



# Resource budget for raw materials in Norwegian salmon feeds 2010 and 2012

Trine Ytrestøyl, Torbjørn Åsgård & Turid  
Synnøve Aas

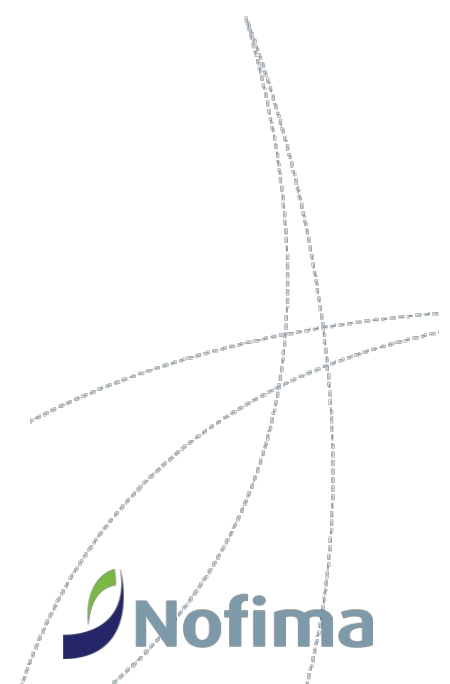
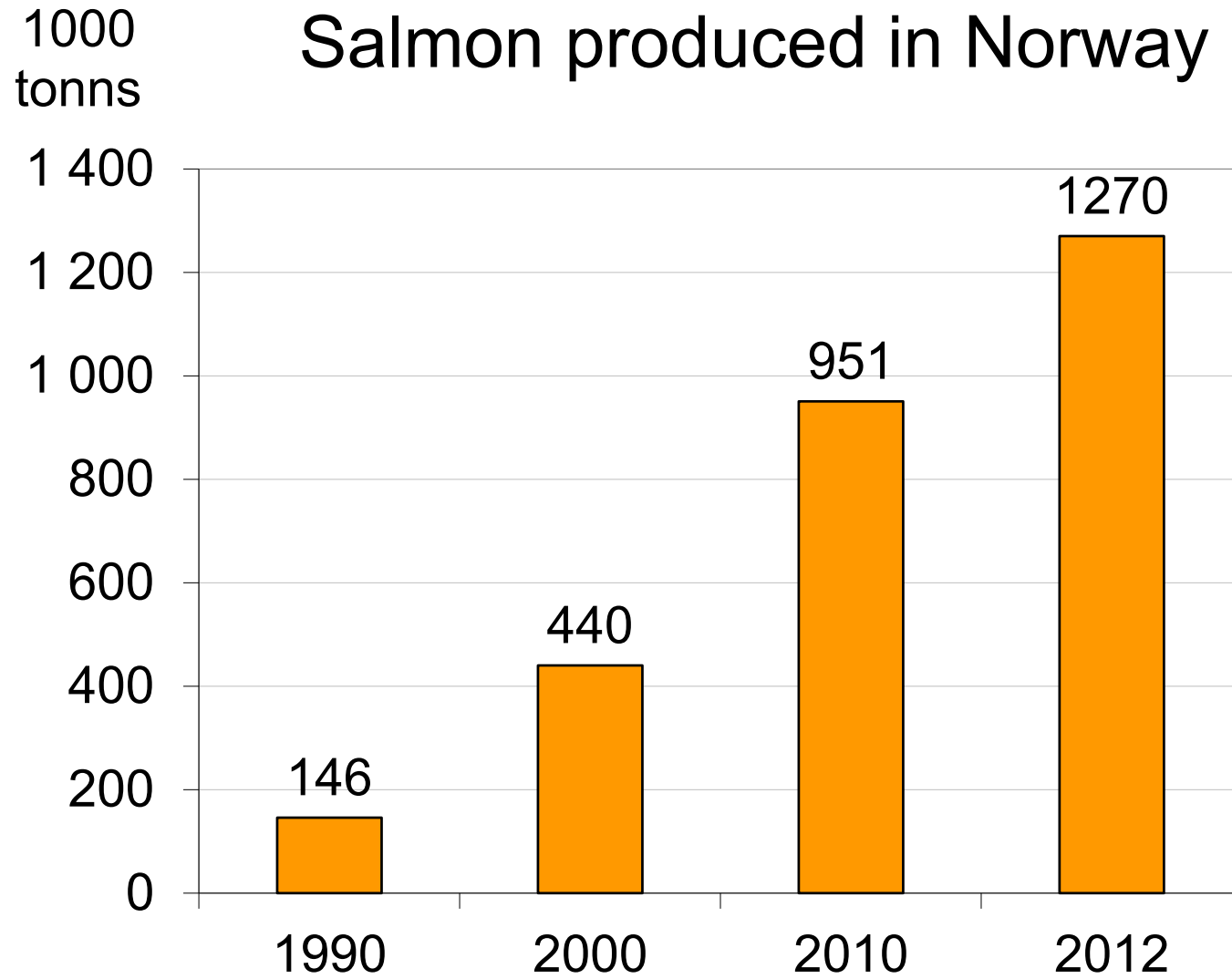
Nutrition and Feed Technology  
Nofima

