in every type of fishery
- But the conditions for delivering the best quality is there

Quality:
- Freshness (shelf life in the fresh value chain)
- Proper gutting, bleeding and cleaning
- Stable quality / homogenous (less waste)
- Gaping and texture (maximum high value products)
- Skin colour (for shiny packed fish)

Long lining

- Many forms of long lining
- Automatic longliners – fresh 1-3 days old rawmaterial, or frozen
- Smaller longliners – normally day boats

- Pelagic long line
- Bottom long line
- Vertical longline (påleline)
Bad workmanship can happen everywhere

Other fishing methods

- Trawl
- Purse seine
- Gill net
Other fishing methods

- Most fishing methods can deliver good quality
- However, some methods have more challenges in order to reach optimal – and stable – quality

**Important factors:**
- Age of raw material when landed
- Time of fishing (season, capelin/herring/spawning)
- The bleeding of the fish
- The gutting and cleanliness of the fish
- The gaping of the fish (many factors that influence this)

- In Norway the general quality of a large volume proportion of the fish landed is too poor to develop the fresh market in any large extent (on top of what is already developed)
What does this mean in economical terms?
Definitions

Grade 1 Grade 2 Grade 3

Comparison - good and bad quality

<table>
<thead>
<tr>
<th>HADDOCK, WHOLE FILLETS</th>
<th>Quality 1</th>
<th>Quality 2</th>
<th>Quality 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw material price 1st hand</td>
<td>kr 11.00</td>
<td>kr 5.50</td>
<td>kr 7.50</td>
</tr>
<tr>
<td>Value</td>
<td>80%</td>
<td>47%</td>
<td>45%</td>
</tr>
<tr>
<td>Raw material cost</td>
<td>kr 22.00</td>
<td>kr 16.50</td>
<td>kr 16.67</td>
</tr>
<tr>
<td>Labour cost</td>
<td>kr 6.00</td>
<td>kr 8.60</td>
<td>kr 0.00</td>
</tr>
<tr>
<td>Packaging material etc</td>
<td>kr 1.50</td>
<td>kr 1.50</td>
<td>kr 1.20</td>
</tr>
<tr>
<td>Other fixed costs</td>
<td>kr 4.00</td>
<td>kr 4.00</td>
<td>kr 5.00</td>
</tr>
<tr>
<td>Cost price</td>
<td>kr 32.50</td>
<td>kr 30.69</td>
<td>kr 30.87</td>
</tr>
</tbody>
</table>

Quality 1: No gaping and freshly landed
Quality 2: Partially gaping
Quality 3: Extensive gaping

<table>
<thead>
<tr>
<th>HADDOCK production mix</th>
<th>Quality 1</th>
<th>Quality 2</th>
<th>Quality 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1 fillets</td>
<td>98%</td>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td>Grade 2 fillets</td>
<td>2%</td>
<td>50%</td>
<td>45%</td>
</tr>
<tr>
<td>Grade 3 fillets</td>
<td>0%</td>
<td>20%</td>
<td>88%</td>
</tr>
</tbody>
</table>
## Haddock, prices whole fillets

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>kr 35.00</td>
</tr>
<tr>
<td>Grade 2</td>
<td>kr 29.00</td>
</tr>
<tr>
<td>Grade 3</td>
<td>kr 26.00</td>
</tr>
</tbody>
</table>

## Haddock

<table>
<thead>
<tr>
<th>Quality</th>
<th>Quality 1</th>
<th>Quality 2</th>
<th>Quality 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated sales price achieved</td>
<td>kr 37.62</td>
<td>kr 30.90</td>
<td>kr 26.80</td>
</tr>
<tr>
<td>- Cost price in production</td>
<td>kr 32.60</td>
<td>kr 30.09</td>
<td>kr 30.67</td>
</tr>
<tr>
<td>Estimated margin</td>
<td>kr 6.02</td>
<td>kr 0.81</td>
<td>(4.07%)</td>
</tr>
</tbody>
</table>

## Haddock - Loin & Blocks

<table>
<thead>
<tr>
<th>Quality</th>
<th>Quality 1</th>
<th>Quality 2</th>
<th>Quality 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw material price 1st hand</td>
<td>kr 11.00</td>
<td>kr 8.50</td>
<td>kr 7.50</td>
</tr>
<tr>
<td>Yield</td>
<td>45 %</td>
<td>43 %</td>
<td>41 %</td>
</tr>
<tr>
<td>Raw material cost</td>
<td>kr 24.44</td>
<td>kr 19.77</td>
<td>kr 16.20</td>
</tr>
<tr>
<td>Labour cost</td>
<td>kr 6.50</td>
<td>kr 6.00</td>
<td>kr 6.00</td>
</tr>
<tr>
<td>Packaging material, etc.</td>
<td>kr 2.00</td>
<td>kr 2.00</td>
<td>kr 2.00</td>
</tr>
<tr>
<td>Other fixed costs</td>
<td>kr 4.00</td>
<td>kr 4.00</td>
<td>kr 5.00</td>
</tr>
<tr>
<td>Cost price</td>
<td>kr 36.64</td>
<td>kr 33.77</td>
<td>kr 33.49</td>
</tr>
</tbody>
</table>

## Haddock, production mix

<table>
<thead>
<tr>
<th>Quality</th>
<th>Quality 1</th>
<th>Quality 2</th>
<th>Quality 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loin</td>
<td>45 %</td>
<td>25 %</td>
<td>5 %</td>
</tr>
<tr>
<td>Block</td>
<td>47 %</td>
<td>67 %</td>
<td>87 %</td>
</tr>
<tr>
<td>Pinbone</td>
<td>0 %</td>
<td>0 %</td>
<td>0 %</td>
</tr>
</tbody>
</table>
### Haddock, prices loins and blocks

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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</thead>
<tbody>
<tr>
<td>Loins</td>
<td>kr 70.00</td>
</tr>
<tr>
<td>Blocks</td>
<td>kr 30.00</td>
</tr>
<tr>
<td>Pinbone</td>
<td>kr 12.00</td>
</tr>
</tbody>
</table>

### Haddock

<table>
<thead>
<tr>
<th>Quality</th>
<th>Price 1</th>
<th>Price 2</th>
<th>Price 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kr 46.66</td>
<td>kr 36.66</td>
<td>kr 30.56</td>
</tr>
<tr>
<td>COG - CoP</td>
<td>kr 26.64</td>
<td>kr 23.77</td>
<td>kr 22.49</td>
</tr>
<tr>
<td>Estimated margin</td>
<td>kr 9.62</td>
<td>kr 4.79</td>
<td></td>
</tr>
</tbody>
</table>

### COD - Loins and Block 3

<table>
<thead>
<tr>
<th>Quality</th>
<th>Price 1</th>
<th>Price 2</th>
<th>Price 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield</td>
<td>58%</td>
<td>62%</td>
<td>60%</td>
</tr>
<tr>
<td>Raw material price 1st hand</td>
<td>kr 17.00</td>
<td>kr 17.00</td>
<td>kr 17.00</td>
</tr>
<tr>
<td>Labour cost</td>
<td>kr 30.91</td>
<td>kr 32.08</td>
<td>kr 34.00</td>
</tr>
<tr>
<td>Packaging material, etc</td>
<td>kr 6.00</td>
<td>kr 7.00</td>
<td>kr 8.00</td>
</tr>
<tr>
<td>Other fixed costs</td>
<td>kr 2.00</td>
<td>kr 2.00</td>
<td>kr 1.20</td>
</tr>
<tr>
<td>Costrice</td>
<td>kr 42.91</td>
<td>kr 45.08</td>
<td>kr 48.20</td>
</tr>
</tbody>
</table>

### COD, production mix

<table>
<thead>
<tr>
<th>Quality</th>
<th>Quality 1</th>
<th>Quality 2</th>
<th>Quality 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loins</td>
<td>30%</td>
<td>25%</td>
<td>15%</td>
</tr>
<tr>
<td>Block</td>
<td>42%</td>
<td>72%</td>
<td>82%</td>
</tr>
<tr>
<td>Pinbone</td>
<td>8%</td>
<td>5%</td>
<td>8%</td>
</tr>
<tr>
<td>COD prices loins and blocks</td>
<td>Price</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loins</td>
<td>kr 90.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blocks</td>
<td>kr 32.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pinbone</td>
<td>kr 12.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COD</th>
<th>Quality 1</th>
<th>Quality 2</th>
<th>Quality 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimated sales price achieved</td>
<td>kr 56.40</td>
<td>kr 42.00</td>
</tr>
<tr>
<td></td>
<td>- cost/price in production</td>
<td>kr 42.91</td>
<td>kr 45.08</td>
</tr>
<tr>
<td></td>
<td>Estimated margin</td>
<td>kr 13.49</td>
<td>kr 0.92</td>
</tr>
</tbody>
</table>

**Comments**

- The quality of the raw material is of essential importance for the economical result.
- Lower raw material price for lesser quality will very seldom/never compensate for higher costs and loss of HVP%.
- Bad quality will lead to more labour cost going into the product. Less volume through the plant to cover fixed overheads - and combined with lower average sales price this is three factors leading to disaster.
- In some markets/segments there is a demand for long-line fish specifically. This is often due to the “green factor” more than quality specifically.
- Further development of the fresh markets (consumer packs) demands a stable and high quality with maximum remaining shelf life.
- Much of the products sent to the markets today are of inferior quality.
- Long line quality (and hand jig – good purse seine) quality is needed to develop the fresh market in the future.
FLEET DEVELOPMENT IN NORWAY

