

Marine Bioproducts AS

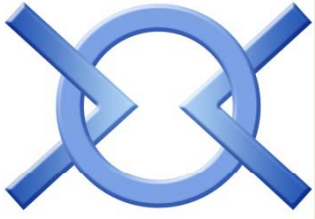
Proteinhydrolysater fra laks - hva er status for produksjon og utvikling?

Kjartan Sandnes, Ola Flesland og Harald Hagen



RUBIN-konferansen 2010
Rica Hell Hotell, Stjørdal
3-4 februar





Fish protein processes

Fish proteins

Fish meal

- cooking and drying

Extraction

- salt, pH etc.

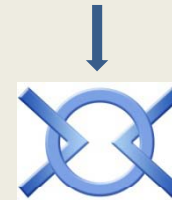
Autolysis

- endogenous enzymes
- fish sauce (example)
- fish silage (example)

Hydrolysis

- acid
- alkaline

- exogenous enzymes



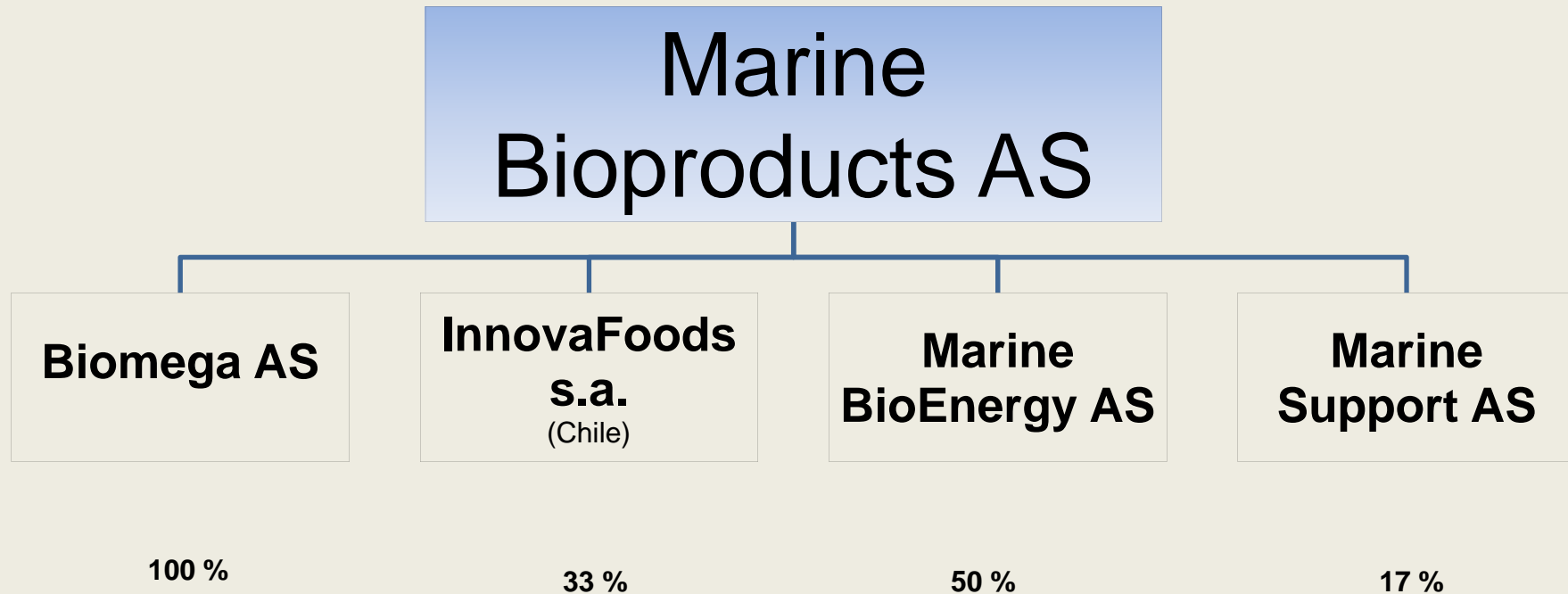
Native proteins



Peptides and amino acids

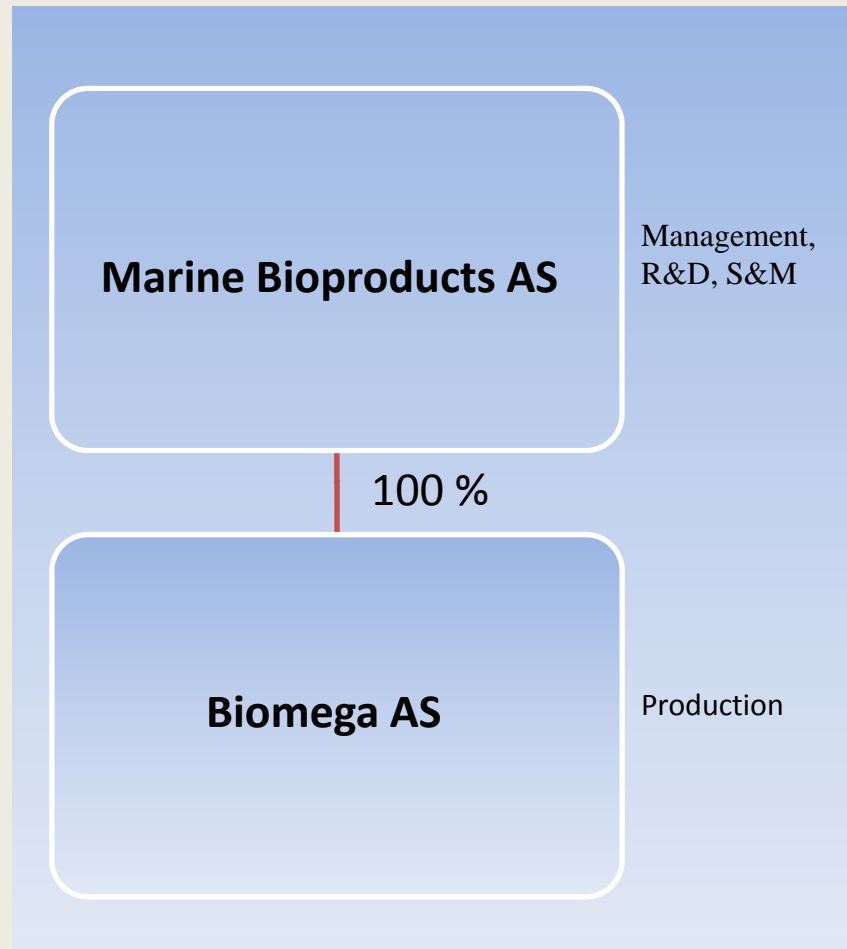


Company structure

