



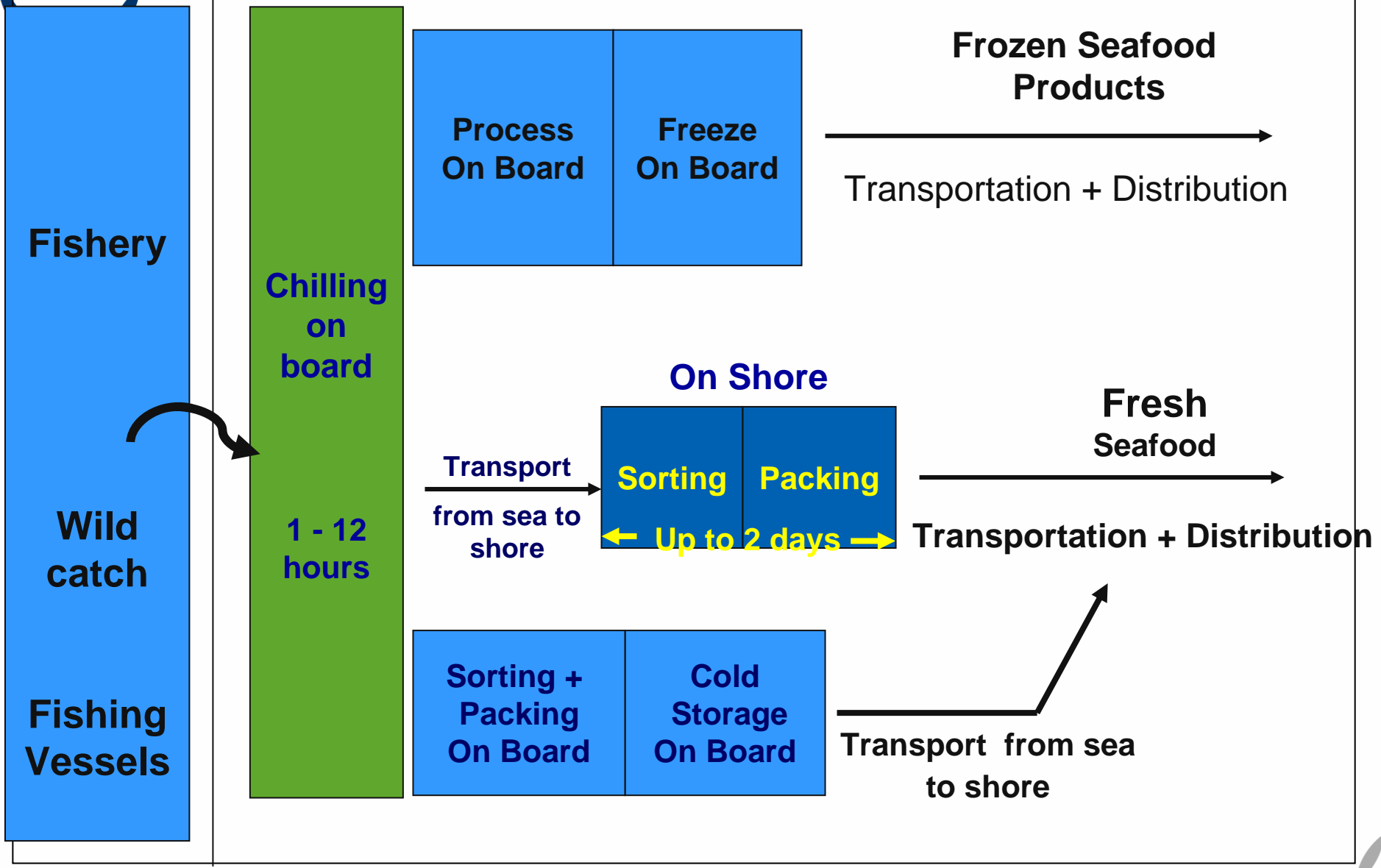
How does the fish industry see logistic to improve the sustainability of the value chain?

Sigurjón Arason
Matis ohf, Reykjavik, Iceland

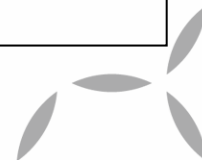




Wild Catch - Cold Chain Map



← Up to 2 Hours → | ← Up to 5 days → | ← Up to 3 days → |





Development in storage fish on board the Icelandic ice fish vessels

- **1972: Stern trawlers; storage of fish in plastic boxes**
- **1982: Storage of fish in plastic tubs - 660 l**
- **1992: Storage of fish in plastic tubs - 460 l**





Fish is iced in boxes on board

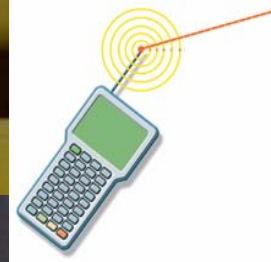
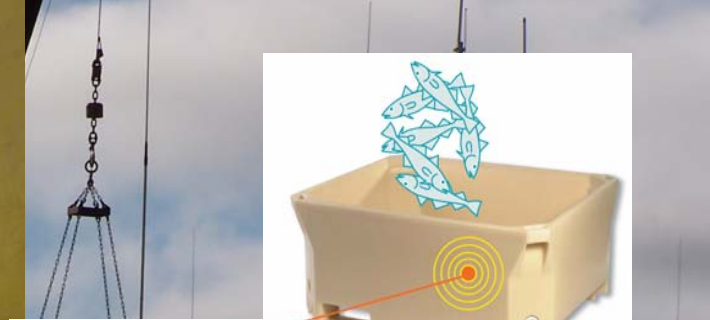




Landing both boxes and tubs



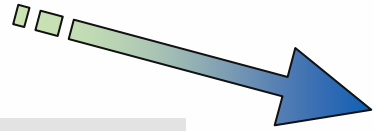
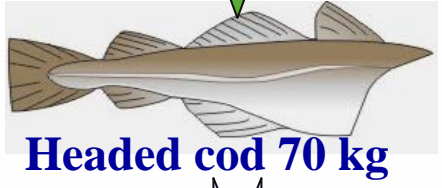
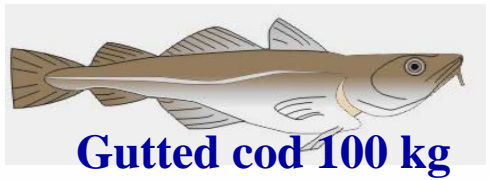
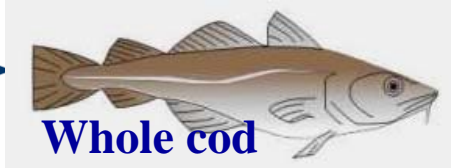
Time of landing will be reduced with use of tubs





