GOAL
VANCOUVER, CANADA 2015

The Appeal of Fishmeal:
Fishmeal's Transformation from Commodity to High-Priced, Strategic Protein

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- Gorjan Nikolik is a senior analyst on food and agribusiness for Rabobank International.
- Since joining Rabobank in 2005, are has focused on the global seafood sector, including aquaculture, wild catch, seafood trade and processing.
- In his primary role, Nikolik works as an internal consultant to Rabobank departments such as Mergers and Acquisitions, Leveraged Finance, Venture Capital and Credit Risk Management.
- He also produces research articles covering the seafood industry.

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Appeal of Fishmeal

Rabobank international

Gorjan Nikolik, Rabobank Food and Agri-business research and advisory

October 2015

the alliance global aquaculture

Rabobank

Rabobank: global leading food & agribusiness financial services group

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Focused on the F&A sector - active in 52 countries; and most key food producing regions

We recently produced a report on the Fish Meal industry, here are the main points

Source: Rabobank 2013

Demand drivers for fish meal: Aquaculture volume growth

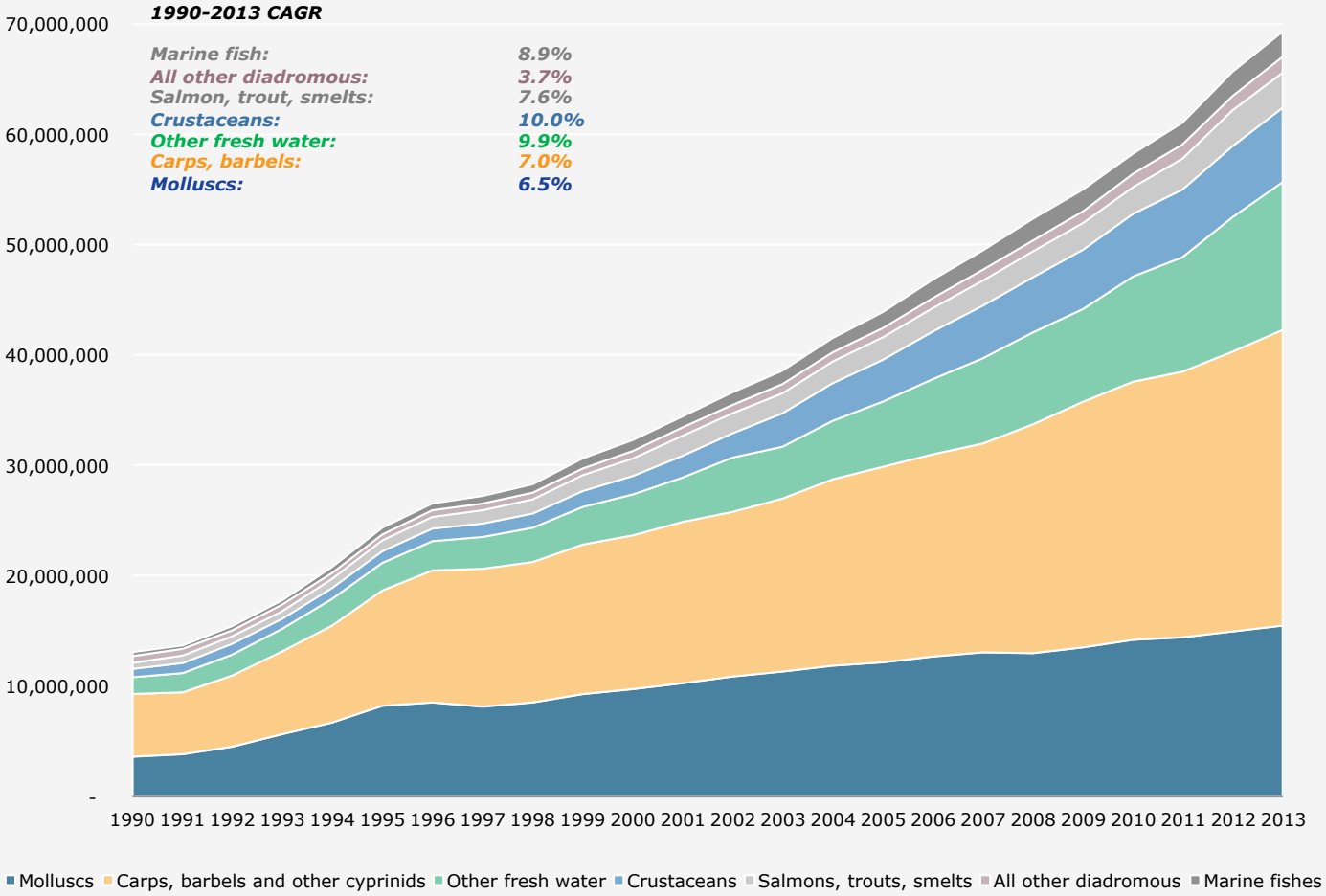
Seafood consumption globally is growing

- *In developing countries a diet change from grain/rice towards higher value proteins*
- *Healthy and indulged food demand for wealthier consumers globally*