- Substantial changes in the fleet structure in Norway
- The changes done at sea impacts the on-shore industry structure to a high degree

Main factors:
- Fewer and larger vessels
- Increased volume of frozen H&G and less fresh landings
- Main focus on cod — with haddock and other species as a “by catch”
- 75% of the cod quota landed by end May
- With little or no cod quota left, the vessels are unable to conduct a haddock fishery for the rest of the year

Change in fleet structure 1995 – 2010

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 10 m</td>
<td>10872</td>
<td>9688</td>
<td>4822</td>
<td>3674</td>
<td>-7198</td>
<td>-66 %</td>
</tr>
<tr>
<td>10-15 m</td>
<td>363</td>
<td>333</td>
<td>835</td>
<td>760</td>
<td>-229</td>
<td>-22 %</td>
</tr>
<tr>
<td>15-20 m</td>
<td>551</td>
<td>503</td>
<td>333</td>
<td>218</td>
<td>-373</td>
<td>-42 %</td>
</tr>
<tr>
<td>20-25 m</td>
<td>181</td>
<td>239</td>
<td>247</td>
<td>191</td>
<td>0</td>
<td>4 %</td>
</tr>
<tr>
<td>25+ m</td>
<td>372</td>
<td>365</td>
<td>240</td>
<td>206</td>
<td>-107</td>
<td>-37 %</td>
</tr>
</tbody>
</table>
# Total Income

<table>
<thead>
<tr>
<th>Item</th>
<th>2007</th>
<th>2008</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,774,115</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raw</td>
<td>1,575,517</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production (fisheries sales and others)</td>
<td>40,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structure tax</td>
<td>2,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Licence</td>
<td>3,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personnel expenses</td>
<td>2,387</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salt, sell, etc</td>
<td>9,985</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social expenditure</td>
<td>4,780</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance (vehicle)</td>
<td>50,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other insurances</td>
<td>5,900</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>45,703</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishing por</td>
<td>36,667</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hide costs</td>
<td>170,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserve</td>
<td>18,702</td>
<td></td>
<td></td>
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<tr>
<td>Defence</td>
<td>50,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation vessel</td>
<td>126,917</td>
<td></td>
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</tr>
<tr>
<td>Depreciation fishing license</td>
<td>16,124</td>
<td></td>
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</tr>
<tr>
<td><strong>SUMMARY OF DIRECT EXPENSES</strong></td>
<td><strong>1,651,735</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RESULT FROM OPERATIONS</strong></td>
<td><strong>112,380</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total finance</strong></td>
<td>-116,962</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PRES TAX &amp; SUBS</strong></td>
<td>870</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Profit before corporation tax</strong></td>
<td><strong>0.00%</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### Average Economical results in the fishing fleet 2007-2008

<table>
<thead>
<tr>
<th>Size Class</th>
<th>TOTAL INCOME</th>
<th>TOTAL EXPENSES</th>
<th>RESULT FROM OPERATIONS</th>
<th>RESULT FOR TAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10 m</td>
<td>79,000</td>
<td>50,000</td>
<td>29,000</td>
<td>22,300</td>
</tr>
<tr>
<td>11-25 m</td>
<td>299,000</td>
<td>159,000</td>
<td>140,000</td>
<td>107,300</td>
</tr>
<tr>
<td>26-50 m</td>
<td>1,079,000</td>
<td>510,000</td>
<td>569,000</td>
<td>457,300</td>
</tr>
<tr>
<td>51-100 m</td>
<td>3,053,000</td>
<td>1,312,000</td>
<td>1,741,000</td>
<td>1,367,300</td>
</tr>
<tr>
<td>101-200 m</td>
<td>3,763,000</td>
<td>8,624,000</td>
<td>7,861,000</td>
<td>6,194,000</td>
</tr>
<tr>
<td>201+ m</td>
<td>11,380,000</td>
<td>18,300,000</td>
<td>9,920,000</td>
<td>7,600,000</td>
</tr>
</tbody>
</table>

---

**Note:** The above tables represent the average economical results in the fishing fleet from 2007 to 2008.
Background

- Napp is located in the western part of Lofoten
- A traditional Long Line harbour
- Surrounding harbours (Sund, Ramberg, Ballstad, Raine, etc.) are all typical long line locations
- There is a need to establish a more “nonseasonal” fishing pattern
- The Napp-project is a cooperation between Aalesundfisk and Marine Fresh

The fresh market has the last 5 years consisted of 2 main product forms

- Standard fresh products
- Chilled (defrosted) products (in some markets 65%+ of the fresh sales are from chilled)

- The chilled products are solving most of the logistical challenges the standard fresh products have.
- In addition it offers a stable/secure quality and price
- The standard fresh products are variable in quality and supply and the end customers need to buy many days before they know what they have on order from the retailers
- The Superfresh concept offers a stable and high quality in a more predictable supply and will be a third option for quality focused customers
Main objective

- Supply of "Superfresh" products – based on the best available raw material from Cod, Saithe and Haddock fisheries
- Develop a "non seasonal" supply pattern
- Sustainable sourcing – based on MSC approved fisheries and environmental friendly harvesting (long line, hand jigg mainly)
- Market adapted products – fillets & portions
- Cost efficient production

Category development

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>Products</th>
<th>Attributes</th>
<th>Competition</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPER FRESH</td>
<td>Superfresh (max 12 hrs) fillets and portions</td>
<td>freshness /不变鲜 flexibility, Elimination of meal problems</td>
<td>Few</td>
<td>Few</td>
</tr>
<tr>
<td></td>
<td>Lohr Supreme Tails</td>
<td>Tradability, Stable supply</td>
<td>Few</td>
<td>Limited</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Portion control (size length)</td>
<td>Few</td>
<td>Few</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flaked/poaching/paste</td>
<td>Few</td>
<td>Few</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MAP-ready products</td>
<td>Few</td>
<td>Few</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Harvesting from sustainable MSC sites</td>
<td>Few</td>
<td>Few</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environment-friendly fishing</td>
<td>Few</td>
<td>Long line, hand jigg</td>
</tr>
</tbody>
</table>
### SEASONALITY, NAPP (today)

<table>
<thead>
<tr>
<th>Species</th>
<th>Stock</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cod</td>
<td>Wild</td>
<td>Whole, Hilo</td>
</tr>
<tr>
<td>Haddock</td>
<td>Wild</td>
<td>Whole, Hilo</td>
</tr>
<tr>
<td>Atlantic</td>
<td>Wild</td>
<td>Whole, Hilo</td>
</tr>
<tr>
<td>Catch</td>
<td>Wild</td>
<td>Whole</td>
</tr>
<tr>
<td>Herring</td>
<td>Wild</td>
<td>Whole</td>
</tr>
<tr>
<td>Salmon</td>
<td>Whole</td>
<td>Whole</td>
</tr>
<tr>
<td>Halibut</td>
<td>Wild</td>
<td>Whole</td>
</tr>
<tr>
<td>Greenland Halibut</td>
<td>Wild</td>
<td>Whole</td>
</tr>
<tr>
<td>Hake</td>
<td>Wild</td>
<td>Whole</td>
</tr>
</tbody>
</table>

**MONTHS / AVAILABILITY**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>September</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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### SEASONALITY, NAPP (objective 2011-2012)

<table>
<thead>
<tr>
<th>Species</th>
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<tbody>
<tr>
<td>Cod</td>
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<td>Whole, Hilo</td>
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<td>Whole, Hilo</td>
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<td>Wild</td>
<td>Whole, Hilo</td>
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<td>Halibut</td>
<td>Wild</td>
<td>Whole</td>
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<tr>
<td>Greenland Halibut</td>
<td>Wild</td>
<td>Whole</td>
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<td>Hake</td>
<td>Wild</td>
<td>Whole</td>
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**MONTHS / AVAILABILITY**

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</table>

50
Napp

- Pictures from the harbour and of the plant
- Built in 2004

Napp

- The fleet is mainly consisting of smaller to medium sized longliners and purse seiners
- Most of the vessels deliver every day (day boats) – with fish being from 1 to 10 hrs old
Napp

- The raw material landed from the dayboats is of high quality
- Landed from 1-10 hours after catch!

Napp

- Production starts as soon as raw material is landed (normally at 5-6 pm) and lasts until all raw material for filleting has been produced (2-4 in the morning)
- Top quality raw material processed immediately after landing.
Napp

- Project started in August 2010
- August-December a standard whole fillet line is in operation
- From December a full portioning line is in place for production of Superfresh skinless/boneless portions and loins

With the whole fish in focus!
Summary

- Our objective is to take the best raw material available and produce the fish into market adapted products without further loss of quality.
- We work closely with the fishermen, to adapt and improve the quality continually.
- Developing a stable supply – based on stable and high quality raw material is essential for the development of the fresh white fish sector.
- Alongside with the quality aspects, we combine efficiency with flexibility.
- We develop the Superfresh concept in close cooperation with our main/regular customers.
6 Documentation of quality and environment issues – is that useful?

Kine Mari Karlsen, Nofima Market, Norway

Content

- What is traceability?
- Two types of traceability
- Case study: Implementation of traceability for fresh captured fish
- Application of traceable information
What is traceability?

Example from a supermarket to illustrate this:

- Which gear type is used to catch the fresh fish?
- Which production method is used?
- What is the catch area?

How can the supermarket get access to this information?

Documentation

- This information is recorded at different places in the supply chain
- How is it possible to document this information?
- Can traceability be a tool to make this information available for the supermarket?
What is traceability?

Traceability is a tool to trace product and process information in a systematic way.