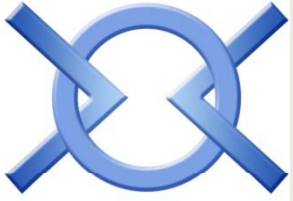




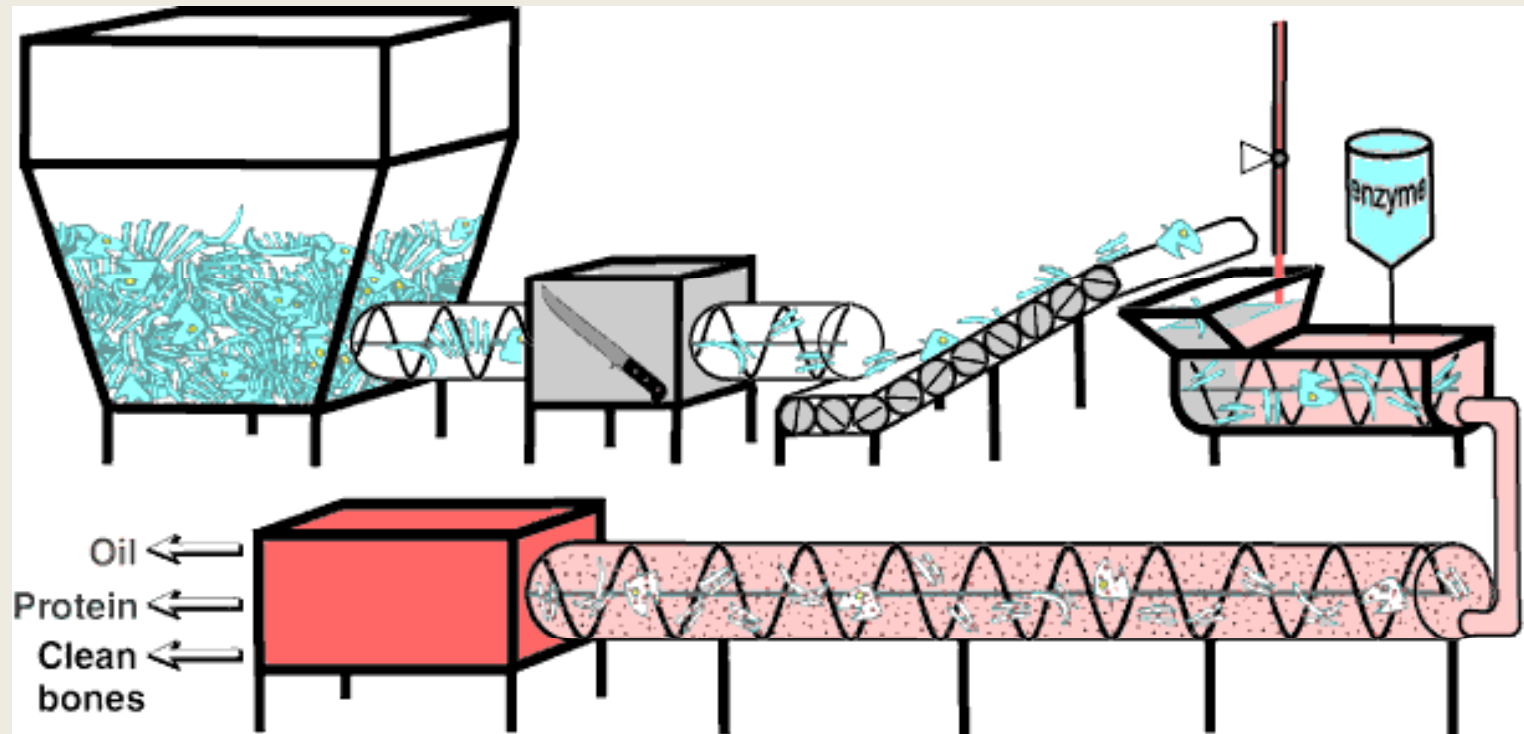
Marine Bioproducts AS



- Marine Bioproducts AS established 2000
- Production established 2002 at Biomega AS, Sotra
- Continuous enzymatic hydrolysis
- Fresh raw material
- 25.000 tons annually
- No chemical processing aids
- New oil separation plant opened in Florø June 2009