Aquaculture is the only way to increases seafood supply

- *Wild catch is fixed*
- *50% of the industry needs to provide 100% of the growth*

Global aquaculture production (excluding aquatic plants) 1990 – 2013 per key species group



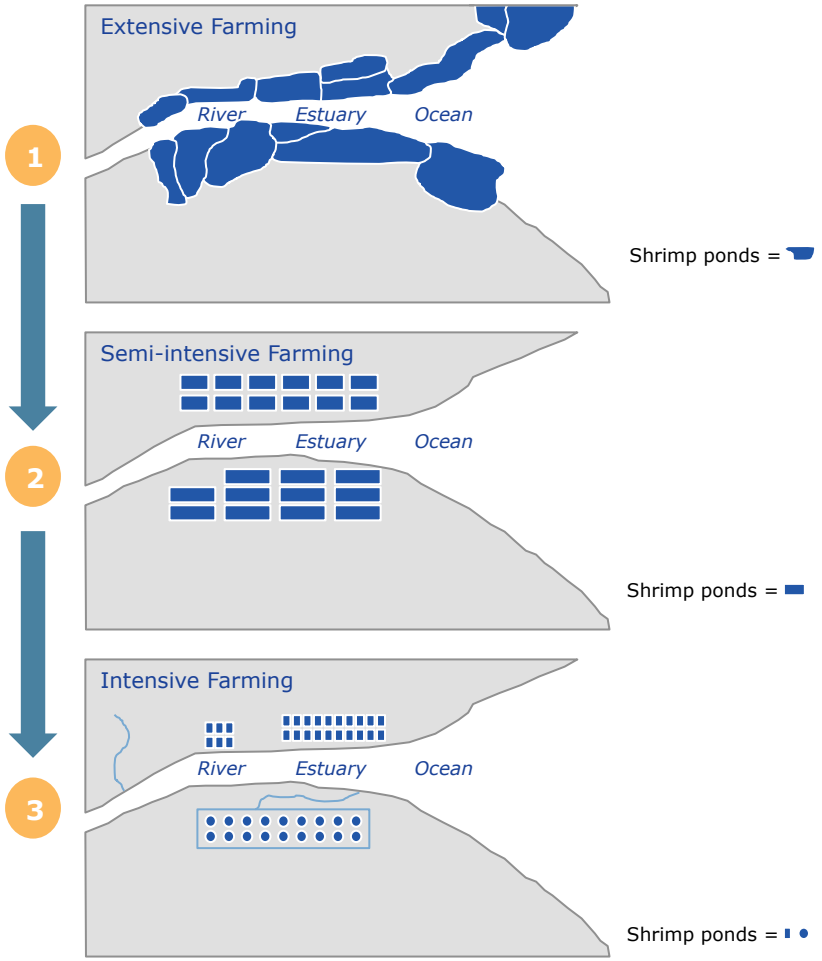
Source: FAO FIGIS

Demand drivers for fish meal: Intensification of aquaculture production

Comment

- *Farmers can only expand their productivity by increasing intensification*
- *At the moment the largest part of aquaculture is still artisanal and uses very little feed*
- *Shrimp, Tilapia, Catfish and even the Carp species are farmed in an increasingly more intensive way*
- *More intensity means more feed*
- *So even with a very low FM content it means more demand for FM*

Shrimp farm design evolution, an example of an industry switching to higher level of farming intensity



More intense and modern aquaculture

More formulated feed

More fishmeal *(in most cases)*

Source: Rabobank 2013

Demand drivers for fish meal: New premium aquacultured species

Comment

- ***Marine fish:*** *Groupers, Blue fin tuna, cobia, barramundi, amberjacks , flat fish ..*
- ***Tropical fresh water fish****: Amazon species, snake head, mandarin fish ...*
- ***Crustaceans:*** *lobsters, crabs*
- ***Shellfish:*** *abalones use FM in the feed*
- ***Features***
  - *Many are premium products*
  - *Most are carnivores or at least need some FM in the diet*
  - *It will be long before formulations become sophisticated enough to substitute FM for emerging species*