[torbjorn.asgard@nofima.no](mailto:torbjorn.asgard@nofima.no)

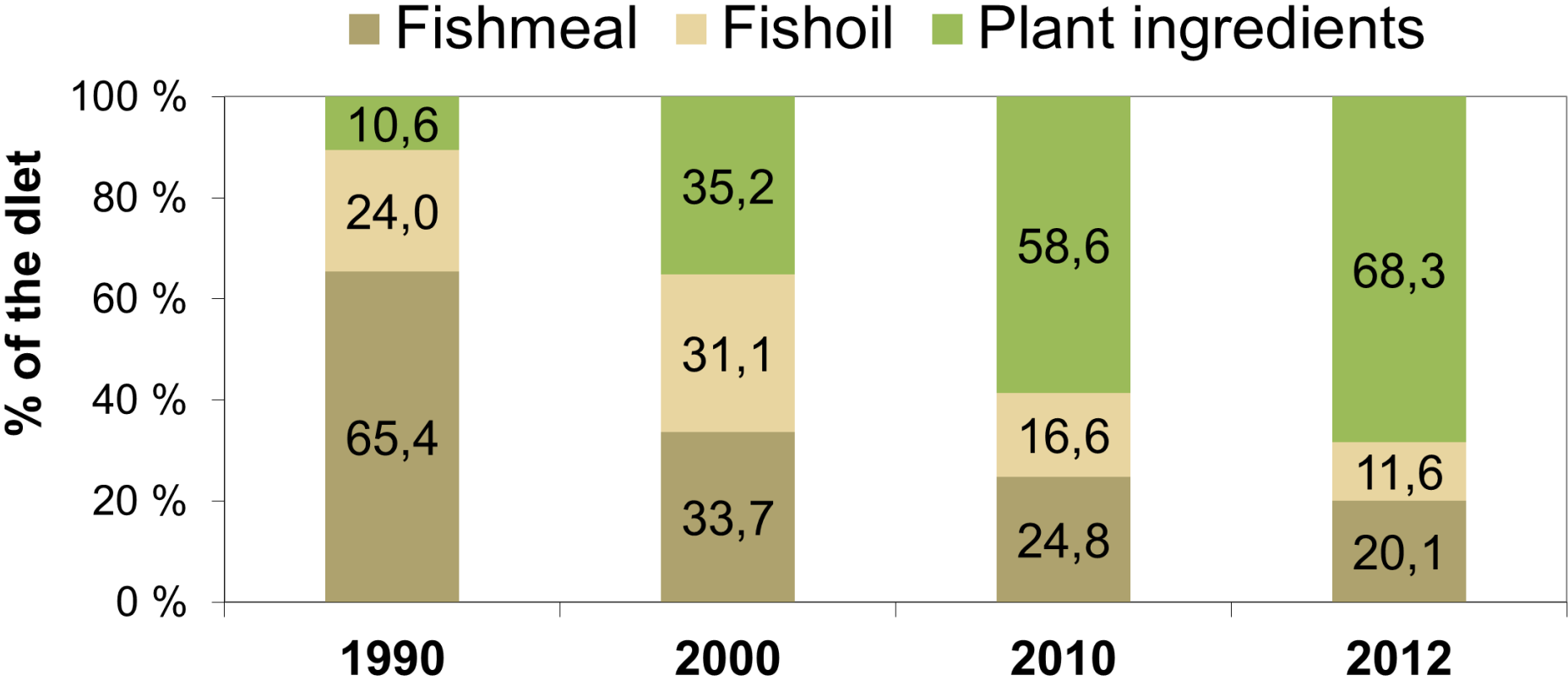
[www.nofima.no](http://www.nofima.no)