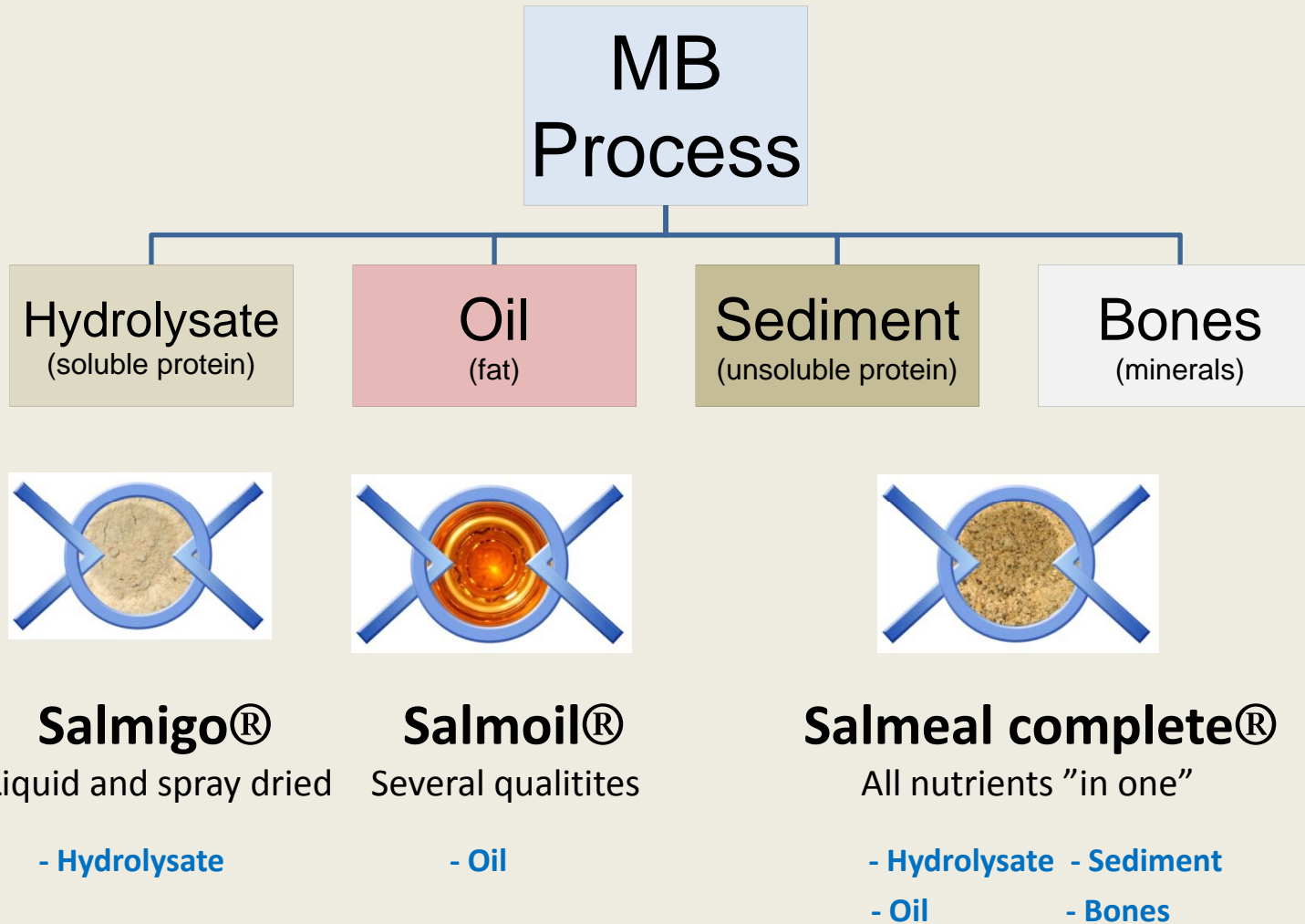


The MB process





Current product groups





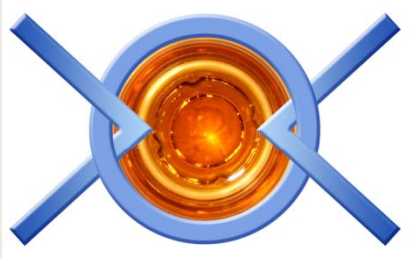
Certification



Our products are manufactured and certified according to European food regulations, and according to GMP+.

GMP+ certificate No. 44188-2008-OTH-NOR-RvA. PDV Reg. No. PDV109441





Salmoil® Virgin

Salmoil® Virgin is separated fresh salmon tissues within minutes after slaughtering.

Strickt focus on QA and R&D secure the high standard.

- Low FFA**
- Extremely low oxidation**





RUBIN – Markeds- og industrialanalyse



Marine proteiner

- Salget av marine proteiner til mer avanserte applikasjoner er fortsatt lavt, og utviklingen har gått tregt. Dette skyldes i stor grad de relativt kompliserte teknologiske utfordringer som må løses før dokumentasjon, markedsføring og salg kan starte.
- Den industrielle strukturen i Norge med store lakseslakterier gir muligheter til å samle opp biprodukter i kommersielt interessante mengder. Strukturen er på plass, men tradisjonen med å utvikle høyverdige avanserte produkter er ennå i startfasen.
- Proteinisolat: En ny metode for å fremstille marint protein med høy renhet og god kvalitet har blitt utviklet de senere år. Metoden er egnet til å fremstille funksjonelle, stabile proteiner fra fangst og biprodukter i den fiskeprosesserende industri.
- Proteinisolat fra fisk er et relativt nytt produkt og applikasjoner er under utvikling. En av de mest interessante er bruk av produktet som vannbinder i ulike typer av sjømat.
- Fiskeprotein har et stort potensial som humant proteintilskudd. Innenfor næringsmiddel er den viktigste anvendelsen fortsatt fiskesaus og "sea food flavours".
- Flere marine peptider er bioaktive og har blodtrykksenkende eller immunstimulerende effekter.
- Fiskeproteinhydrolysat/ peptoner, har et interessant markedspotensial som nitrogenkilde i tilvekstmedier for mikroorganismer.
- Spesialfôr til smågris (weaning pigs) er i dag et stort marked som forventes å utvikles videre. Marine proteiner står her overfor store muligheter.
- Petfood og "pet supplements" representerer interessante markeder for marinefunksjonelle og bioaktive proteiner.