New farmed species, key drivers of demand for fish meal and fish oil in the future

Source: Rabobank, Intrafish (photos)

But supply is declining (or at best stable), down by 1/3 in 15 years

Comment

- Since 1997 FM production has declined over 2 million tonnes approximately 1/3
- The IFFO 6 FM production has declined to 35% of what it was were back in 1997

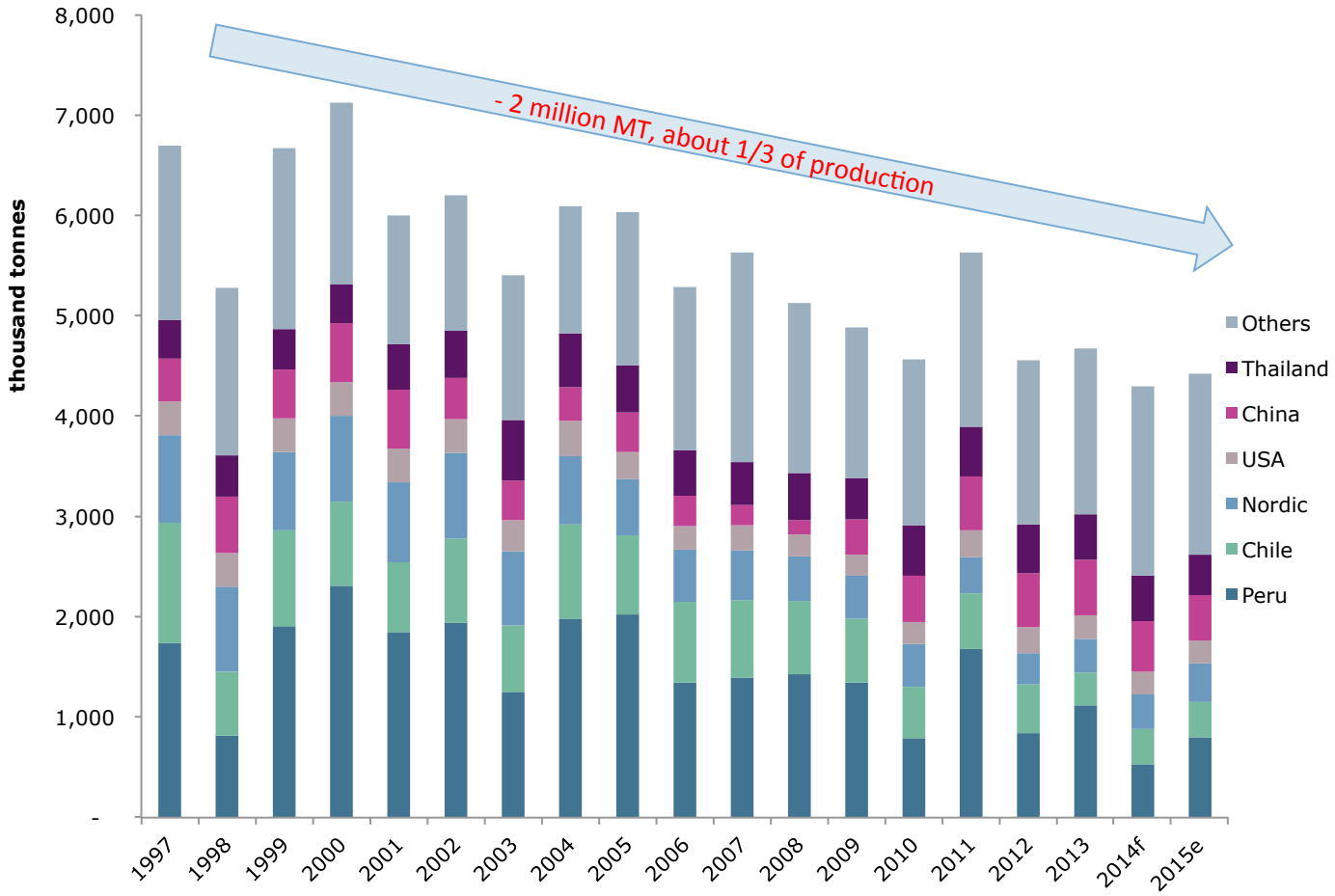
WHY:

- (1) Lower catch of small pelagics
- Unsustainable harvesting in the past?
- Climate change?
- Other changes in the ocean?

