



# FOODS OF NORWAY

**Annual Report 2015**



# Foreword

The 21st century faces great uncertainty about global food security. Concerns about resource sustainability are growing, particularly in regard to food scarcity and food security; limited national or global capacity to produce goods; and environmental degradation.

The bioeconomy presents biotechnologies and biomass as solutions for global resource shortages and environmental challenges. Foods of Norway has been selected by the Research Council of Norway to contribute to growth and increased value creation in the Norwegian aquaculture and agriculture industries by developing sustainable feed ingredients from natural bioresources that are not suitable for direct human consumption. Based on the unique strength of the concept, new feed products will be developed from forestry, agriculture, and marine resources through industrial exploitation of cutting-edge research on processing and (bio)technology. Foods of Norway also aims to improve feed efficiency by advanced genomic analysis to support genetic adaptation and identification of new selection criteria for fish and farm animals.

Foods of Norway started up on September 1, 2015 and was launched at an open seminar on October 8. Even before the centre started, the interest in our research approach has been massive. I am therefore pleased to see that the centre during its first months of existence has started to establish a portfolio of tools and methods that comprise a solid basis for the projected development with our industry partners. We now look forward to 2016 where basic academic research will be further developed in order to reach the long-term goal of Foods of Norway: commercial product development based on innovative research.

We have no illusions: substantial challenges lie ahead of the center, both scientifically and financially. We face these challenges with the confidence that the chosen strategy is correct.

I want to use this opportunity to thank the Research Council of Norway for its support to Foods of Norway and thank our industry and innovation partners for their outstanding commitment. We feel privileged to be able to contribute at the cutting edge of science and technology to develop sustainable feed ingredients from biomass and to improve feed efficiency. Feed represents a considerable cost item for farmers, constituting 70-80 percent of all variable costs in, for instance, dairy cattle production. In 2015, the economic value creation from biomass in Norway was estimated at 270 billion NOK. By 2040, the bioeconomy in Norway could reach 750 billion NOK. Our aim is that Foods of Norway will contribute to achieving such an increase.

*Margareth Øverland  
Centre Director*

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The Research Council of Norway



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Submitted April 1<sup>st</sup>, 2016

# Summary

Foods of Norway will contribute to growth and increased value creation in the Norwegian aquaculture and agriculture industries by developing sustainable feed ingredients from natural bioresources that are not suitable for direct human consumption. New feed products will be developed from forestry, agriculture, and marine resources through industrial exploitation of cutting-edge research on processing and (bio)technology. The centre also aims at improving feed efficiency by innovative feed processing technology, and by combining important phenotypic traits, new biomarkers for feed efficiency and advanced genomic analysis to support genetic adaptation to the novel feed resources. Today, Norway relies largely on imported feed ingredients, mainly due to insufficient land area suitable for agriculture and challenging climatic conditions. The centre will have a special focus on developing new innovative processing technologies that allow conversion of national bioresources into feed for farm animals and fish. The development and introduction of the novel feed resources will be accompanied by comprehensive biological verification in fish and farm animals, as well as evaluation of food quality, using state of the art methods.

The consortium comprises 9 academic and 18 research and innovation partners with broad and long-standing multidisciplinary expertise in the fields of (bio)processing, feed technology, physiology, nutrition, health and genetics, food production and food quality, and resource economics and sustainability assessors. The potential value creation from use of novel feed resources and increased feed efficiency is substantial, and the aim is to secure growth and competitive advantages for all industrial partners. Foods of Norway will help make a major contribution towards strengthening national food security, overall bioeconomy and sustainability along the production chain from basic resources to final food products, and minimize the environmental impact of aquaculture and agriculture.

# Vision

To increase value creation in the Norwegian aquaculture, meat and dairy industries by developing novel feed ingredients from natural bioresources and by improving feed utilization through industrial exploitation of cutting-edge research on processing and (bio)technology, nutrition, health, genetics and food quality.

# Objectives

## Primary objective

To make Norwegian fish and animal farming industries more competitive and innovative by developing novel feed ingredients from bioresources and ensuring efficient feed resource utilization.