What is systematic way?

We record information received from the vessels.

We record information during the production.

We send information to the customers.

Information must be recorded and linked together to be able to find again at a later point.

Able to find again at a later point.
Two types of traceability

1. Chain traceability
   Ability to trace information through a supply chain

2. Internal traceability
   Ability to trace information within a company

Case study: Implementation of electronic traceability

The information of the catch did not follow the fish, and it did not reach the supermarket or the consumer.
Findings

- Such implementation is complex
- Different architectures and traceability schemes are available
- A number of critical success criteria were identified - human factors are central
- Motivation is extremely important to succeed with implementation of electronic chain traceability
- A big challenge was to find optimal practical solutions
- The benefits of doing the extra work must be clear to all the actors in the chain

Different motivations

- Supermarket wanted to get access to more information about the fresh fish they were selling
- The wholesaler wanted to keep his customer happy
- The wholesaler and the supermarket saw traceability as a tool for improved documentation of the cooling chain:
  - simpler to identify the cause of low quality, and then responsibility could be assigned
  - Better control of the material flow to achieve shorter lead and storage time of the fish
- The weakest link in the supply chain was the production plant. Can target harvesting be used to increase the motivation?
Target harvesting

Exchange catch information

Vessel ➔ Production plant

Coordinating the activities

The aim of target harvesting:
- To increase the profit for both links (Margeirsson, 2008)
- Traceability can be a tool to get access to relevant information

Which information to trace?

- Depending on the application of information
- Important questions:
  - Which information is relevant to trace in-house (internal traceability)?
  - Which information is relevant to exchange to the suppliers and customers (chain traceability)?

Decision: Which entity (quantity of fish) to trace?

- All traceable information must not be available to all actors in a supply chain
Two examples

1) Documentation of gear type: Fish caught with long line must be kept separated from the fish caught with other gear types.

2) Documentation of catch date: Fish caught on different catch dates must be kept separated.

Summary

- Documentation of quality and sustainability - useful or not?
- Probably not useful for everybody - it depends on the application of information
- Traceability is only a tool to get access to relevant information
Thank you

Pictures from @www.tlfoto.no
Illustrator: Gudvar Dahl @Nofima

7  From Seafloor to Consumer- a value chain project for longline fishing

Bjørn Tore Rotabakk, Nofima Mat, Norway

“From Seafloor to Consumer- a value chain project for longline fishing”
The environmental impact of linefishing

Bjørn Tore Rotabakk and Erik Svanes

Workshop Reykjavik Oct. 2010

Content

- Background for the project
- What is environmental efficiency?
- How is environmental efficiency measured?
- Is line caught cod environmentally efficient?
- Reduction of environmental impact of line caught cod.
- Further work
Background for the project

- Mustad Longline wanted to further develop the technology on their autoline system.
- Contact with the Research council of Norway resulted in a value chain project with international leading partners within fishing technology, white fish, traceability and research institutes on quality and environment on seafood.
- More info about the project and the partners: www.longlinefishing.com

Project partners

- Mustad
- Nofima
- Østfoldforskning
- TraceTracker
- Forskningsrådet
- Domstein
- Nofima
Aim of the project

- Main goal for the project was contributing to increased environmental and resource efficiency from sustainable whitefish stocks, and maintain the high quality from seafloor to consumer.
- The project would also contribute to develop new technology and added value throughout the whole value chain for longlined white fish.

Background

Worldwide capture fisheries stagnates

IEA ‘whistleblower’ says peak oil nearing

The conclusion is:

Change is necessary.

In order to feed the world's rapidly expanding population with high nutritional value food with a limited resource base and at the same time limit the energy consumption and fossil fuel consumption we must change the way we produce food.

How can we achieve change?

First we must document the current efficiency, then identify improvement options and measure the effect of these options. What measuring stick to use?

Environmental and resource efficiency is such a measuring stick:

Environmental impact and resource use per kg seafood produced and delivered to the market.
Calculating environmental and resource efficiency. Life Cycle Assessment (LCA) – of products.

- LCA: A comprehensive method where all emissions and resource consumption for the product in the value chain is added, e.g. for sea food fishing, processing, transport, storage and sale.

Value chains
Environmental efficiency and resource use

Is linefished cod environmentally efficient?

Since it is almost impossible to say that seafood production is sustainable or not we rephrase the question:

Is linefished cod more environmentally efficient than cod fished with other methods?

In this project we have only studied linefished cod but comparisons with results from published studies that has investigated other fishing methods or average Norwegian fisheries we have strong indications that linefished cod is environmentally efficient.
The fuel consumption in the fisheries is the most important factor for GHG emissions and a number of other environmental impacts. Autoline fisheries use considerably less energy than other fishing methods (36% less than trawl according to Winther et al. 2009), but more than coastal line fisheries because autoline fisheries take place far from the coast. Coastal line fisheries consume less energy than the average Norwegian coastal fisheries.

Products from autoline fisheries seems to be more environmentally efficient than similar products from other countries and average Norwegian products. Norwegian studies include only the value chain until regional distribution centre in Paris. The last part of the value chain is not included. In addition the Norwegian study referred to in this diagram are average cod products, i.e., a mixture of coastal cod and North-East Arctic cod. Coastal cod require less fuel and hence gives lower GWP. Autoline caught cod in our study is only North-East Arctic cod.
BUT:
LCA does not give a complete picture of environmental impacts. Hence more investigations are needed.

1. Effect on fish stocks: Certification according to the ecolabels Marine Stewardship Council and KRAV shows that the fisheries are sustainable.
2. Effect on marine biotopes and other marine organisms

Line fishing gives a low impact.
- The impact on the seafloor is probably low
- The level of "ghostfishing" is probably low
- Line fishing gives little or no poorly bled and pressure-damaged fish. Such fish are of low quality.
- All caught fish are processed to premium quality seafood.

But there are some problems:
- Some fish falls of the hooks and are not recovered. Mortality of this fish can be high.
- Some seabirds are caught and die, but very few!

Linefishing, summary of environmental effects.

**Resource consumption.**
- Fuel: 0.29 litre/kg landed fish.
- Energy: 35.4 MJ/kg finished product

**Environmental impact (one of several categories):**
- GHG emissions: 2.35 kg CO2-eq/kg finished product

**Ecosystem effects:**
- Impacted seafloor: 0 m².
- Bycatch: 11.5 %, but
- Unused bycatch: 0 %.
- Ghost fishing: 0 tonnes/year
- Lost fish: 2 % of total catch (mortality unknown).
- Seabird bycatch: 1 bird pr tonne caught fish.

**Biological resource consumption:**
- Yield: 39.6 % of the fish goes to human consumption, 27 % to animal fodder, the rest is returned to the ocean.

**Other effects:**
- Potential release of toxic compounds in anti-fouling paint: 0.03 g CuO pr kg fish.
- Solid waste: 1.6 g/kg caught fish.
Use of the analyses to improve environmental efficiency

Stopping refrigerant leakages and switching to a better refrigerant will reduce GWP with 33%!
Results of the project – environment, quality, economy.

- GWP impact pr kg produced seafood product has been reduced by 33 %, through replacing onboard refrigerants and repairing leakages.
- Other environmental impacts have been considerably reduced by these measures, e.g. Ozone depletion.
- Other improvement measures have been identified and their effect calculated.
- Selectfish has increased the economic efficiency of linefishing by 30 % compared to traditional linefishing.
- Improvements in the processing facility has been identified.
- Studies indicate that the quality of linefished cod is better than trawled cod.
- Measures for further improvement of the quality of linefished cod has been identified.
Perspectives: How can line fisheries be further improved?

- Avoid future leakages of refrigerants.
- Increase the use of fish waste in bait production.
- Increase the selectivity by designing new bait.
- Use electricity of guaranteed origin.
- Further optimize processing and packaging.
- Improve processing yields.
- Decrease loss of fish in fisheries.

The environmental and resource efficiency of the Norwegian Seafood Industry may be considerably reduced by increasing the market share of seafood sourced from more selective, less energy consuming fishing methods with a lower impact on marine biotopes and other marine organisms.

Industrial Gastronomy & Processing

- from raw material
- to meal

Research and development for aquaculture, fisheries and food industries
What do we need to know to design the next generation longline vessels?

Lasse Rindahl, SINTEF, Norway
Introduction

- Going to provide more questions than answers
- Going to separate in two groups: Coastal vessels and offshore vessels
- Going to address both vessel design and onboard equipment.
- This presentation will mostly be based on experience from the Norwegian fleet.

The offshore fleet – status in Norway

- Counts about 30 vessels
- Onboard freezing
- Some combined with gillnets
- Mechanized longline
- Size of 30 to 50 meters.
Offshore fleet - Challenges in vessel design and propulsion

- Overall hull design are more or less standardized

- Propulsion is an important case at this type of vessels due to the large variations in power demand from fishing operations to long distance transit.

- Dynamic positioning during hauling

Offshore fleet - Challenges related to equipment

- Gaffing is one of the most challenging operations onboard, but will be addressed in a later presentation today.

- Automatic mending of defect hooks in the separator

- Drum based autoline

- Fish handling in the cargo hold
Coastal fleet – Status

- Hundreds of vessels
- A few vessels full time longliners, most in combination with other gears.
- Fresh fish delivered one or two days after catch.
- Mostly based on hand baited gears.
- Between 9 and 28 meters, most of them between 9 and 15 meters

Coastal fleet – Challenges related to vessel design and propulsion

- Need for speed?
- One or more hulls?
- Conventional or diesel electric propulsion?
- Only longline or a combination with other gears?
Coastal fleet - Challenges related to equipment

- Hand baiting or autoline, or maybe something in between?
- Fish handling technology - deliver the fish gutted, round or alive?
- Hauling equipment

What do we need to know to get started then?
Summary

- Hull design and propulsion related to fuel efficiency
  - We need to acquire exact knowledge of the fuel consumption related to each operation on the vessel. This will be the necessary tool to put together the most fuel efficient technologies and designs.