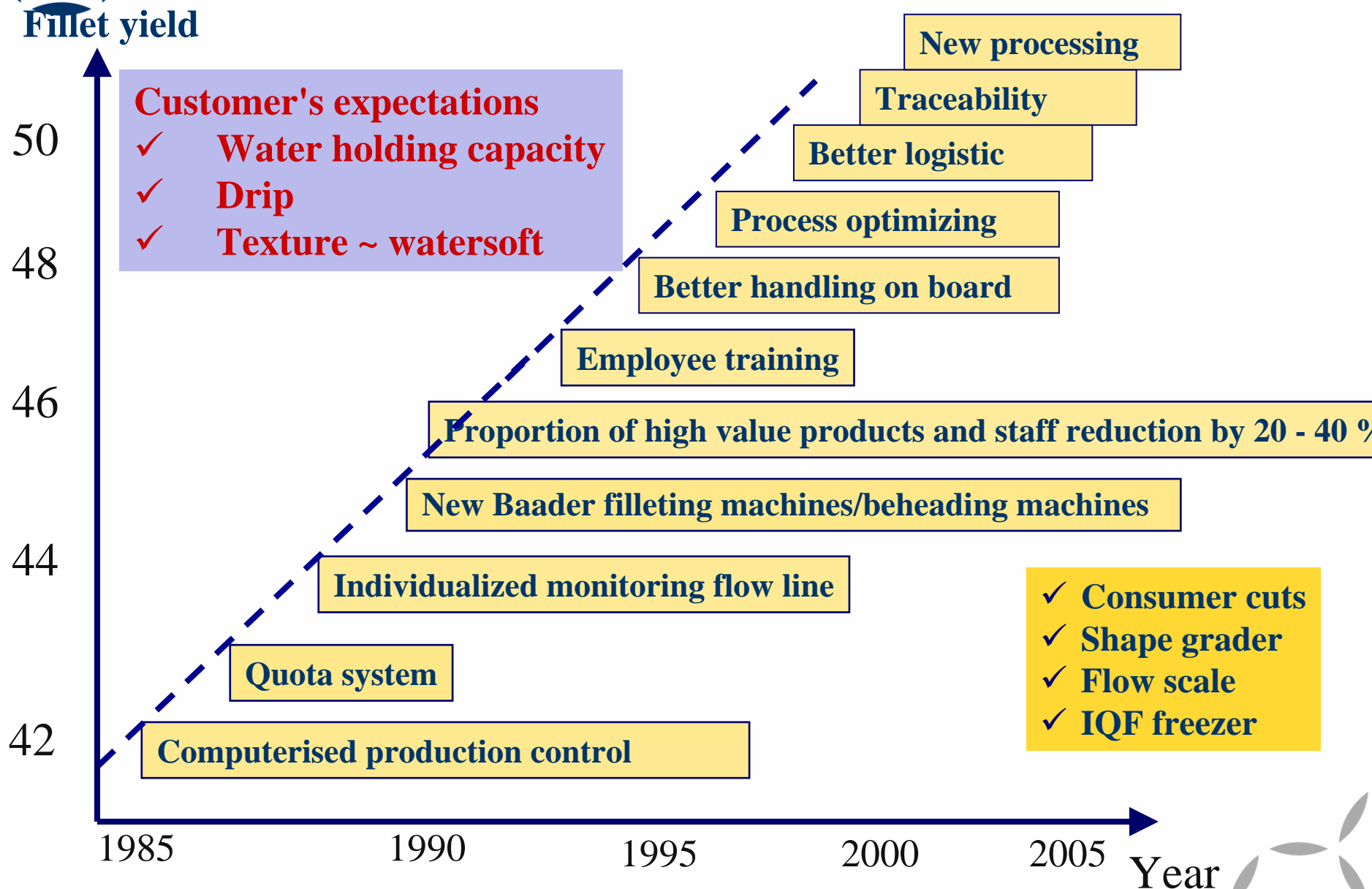
Production of cod fillet

By-products





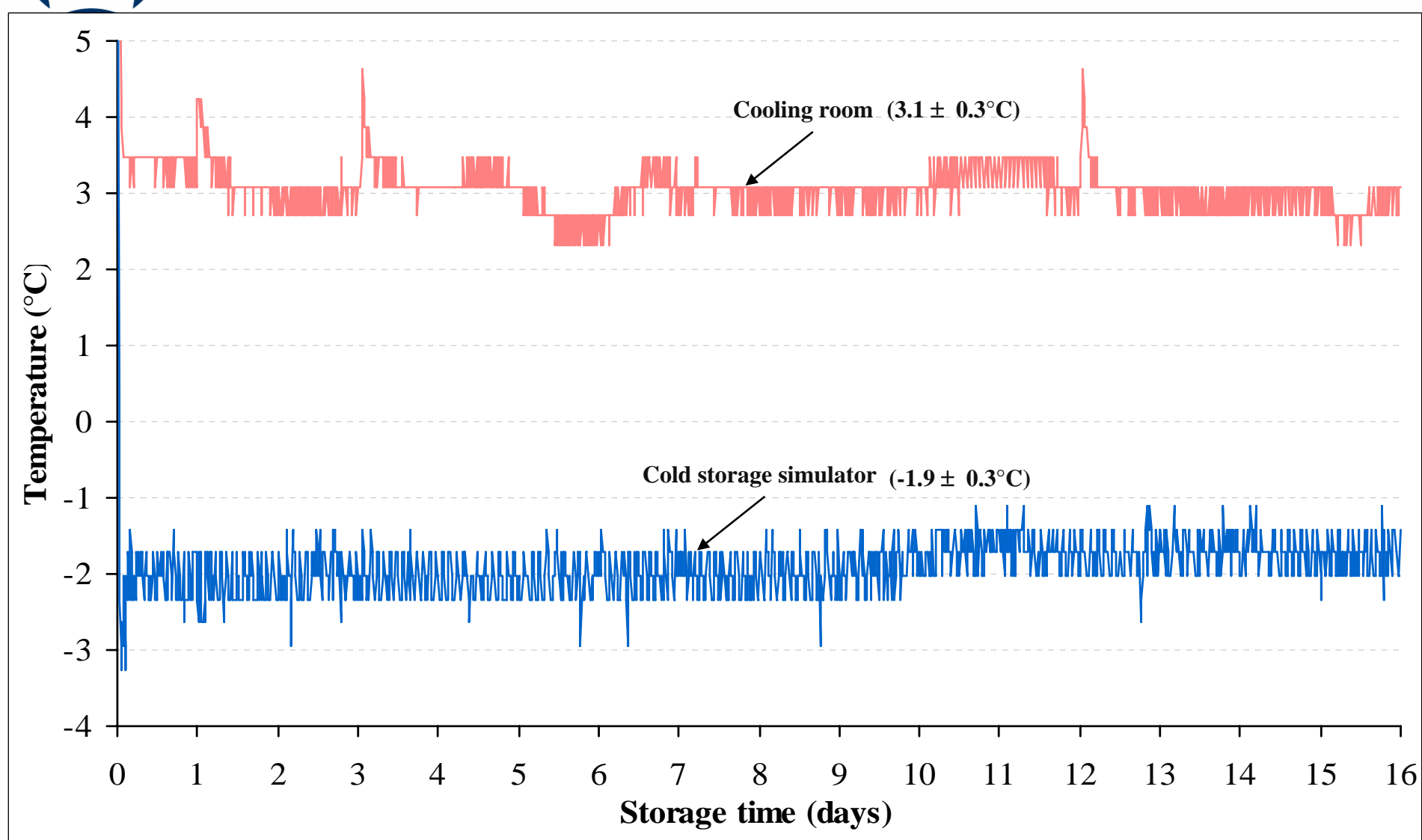
Development in the Icelandic fish processing industry and in the filleting yield for cod the last 20 years





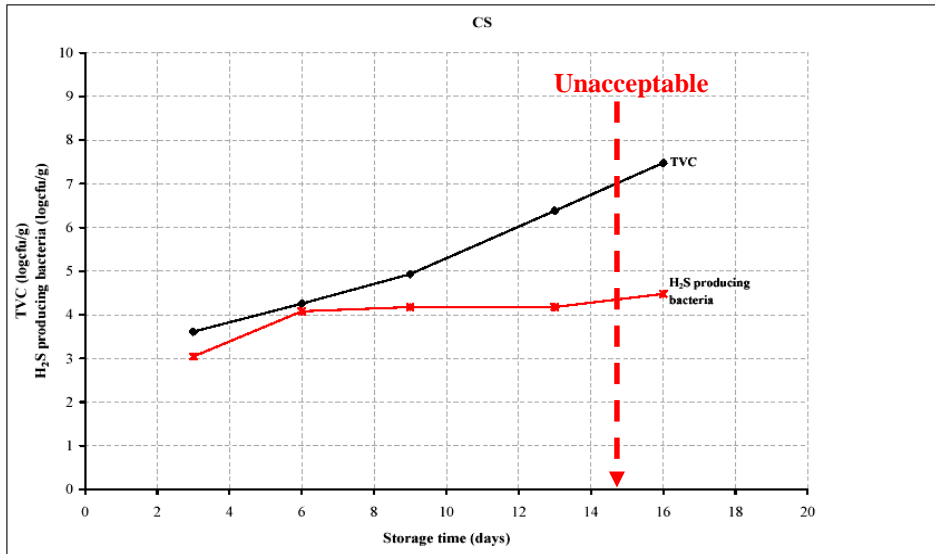
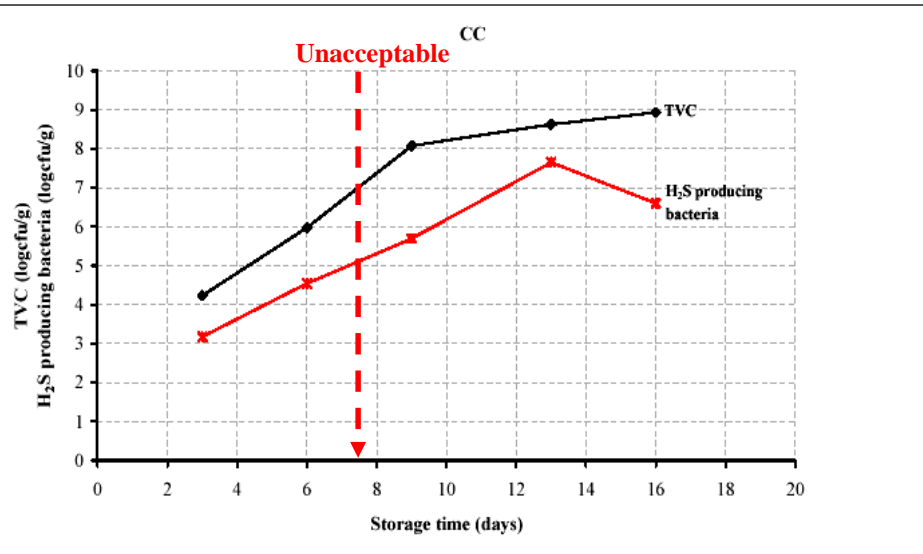
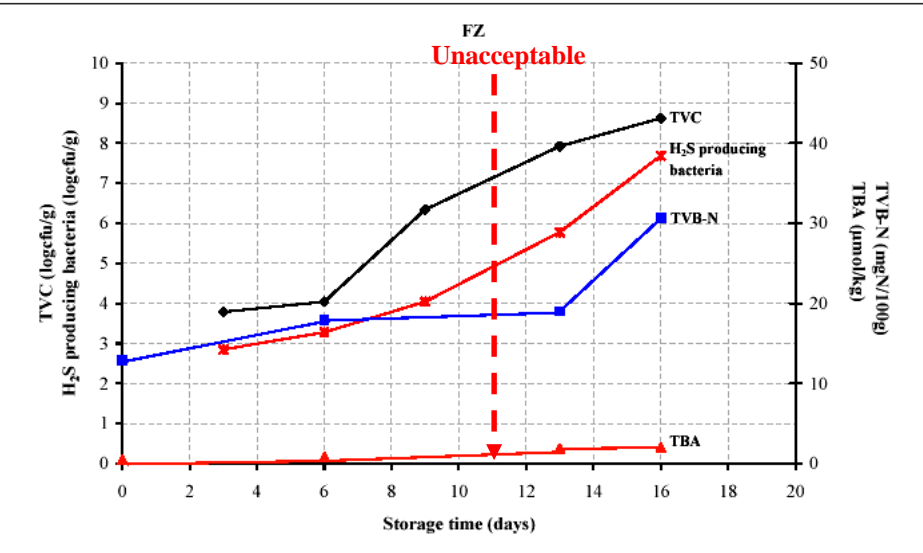
Effects of superchilling on quality and shelf life of Arctic charr (*Salvelinus alpinus*) fillets