And

- (2) Pelagics are being used for direct human consumption, canning or freezing

Global supply of fish meal



Source: Rabobank, Kontali, Oilworld 2015

Trimmings, now 1/3 of supply: debatable if more or less will be available for FM production in the future

Comment

- According to FAO over 1.5 million tonnes of fish meal (above 35%) is now made out of trimmings
- This has been a key source of additional fish meal in the last decade
- BUT who will be the end user of trimmings in the future?
- Next to fish meal producers there are two other potential buyers of trimmings:
- (1) pet food producers - sold to affluent buyers and the ingredients list is key . And there are dynamics here that favour FM use
- (2) human consumption based on trimmings – burgers, nuggets, fantasy shapes etc ...
- In animal protein industries these products have long been considered the "fifth quarter" and have been a key driver of profitability for processors

Pet food

Estimates by PFMA is that c. 0.8 kg of FM is consumed per cat per year… In EU alone there are 98 mln cats, so c. 80k of FM

What happens when the Chinese have cats like we do in Europe?

The "fifth quarter"

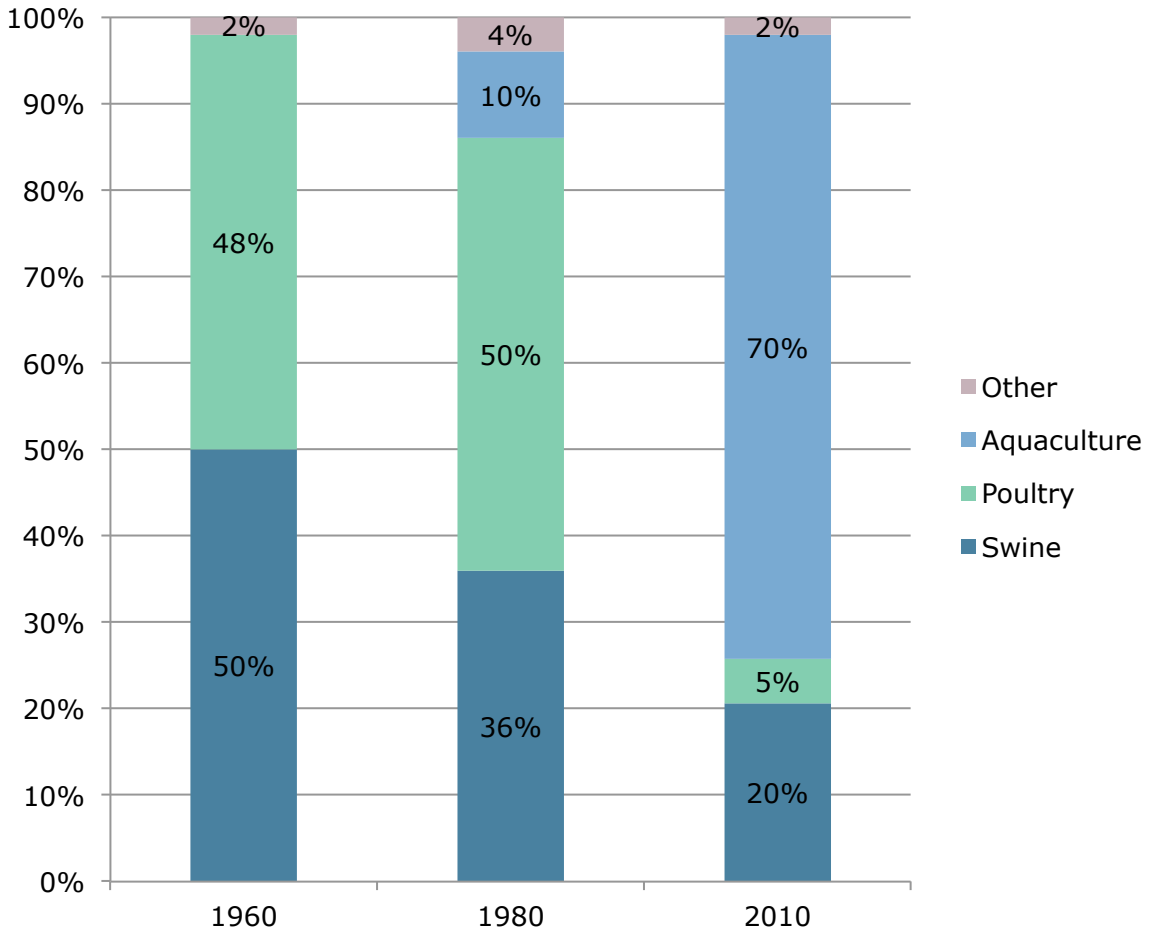
The best performing seafood processors utilize 100% of the trimmings for human consumption products, or combine with pet food products