- Need for speed? (relevant for the coastal fleet)
  - We need an evaluation of pros and cons by speed boats compared to conventional hulls.

- This is a type of vessel with very heavy workload for the crew. There will be a focus on reducing the workload for each crew member.
  - Several important measures are in progress. What we need to do further is to approach the EHS situation systematically to map which areas we should pay effort in the future.

Summary

- Baiting the longline
  - To further develop the automation of the longline we need to know more about which factors that are affecting the efficiency.

  - We need to come up with solutions for the fleet with one and two crew members (semi-automated longline)
Development of new hauling systems

Roger Larsen, BFE, University of Tromsø, Norway

Research is often about solving the...
Main goals of UIT projects 2002 - 2010 on coastal and deep sea longlining

- Improved fish quality
- Improved working conditions
- Safety on board
- Reduced unaccounted mortality

- Additional studies on parameters as bait, line thickness, line materials, snood material and hauling speed

Research team: Lasse Rindahl, Roger B Larsen, Ivan Tatone

Conventional hauling method (coastal)

The gaff is important in many longline fisheries to secure and de-hook the fish.

Work position might be hazardous
Smaller and coastal vessels

In 2002 we started testing the Automatic Longline Hauler system (ALH*).

The technology aimed at removing the gaff to improve fish quality and to improve working conditions for the (rail roller) crew.

The system (ALH) was tested with 6 coastal vessels with variable results.

Fishermen didn't achieve better price on non-gaffed fish. Currently, only 2 systems are used.

* Develop by Deltek AS

ALH experiments 2002-2006 on coastal vessels

1: Hauling a bottom set PA line with cod
2: Live fish to be kept in net-pens (2004)
3: Greenland halibut caught with PES line on board M/V "Havsvalen" (2006)
4: L. Rindahl inspecting the collapsible ALH during the 2006 experiments
Conventional hauling method 2006-2007

- Rail-roller
- Long-hook
- Gaff
- Fish
- Line
- Retrieving lost fish with the long hook
- Securing catch with the gaff

ALH experiments with M/Y “Loran” 2006-2007

- Long-hook
- The traditional hauling hatch, hauling room
- Rail-roller for conventional hauling
- Adjustable hatch for the new hauling method and the well with conveyor belt in the side
- Line with haddock entering through the hauling well
Unaccounted mortality

- A fraction of fish caught by longlining is lost on the surface during hauling

- It is believed that most “floaters” will die, hence resulting in unaccounted mortality

- High-grading during hauling would have the same effect

- Anecdotal information reports losses of 3-10%
Conventional hauling compared to ALH M/V “Loran” 2006-2007 experiments

May 2007: Results on cod (Gadus morhua)

![Diagram showing catch efficiency on cod with ALH system compared to traditional method.](image)

- Improved catch = reduced unaccounted mortality

Conventional hauling compared to ALH M/V “Loran” 2006-2007 experiments

May 2007: Results on haddock (Melanogrammus aeglefinus)

![Diagram showing catch efficiency on haddock with ALH system compared to traditional method.](image)

- Improved catch = reduced unaccounted mortality
Conventional hauling compared to ALH M/V “Loran” 2006-2007 experiments

May 2007: Results on Greenland halibut (Reinhardtius hippoglossoides)

- Improved catch = reduced unaccounted mortality?

Comparisons between conventional hauling, ALH and moonpool in the deep sea fleet 2008

- Three larger mechanized longline vessels used in the same area and with equal gears November 2008

- Three different hauling methods were analyzed (i.e. conventional-, ALH- and moonpool hauling techniques)

- Focus was on unaccounted mortality, fish quality and crew safety/their working conditions
Fish lost at the surface during hauling (% by numbers) during 2008 experiments

Comparisons between 3 different hauling methods

<table>
<thead>
<tr>
<th>% lost during hauling</th>
<th>Cod (Gadus morhua)</th>
<th>Haddock (Melanogrammus aeglefinus)</th>
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</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>2.49</td>
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<tr>
<td>ALH</td>
<td>3.25</td>
<td>3.50</td>
</tr>
<tr>
<td>Moonpool</td>
<td>4.60</td>
<td>5.20</td>
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</table>

Quality of fish through a clip-fish production chain

Samples (N = 150) of cod from the moonpool and ALH hauling were taken through the production chain. N=100 fish was produced according to normal routines on board and N=50 directly processed (no bleeding before processed). The samples were frozen.

A Norwegian saltfish/clipfish company treated the fish without knowing the origin following normal quality standards.

We found no reduction in quality due to gaffing or long-hook marks in the fish and no marks in the fish that could be related to the hauling methods.

It is believed that a significant fraction of fish from conventional hauling would have been downgraded (from “superior” to “universal”) due to gaff- and long-hook marks.

Axel et al. 2005 reported close to 14% serious damages on gaffed fish during conventional longline hauling. We found similar results in our previous studies from coastal fishing. The sample from conventional hauling was...
The safety issue on board a conventional vessel (and how it was changed with ALH)

The working conditions at the rail roller can be extremely rough.

M/V "Geir II" is the latest Norwegian longline vessel and she's built with a moonpool hauling unit.
Conclusions

- We’ve shown that modern hauling methods reduces unaccounted mortality
- Quality on landed fish will be improved by removing the gaff
- Working conditions for the crew (at the rail roller) is improved with new hauling methods
- Safety and welfare for crew is improved with new hauling methods (closed hauler rooms or moonpool)

Hooked on longline

Reykjavik, Iceland
October 19th-20th 2010

Thanks for your attention!
Challenges in further development of autoline

Christian H. Engh, Mustad Longline, Norway

Agenda

- Mustad – a brief presentation
- History of autolining
- Autolining today
- Developments and challenges in the future
Longlining - History

Mustad’s fish-hook machine anno 1877
Mustad Group

- Mustad from 1832
- Family company in 6th. generation
- Market leader in two global niches, -sales in 160 markets
- Approx. 900 employees

Mustad Longline AS

- Develops technology for the global longline fleet
- HQ, R&D and production in Gjøvik, Norway
- Has delivered 80% of autoline technology in use
Lofotfishing before...
F/L Geir II

"-10 years of various technological advancements, makes it interesting to build a new vessel."

Chief Engineer/Owner Arild Holmeseth, F/V Geir II

Mag-Packer on F/L Geir II

Mustad
- A better way to lift
Mustad Line Controller

- Mustad management control system for the vessels longline operation
  - Setting
  - Hauling
  - Database, statistics etc.
  - Special adaptations, fish counting
  - Internet communication, error search

Design for the future...
"Speed-sjark" – fishing the Icelandic way...

- 45 longline vessels since 2004
- 38’ foot and up
- Operating with total crew of 4
- Setting 12-20,000 hooks daily
- Average 100 days fishing
- Catching 1,000 tons yearly

- 1 mill. USD investment – turn-key
  - Pay-back: 1.5 years (except quota)

Case: "M/S Ásta B"

- The future of coastal fisheries is in autolining
  Bjarni Sigursson, Skipper
Technological challenges for the future

- Catch efficiency
- Space
- Flexibility
- Different bait types
- Hauling
- Less manpower
- Less gear consumption
- Bird and whale issues
- Health and safety issues
- Maintenance and service

Mustad SelectFish System – For the future

- Can operate with both monofilament line and rope line.
- Disconnects the snoods in the hauling process and connects and baits the hooks and snoods in setting position.

Key system components:
- Line Hauler
- Drum Spool
- Hook Separator
- Clip connector and disconnector
- Magazines
- Mustad Coastal Baiting machine
- Linesseter
SelectFish technology
Mustad Select Fish; Case M/S Ringskjær

"SelectFish makes it attractive to go into the industry for a new generation of fishermen."

Captain-owner Ole Jacob Nygård (40)
OrcaSaver

- A innovative approach to secure the catch from orcas. An extensive problem in toothfish, black cod and halibut fisheries
- Ultra sound pulses to disorient the sonar system of the orcas.
- To be lowered 8-10 m. below vessel, powered by cable
- Gradual decibel increase not to cause mammal damage
- Extensive testing in Alaska, South Georgia, Greenland and Russia (far East)
  - Reduces catch loss with 30-40%
  - Fishing Inspectors endorse the unit as orca friendly
- Lifetime 500 hours operating time
11 Challenges in designing systems for fish handling preserving quality and value through the value chain

Sveinn Margeirsson, Matis, Iceland
Margin, margin and margin

Revenues of fishing
Revenues of processing
Cost of fishing
Cost of processing

Margin = Revenues – Cost

“We can not survive without good quality”
The value chain

Long line caught!

No chain is stronger than the weakest link!

If you fall in the beginning

Catching  Landing-Inventory  Processing  Marketing

Catching  Landing-Inventory  Processing  Marketing
The best way to die

What is the best way to bleed?

- 5°C flowing water?
- 3°C for 10 minutes, then 15°C for 5 minutes?
- -1°C, do not ever change the bleeding water?
- The fish should not bleed?
It is good to be cool – to ensure shelf life

Keeping cool

- Catching
- Landing-Inventory
- Processing
- Marketing

Is small beautiful?

This is how we do it

Not like this!
Are we cool enough?

