



**Nordic
Co-operation**



Food integrity and animal feed

Jón Árnason and Jónas R. Viðarsson

Final meeting of the Authenticate project

November 14th 2017

Venue: Havstovan – Faroe Islands

Funding: AG-fisk



Food Integrity and animal feed

The content of this presentation focuses on aquaculture feed in Europe - that is where we have the necessary expertise.

The feed producers in Europe are technologically advanced and have generally more information of the ingredients than their suppliers.

Companies such as EWOS and Skretting have state of art laboratories to authenticate ingredients.

The Fishmeal and fish oil industry does generally not have the same technology to measure various attributes.



Food Integrity and animal feed

Majority of aquaculture feed used in the Nordic countries is produced in Europe.

Approximately 70% of the production cost in salmon farming is feed.

Big emphasis on R&D by aquaculture feed producers.

The feed producers take on responsibility for sustainable-, ethical-, responsible sourcing.

The Nordic aquaculture industry generally not willing to take chances in sourcing feed from producers in other continents.



Aquaculture feed – What is important?

- 1. The feed needs to fulfill nutritional requirements – different depending on species and life-stages.**
- 2. The feed has to ensure health and animal welfare issues**
- 3. The feed has to include low volumes of anti-nutritional elements**
- 4. The feed has to be affordable/inexpensive**



Nutrition

The feed needs to fulfill nutritional requirements – different depending on species and life-stages.

Nutritional elements:

- protein(amino acids), fat, carbohydrates, phosphorus, Calcium, natrium and potassium

Trace elements:

- Vitamins, minerals and other amino acids

Energy:

- Feed has to be high in energy

Ratio of nutritional elements:

- Dependent on species, life-stages, age and size

Low amounts of anti-nutritional elements

- For example trypsin inhibitors. Lipase, antibody catalyst, lectin, saponin and other elements that can have negative effects on digestibility and growth.



Nutrition - ingredients

What are the most common ingredients

Protein sources:

- Animal- other fish proteins, seeds, beans (Soya), nuts, by-products from olive- and grain/cereal production.

Fat sources:

- Fish oil, plant oil, fat from other animals

Carbohydrate sources

- Cereals of different types

Mineral sources:

- From animals/other fish

Vitamin sources:

- Various ingredients



Labelling laws on feed and feed ingredients

Nutritional values:

- Water/solid materials
- Protein
- Fat
- Minerals/ash
- Carbohydrates NFE (Nitrogen-free extract)

Ingredients composition:

- The order of ingredients by volume



Example of a salmon feed formula

Recipe 3624 Salmon 2500 anno 2015				
N°	Name	Share	Min	Max
500011	WHEATGLuten meal800 PF	14.714		
7	WHEAT	8.798		20.00
228	SUNFLOWERSDML 361 cp	2.658		10.00
500013	SPC 60 PF	6.466		20.00
200	SOYA Hipro 49 CP	15.000		15.00
380	RAPESEEDOIL	24.894		
2152	Premix Polarfeed	0.500	0.50	0.50
452000	Panaferd	0.200		
519	MONOCA-PHOSPHATE	2.111		
600001	FM MEAL710/81 Polarf	14.000	14.00	
2509	FISH OIL Polar mix q1 14	10.660	10.66	



R&D on optimising feed is important

351	Astaxanthin	mq/ka	44.000	44.000
362	Av P fish	q/ka	3.864	3.800
65	Crude ash	q/ka	60.512	
60	Crude fat	q/ka	380.000	380.000
41	Crude protein	q/ka	350.000	350.000
366	GE	MJ/ka	330.421	
147	Histidin	q/ka	8.483	5.500
105	Lysine	q/ka	17.900	17.900
110	Methionine	q/ka	6.968	6.500
120	Methionine+ Cyst	q/ka	13.141	9.300
81	Phosphor	q/ka	10.000	10.000
61	Starch	q/ka	75.000	75.000
392	SUM EPA DHA	q/ka	19.316	13.500
170	Vit A	IU/ka	2.500	
174	Vit B1	mq/ka	15.000	7.000
178	Vit B12	µq/ka	20.000	
175	Vit B2	mq/ka	25.000	15.000
177	Vit B6	mq/ka	15.000	
184	Vit C	mq/ka	124.997	99.000
171	Vit D3	IU/ka	1.500	
172	Vit E	mq/ka	199.996	99.000
173	Vit K	mq/ka		



Need for official monitoring / traceability

Ingredients

- Governmental monitoring – Food and veterinary authorities in most countries
- Feed producer – information from suppliers and internal monitoring/own measurements
- Feed buyer – information from producer and certifications e.g. ASC
- Consumer – Certifications from producer or third party

Ready made feed

- Governmental monitoring / regulatory - Food and veterinary authorities in most countries
- Certifications – such as ASC
- Feed buyers – information from producer and certifications e.g. ASC
- Consumer – Certifications from producer or third party



The most common measures

Most common: Water, protein, fat, minerals (ash), Carbohydrates

Often: Vitamins and minerals (what vitamins and minerals)

DNA / Isotopes: what is exactly in the feed

Testing for:

- **Amino acid gives limited information on protein sources**
- **Fatty acids gives more detailed information on the sourcing of the fat**
- **DNA og RNA provides as detailed information as possible**



Other considerations

Organic producers

Sustainability of the feed

Ethical considerations

Cannibalism – e.g. not to use salmon rest raw materials to produce salmon feed

Food miles / CO2

Organic certification – but otherwise mostly trusted to the feed producers