Until recently there were still some animal protein users that could switch to other feed proteins. Very few of those are left

Comment

- 30 years ago the overwhelming majority of fish meal buyers were swine and poultry feed producers
- Swine and pouty can easily digest vegetable proteins such as soy meals
- Today aquaculture consumes close to 80% of the available FM
- The rationalisation of users is occurring within the aquatic species with shrimp becoming the main user accounting for some 35% of FM consumption among aquaculture users
- Marine species, where many newly domesticated species are is also increasing in share

In the past is was still possible to for aquaculture to "take" FM from the poultry and swine farming sector

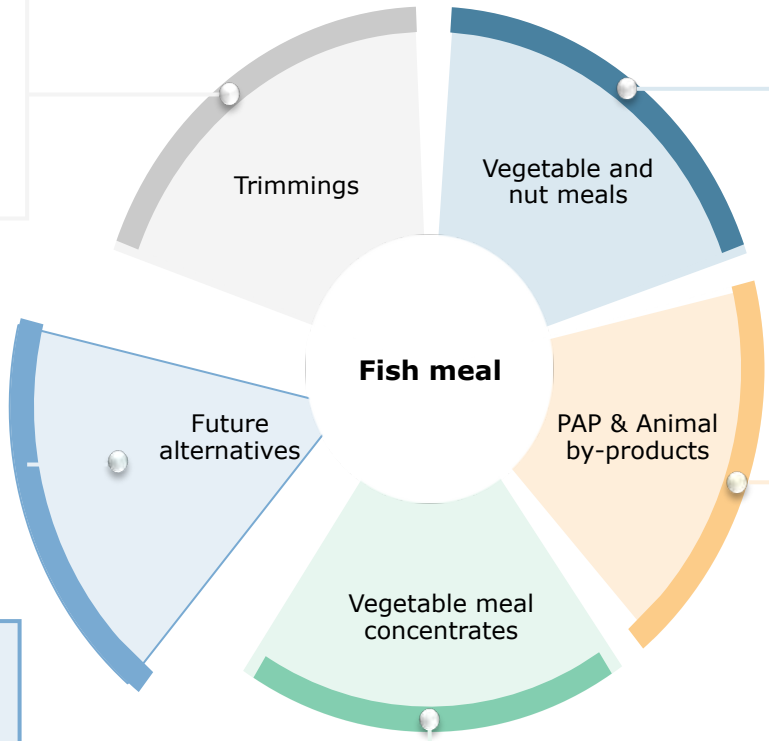


Source: World Bank 2014

And good alternatives to FM are not available (yet) at sufficient scale or price

Comment

- Arguably the current use and price of fishmeal is only justified by its functionality – "it is just a very good mix of amino acids"
- But what else has this mix of amino acids and is available at the same scale and price?
- Veg. meals and PAP are available and cost efficient but lack certain properties to fully replace FM
- There is a long list of future options – non of which are currently available significant volume of have cost price that can compete with FM



- Key alternative source so far
- Logistics issues
- Not available in long term?

- Lower protein content
- Anti-nutritional factors
- Will not work for all species

- Lack minerals, amino acid profile
- Also limited in supply

- Expensive?
- Lack minerals, amino acid profile

- Krill?
- Marine worms?
- Algae?
- Yeast based ingredients?
- Insect-based feeds?
- Single cell proteins?
- Farmed fish?
- Synthetic amino acids?