Ambient air temperature.

The fish markets

Distribution centers

Grading

Ensuring traceability
### Traceability: Value chain and data management

<table>
<thead>
<tr>
<th>Catching</th>
<th>Lending-Inventory</th>
<th>Processing</th>
<th>Marketing</th>
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<tr>
<td>Electronic log-books</td>
<td>Raw material stock system</td>
<td>Processing info system</td>
<td>Market info system</td>
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<tr>
<td>Catching area</td>
<td>Quality of icing</td>
<td>Fillet yield</td>
<td>Orders</td>
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<tr>
<td>Season</td>
<td>Days from catch</td>
<td>Total yield</td>
<td>Price</td>
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<tr>
<td>Species</td>
<td>Temperature</td>
<td>Defects</td>
<td>Complaints</td>
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<tr>
<td>Size of catch</td>
<td>Inventory</td>
<td>Product mix</td>
<td></td>
</tr>
</tbody>
</table>

### Measured fillet yield: Dec-Feb

![Map showing measured fillet yield for different areas, with various yield levels indicated by colors.]
What do we need?

Need to know optimum bleeding conditions

Mechanical solutions to help maintaining quality

Temperature recordings

Full traceability
  Fish markets must be able to handle fish and data!
  IT systems that keep track – cheap, user friendly and accountable

Use the data for more efficient management of the value chain

Staff training

And lots more.....
12 How can IT improve the fleets overall efficiency?

Kolbeinn Gunnarsson, Trackwell, Iceland

Workshop on longlining

How can IT improve the fleet’s overall efficiency?

Kolbeinn Gunnarsson
October 2010

TrackWell

Products and Solutions

• TrackWell founded 1990
  • 25 employees in Iceland
  • Software solutions and consultancy

• Electronic Logbook and Reporting System (ERS)
  • Icelandic Directorate of Fisheries, Føroya Hólsaraftirkyn, Fishing companies in Iceland, Canada and Norway

• Fleet Management Systems - Cars, Trucks, Vessels, etc.
  • TrackWell ADS, Samskip, Elmskip, Flybusen, ...

• Vessel Monitoring Systems / Safety At Sea Systems
  • Icelandic Coast Guard, Vaktarkafla ïgilings, NEAFO, SFAFO, World Bank

• Time and project management systems
  • Landesbanki, Íslandsbúð, Elmskip, Kaupí ...

MOBILE RESOURCE MANAGEMENT
Some important parameters influencing efficiency

- Quality of fishing grounds
  - Expected catch by species
  - Fish conditions, parasites, etc.
- Time spent fishing vs. time steaming and landing
- Bait usage
  - Type and amount of bait per kg of catch
- Quality of the catch at the time of landing (age, handling)
- Price of catch
- Fuel consumption
- Etc.

What can we do?

- Use the Information Technology
  - To collect information on as many parameters as possible (and practical)
  - Analyse the data
  - Use the results to optimize our effort and minimize cost

How do we do it?
TrackWell ERS – a suite of tools to collect and analyse catch information

Electronic Logbook

- Registers vessels' location, quantity of fish caught, plus quality and environmental parameters. Stores information on the fishing gear as well.
- Reports the data to the fisheries and fishing authorities.
- Supports mandatory reports to fishing authorities in Europe according to Norwegian, Icelandic, and EU Common Fisheries regulations.
- Enables the user to view the catch details of each vessel and history of previous trips.
Product Manager

- TrackWell Product Manager is a extension to the Electronic Logbook:

  - It handles information on quantity and quality of the catch, i.e., the number of units (boxes or tubs) per product, condition and grade
  - Sends production information automatically to the fishing company or others on-shore
  - Some configurations makes Product Manager the first link in the traceability chain

Fleet Manager

- The Fleet Manager receives data from the Electronic Logbooks and stores it in a database for further processing and analysis

- The users can extract data and statistics into a large selection of predefined reports

- Enables the user to view the catch details of each vessel and history of previous trips
### Fäll Jönsson GJ-7 - sklösaknr. 1080

<table>
<thead>
<tr>
<th>Date</th>
<th>01-01-2021</th>
<th>01-02-2021</th>
<th>01-03-2021</th>
<th>01-04-2021</th>
<th>01-05-2021</th>
<th>01-06-2021</th>
<th>01-07-2021</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material A</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>8.3</td>
</tr>
<tr>
<td>Material B</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>5.4</td>
</tr>
<tr>
<td>Material C</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>13.5</td>
</tr>
</tbody>
</table>

**Note:** The table above shows the quantity of materials used on different dates. The average usage for each material is calculated and provided for reference.
Catch Viewer is an additional module to the Fleet Manager.

- Enables the user to view the current position of each vessel in near real-time.
- Location and history trails of previous trips can be viewed on a detailed Electronic Chart Display (ECDIS).
- The system allows comparison of fishing grounds and vessels over a selected time interval.
**ERP Integration**

- Landing report data from TrackWell to ERP system, like Microsoft Navision, via XML-files
- Product data from ERP to TrackWell
- Automatic data transfer—less effort and fewer errors

---

**What do we do with the data?**

- Direct the vessels to the most suitable fishing grounds
  - distance, expected catch by species, expected quality
- Use the bait combination that proves to give best results, based on experience
- Maximize the price by providing traceability information
  - detailed information on origin, age and quality of the catch provided to the processing plants / fish markets
  - higher price and/or easier to sell
Case Study 1: Fishing Ground Labeling

- Thorðð is TrackWell customer since 2006
- Operates 3 factory vessels and 4 longliners
- Fresh fish and salted fish (bacalhau) processing factories
- All catch data from the vessels are collected online in the factory manager office
- Each cargo (batch) is kept separately through the processing
- Final products packaging are labeled with catch area information

Origin (fishing zone) labeled on every packaging
**MOBILE RESOURCE MANAGEMENT**

**Case Study 2:**

**TracePlace**

- TrackWell has entered into a partnership with The Federation of Fishing Vessel Owners in Faroe Island.
- TrackWell supplies electronic logbooks and deliver the catch data into a common database.
- Part of a pilot project in Faroe Island for a common database called DNTS (Digital National Traceability System).
- Data will also be forwarded to fishing authorities and selected fishing companies.

**Diagram:**

- Electronic Logbook
- TrackWell Distribution Server
- Fishing Authorities

**TracePlace**

- Raw material received:
  - Catch log from vessels
  - Weight receipt from landing base station
- Export documents:
  - Waybill
  - Export report to Customs control
- Traceability documents:
  - Reception and dispatch
  - Transformations
  - Master data
- Reports to authorities:
  - Total Catch Log
  - Crew list
  - Sales receipt (for the catch)
  - Salary to the fishermen
  - Environment reports
- Other documents:
  - Invoices
  - Bills

---

121
• Web interface with access control
Case Study 3: Value Chain Management

- FishMark – A research project on Value Chain Management
- Funded by AVS and Rannis
- TrackWell and Mali’s among two other suppliers together with four Icelandic fishing companies
- Information from all stages of the value chain are used to optimize decision making on fishing

Value Chain Management

Selection of parameters – Area, time period, vessels
Total catch by species and grades

Catch by species
VCM- Data Analysis

Grade and quality

Value Chain Management

Optimization

Interpretation of results

Suggest the best solution

Data collection and analysis

Fishmark

MATIS
Future steps

- Direct link to fish markets for detailed product information from vessels planning to sell their catch
- Optimizations tools to analyze data and suggest action
- Further registration of environmental parameters with the catch
- Meet the demands of the markets regarding sustainability and low environmental impact of the fishing
- Further steps towards full traceability end to end

THANK YOU!
Is there a potential for improved earnings in the longline fleet and the value chain by marketing of the qualities of longline-caught fish?

Svavar Þór Guðmundsson, Sæmark Seafoods Ltd., Iceland
How do we create value from line caught fresh fish?
Distributors → Retailers → Consumers

Packers
- Less Waste, higher quality, more shelf life, consistent supply
Retailers
- Visually better, consistent supply and quality, Sustainable Message
Consumers
- Looks Great, Tastes Great, Sustainably Caught (no guilt)

Case Study
- Line Caught Strategy for a Major Customer

Sainsbury's

Product news
Sainsbury's to sell 100% line-caught fresh cod and haddock
April 6. 2007

Oliver Knowles, Greenpeace oceans campaigner said: "Sainsbury's move to 100% line-caught fresh cod and haddock once again demonstrates the company's serious commitment to eliminating destructively caught seafood from their shelves.

Richie McLean, Fresh fish buyer, Sainsbury's says: "To address this, we want to ensure we can make cod and haddock, and all species as sustainable as possible. This way our customers can continue to buy what they like, without the worry of where it's come from, and how it's been caught."
Support for line caught

Benefits

- Distributor gets a dedicated supply chain with high quality and low waste
- Retailer gets an exclusive supply chain which is difficult to copy and delivers high quality and high level of ethics and sustainability
- Consumer gets a product which delivers
  - Quality, shelf life, and no guilt to consumers
- The processor gets a regular order at a decent margin
- FINALLY the QUOTA HOLDER gets an enhanced return for his fish
• Every Box we sell shows date and area of catch
• Every box shows which vessel caught it
• Every box is destined for a specific customer who will appreciate the quality
• Every box meets specification
• When fish is $15/kg every box must be RIGHT FIRST TIME
• When fish is $15/kg the customer has to be MORE than satisfied.

How do we ensure maximum value?