Temperature profiles of the cold storage simulator and cooling room

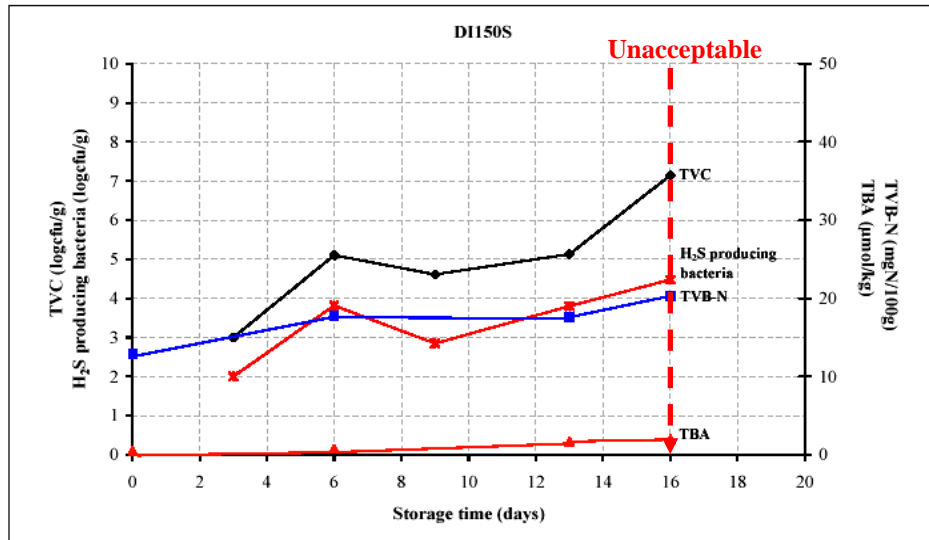
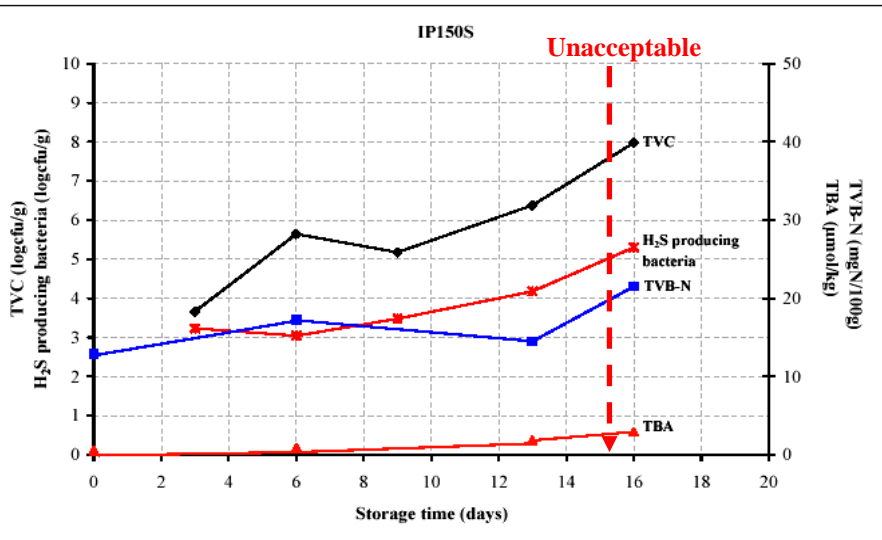
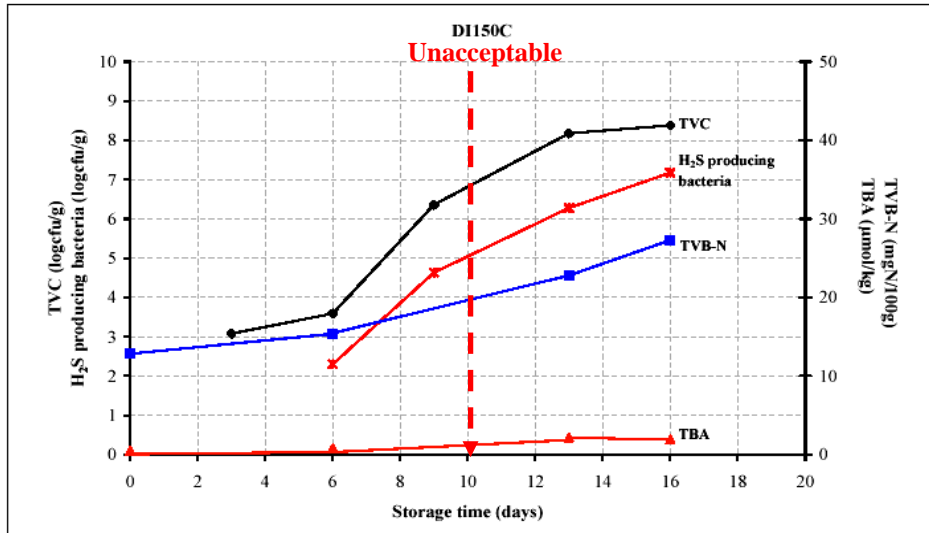
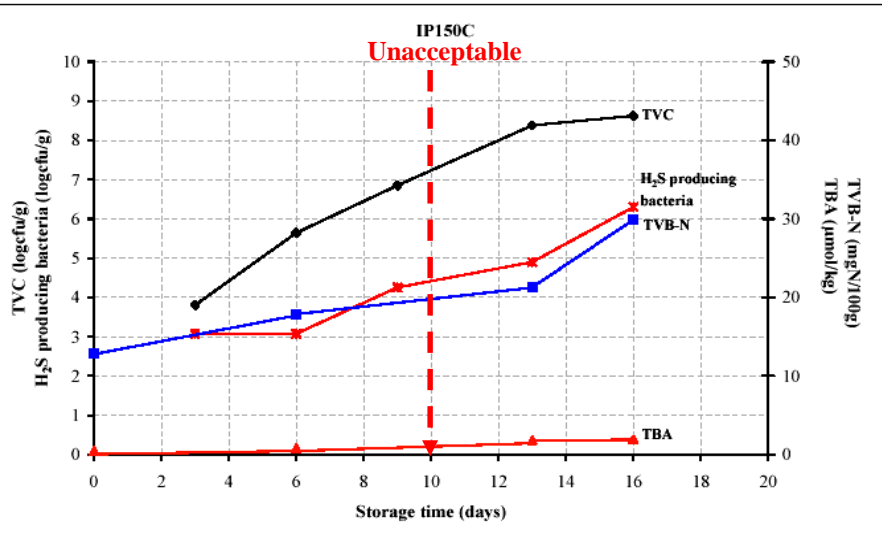




Effect of chilling and superchilling with different cooling agents on the shelf life of Arctic charr fillets



Effect of chilling and superchilling with different cooling agents on the shelf life of Arctic charr fillets





Mapping – one example

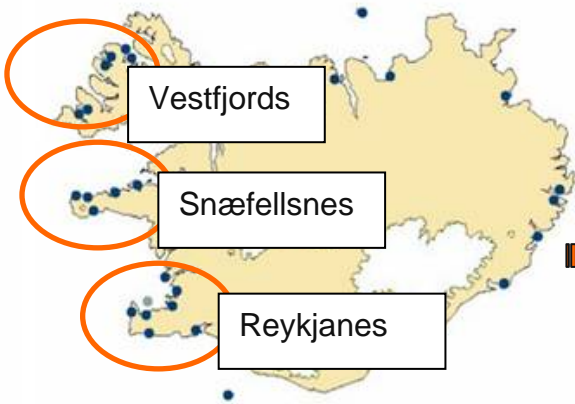
- Project done at UNU/FTP in 2005-2006
 - TRACEABILITY AND QUALITY IN A FRESH FISH EXPORT CHAIN
 - Fresh fish by plane to Belgium
- Short and relatively simple chain





Mapping example, cont...

Origin of fish



Reception Raw material

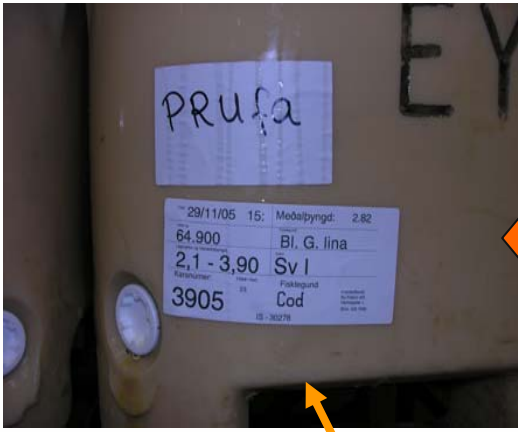


Check weighing

Framleiðsluskýrsla frá flokkara

Flokkur	Frá	Til	Skammtur (Kg/Stk)	Samtals (Kg)	Stk	Mvgt	Fjöldi skammta	Dreifing
Svæði 1 29. nóvember 2005 Kl: 13:51:00								
2 : Þorskur óstl								
3	1701	2000	0	1,844	1	1,844		0 0,16%
4	2001	2700	0	59,026	25	2,361		0 5,22%
5	2701	3500	0	169,48	54	3,138		0 15,00%
6	3501	5000	0	397,66	95	4,186		0 35,19%
7	5001	30000	0	502,04	79	6,355		0 44,43%
Samtals:				1130	254	4,449		0

Internal Label



Grading step



Quality assessment



Mapping example, cont...