R&D - Peptides

Spray dried MB peptides



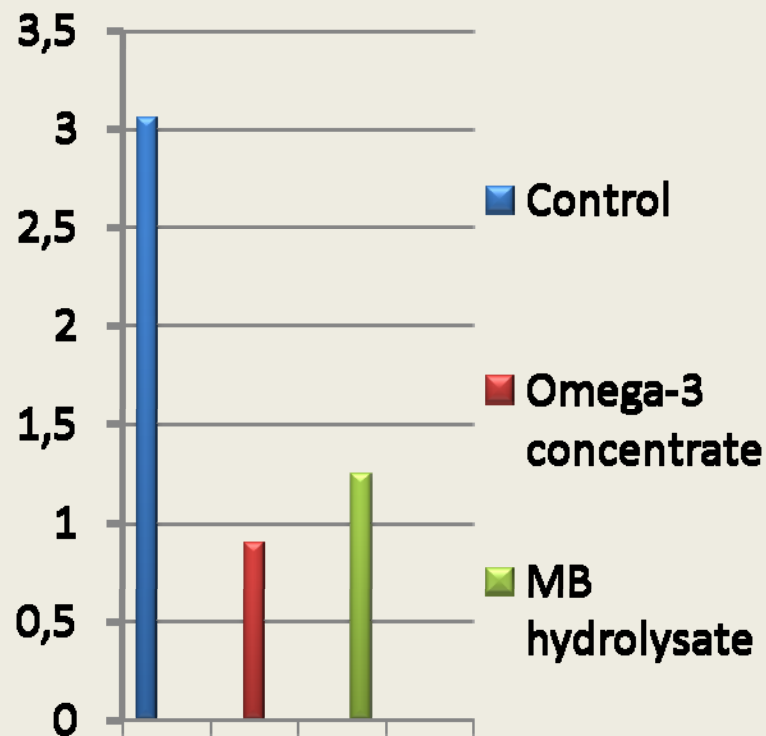
R&D

- Process optimization
- Nutritional value
- Flavour/palatability
- Fermentation
- Bioactivity
- Functional properties in food