• The supply chain has to work as a team
• There is a high level of quality control in processors, but this is kept to a common standard by our own QA Manager in Iceland
• The concept must be supported in market by the retailer and distributor. The consumer doesn’t automatically “visualise” line caught – they are thinking about a man with a rod
• The product needs to be differentiated by marketing
• Above all, the supply chain has to function 24/7, with close attention to detail and a plan A, B and C
What is the future for our business?

• Best Practice
• Carbon footprint
• Eco-labels

Thank you
14 Optimizing profitability in the longline fleet. Which are the important parameters?

Erla Ósk Pétursdóttir, Visir hf, Iceland

Optimizing Profitability in Longlining

Erla Ósk Pétursdóttir

October 20, 2010

Optimizing Profitability in Longlining

1. Visir background

2. Developments in longlining

3. Current status and future prospects
Vísir hf.

- Family company
- Founded in 1965
- Headquarters in Grindavík

- Five longliners
- Four processing plants
- 300 employees

Vísir – Fishing

- All catch is landed at nearest harbor
  - distributed to the specialized processing locations
- Vessel returns to fishing (ongoing system)
  - constant supply of product all year
- 50% of the catch is transported via truck

<table>
<thead>
<tr>
<th>No.</th>
<th>Vessel Name</th>
<th>Built</th>
<th>Length</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>1030</td>
<td>Pall Jónsson GK 7</td>
<td>1967</td>
<td>43.9</td>
<td>7.6</td>
</tr>
<tr>
<td>972</td>
<td>Kristín PH 157</td>
<td>1965</td>
<td>41.7</td>
<td>7.2</td>
</tr>
<tr>
<td>975</td>
<td>Sighvatur GK 57</td>
<td>1965</td>
<td>41.4</td>
<td>7.2</td>
</tr>
<tr>
<td>237</td>
<td>Fjölnir SU 57</td>
<td>1964</td>
<td>39.3</td>
<td>7.0</td>
</tr>
<tr>
<td>1076</td>
<td>Jóhanna Gísladóttir ÍS 7</td>
<td>1969</td>
<td>56.8</td>
<td>8.0</td>
</tr>
</tbody>
</table>
### Vísir’s share of total allowable catch

<table>
<thead>
<tr>
<th>Specie</th>
<th>Tegund</th>
<th>Share of TAC</th>
<th>2010/2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cod</td>
<td>Porskur</td>
<td>5.14%</td>
<td>6,353,909</td>
</tr>
<tr>
<td>Haddock</td>
<td>Ysa</td>
<td>5.87%</td>
<td>2,292,033</td>
</tr>
<tr>
<td>Saithe</td>
<td>Uföl</td>
<td>1.95%</td>
<td>775,592</td>
</tr>
<tr>
<td>Redfish</td>
<td>Guðkarfi</td>
<td>0.99%</td>
<td>298,458</td>
</tr>
<tr>
<td>Deepwater Redfish</td>
<td>Dýúkarfi</td>
<td>0.92%</td>
<td>91,539</td>
</tr>
<tr>
<td>Ling</td>
<td>Langa</td>
<td>16.64%</td>
<td>958,389</td>
</tr>
<tr>
<td>Tusk</td>
<td>Kellia</td>
<td>46.07%</td>
<td>2,487,881</td>
</tr>
<tr>
<td>Catfish</td>
<td>Skamblitur</td>
<td>7.28%</td>
<td>701,156</td>
</tr>
<tr>
<td>Monkfish</td>
<td>Skótustur</td>
<td>0.10%</td>
<td>2,203</td>
</tr>
<tr>
<td>Greysole</td>
<td>Grálúða</td>
<td>0.28%</td>
<td>33,283</td>
</tr>
<tr>
<td>Plaice</td>
<td>Skarkolli</td>
<td>3.52%</td>
<td>210,353</td>
</tr>
<tr>
<td>Sole</td>
<td>Pykkvalera</td>
<td>1.25%</td>
<td>20,792</td>
</tr>
<tr>
<td>Whelk</td>
<td>Langlúra</td>
<td>2.31%</td>
<td>27,671</td>
</tr>
<tr>
<td>American Plaice</td>
<td>Skrapflúra</td>
<td>1.79%</td>
<td>3,287</td>
</tr>
<tr>
<td>Limanda</td>
<td>Sandkoll</td>
<td>2.93%</td>
<td>13,480</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>14,310,335</strong></td>
</tr>
</tbody>
</table>

Total code equivalence kg: 11,582,000
Electronic Tracking System at Visir

- Using this system since 2004, data from 1999
- Electronic Log Book - records catch data on board
- Fleet Management Systems - info observed at headquarters
- Marel Innova - records weights, yields, etc. in operations
- Navision - all information is uploaded for sales
- The communication between systems is key for traceability

Electronic Logging

- Recorded on board:
  - Location (all routes of vessels)
  - Number of hooks
  - Number of fish
  - Bait, type, amount
  - Depth, wave height
  - Weather, course, wind speed
  - Sea and air temperature
  - Type, amount and size of fish estimated
  - Etc.

- Recording on land.
  - Size, utilisation, quality, etc.
Fleet Management System

Graphically
Zoom-in Pathway (Analyze the Day)

Compare Areas

Comparison Results
Result Details - Species

![Species Table]

Result Details – Species Graph

![Species Graph]
Result Details - Cod

Result Details – Cod Graph
Electronic Tracking System at Vísur

- Tool for management
  - Trace product from fishing to customers
  - Track yield at each stage of process
  - Keep track of fishing areas
- System information can also be used to
  - Increase catch per hook
    - where caught, with what bait, etc.
  - Avoid low yielding fishing areas
  - Respond quickly to market conditions
    - what product mix gives the highest value
- Giving the market what it wants: traceability
Maximise the Value of the Quota through Traceability

Responsible Fishing

- Traceability from fishing grounds to market is an integral part of responsible and sustainable fishing
  - Another big part is fisheries management
- Responsible parties in the Icelandic fishing industry have signed a statement on responsible fishing
- The industry has prepared a logo for products originating in Icelandic waters
- Third party certification coming, fall 2010
- More information: [www.fisheries.is](http://www.fisheries.is) and [www.responsiblefisheries.is](http://www.responsiblefisheries.is)
Optimizing Profitability in Longlining

1. Visir background

2. Developments in longlining

3. Current status and future prospects

Key developments in longlining: the Automatic Baiting Machine

- Vessels able to stay at sea longer and can go to fishing grounds further away

- This Mustad update had:
  1. Baiting machine
  2. Hauling operation
  3. Hook separator
     - Gets the line ready to be used again
Other key developments in longlining

- Larger boats
  - Vessels able to stay at sea longer
- Better handling of the catch
- Swivels on the line
  - Hooks can spin around the line (not get tangled)
- New type of bait
- New types of hooks

Results at Víslir

- Greater catch
  - More hooks with fewer people
  - Increased grams/hook per specie
- Bait more effective
- More effective fishing and less quota ➔ fewer boats
  - From 8 to 5 vessels last 10 years
Total Catch per Fishing Year
All species

Comparison to the Past

• In the past it was considered good to catch 100 kg of cod (ungutted) per line
• Each line had 450 hooks
  ➔ 220 grams/hook (ungutted)
  ➔ 190 grams/hook (gutted)
• Today we get 500+ grams/hook in cod fishing, even up to 800 grams/hook
  – All species: 350-400 grams/hook
Optimizing Profitability in Longlining

1. Visir background

2. Developments in longlining

3. Current status and future prospects

Current Efforts

• Now we are focusing mostly on the bait
  – Reduce the amount of bait used
  – Be able to affect which species take the bait

• For a portion of our fishing, we have reduced the bait used from 30 grams to 10 grams

• We have also found a bait mix that catches less cod and significantly more haddock
Bait Development

2000
• Squid
• Herring
2005
• Sausage
• Mackerel
• Pacific Saury
2010
• Bag bait

Bait Used

[Bar chart showing the percentage of different bait types used from 09/01 to 06/10]

Legend:
- Herring
- Squid
- Sausage
- Pacific Saury
- Mackerel
- Bag bait
Bag Bait

• Visir has added a new baiting machine for bags
  – In addition to the Mustad
• Possibilities include:
  – Bait amount reduced by 2/3
  – Ability to mix bait types
  – Not be constrained by the size/shape of the fish as bait
• Purpose is to find a bait which can “select” species

Conclusions

• Profitability in longlining is largely driven by technological advances
  – We need to continue research and development
• Information gathering is important so that we can build knowledge
• Once we have a good information base we can better optimize the profitability
  – For example, given the current market situation and our quota, where should we direct our fleet?
Thank you!
15  Longline-caught fish in the Faroese fishing industry

Páll Gregersen, P/F PRG Export, Faroe Island

Introduction

- P/F Fiskavirkið  5000 ton
- Luna, salmon    6000 ton
The Economy

Market Economy

Planned Economy

Things done right...
Different Prices

The Difference
The Difference

The Difference
Things done wrong...

- Trips are too long
- Not bled
- 5 of 16 boats no proper bleeding bin
- Bled and gutted at the same time
- Poorly cleaned
- Poorly placed in boxes
- Too much in the boxes
- Not enough ice
- Lack of respect for the product
- Lack of education
- Mix the different days of catch when discharging
- Too much handling when sorted at shore

Why is it like this?