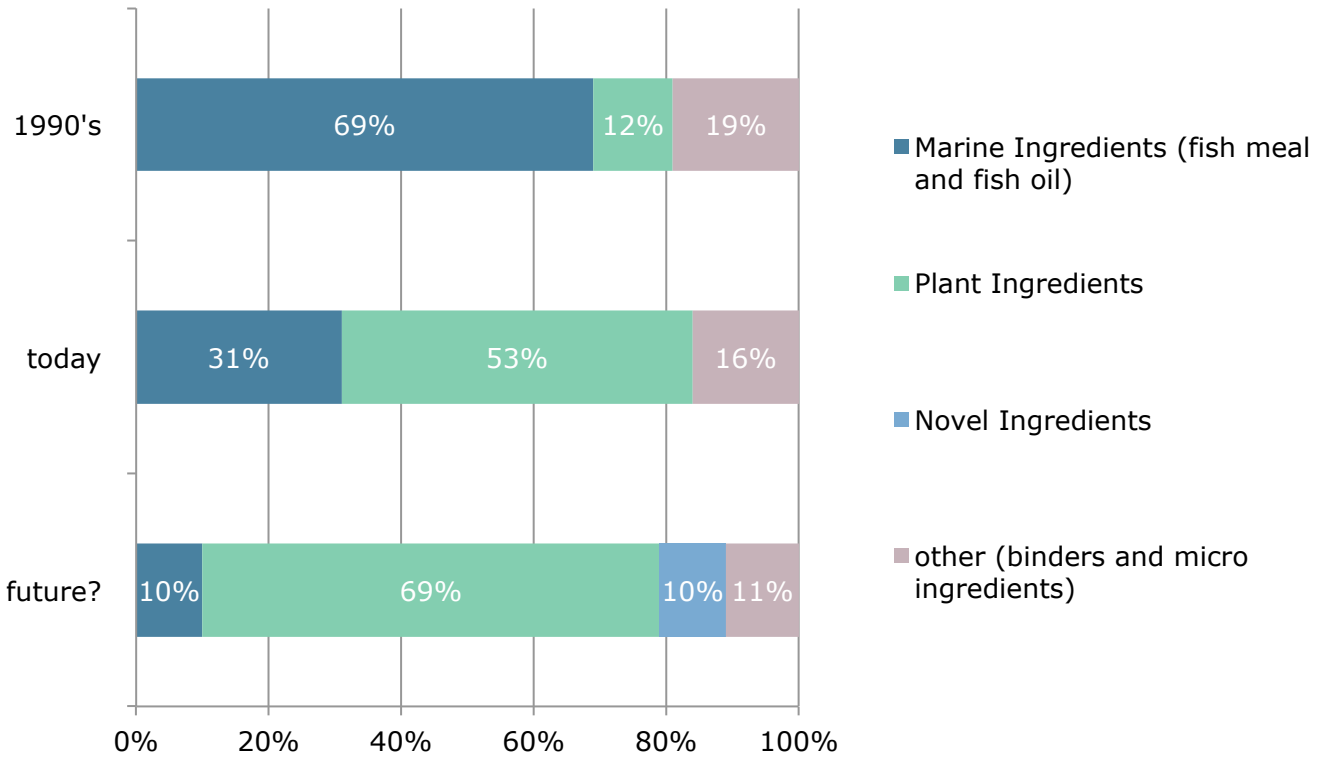
Source: Rabobank 2015

The most advanced aquafeed producers have done a great job, but it is increasingly more difficult to lower the inclusion further

Comment

- The expectation is that the inclusion of FM and FO together could represent 10% of the formula in the future
- This is 1/3 of current use but it will be very difficult to get to this point and it depends on the availably of "novel ingredients"
- The role FM and FO have in the future feed formulas is strategic, not a bulk protein or oil
- It will be used in larger inclusion levels in times of disease, for juveniles, for broodstock animals, when changing environment, etc...

Salmon feed formula evolution



Source: EWOS 2015

The balance: So far the dynamics are indicating towards further long term tightening of the marine proteins market

Long term price erosion for FM

- Technology in feed formulation – i.e. carnivores become vegetarians
- Development of new ingredients (e.g. PAP,SBM concentrates, algae based...)
- Production Cost decline? (crude oil or energy component)