Cold storage



Fresh loins processing



Packaging



AWB glued on pallet



DISPATCH

Label on boxes



Mapping example, cont...

- Flight pallet formation



- Cold storage



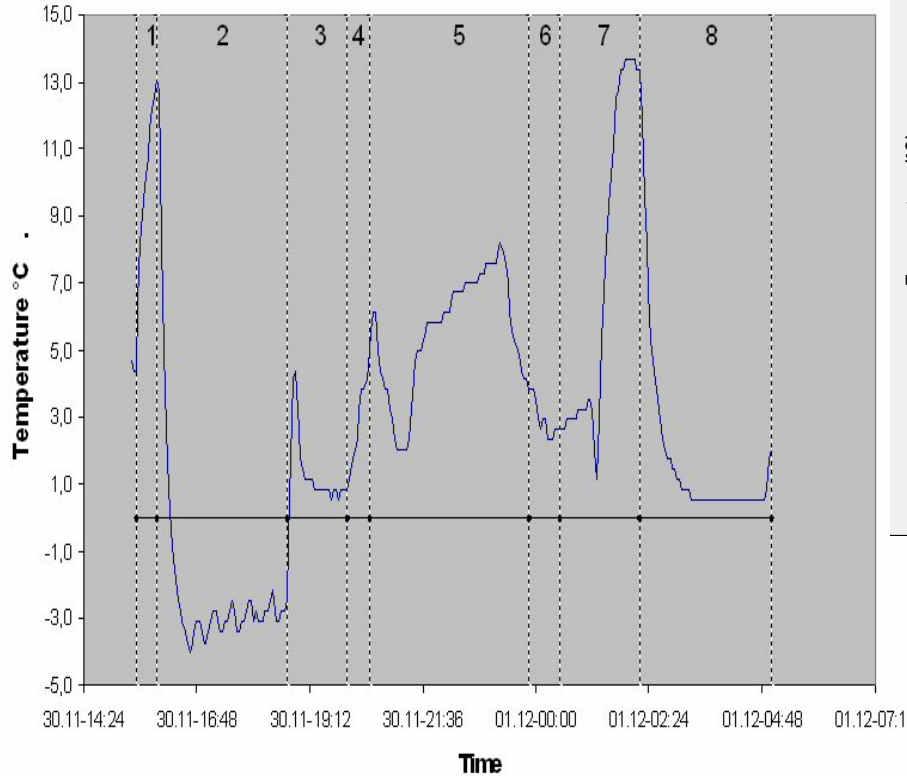
- Loading in plane: 1/2 an hour before departure





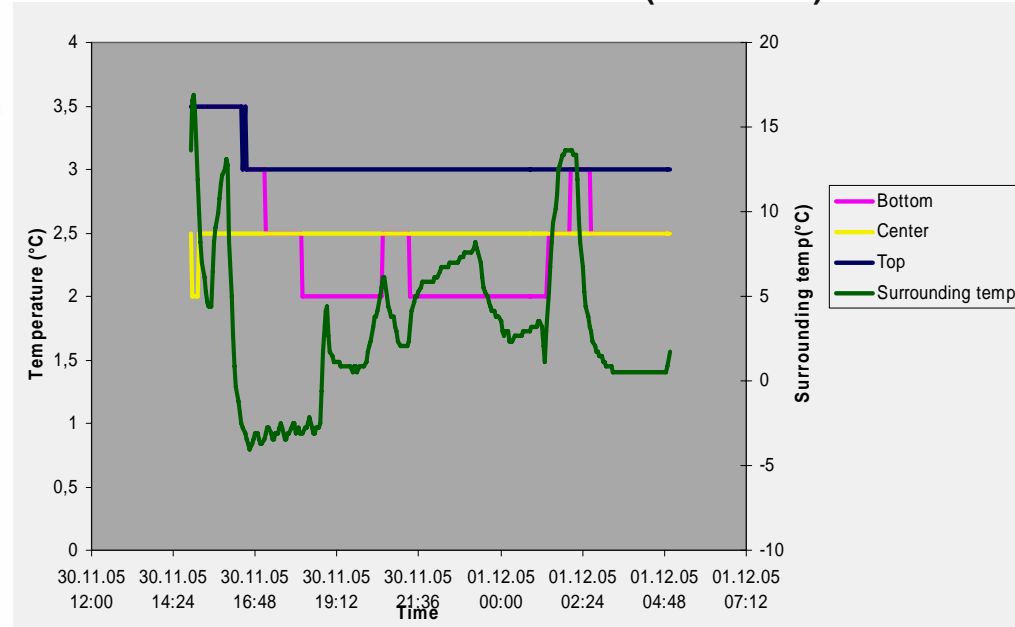
Temperature profile for the chain

Surrounding temperature profile

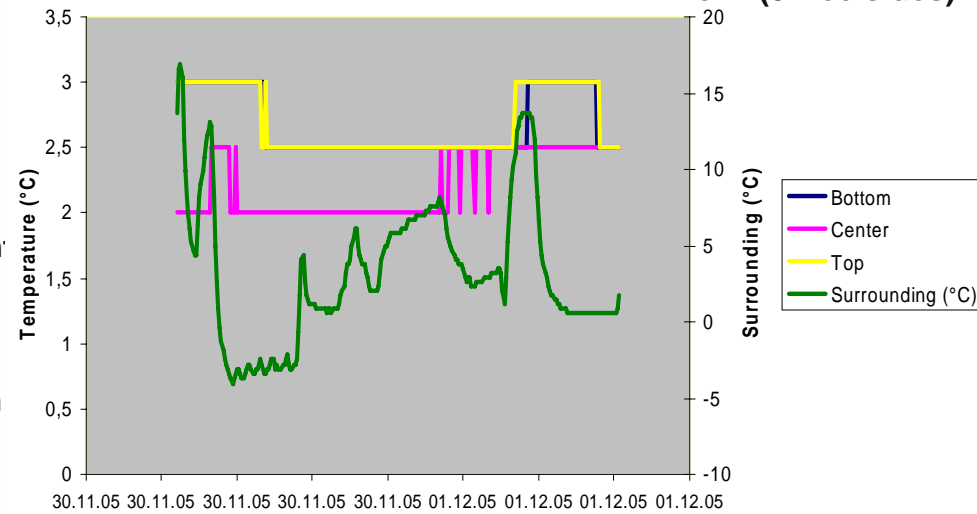


Legend: 1. Transport from producer to airport; 2. Placemen of the pallet in cold storage at airport; 3. Pallets transportation to the plane; 4. Loading in plane; 5. Flight time; 6. Unloading the pallet from the plane at Airport in Belgium; 7. Pallets in the ware house, before loading in the cooling truck; 8. Transport to buyer.

Box 1 (1 free side)

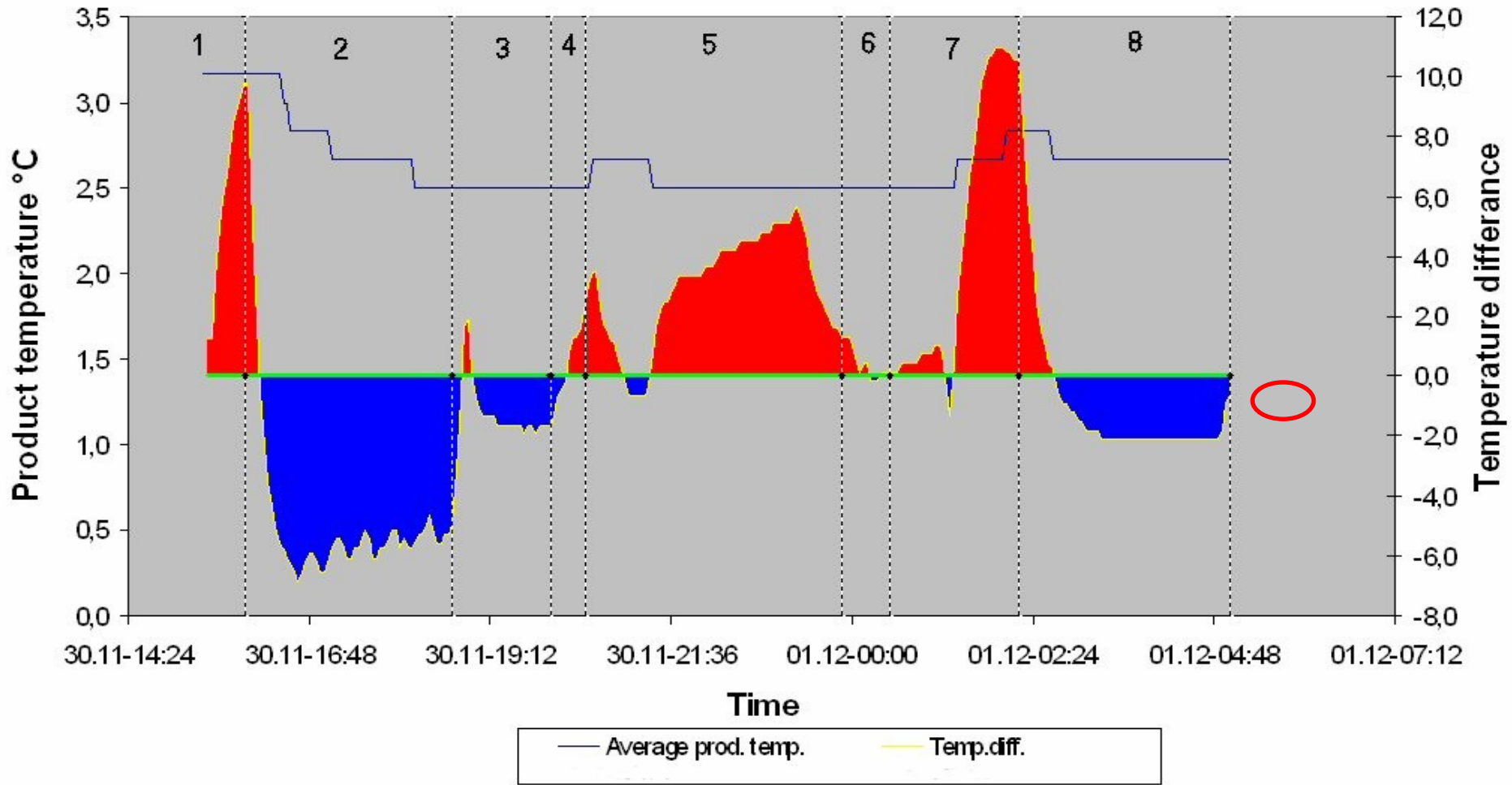


Box 2(3 free sides)