Desperate sellers market
Local patriotism

Market Economy

Planned Economy
What should be done?
Challenges in developing a longline fishery in Greenland

Alfred E.R. Jacobsen, KNAPG, Greenland

Workshop on longlining
Reykjavik – October 2010

Presentation by
Alfred ER Jakobsen
Director - KNAPK

Background information

- National organisation of 70+ of fishermen and hunters' associations
- Established in 1953
- Negotiates prices with producers and export companies on behalf of the members for fish, shellfish and seal skins and other species for subsistence use.
- Negotiates and lobbies to improve conditions for its members with the government and members of the Parliament
- Appoints members to committees and other institutions – national, regional and international bodies e.g. JCNB, IWC, NAMMCO, NASCO etc.
Participation

- Director Alfred ER Jakobsen
- Technical consultant for fishermen, Jens Kielsen
- Fisherman Niels Nielsen
- Executive secretary for Royal Greenland Robert Møller

Longlining in Greenland

- Longlining is used for following species:
- Greenland halibut (TAC appr. 20,000 tonnes per year).
- Cod (8,500 tonnes – mostly by bundgarn – nets)
- Catfish (annual amounts?)
- Halibut (flynder)
Greenland halibut

- 6 months a year: longlining.
- Rest of the year: gill nets in designated areas.
- Fishing is done mostly by using small open boats.
- These boats use mostly longlines with 0.8 – 3.5 mm lines. Hauling line used is mostly 1.0 mm – 3 mm.
- Less than 15 fishing vessels are equipped with modern autoline systems, mustad, beitir, soelyst, fiskevegn.
- In northern areas with solid ice during the winters – longline is used by using a homemade “sliding wing” – 1x0.5 meter.
- Baits used for fishing Greenland halibut is: Sauri, squid and to some degree capelin and polar cod.
- Polar cod is most preferable – baiting is manual.

Challenges ahead

- Project idea:
- Use polar cod as baite in future.
- Goal: Fisherman and autoline developer and/or a baiting system developer carry out a project in 2011 funded by ?.
- Benefit: High catch rates – lower costs etc.
Experience with polar cod

- Mr. Niels Nielsen is here – he can tell you more about his experience in using polar cod as bait.
- But: Baiting has to be done manually – very time consuming
- Challenge: Develop baiting system enabling to use polar cod. New product?

Qujanaq - Thank you!
17  Strength and weaknesses in the Faroese fishing day’s system in relation to boat owner’s economy

Johannes M. Olsen, the Faroese longliners organisation

Fisidagaskipanin

Fyrimunir og vansar

Skrá
  ➢ Innleiðing
  ➢ Søguliga gongdin
  ➢ Eru dagaskipanini rætt stilla?
    ➢ Livfrøðiliga burðardýgt
    ➢ Búskaparliga burðardýgt:
      ➢ Toskaveiðan seinastu 10 árini
      ➢ Niðurstøður
**Innleiðing**

- Framloðgan er uppbygd við eini søguligari gongd og við gögnunum gongd av – fyrirumun við eini fiskidagaskipan og hvat manglar hjá føroyingum, at ræta uppá fyri at fáa skipanina at rækka settum málum
- Eisini eru uppskotum mæguligar loysnr, sum upplegg til kjak

---

**Søgulig gongd**

- Fram til 70-árini varð at kalla fritt hjá føroyingum at fiska úti, sum heima. Ein og hveir, sum hevði skip, slapp at fiska þaði á føroyaskum, sum frommandum fiskiðum. Innöffningsloyvi voru tókrard fyri skip, sum vorðu koppt ella bygd útlandandi
- Í 1977 vorð fiskimarkður flutt út á 200 hjórðingar, og stóru partur av mó- og langtarafotanum kom heim á Føroya-grunnin at verða. Trongligt varð á grunninum, og þá byrjandi uppskyldi av ökum, vefðhættum og skipaslegum. Áðrenn hevði bert okkur kassaskipan verði fyri útlendskar frolarar
- Fleiri av heimsins fiskivinnutjóðum, teirra millum okkara grannalond foru undir at kvótara innan fyri egið fiskimark longu í 70-árnum. Ísland fekk hundilskvotur í 1987.
- Í 90’umum byrjandi landsstýrið at gera teknisar reguleringar, eitt nú at hriða skir, viðka meksar, og seta tróðum barg fyri fiskiðap.
Søgulig gongd

1. Tá böttafall og fiskakvotys raktu fyrst í 30'umum, varð tosað um at settu krotur við Føroyar. Føroyar fiskum er kenda til heita aerstaðafrá.
2. Vinnan mæltu stöðaliga frá kvotum, tí samansættingin av fiskasigum á Føroya-grunninum er so blandað, at heita bar ikki til at fiva undir ella halda skil á.
4. Sum ikki eina ferð hevði vinnan grein í sinum málið, og kvotaskipanin varð ein “takka”
5. Kvoturnar sum styrisamboð misseyðaust, men tá eyðnödst vinnuní saman við fiskafiskungum og fiskvinnunumndugleikumum, at bliva samdil um einna fiskadagaskipan ístaði, sum lægðið samtalið í 1996.
6. Fyrumunir við dagaskipanini, ínum til kvotaskipanina:
   a. at eígin fiskur verður útblakaður
   b. at eígin grund er firi at umdöypa fisk.
   c. og at hægtallini firi velðu a føroyagrunninum verða rétt.
   d. og at vit hava ikki brúk firi fyrivarðisregluni, út frá tí, at alt sum fiska verður - verður skrásett.

27-01-2011  Búðskapur vs Fiskidagskipanin
**Toskaveiðan seinastu 10 árini**

- Ungtiskar (ella toskur undir 2 kg.) liggur jarni um 11,3 av veiddini.
- Toði positiva út frá talnum er, at av ti at bytið millum stóddurnar er so þann sjávarum árni, so sem var nýtt og ef at þegundu þenn av veiði í tóskarínum.

---

**Býtið av veiddum fiskatelli á toski – mikum ylimir og íkki ylimir í Føroya Reðsarafeið**

- 30%  
  - 2009
- 70%  
  - 2009
- 30%  
  - 2010
- 70%  
  - 2010
Faroe Plateau cod, summer survey

Toskaveiðan seinastu 10 árini

Ungtiskur (ella toskur undir 2 kg.) liggur jamt um 113 av veðami.

Tal þess að ganga af um 700 ártíðum er það að þykkvverdi stóðum á
þessu gang þá því at það séir hlaða í ávættum óhætt um veðk
ári. Fiskamenn
• Takk fyri.
18 Management regimes for fisheries with respect to efficiency and responsible fishing

Dominic Rihan, Ireland, ICES-FAO Working Group on Fisheries Technology and Fish Behaviour

OUTLINE

- Longlines - A responsible fishing method?
- Current Management Measures
- Examples of Good and Bad Management
- Management Issues & Mitigation Measures
- Conclusions
LONGLINING – A Responsible Method?

- Dates back to early 1500s
- Criticised by the church in Norway as being too efficient (see Bjordal & Løkkeborg)
- Led to swearing, quarrels, fights & alcohol abuse
- Nowadays 5 - 10 billion hooks per year
- Big upsurge in pelagic longlining since 1992

<table>
<thead>
<tr>
<th>Longlining</th>
<th>Trawl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
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<td>Energy Consumption</td>
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<td>Benthic Impact</td>
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Current Management Measures

- Specific Detailed Measures limited
- No mention of longlines in EU reg 850/98 (covers basic technical conservation measures)
- Traditional management by
  - TAC & Quotas
  - Effort
  - Closed Areas e.g. species & coral
  - Seasonal & temporal closures
- Hook limits in some areas
- Restrictions on Autoliners in Norway
- Depth limits in others
- Gear marking
- Lost gear (Norway)
- Seabird mitigation measures

A Good Fishery!

- Pacific Halibut fishery
- IFQs (transition from derby)
- Single gear fishery
- Technical Measures
  - Closed areas
  - Tori lines mandatory
- Monitoring of bycatch by CCTV
- MSC certified fishery
A Bad Fishery!

- Patagonian Toothfish
- Southern Ocean & South America
- Widespread IUU (Illegal, Unreported, Unregulated)
- Illegal catches 5 times legal limits
- Decimated stocks
- High bycatch

And Now the Ugly!

- Bycatch Issues
  - Seabirds
  - Marine Mammals & Reptiles
  - Elasmobranchs
  - VME (Vulnerable Marine Ecosystem) Impacts
SEABIRDS

- Global Issue
- Considered a threat to 22 species (FAO), mostly albatrosses
- Affects 28 legal LL fisheries from 14 different countries
- FAO IPOA adopted 1999
- Mitigation measures used in many fisheries

Seabird Mitigation Measures

- Night-setting longlines
- Tori or bird-scaring devices
- Line-setting devices/Baitcasters
- Weighted lines
- Modifying bait condition (Dyed)
- Offal discard modifications
- Strategic distracting discards
Marine Mammals & Reptiles

- Turtles & cetaceans
- Mainly pelagic longlines
- 200,000 loggerheads & 50,000 leatherback (2000)
- Estimated mortality 20%
- Cetacean bycatch and depredation
- Widespread issue
- Entanglement, hooking (pilot whales) & ingesting of hooks

Marine Mammal & Reptile Mitigation Measures

- Turtles
  - Circle Hooks
  - De-hookers
  - Dyed or Novel Baits
  - Setting depth
  - Decreased soak time
  - Glow rope/Flashing lightsticks
- Cetaceans
  - Reflective buoys
  - Modified ropes
  - Galvanic releases
  - Acoustic deterrents & predator sounds
  - Physical depredation mitigation devices – (PDMO) – Net sleeves protect fish while hauling
Elasmobranchs

- Widespread
- Pelagic & demersal longlines
- Bycatch in pelagic gear
- Shark Finning
- Deepwater sharks (Atlantic)
Elasmobranch Mitigation Measures

- Modified bait
- Depth setting
- Electromagnetic deterrents
- Decreased soak time
- Ban on using wire traces
- Ban on fishing
- Time/area avoidance

Vulnerable Marine Ecosystems

- UN Resolution 61/105 – action plan to protect high seas ecosystems
- Significant adverse impacts
- Includes longlines
- International Guidelines for the Management of Deepsea fisheries
- Impact Assessment
Mitigation

- Extensive Closed Areas
- Move out following unexpected encounters
- Requirement for Monitoring & Mitigation plans

Conclusions

- Is it an Environmentally Friendly Gear?
- On balance - Yes!
- Lack of specific management measures
- Candidate Burden of Proof (BOP) Management e.g. Pacific halibut
- Longlines not immune to bad press e.g. pelagic longlines & toothfish
- Issues regarding seabird, marine mammal & elasmobranch bycatch
- Emerging issues with VME’s
- Image must be reckoned with
How do regulations in general and parameter regulations especially affect longlining?