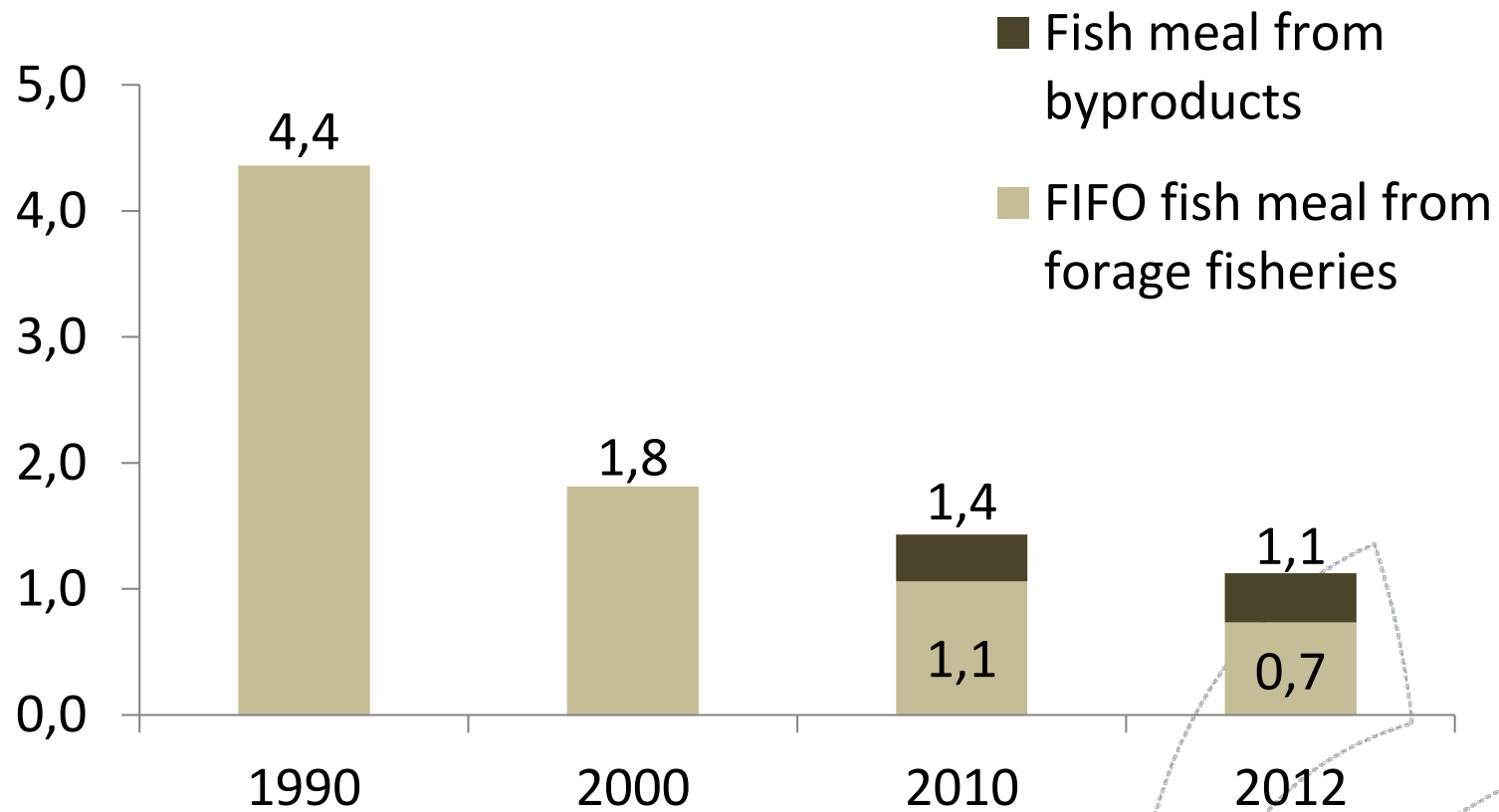
# Salmon produced in Norway