## Secondary objective

- Exploit modern biorefining technologies to develop high-value feed ingredients from lignocellulosic biomass.
- Use innovative bioprocessing to develop novel feed ingredients from local natural bioresources such as macroalgae and animal and plant co-products.
- Improve efficiency of existing feed resources through innovative bioprocessing.
- Allocate feed resources across species (fish, pigs, broiler chickens and dairy cattle) for optimal production economy and minimal environmental impact.
- Provide knowledge to secure that the use of novel feed ingredients concur with production of high quality Norwegian food products.
- Identify biomarkers for optimal utilization of novel feed resources for use in future fish and animal breeding programs.
- Generate expertise that allows maximum utilization of the biomass for various products at different price levels, thus maximizing the use of the entire biomass. This will help move towards a circular economy.

# Research plan

To increase value creation in the Norwegian aquaculture, meat and dairy industries Foods of Norway will target three key research areas: Biomass, feed efficiency and product quality.

## Biomass

Develop future animal feeds based on sustainable feed sources that do not compete directly with human food, such as macroalgae, grass and trees.

## Feed efficiency

Address feed resource utilization across different fish and farm animal species. The advantages of each species with respect to efficiency are used to convert different feed resources into food.

## Product quality

Ensure that the novel feed ingredients based on local natural resources not only increase food security, but also the product quality and nutrition.



Photo: Janne Karin Brodin

## The challenge

Today, the feed used in Norwegian fish farming and concentrates for farm animals rely largely on imported plant ingredients, such as soy. But Norway can no longer continue to depend so heavily on imports, as there have been dramatic changes in world feed resources in recent years, with decreasing supply and higher prices.

In addition, the use of human food as feed ingredients has been questioned, both for ethical and economic reasons. Future fish and animal production will require competitive and sustainable novel feed ingredients produced from non-food resources. Existing feed resources need to be used more efficiently, for example by genetic improvement of animals and optimal feed resource allocation across species.

Identifying and introducing novel feed resources to the market will improve Norway's ability to produce more food with fewer imported resources. For example, the salmon industry is expected to expand from 1.2 million tons today to 5 million tons by 2050, and should rely less on imported feeds, and be more robust and sustainable with less impact on the environment.

These goals coincide with a worldwide need for an increase in food production by 2050, and according to the U.N. Food and Agriculture Organization this must largely come from efficiency-enhancing technologies. Foods of Norway is concerned with developing such technologies, with knowledge transfer to

## The solution

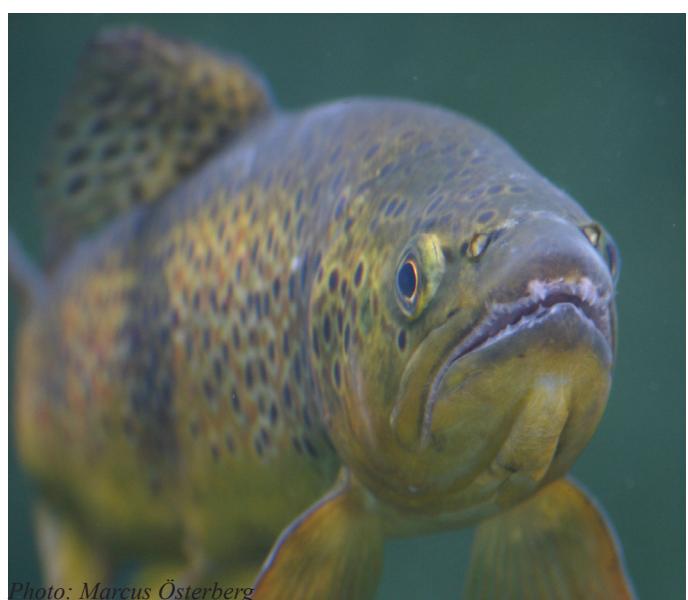
Norway has limited land area for growing food and feed resources, but possesses large natural bioresources such as forests, grass, macroalgae, and co-products from fish, animals and plants that can provide a basis for the production of novel feed ingredients.