Svein Løkkeborg, Institute of Marine Research, Norway

Importance of gear parameters on catch rates and selectivity

Svein Løkkeborg
Fish Capture Division

Fish Behaviour

- Feeding activity
- Hooking behaviour

Gear parameters

- Hook
- Bait
- Material and rigging
- Incidental seabird bycatch
Feeding activity

Swimming speed (cm/s)

Time of day (hour)

11.8 kg

6.4 kg

Current direction

Baited longline

100 m

A

B

C

240 m

574 m

698 m

2h 32min

4h 7min

5h 20min
Fish behaviour – Gear operation

- Rhythms in feeding activity
  - Line setting at breakfast time

- Long distance bait location
  - Large spacing between lines
  - Relative long soak time
  - Set lines across the current

- Differences in behaviour
  - Selective fishing
Improved hook design

"Rush"  Wide Gap  Circle-hook  EZ

Improved hook design
EZ-Baiter Circle Hook

Catch increase (%)

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<th>Species</th>
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<td>Tusk</td>
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Improved hook design

And, smaller hooks are more efficient

Cod
Haddock

![Graphs showing the size distribution of Cod and Haddock.](image)
Cod

Large fish and large bait.

Small fish and large bait.

Haddock

Large/small fish and small bait.

Large/small fish and large bait.
Seabird bycatch - Potential solutions

- Bird-scaring streamer line
- Underwater setting funnel
- Line shooter
- Weighted longline
- Night setting
- Strategic offal discharge
Bird-scaring line

Deters birds from taking baited hooks

Setting Funnel
Seabirds Bycatch per 1000 hooks

Total Catches of Target Fish
The streamer line *scares* seabirds

Potential catch increases

- New hooks + 20-50%
- Smaller hook + 20%
- Smaller bait, cod + 20-50%
- Smaller bait, haddock + 30-120%
- Swivel + 10%
- Monofilament mainline + 100%
- Monofilament gangion + 10%
- Setting direction +100%
- Setting time essential
- Bird deterrents + 30%
- Autoline revolution
Science gives better catches
What are the effects of stimulating longline fisheries with special reference to regional development?

Jahn Petter Johnsen, BFE, University of Tromsø

Conclusion

- The "longlining industry" (fishers, processing, gear- and vessel suppliers) will in the future have to provide information and knowledge to communicate to authorities and public that a positive development in this industry contributes to responsible fishing, fulfill EAF and good governance principles.
- How:
  - Develop a strategic plan and action program for the industry
- Why:
  - Communication of interest
  - To influence structural and management policy
  - To influence research focus and research fund allocations
  - To allocate own resources in the same directions
  - Point to system weaknesses and knowledge gaps
Fisheries (capture) and aquaculture share of market oriented county gross product.
Source: Statistics Norway
Source: Edgar Henriksen, SUROFI, Norges Råfisklag (NRFL.)
Source: Edgar Henriksen, SUROFI, Norges Fiskerifag
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The political shift - 1990 ..... 

- From fisheries development policy
  - Focus on fisheries and fishing communities development - the fisher in focus
  - Management of fishermen - society relations
  - Regional policy success
- to resource management policy
  - Focus on sustainable use of resources
  - Management of fishermen - fish resource relations - fishermen's' conduct and behavior at sea
  - Reduce overcapacity
  - Different regimes for coastal and offshore fleet
  - Offshore in principle more specialized vessels

Shift in focus from yield and target orientation

![Diagram showing yield, cost, open access, and fishing effort with MSY and Management target]
To ecosystem approach to fisheries management (EAF) principles

- Limit the impact from fisheries on the ecosystem
- Responsible fisheries
- More focus on biomass removed than on single species
- Maintain relationship between species
- Measures compatible across the entire distribution of the resource
- Precaution in decision-making and action
- Governance ensure ecosystem (both human and non-human) well-being and equity
- Internalise costs in the ecosystem
- EAF is implemented in European and Nordic fisheries
Effects

- From Government to Governance
  - Management through partnership between government and organized stakeholders
  - Government withdraw from detailed regulations
  - Towards a more responsive and adaptive system – with heavy responsibility on the industry to prove responsibility
  - Industry can produce data that is important for stock and ecosystem monitoring – research system improvement
- Micromanagement where it belongs, namely in the business, while the management system concentrates on the more general framework
- Focus on process and fishing conduct
- Certification processes and Eco labelling
The general framework may vary between different countries.

For example, the Norwegian corporative system with a close cooperation between the fishermen and the state is a precondition that not only has to be taken into account, but which is actually in line with good governance principles.
The Norwegian management policy

- Success
  - resource management in terms of controlling fishing mortality
  - capacity reduction
  - allocation policy
  - legitimate, fair, transparent and participant system
- Problems
  - still structural problems in the fleet
  - recruitment
  - cod focus
  - detailed, costly and complicated system
  - heavy bureaucracy
  - Limitations on possibilities to integrate in the value chain
Fishermen’s choice

- Governance and regulations
- Fishers choice
- Market
- Technology and organization

Choice of gear

- Offshore fleet is specialized
  - Institutionalized in the management system
- In the coastal fleet choice of gear is in principle free, but will be impacted by
  - management and regulation policy
  - market conditions
  - customs
  - fish abundance and availability
  - costs
  - More liberal regime in the future?
Fleet structuring consequences

- In a fleet downsizing process - there will be less job positions available, surplus of labour
- Quota transactions and push towards increased efficiency and less crew – increased costs
- Recruitment of new persons can stop for a period, which in the longer run can result in:
  - Loss of a “generation” of recruits (as mentioned yesterday)
- Offshore fleet recruit from a national labour market and has a more national landing pattern, the effects of changes are dispersed to the whole society
- Where the coastal fleet have a more community based or regional recruitment pattern, fishing and landing pattern, effects will be more local or regional
- Large quantities of haddock and saithe are not fished - Undercapacity or an organizational problem?
Challenges (in addition to what has been presented these days)

- General:
  - Maintain local fishing culture and knowledge
  - Increase value and income
  - Increase cooperation land-sea – new forms of organization
- Offshore
  - Control cost development
  - Recruit crew
- Coastal long lining
  - Costs
  - Recruitment of crew
  - Recruitment of baiters
  - Change to auto-line
  - Technological development – automatic land-based baiting
How to stimulate?

- Support technological development project
- Regulation - quota by catch regimes
- Closer cooperation processing - fishing towards niches - freedom to collaborate, sharing of profits, but loss of flexibility
- Stronger integration - however strongly restricted of the institutional arrangements in Norwegian fisheries
- Modification of the institutional arrangements

- Proactive: The longlining industry with partners:
- Create a long lining forum and develop a strategic plan 2010 - 20 for development and management of the industry.
- Define a five year action program
- Use it to forward interests and to feed the authorities with information and knowledge about the challenges and the perspectives for this industry
Thank you!
21 Summing up

Edgar Henriksen

Strategic plan

• Is there any interest in an international cooperative programme to promote long lining?
  – Industry alone or in cooperation with the scientific community?

• International scientific network
  – A good idea and how do we involve the industry?

Right price for high quality

• How should management of stocks and fisheries be designed to gain value?
  – Were are the best practices found?

• Organising of the first hand marked
  – A Norwegian problem only?

• Marketing of high quality fish or line caught fish.
  – LCA and tracking
Reducing cost

• Increasing catch per hook
  – Gear parameters
  – Reduce loss of fish during hauling
  – Bait
    • More effective and selective
    • Using other species or waste
    • Attractants?
• More hooks in water or/or more catch per hook
  – Improving auto line systems
  – Effective on shore baiting
• More cost efficient vessels

Preserving quality

• Management again
• New or improved methods for fish handling
• Better educated fishermen or improving pride in profession?
• Logistics – maintaining quality
Improving working conditions

• Mechanized operations
• Sheltered working position during hauling
• Shorter hours

Benchmarking

• Comparing the situation in the long lining industry in the participating countries
  – Fleet efficiency
    • Fleet groups
      – Catch per hook
      – Size and species selectivity
  – Macro numbers
    • Revenues
    • Cost
    • Profits
  – “Bottlenecks”
  – Raw material quality
    • Proportions of fish to high value products
    • Vessel size
Bait

• Need to find baits that:
  – Reduce the use of valuable fish
  – Are size and species selective
  – Reduce costs

• Preliminary study
  – Revue paper
  – Planning international cooperation

• International cooperation on bait development
## List of participants

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<th>Name</th>
<th>Company</th>
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<th>sector</th>
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<td>12 Jón Kristjánsson</td>
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<td>14 Amanda Garner</td>
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