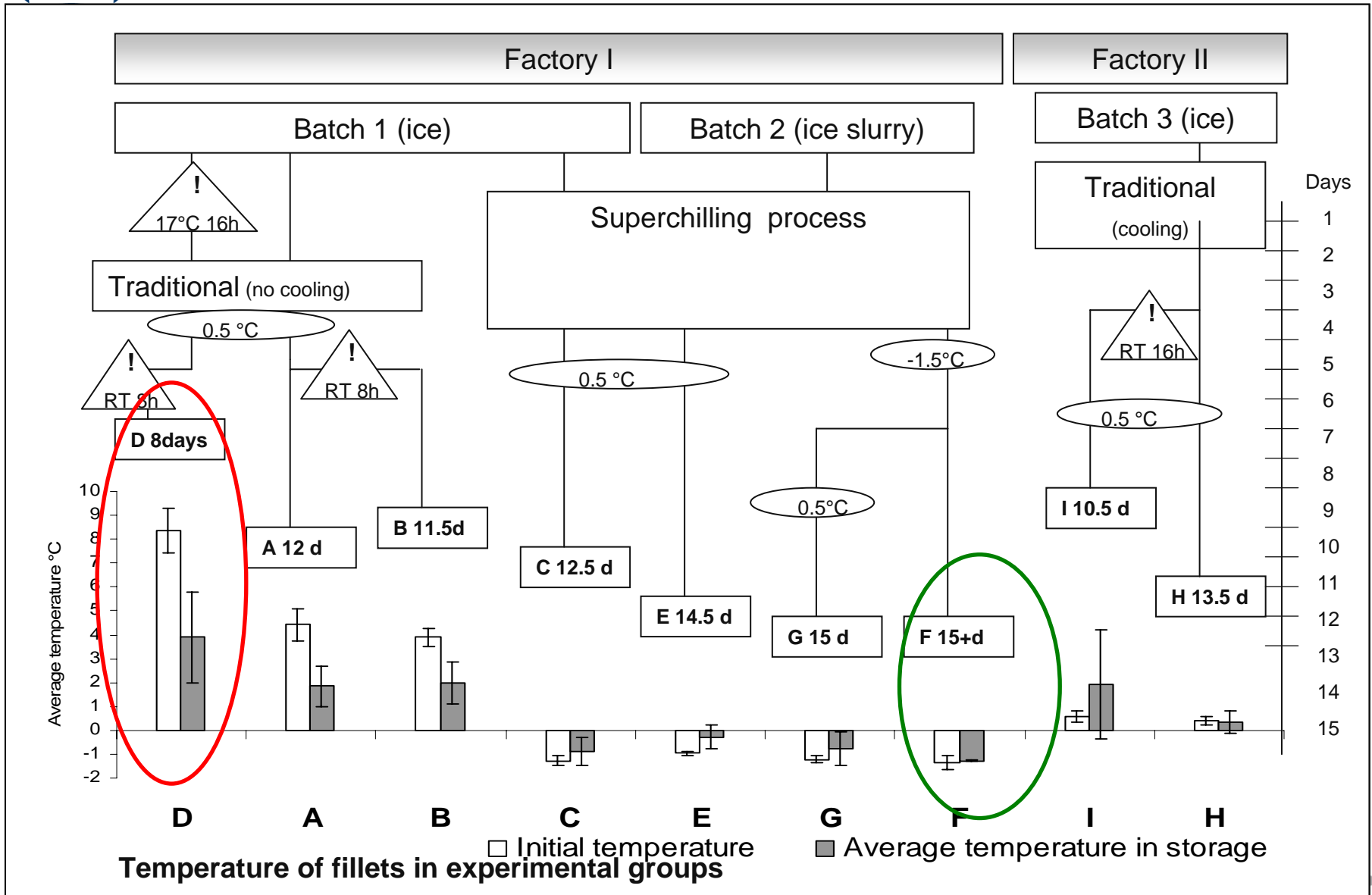


Temperature difference over box 1

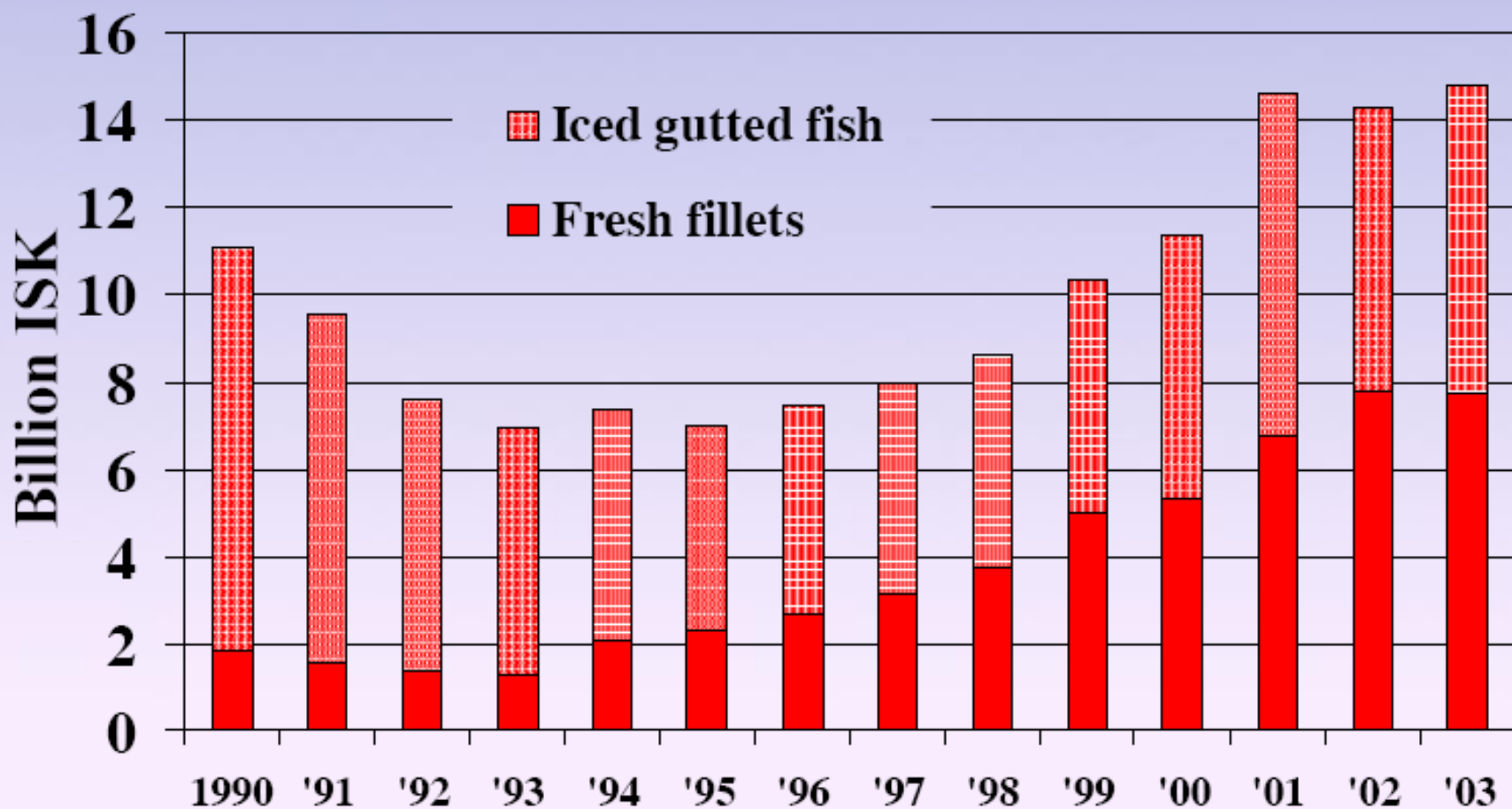


Legend: 1. Transport from producer to airport; 2. Placement of the pallet in cold storage at airport; 3. Pallets transportation to the plane; 4. Loading in plane; 5. Flight time; 6. Unloading the pallet from the plane at Airport in Belgium; 7. Pallets in the warehouse, before loading in the cooling truck; 8. Transport to buyer.