Norway's 100,000-kilometer-long coastline provides great opportunities for cultivating macroalgae. The fishery and expanding aquaculture industries represent large sources of underutilized marine co-products that can be developed into feed. Grassland and pasture make up 70% of the arable land, but half of this can only be used for grass cultivation.

Norway also possesses large, underutilized forest areas (39% of the total land area, of which the annual harvest is less than 50% of the growth) that can provide bioresources for the production of feed ingredients.

Foods of Norway has a special focus on developing sustainable feed ingredients from renewable bioresources that are not suitable for direct human consumption and that have the potential to be produced in large quantities at a competitive cost.

The centre aims to develop new, innovative processing techniques by exploiting state-of-the-art biorefining technologies that allow conversion of natural bioresources into high-quality feed ingredients for fish and farm animals.



*Photo: Marcus Österberg*



*Photo: Elisabeth Theodorsson*

## The technology

Foods of Norway will use new technology to create novel feeds from land-based and marine resources as well as improve the genetic robustness of fish and farm animals.

First, Foods of Norway will use modern biorefining, enzyme technology and fermentation to produce high-quality single-cell proteins from wood as feedstock for use in feed for fish and livestock. Wood consists of three main constituents: cellulose, hemicellulose and lignin. In the biorefinery process, lignin will be separated out and used for high-value products, while cellulose and hemicellulose will be converted into sugars and used in the fermentation of certain yeast strains for the production of single-cell proteins.

Secondly, we aim to develop feed ingredients and high-value functional products based on macroalgae by using novel cultivation and harvesting technologies and new downstream processing methods. A major task will be to upgrade the nutrient value of the seaweeds by a biorefinery process so we make use of the entire biomass in the fermentation process for the production of yeast.

Thirdly, Foods of Norway will have a special focus on improving feed efficiency and robustness of fish and farm animals by combining important phenotypic traits, new biomarkers for feed utilization and advanced genomic analysis to support genetic adaptation to existing and novel feed resources. Improvements in feed efficiency allows the production of more food from the feed resource inputs, and will reduce feed costs and reduce impact on the environment.

# Organisation

## Governance

Foods of Norway comprises the following governance structure:

**The Annual Meeting** will convene once a year. The purpose of the Annual Meeting is to discuss the Centre's activities, present Result highlights from the past year and discuss forthcoming plans. The Company Partners will elect their Board Members and their Deputy Representatives at the Annual Meeting. The Supporting Partners will elect their Board observer at the Annual Meeting.

**The Board** is the ultimate decision making body of the Consortium. The Board's main responsibility is to ensure that the intentions and plans underlying the Contract for the establishment of the Centre are fulfilled, and in particular that the activities presented in the Project Description are performed within the stipulated budget and time frameworks. The Board is to ensure that cooperation proceeds smoothly between the Centre, the Host Institution and the Parties in the SFI Consortium.

**The Centre Director**, at the Host institution, serves as Project Manager, and reports to the Research Council of Norway and to the Board. The Centre Director has overall budget responsibility and responsibility for leading the research work to be carried out in the Centre, and shall present the annual Working Plan and budget to the Board. The Centre Director is also responsible for reporting progress to every Board meeting, to the Parties regularly and for formal reporting to the Norwegian Research Council within deadlines.

The Project activities are organised in **Work Packages** with tasks as further described in the Project Description and Working Plans. The Work Packages are coordinated by Work Package Leaders.

**The Research Management Group** consists of the Centre Director and the Work Package Leaders and is responsible for the daily operation of the WPs and for drafting the annual Working Plan.

**A Scientific Advisory Board (SAB)** will ensure quality and excellence of the Centre's work.

**An Innovation Group** will give advice to the Board, Centre Director and Research Management Group on how research results, ideas and concepts generated in the Centre could be commercialized.

**The Host Institution** is the legal entity acting as the intermediary between the partners and the Research Council of Norway. The Host Institution will provide administrative support for the Centre, including a Centre Administrator, a Centre Coordinator and other key administrative support staff, to assist the Centre Director, the Board and the Research Management Group.

Foods of Norway's administration is tightly integrated with NMBU's administrative resources, and functions such as accounting, recruitment, personnel management, IT support, communication tools and so on are handled in accordance with normal University regulations and practices and in close collaboration with NMBU's administrative staff.