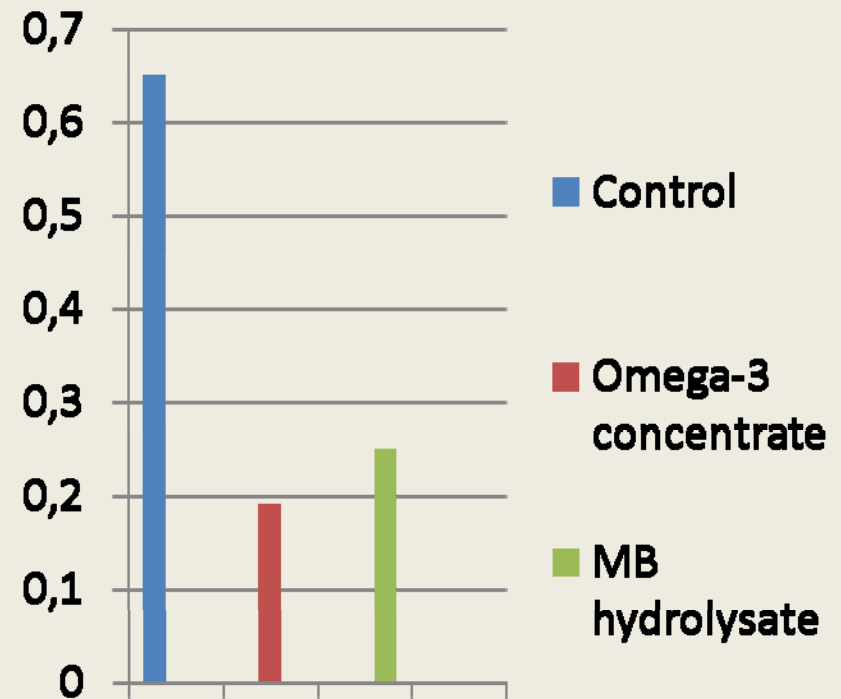


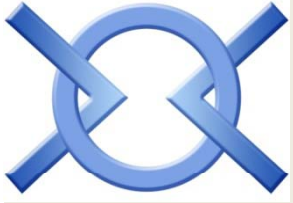
MB peptides reduce blood lipids

mmol/L plasma TG



mmol/L plasma non-HDL cholesterol

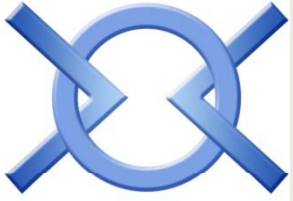




Searching for bioactive components



- Enzymes/process
- Fractionations
- Peptides
- Chemical documentation
- Animal studies
- Clinical studies



Food Ingredients Asia

September 2009





Asia Food Journal



- **Ola Flesland CEO**
Biomega AS
Marine Bioproducts AS

Even though we supply products to animal feed and pet food customers in Europe, we are starting to test new products in the food sector. This is our first time participating in Fi Asia and we have gathered much interest among food and beverage players on marine ingredients such as the food-grade salmon oil. We are conducting more research and development on marine protein products as food ingredients and nutraceuticals, which we believe will be a trend in the health sector in the future.



Peptones for fermentation



SALMICRO®
*The cost effective
marine peptone*

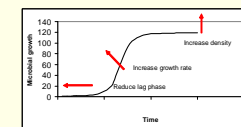


Marine protein in industrial fermentation.

Marine protein sources are excellent substrates for microbial growth. This is well documented in the scientific literature, and is experienced by many users. The reasons to choose marine protein sources as nutrient for microorganisms are

- high level of protein
- high levels of amino acids
- high levels of essential amino acids
- vitamins
- minerals
- nucleotides

In addition, marine raw materials are known to contain unidentified growth components. Salmicro® in industrial fermentation may reduce the lag-phase of the growth curve, increase growth rate and result in higher microbial density in the fermentors.



Good performance is demonstrated for *Lactobacillus*, *Brevibacterium*, *Bacillus*, *Vacillus*, *Xanthomonas*, *E. Coli* and *Saccharomyces*.

Salmicro®

Salmicro® is produced from fresh non-GMO salmon by a continuous enzymatic hydrolysis process using endogenous non-GMO enzymes. The process is food certified, and the freshness of the raw material and the gentle processing conditions ensure high quality products.

- Salmicro® is refined to a
- protein level of 92 % (of DM).
 - free of lipids and particles.
 - no additives are used during processing.
 - totally soluble.
 - homogenous quality due to fresh raw material.
 - no seasonal variation.
 - no batch variations.
 - continuous supply all year.

The product is produced from reliable supplies of sustainable raw material. Salmicro® may be certified according to Kosher and Halal.

Salmicro® can be delivered as a paste (60-62 % DM) or spray dried.





INNOVAFOODS s.a.