Influence of different processes and temperature conditions (-1,5 °C superchilling, 0.5 °C and Temp. abuse) on the shelf-life of cod fillets



Iceland - Export value of fresh fillets and iced gutted fish 1990-2003

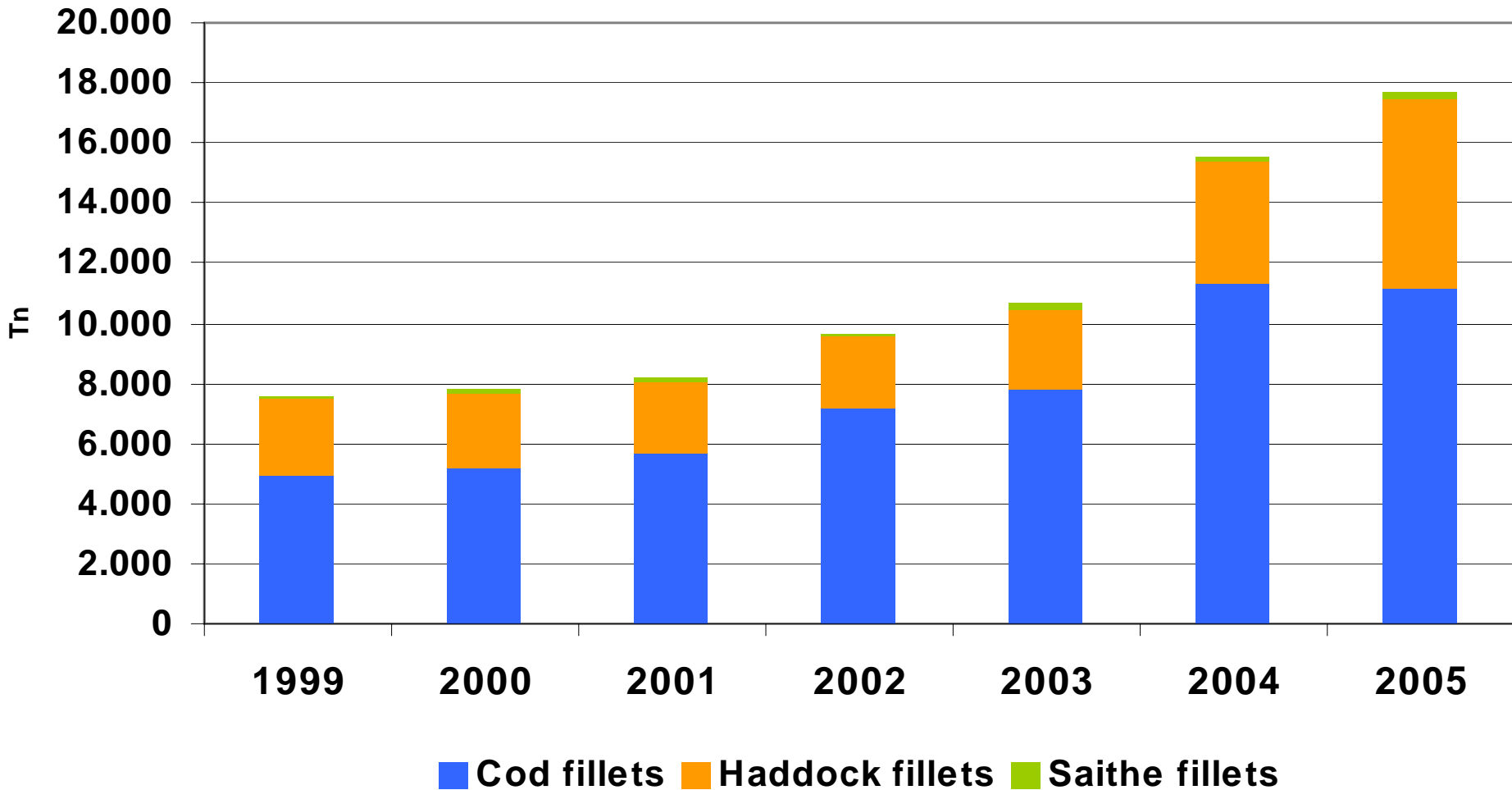


*FOB values at year's prices



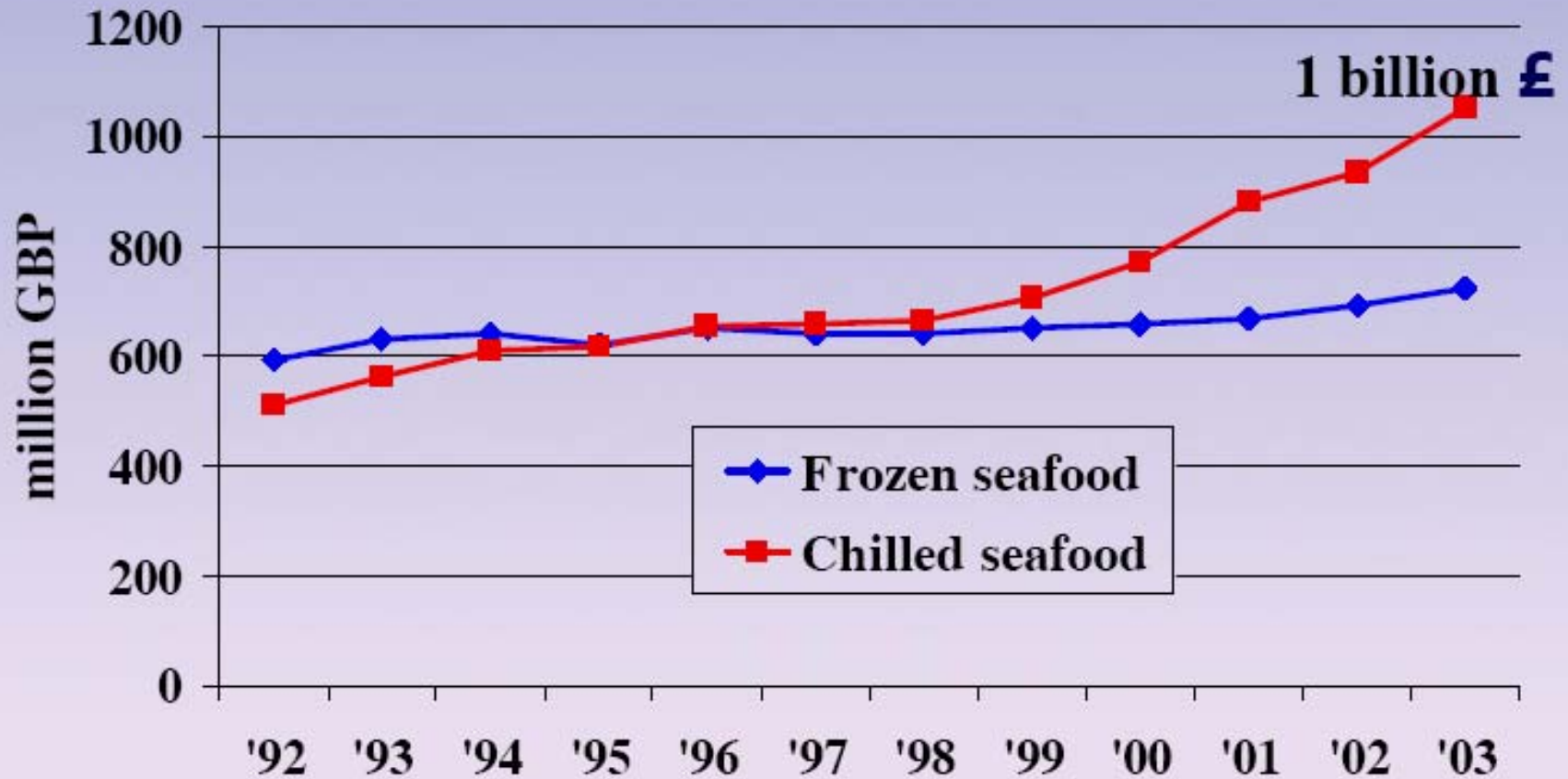
Increase of fresh fillets

Export of fresh fillets (cod, haddock, saithe)
from Iceland



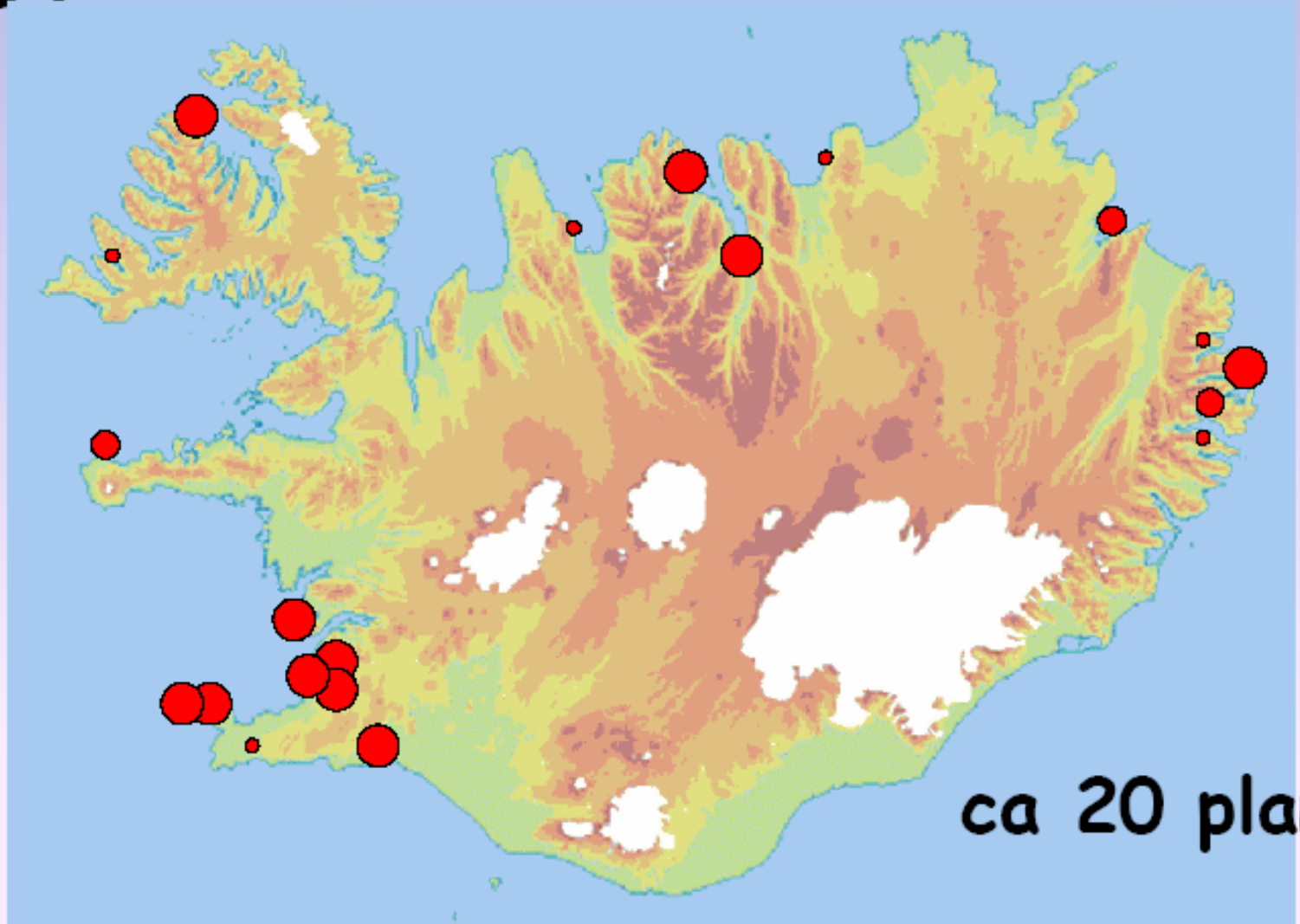
UK Retail Seafood since 1992

Value Sales in GBP million

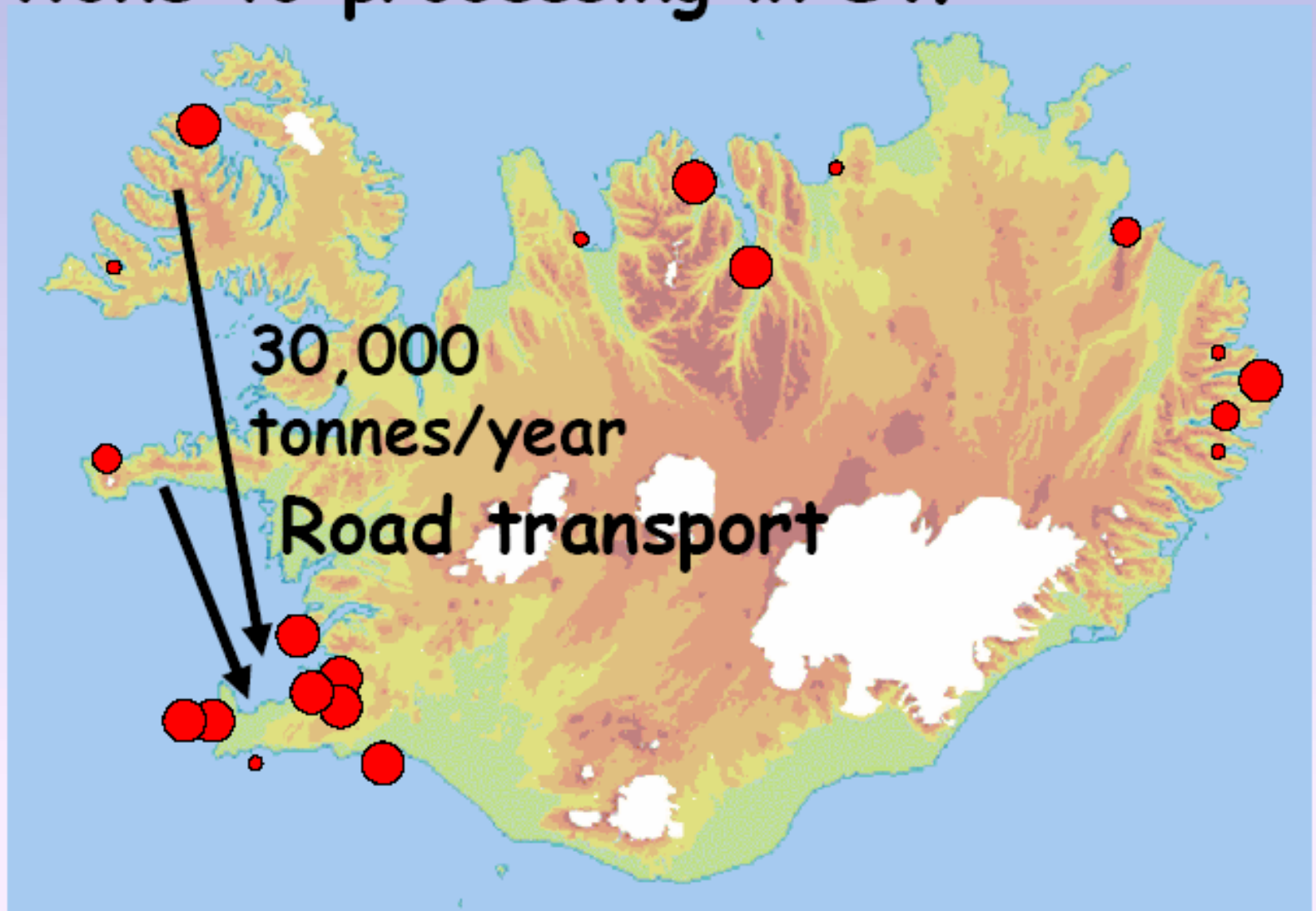


Source: Young's, original ref: TNS/SFA

Fresh fish fillets processing plants 2004



Massive Road transport from auctions to processing in SW