## Partners with broad multidisciplinary expertise

The Foods of Norway consortium comprises four departments at NMBU, five international academic partners and 18 partners in industry and innovation, representing forestry, aquaculture and agriculture.

### **Academic partners:**

*NMBU's departments of:*

- Animal and Aquacultural Sciences (host)
- Basic Sciences and Aquatic Medicine
- Chemistry, Biotechnology and Food Science
- Food Safety and Infection Biology

*International:*

- University of Copenhagen
- Aarhus University
- University of Minnesota
- University of Western Australia
- US Department of Agriculture - ARS

### **Industrial partners:**

- Agrifirm Innovation Centre
- Animalia
- AquaGen
- Borregaard
- Felleskjøpet Fôrutvikling
- Geno
- Norilia
- Norske Felleskjøp
- Norsvin
- Nortura
- TINE
- Viken Skog
- Seaweed Energy Solutions
- Yara

### **Supporting partners:**

- Innovation Norway
- NHO Mat og Drikke
- The Federation of Norwegian Agricultural Co-operatives
- The Norwegian Farmers' Union



*Photo: Shutterstock*

### Cooperation between the centre's partners

All partners were invited to two full-day meetings (April 16th and October 8th) for information and discussions with each other, work package leaders and key researchers. Establishing an arena for socializing and informal contact was an integral part of planning the meetings. Work package leaders have also held meetings with partners both within their own work package and across work packages.



## Scientific activities and results

Foods of Norway started up in September 2015 and plans for research, recruitment of young scientists and acquiring important research infrastructure are under way. The challenge, the solution and the technology driving the research have been widely presented both to the scientific community and the general public.

A major research activity is to produce sustainable feed sources from non-food biomass, such as macroalgae and trees, by biorefinery processes, novel enzyme technology, fermentation technology, and down-stream processing. Producing yeast from tree biomass involves the use of thermo-chemical processes to separate the tree fibers into the main constituents lignin, cellulose, and hemicellulose. Hemicellulose and cellulose are then converted to sugars by enzymatic hydrolysis, and these sugars are used as energy and carbon sources for yeast cells in large fermentation tanks. Lastly, the yeast cells are harvested and dried into a product that can be used as a high quality protein-rich feed ingredient. Small-scale experiments involving the use of sugar solutions from Borregaard to optimize the fermentation conditions and to screen for promising yeast strains have started.

Methods for analyzing sugar content and composition of macroalgae have been established. Current research also includes hydrolyzing macroalgae to upgrade the nutritional value through a biorefinery process. Animal and fish by-products represent a valuable, underutilized resource. To optimize the fermentation condition it is important to provide a media that not only contain sugars, but also N, P and other nutrients. A PhD student has been recruited to explore the use of animal and fish co-products as alternative sources of N and other nutrients in the fermentation process. Fractionation of bioactive components from macroalgae will also be performed for use in feeding experiments with salmon and other farm animals. Grass represents an important biomass in Norway, but the nutritional value is limited by a high content of indigestible fiber and a low protein content. Current research activities include upgrading the nutritional value of grass silage by more robust mechanical and chemical methods in combination with the use of novel enzymes or enzyme cocktails. Nutritional value of the silage will be evaluated in in sacco experiments with rumen-fistulated cows.

Improving feed efficiency to support genetic adaptation to the novel feed resources provides large opportunities for value creation. A PhD student in fish nutrition and genetics has been employed and current research activities include method development for measuring individual feed utilization in farmed salmon. Finally, plans for assessing the sustainability aspect by using tree and macroalgae biomass for feed production have started with national and international partners.

## International cooperation

Foods of Norway has two international consortium partners (University of Copenhagen (DK) and Agrifirm Innovation Centre (NL) in addition to several associated partners (Århus University (DK), University of Minnesota (US), University of Western Australia (AUS), USDA-ARS (US) and the Swedish University of Agricultural Sciences (SE)).

The centre also collaborates with the University of California at Santa Barbara on sustainability analysis of novel feed ingredients in aquaculture feed.

