Increasing quality through rapid chilling

Mode Slurry Ice Systems
Thorsteinn Ingi Viglundsson (Thor)

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Increasing quality through rapid chilling of fish

Personal experience:
- 8 years of work with rapid chilling
- Sale and implementation of over 200 systems worldwide
- Research work together with Matís Iceland, Seafood Scotland and Seafish UK
High Quality Fish

- What is high quality fish?
- How do we improve quality?
- Why improve quality?
Results of enhanced Quality

- Fresh fish (looks, odor, taste, feel)
- Better processing, more yield
- Longer shelf life:
  - Lasts longer in transport,
  - Opens possibility for new markets
    - EU
    - US
- Gives buyers more flexibility
Which cod would you buy?

- Rapid chilling
- Traditional icing
Different methods

- Traditional icing with flake ice
Different methods

Rapid chilling with Slurry Ice

![Graph showing temperature change over time for Traditional icing and Slurry Ice.](image-url)
Rules of thumb for quality:

- Chilling 1 hour faster gives 2 days in added shelf life
- Effect bigger in warm seawater than cold
Quality starts at sea

- Handling of the fish from catch to dish!
- Rapid chilling on board
- Storage at the right temperature at sea and on shore
- You cannot regain lost quality!!
Financial gain
a case study: Challenge UL33, Scotland

- Price drop from catch to market
Financial gain
a case study: Challenge UL33, Scotland

- Less drop in price
- Longer shelf life
Financial gain
a case study: Challenge UL33, Scotland

‣ High value for all the catch, not just the newest!!
‣ Adds up quickly
Rapid Chilling
What fish does it work on?

- Tuna
- Pelagic
- Shrimp/shellfish
- Groundfish
- (what is being fished in the area)
Where do we Chill?

- Chilling on arrival on board (on the deck or hopper)
- Chilling on the workdeck (in tubs or tanks)
- Iceing in the hold
Who uses slurry-ice?

- Small boats (1-5 days at sea)
- Freezer vessels
- Pelagic vessels
- Longliners
- Tuna catching
- Shellfish (crab, shrimp, lobster)
Small boats in Iceland

- Stay at sea for 1-5 days
- Highest quality fish
- Chill on the workdeck or in tubs/boxes in the hold
- Small machines suited for their size
Case Studies

- Pelagic fishing in warm seas
- Small boats fishing in Iceland
- Groundfish in Scotland
- Tuna
- Prawns in Scotland
- Processing
Payback

- Payback varies / situation differs
- Eliminates the need to buy ice
- Less time spent in waiting for ice
- Higher price at the market
- Less reduction in price due to days at sea
- More days at sea without landing the catch
Business concept

- Mode supplies generators and know-how
- The heart of the slurry-ice machine is the generator
- Local production of the ice machine
- Local service
- Local know how combined with our know-how
Matís ohf.

- The Icelandic Fisheries Laboratories (IFL), which was an independent food research institute.

- MATRA: which was a joint venture of IceTec and the Agricultural Research Institute.

- RUST: The research division of the Environment and Food Agency.

- Matis also operates Prokaria, a private biotechnology company and Iceprotein, a protein production company.
About Matis ohf.

- **Matis is a dynamic R&D company which specialises in various services for the food industry in Iceland and abroad research, innovation and consultancy**

- **Number of employees: 100**
  Engineers, food scientists, fishery scientists, chemists, biologists, microbiologists and technicians

- **Education**
  
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- **Matis is an important link between the fish and transport industries, universities and other research companies**
- **Processes**

- **Shelf life and chilling**

- Trace and sustainable production

- Aquaculture

- Consumer behavior and food market developments

- **Products development**
Biology and theory

- Rigor Mortis
- Bakteria Growth (TMA)
Bakteria-growth in fish flesh

- Chart showing bakteriagrowth vs temperature vs time
- Chart showing reduced growth if temperature is reduced
The influence of Rigor Mortis

› Rigor mortis delayed by .... Hours
› The fish stays longer in Rigor
› Bakteria growth doesn´t start until Rigor is over
› (Graph ............)