Fresh fillets-transport to market

Major
transport
by air



Fresh fillets-transport to market

Minor
transport
by sea
increasing





Compared the carbon emissions for transporting one kilogram of product by road, sea and air freight.



- Air freight from South Africa generates 15 kg of CO₂

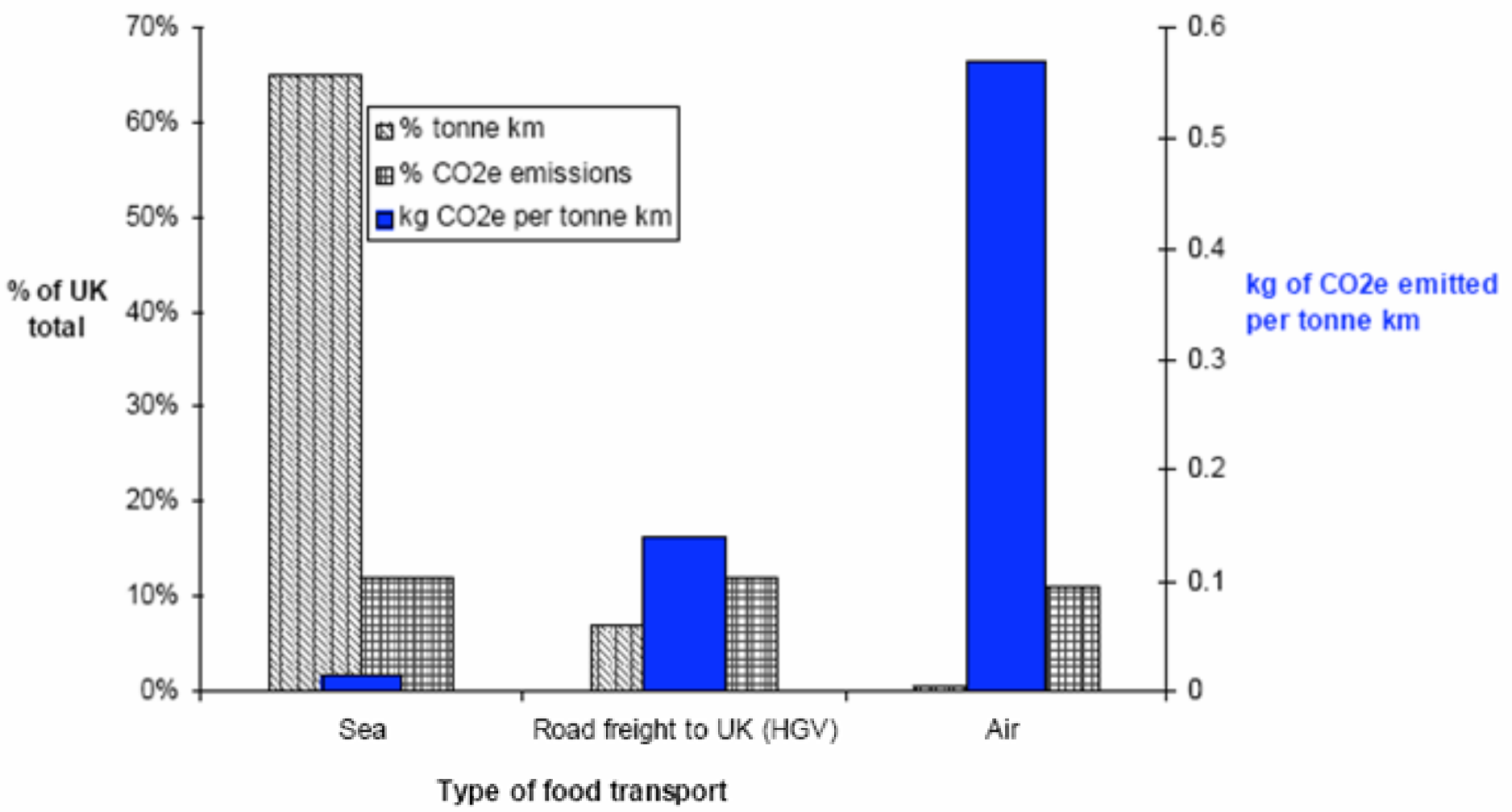


- Sea freight from South Africa generates 0.1kg of CO₂



- Road freight from southern Spain, although a shorter distance, generates 0.1kg of CO₂

CO₂ emitted per food mile in tonne km for air, sea and road freight - % of the UK's total food tonne km and food transport related CO₂ emissions. The remaining 65% of CO₂ emissions, not shown, occur on UK roads.