Long term price support for FM

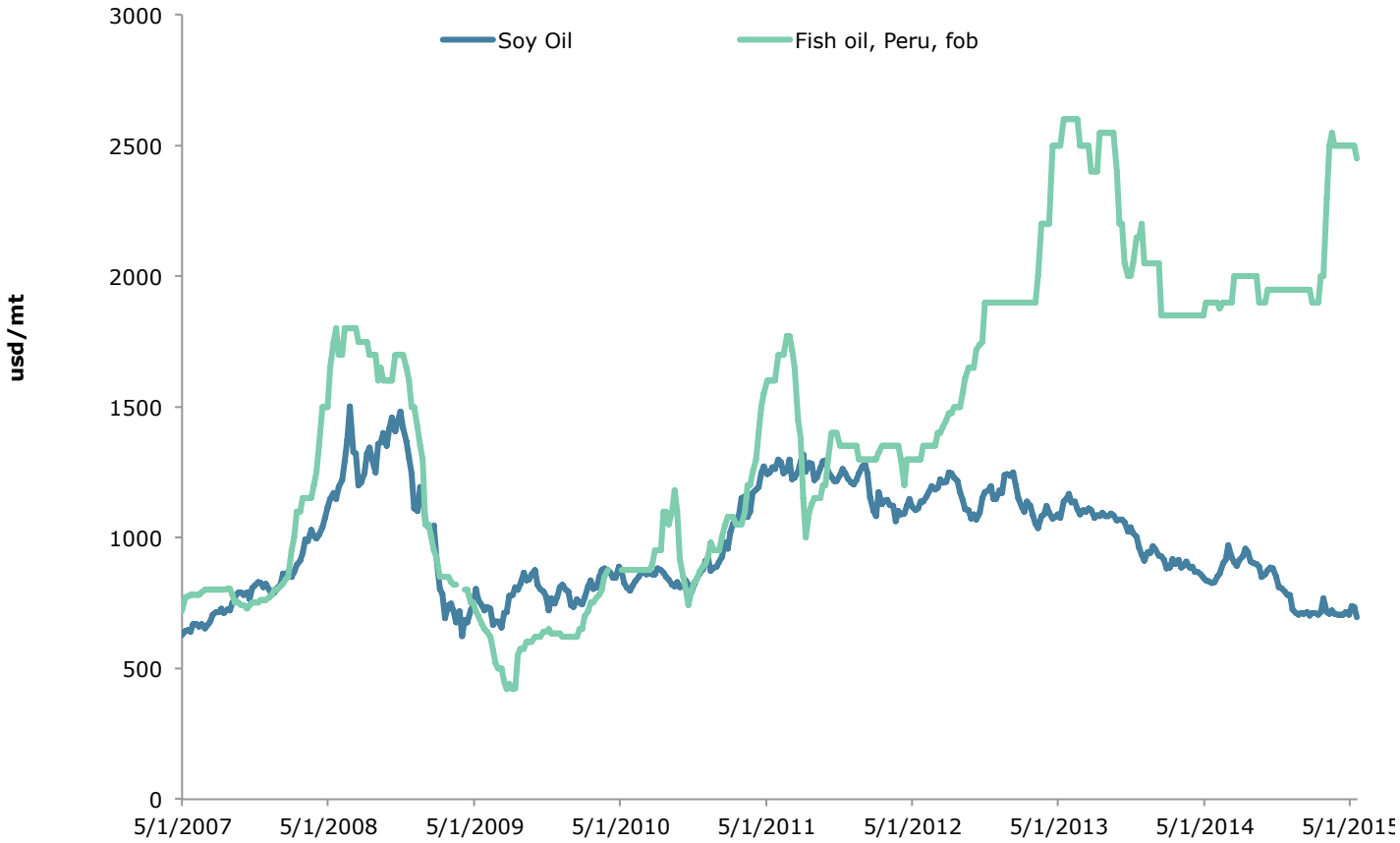
- Supply contraction (or stability at best)
- Aquaculture growth and intensification
- Rise of new farmed species
- Protein demand from human and pet food markets

Fish oil and vegetable oils price are moving in opposite direction since 2012, evidence of lack of substitutability

Comment

- Since about 2012 fish oil no longer has any real relation with soy oil
- For at least a part of the buyers of fish oil, (salmon feed producers and human consumption fish oil producers) vegetable oil is no longer a real substitute product