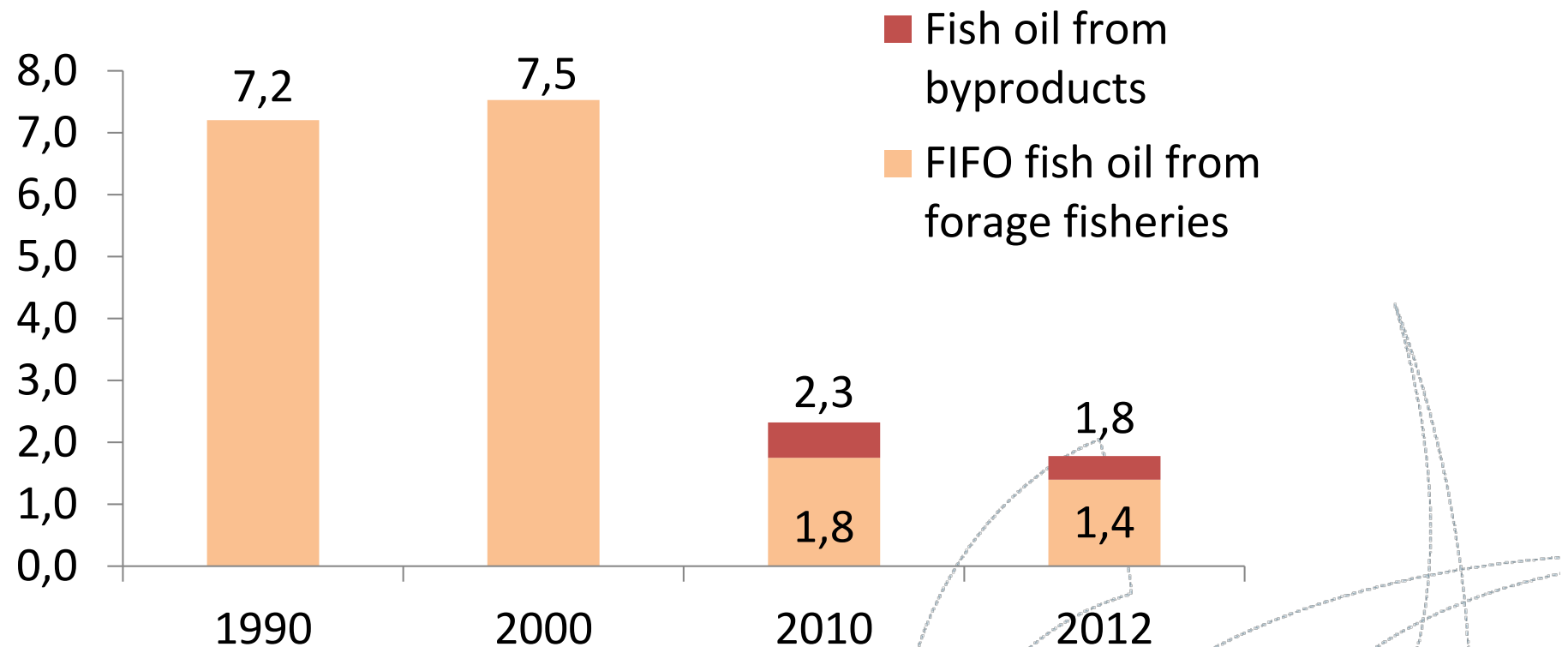
# Figure 1: Norwegian salmon feed 1990-2012