Average fuel consumption at different fishing ship in Iceland

<u>Fishing ship</u>	<u>Fuel ratio</u> kg fuel/kg fish
➤ Ice fish trawlers	0,43
➤ Factory ships	0,71
➤ Vessels > 10 tons	0,21
➤ Vessels < 10 tons	0,15
➤ Purse seines (herring, capelin)	0,035
➤ Purse seines (blue whiting)	0,089



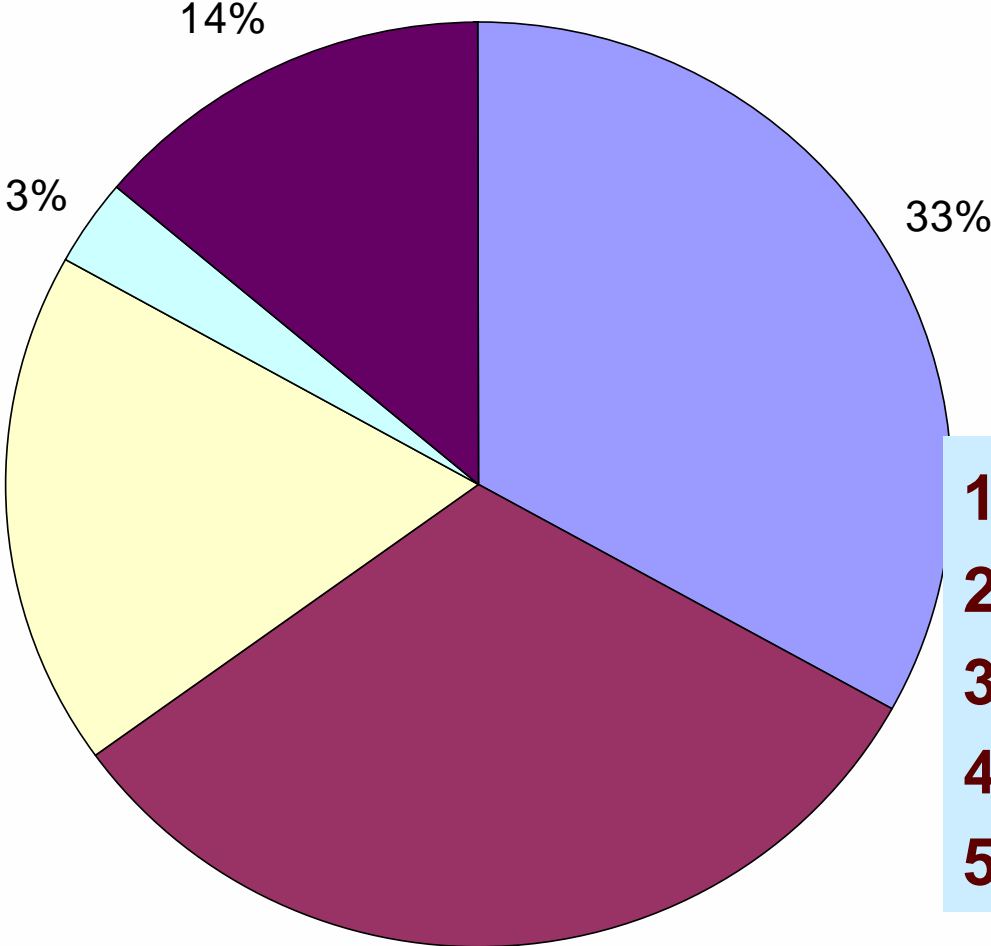


The emission rates

**The emission rates of 3.1 metric tons
of CO₂ per ton of oil.**



Total emission of carbon dioxide in Iceland 1999

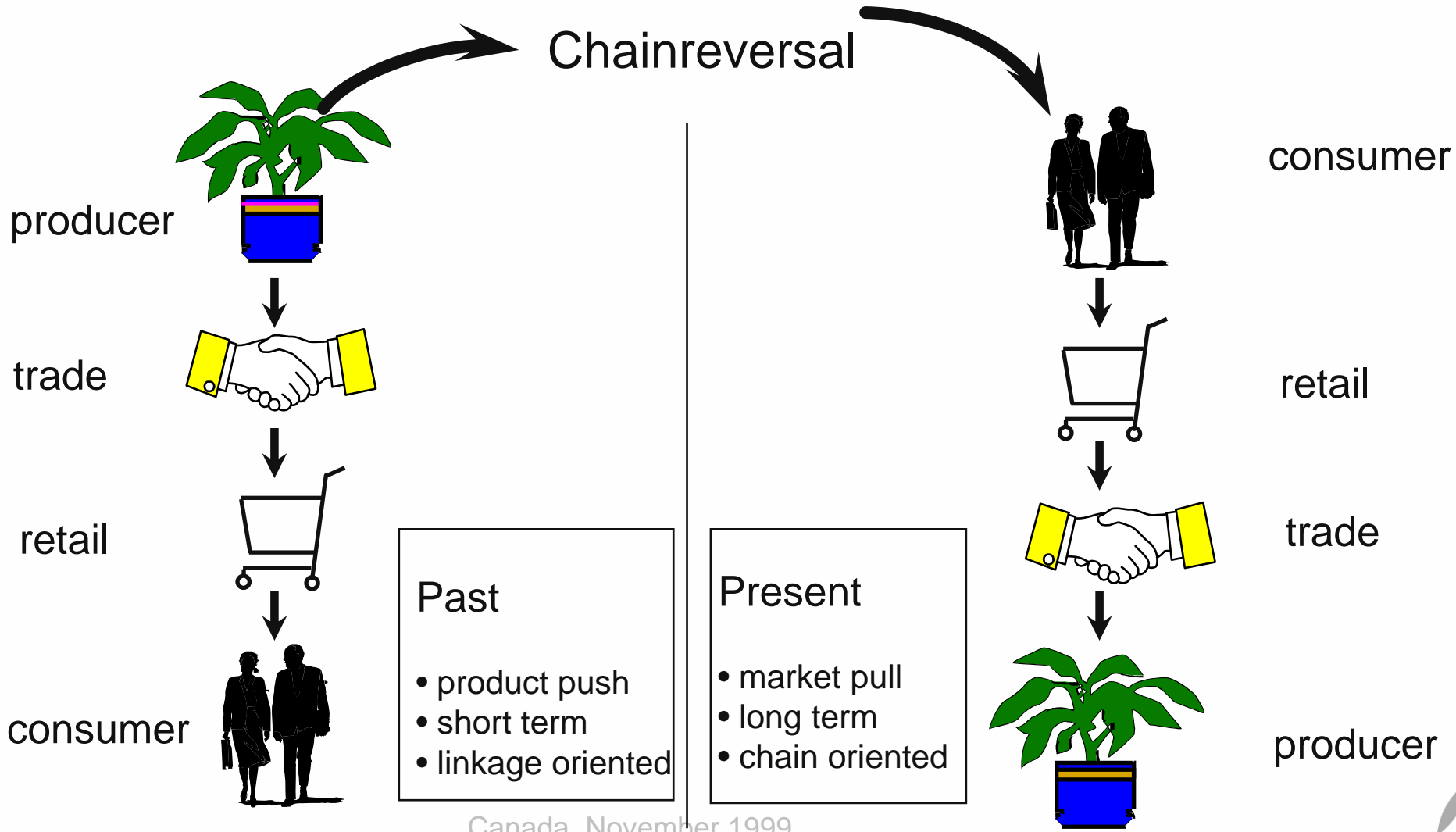


- 1. Fishing
- 2. Transport
- 3. Industry
- 4. Geothermal power plants
- 5. Others





Changes in the global food system



Canada, November 1999







Questions?

Comments?





However, when reducing our impact on the world's climate we must carefully consider the social and economic benefits of air freight for international development and growth of the organic market as a whole.

- Some highly perishable fresh food are imported all year round by air. This represents a very small but growing proportion of the carbon emissions from food distribution.
- The cost of air freighting food is extremely high and likely to rise. Consequently the vast majority of imported organic food comes by ship or road. Businesses avoid air freight when ever possible.
- Supermarkets strive for continual availability of even the most perishable and exotic produce all year round. Air freight also enables importers to respond to unexpected shortfalls in continuity of supply.
- There are a range of existing air freight initiatives: Tesco and Marks & Spencer have started labelling air freighted food; some organic box schemes have 'no air-freight' policies.
- Air freight is the fastest growing form of food transport. UK consumer demand for all year round fresh produce has seen air freight more than double since 1992 and growth is predicted to continue.
- Air freight has the highest global warming potential of any form of transport. It is less than 1% of the total UK food miles but is responsible for 11% of the CO₂ emissions from UK food transport. Air freight can generate 177 times more greenhouse gas than shipping.