Test Plant, Puerto Montt, Chile

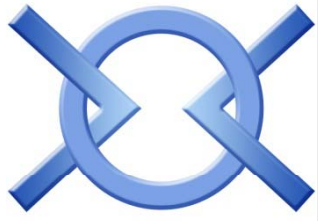




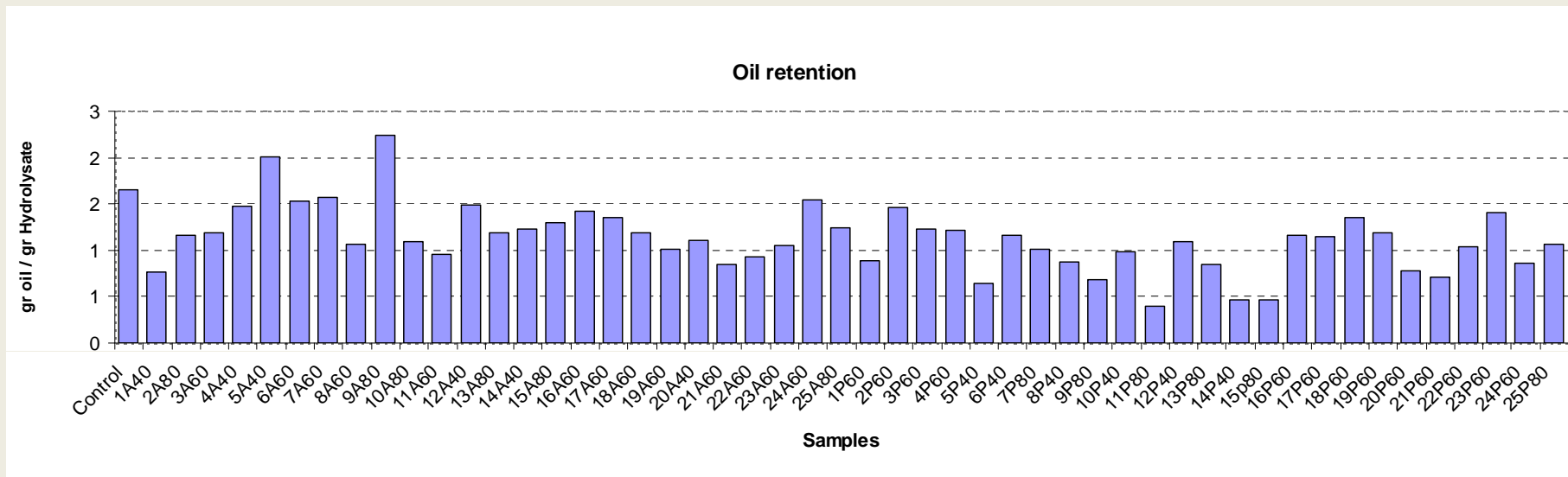
R&D at InnovaFoods s.a.



- Yield
- Solubility
- Water-holding capacity
- Emulsifying properties
- Foaming properties
- Fat absorption
- Sensory properties



Functional properties





Intellectual property

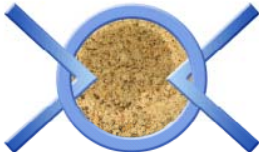
Patents

- Process 1
- Application/products 5 (8)

Trade marks

- Products 11
- Company name 1
- Logo 1

A



Salmeal® Complete
Predigested Salmon Meal
Food Grade

MarineBioproducts AS

Description
 Salmeal® Complete is a pre-digested meal comprising a natural marine composition of nutrients.

- Traceability
- Sustainable sourcing
- Continuous processing
- Excellent source of essential amino acids, fatty acids and minerals

Definition
 Salmeal® Complete is manufactured from a special mix of the soluble and the insoluble protein fraction following a controlled enzymatic hydrolysis of salmon tissues

Appearance
 Light brownish powder.


Certification
 This product is manufactured and certified according to GMP®. Certificate No. 44158-2008-OTH-NOR-BvA. PDV Reg. No. PDV109441.

Physiochemical characteristics

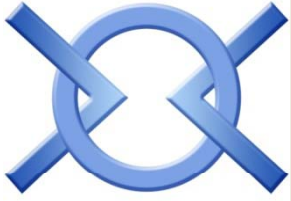
	Standard
Dry matter	> 92 %
Protein (as is, N x 6,25)	68 - 70 %
Fat (Sorbite)	12 - 14 %
Ash	12 - 14 %
Salt (as NaCl)	1.0 - 1.2 %
EPA (20:5 n-3)	5 - 6 % of oil fraction
DHA (22:6 n-3)	7 - 8 % of oil fraction

Microbiology

	Standard
Total aerobic microbial count	< 1 x 10 ⁷ /g
Salmonella	Absence/25 g
Enterobacteriaceae	< 10/g



Version 3 - May 09/Product code 350



Highlights

Process

Continuous enzymatic hydrolysis
Eco friendly and natural
Top of the line products

R&D

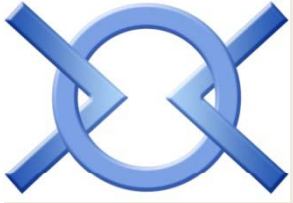
Carried out at leading institutions by world leading scientists
Marine peptides – a potential new bioactive adventure in line with the Omega-3 story? R&D budget approximately 40 mill NOK so far

S&M

IPR strategy – patents and trade marks
Ingredients – feeds, foods, supplements and nutraceuticals

Competence

Highly competent staff with unique complementary skills and experience from the marine sector



E N D