Fish oil and soy oil prices diverging already since 2012



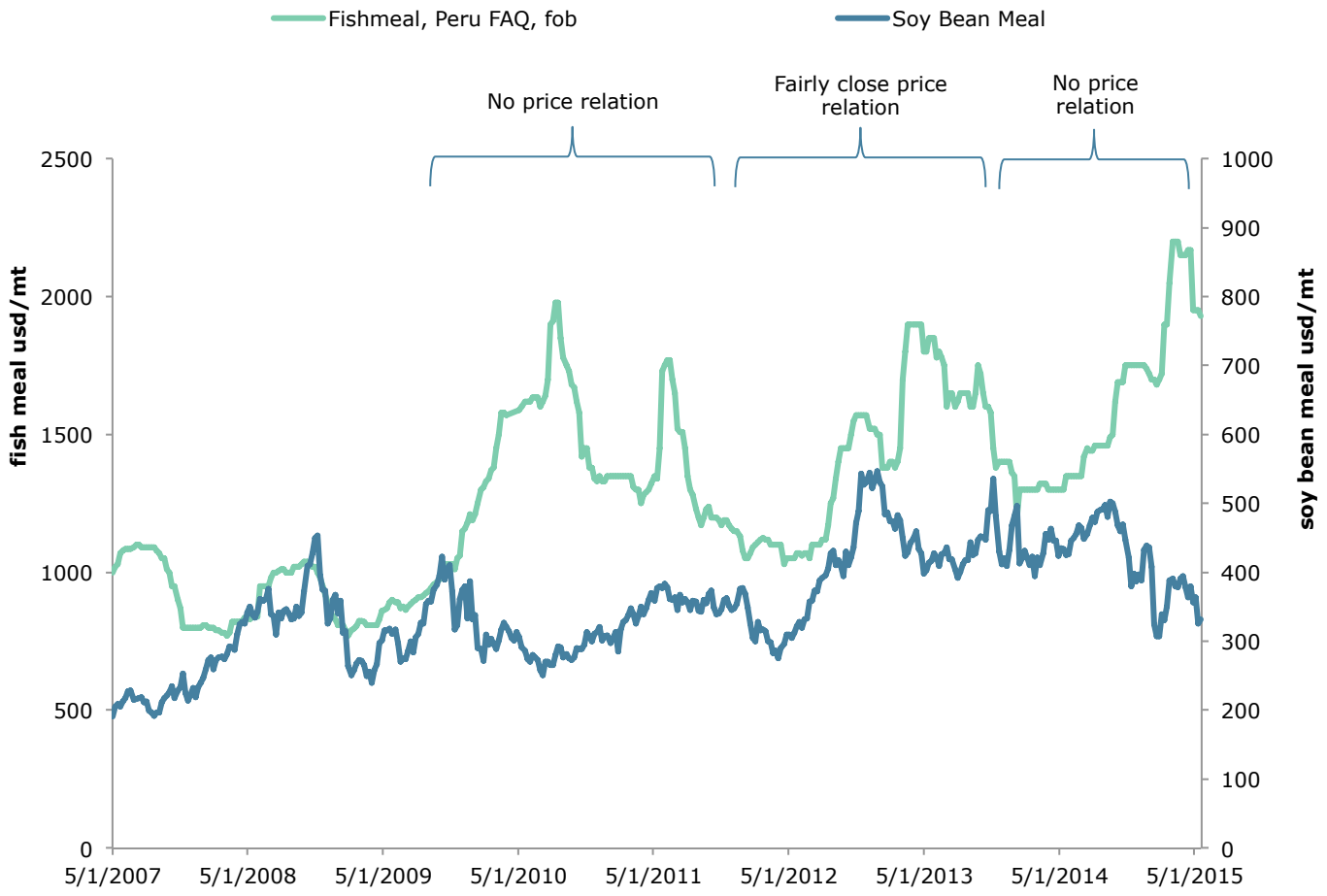
Source: Rabobank, Oilworld, Bloomberg 2015

How long will it take before FM also no longer has a price correlation with vegetable meals ?

Comment

- Since early 2014 prices of FM and soy bean meal are moving in opposite direction
- There may be a correction of FM prices if the April/ May season is good, but we expect that in the medium to longer term FM and SMB meal will loose their traditional relationship

Fish meal and soy bean meal prices, also diverging



Source: Rabobank, Oilworld, Bloomberg 2015

Implications for aqua feed producers

- Key to develop the use of novel ingredients that are cost effective versus FM and FO but with out comprising performance

- R&D is a key success factor and has significant scale economies

- This translates in a driver for consolidation.....

Implications for new species development

- Only fish that require low FM content can be developed to commercial scale farming e.g.. Tilapia or Pangasius

  OR

- Very high value niche species that can use a high FM content and still be profitable to farm (e.g. Groupers, Blue-Fin tuna or Sturgeon)

- So it will be increasingly more difficult to find new profitable species to farm. And some industries may reach a dead end (e.g. Atlantic Cod)

- *Note: the issues of Atlantic Cod are more then just high FM content in the feed.*

Implications for pelagics harvesters

- With increasing FM & FO prices fishing rights should increase in value (provided fishing is sustainable and cost of harvest is the same)

- Some may even find FM and FO production assets of strategic value. It could crate more investor interest this niche market and strategic M&A

Implications for producers of alternatives

- There will be increasingly more attention towards alternatives. The higher the FM price the more likely a producer of the new raw material will make a profit

- In a few years we are still unlikely to not have the perfect replacement of FM but feed companies will have many more alternatives to choose from



Thank you for your attention

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