## FIFO for fish meal 1990-2012

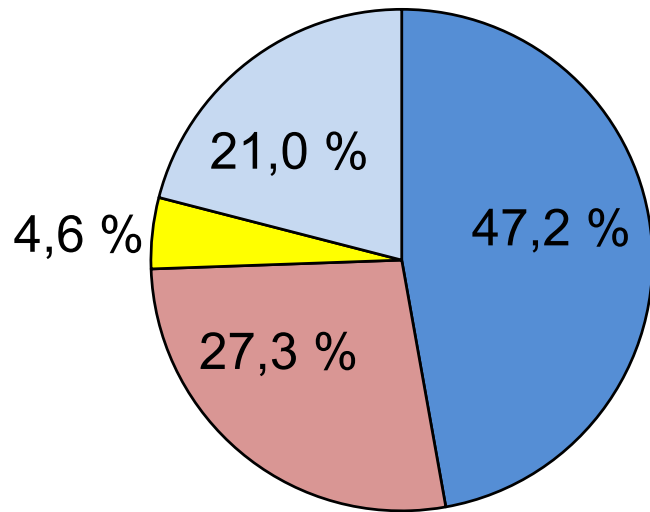


## FIFO for Fish oil 1990-2012

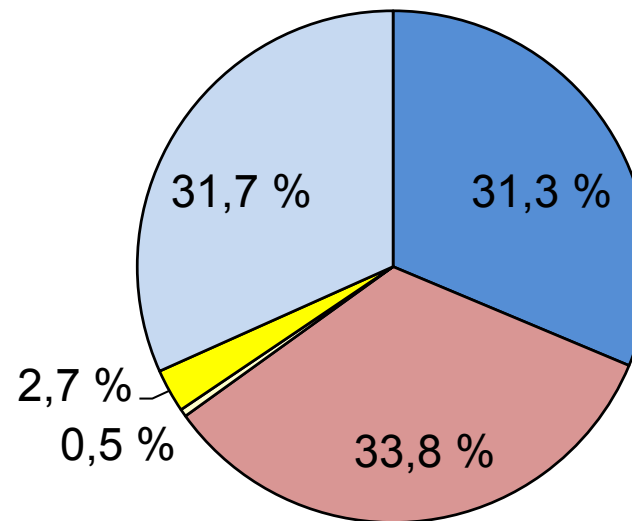


# Origin of fish meal

2010

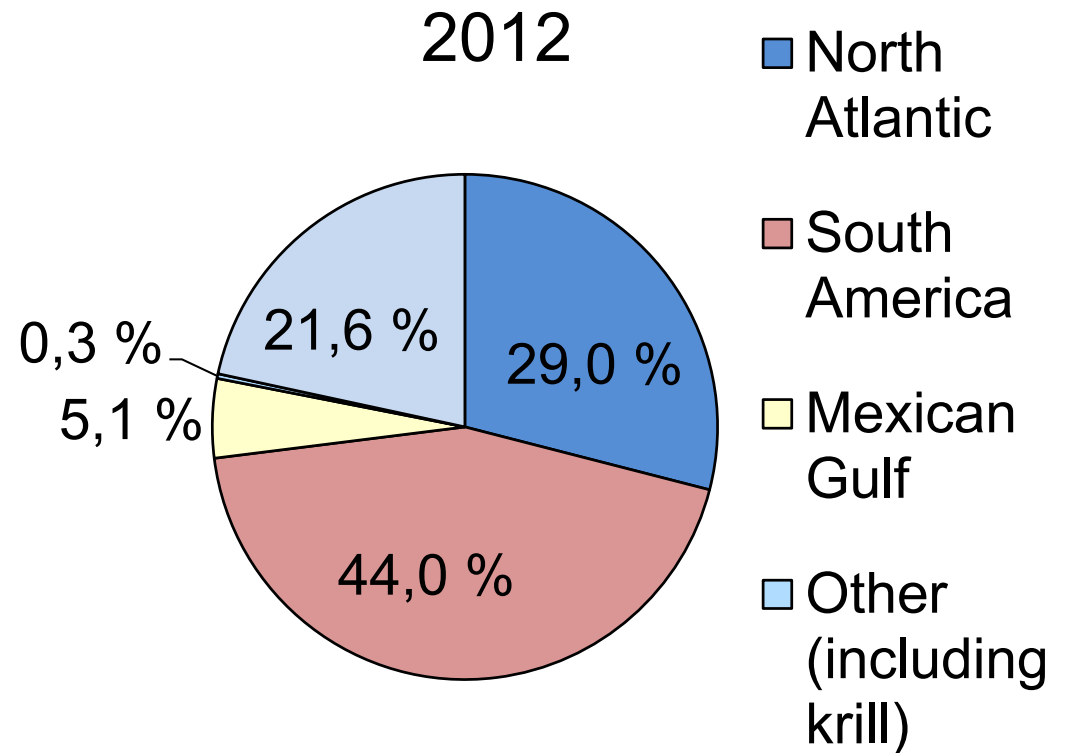
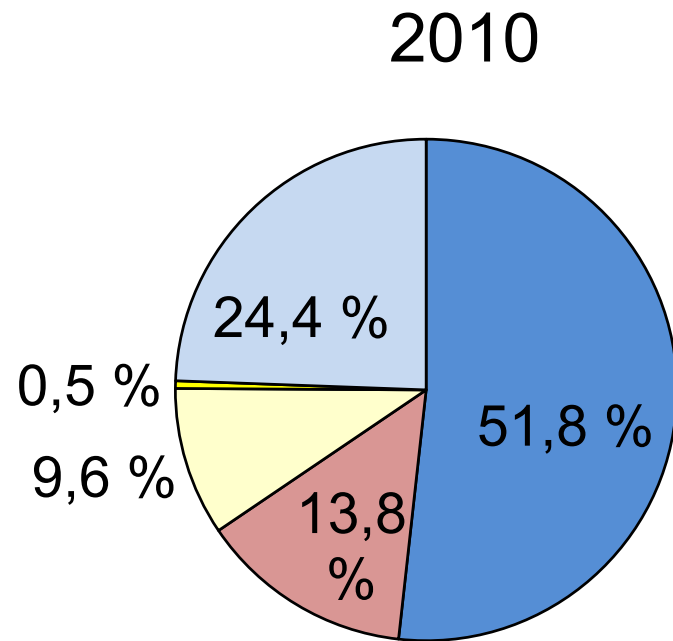


