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Current experiences, future bottlenecks and opportunities of new feed ingredients from low trophic resources

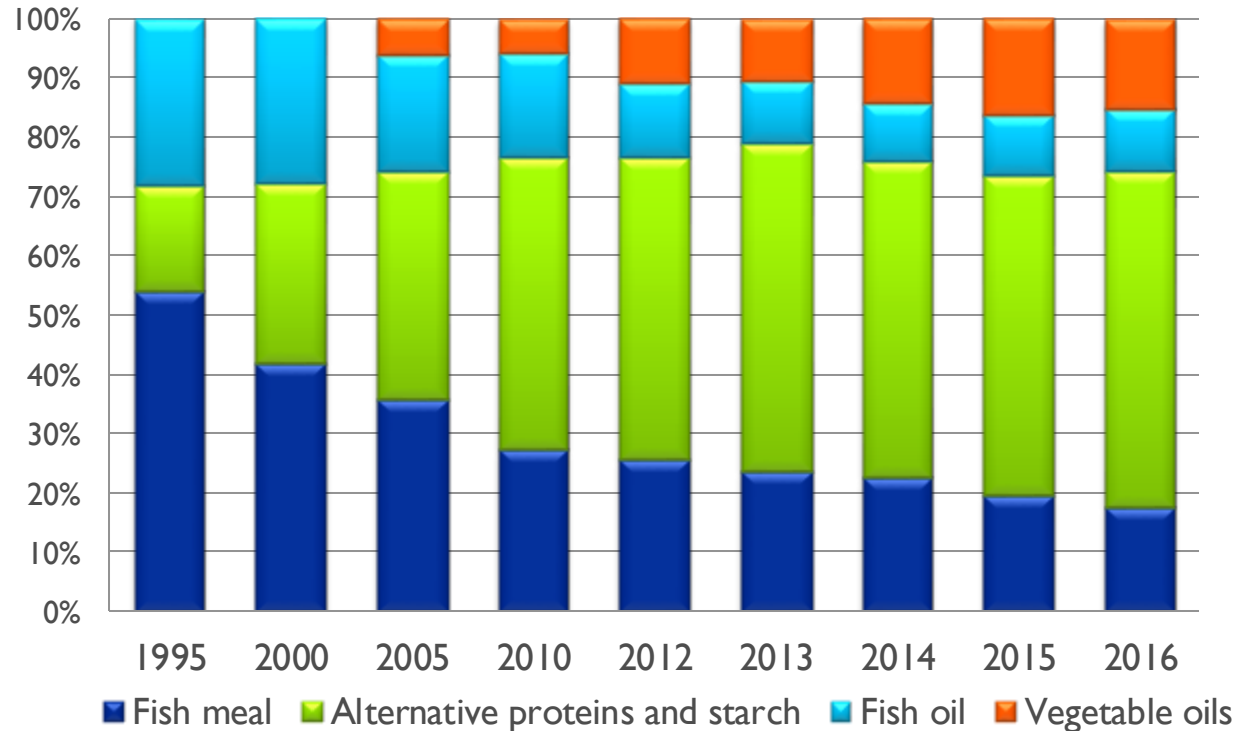
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LET'S INNOVATE AQUACULTURE

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Raw material experiences in Aquafeed

- We have been heavily relying on marine raw materials
- We realised the need for a change a lot of years ago
- We have introduced:
 - More vegetable raw materials – based on know sources
 - LAP's and PAP's
 - more micro ingredients
- Increased focus on FIFO and sustainability



Current situation on raw materials in Aquafeed



- Number of raw materials used increases
- Ongoing search for know raw materials – primarily commodities based on product from agriculture origin but also from increased focus on solutions relating to circular economy
- We are today using some low trophic raw materials like:
 - More unprocessed vegetable raw materials
 - More processed vegetable raw materials
 - Single cell protein based on gas
 - Fermentation of algae's - can be based on different substrates
 - Other fermented products as chelated amino acids
 - Insect protein
- One example is the algaprime from Corbion – from that source we add omega-3 fatty acids from a non-marine origin

Future focus on low trophic raw materials in Aquafeed



- We have to think in new raw materials due to several reasons
- Going for low trophic raw materials means quite often that you have to go for something not being developed fully and that they are not ready for direct use
- We have to add a process, some technology, some costs and some value
- Maybe also some cooperation between different companies and different business
- We will in the future see use of:
 - single cell protein
 - more seaweed
 - microalgae
 - fermentation of raw materials
 - Raw materials based on grass and other plant based materials

Challenges using low trophic raw materials in Aquafeed



- Common to most low trophic raw material - they are not ready for use as they are
- We will be facing bottlenecks like:
 - Availability – volume/price
 - Commercial visions
 - Necessary technology for refining and improving
 - Approval as a feed ingredient
 - Risk awareness
 - Test of raw material – processability/stability/environment
 - Test for food safety issues – short term long term
 - Test for nutritional effects – availability for the fish
 - Test for antinutritional factors

Conclusive comments

- We have:
 - been heavily relying on marine raw materials
 - to find ways of using unexploited sources – can be from waste
 - to use new technologies - also including gene-technologies
- As we will be facing an increased focus on:
 - FIFO
 - Sustainability
 - CO2 footprint
 - Consumer awareness
- Ready for change not only in the aquaculture sector but also among consumers