2012

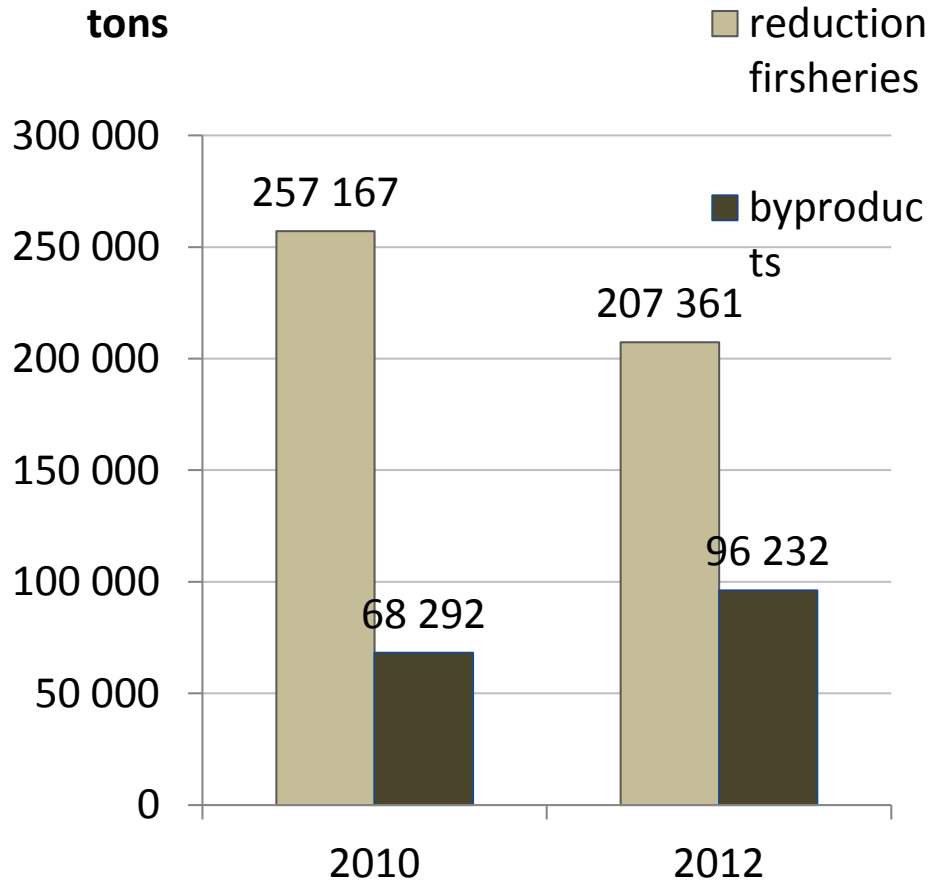


- North Atlantic
- South America
- Mexican Gulf
- Other (including krill)
- By-products (N Atlantic)

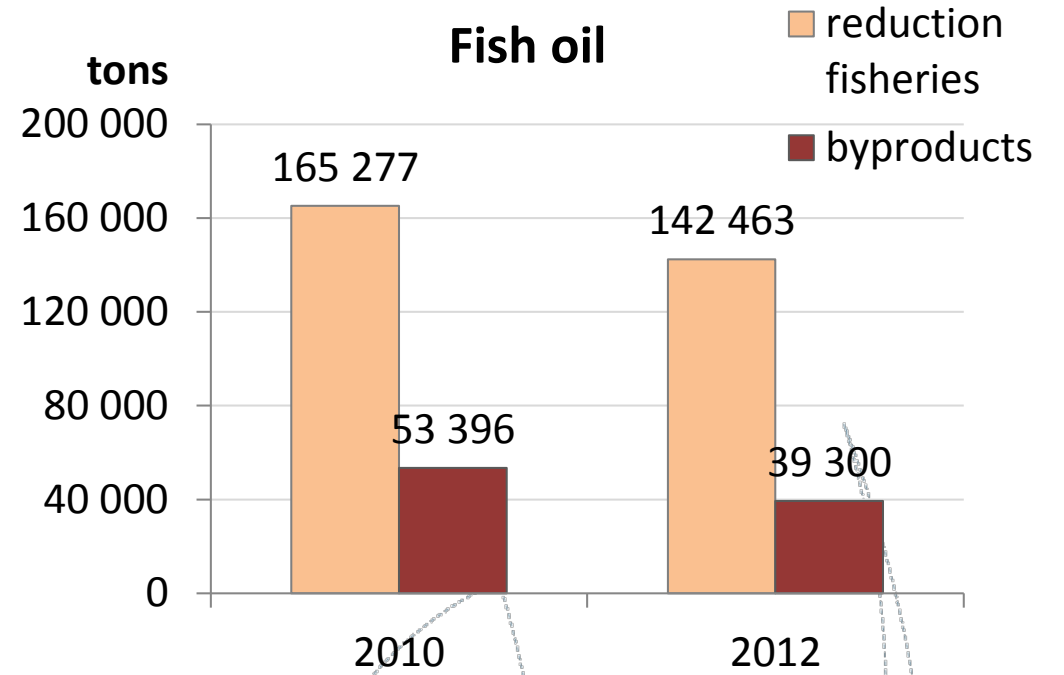
# Origin of fish oil



## Fishmeal



## Fish oil

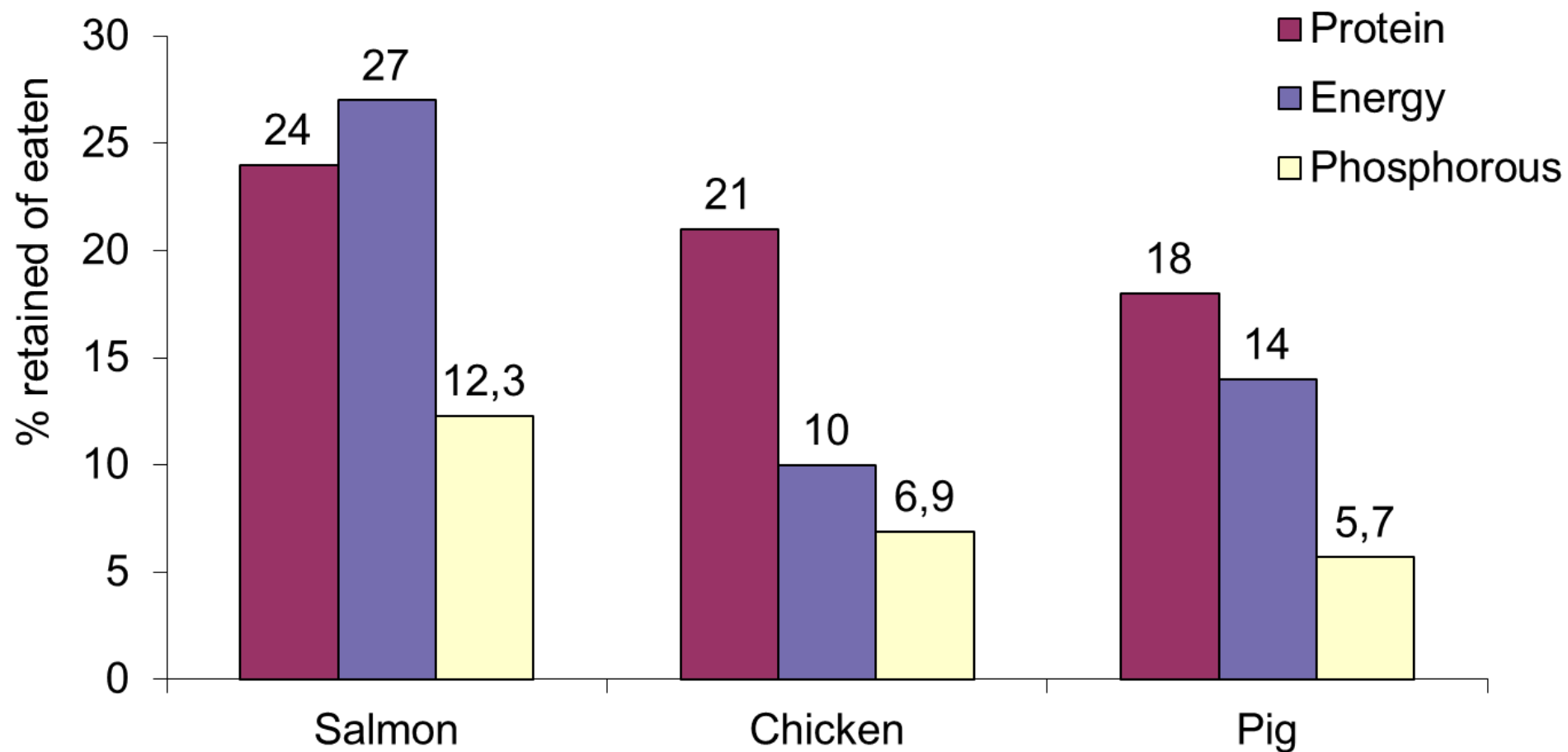




# Nutrient or energy content and utilization in salmon

| <b>2012</b>    | <b>Nutrient content<br/>(% or MJ/kg)</b> |               | <b>Retention<br/>(% of eaten)</b> |               |
|----------------|--|---------------|-----------------------------------|---------------|
|                | <b>Whole body</b>                        | <b>Fillet</b> | <b>Whole body</b>                 | <b>Fillet</b> |
| <b>Energy</b>  | 12.6                                     | 11.5          | 45                                | 27            |
| <b>Protein</b> | 17.5                                     | 19.1          | 33                                | 24            |
| <b>Fat</b>     | 21.3                                     | 18.4          | 51                                | 29            |
| <b>EPA+DHA</b> | 1.58                                     | 1.36          | 41                                | 23            |

## Nutrient retention in edible product



# Conclusions

- We have a detailed overview of the feed resources used in Norwegian salmon farming
- The use of feed resources is very dynamic
- The salmon production increased more than 30 % from 2010 til 2012 but the use of fish meal and oil from reduction fisheries (i.e. fish caught for this purpose) decreased
- Salmon is very efficient in converting feed resources to meat compared to terrestrial domestic animals and thereby an important innovation in meat production
- We get more for less and the industry becomes less dependent on specific resources

Thank you for your attention!

[torbjorn.asgard@nofima.no](mailto:torbjorn.asgard@nofima.no)

[www.nofima.no](http://www.nofima.no)