Through associated RCN-funded projects, such as Biofeed (grant number 239003/O30) and FeedMileage (grant number 233685/E50), Foods of Norway collaborates with other international research groups and organisations, such as the Scottish Association for Marine Sciences.



*Photo: Shutterstock*

## Gender equality

The centre has a strong focus on gender equality. Foods of Norway has a female director and 50% of the work package leaders are female. The doctoral fellows are one female, one male. The centre's board, to which the partners have elected their own representatives, consists of 12 men and 6 women, taking into account members, deputy members and designated observers.

## Recruitment

Part of NMBU's own contribution to Foods of Norway consists of funding for four doctoral fellows, two of whom were recruited in 2015. The first, who started in September, is linked to work package 1, focusing on making non-food raw materials available as carbon and nitrogen sources for fermentation through enzymatic processes.

The second doctoral student, who starts in January 2016, is linked to both work package 2 and 5, and will examine the effect of novel feed ingredients on nutritional value and feed efficiency in farm animals and salmon. A specific topic will be to identify biomarkers that can explain differences in individual feed efficiency when fed both traditional and novel feed ingredients.

Researcher positions in a) nutrition and health in farm animals, and b) fish nutrition, as well as a research assistant position, have been announced and recruitment is in progress.

## Communication and dissemination activities

Foods of Norway has established a website, [foodsofnorway.net](http://foodsofnorway.net). On the website, the research story behind Foods of Norway is presented, elaborating challenges to be solved and possible solutions. In addition, the site presents general information about the consortium, including the organization of the centre, board and partners. Further content is updated news about Foods of Norway and a news archive for online articles. In 2015, plans for communication activities were discussed and implemented in close collaboration with partners and the board.

Foods of Norway has attracted considerable media attention, both domestically and internationally. The centre's vision, goals and plans for contributing to meet global challenges in ways to increase food production by identifying and introducing novel feed ingredients to the market while focusing on using existing, local feed resources more efficiently have been widely presented to a large variety of audiences. In total, 76 articles, interviews, chronicles and reports aimed at the general public were logged in 2014-2015, while 41 presentations were given for various user groups in the public sector, trade and industry, and among interest groups and cooperatives (see Appendix 3).

## Appendix 1:

### Personnel as of 31.12.15

Name	Position	Main research area
Margareth Øverland	Professor	Centre director; Feed ingredient evaluation
Vincent Eijsink	Professor	Fundamental and applied enzymology; bioprocessing; management
Liv Torunn Mydland	Senior scientist	Process; feed ingredient evaluation
Charles Press	Professor	Veterinary pathophysiology, veterinary immunology
Henning Sørum	Professor	Bacteriology, pre- probiotics, microbiotica, antibiotic resistance, fish diseases
Siv Skeie	Professor	Product quality
Gunnar Klemetsdal	Professor	Genetics; nutrition; feed efficiency
Anne-Helene Tauson	Professor	Monogastric nutrition, physiology and metabolism
Christian Sahlmann	Scientist	Macroalgae ecology and food safety
Svein Horn	Professor	Bioprocessing, applied enzymology, management
Magnus Arntzen	Scientist	Analytics; characterization of biomass and process fractions
Bjørge Westereng	Scientist	Biorefining facilities, bioprocesses, analytics
Kiira Vuoristo	Scientist	Biorefining, fermentation technology, some enzymology
David Lapeña Gomez	Doctoral fellow	Bioprocessing, enzymatic processes, analysis and testing of hydrolysates
Rouzbeh Keihani	Master student	Bioprocessing, fish nutrition and health
Barbara Eriksen	Centre administrator	

## Appendix 2:

### Summary of accounts

<b>1. Actual costs 2015 (NOK)</b>	<b>Actual</b>	<b>Budget</b>
1.1 Personnel and indirect costs	2 148 053	2 817 000
1.2 Acquisitions R&D	0	500 000
1.3 Equipment	1 029 149	0
1.4 Other operating costs	4 442 608	10 019 000
<b>Sum actual costs 2015</b>	<b>7 619 810</b>	<b>13 336 000</b>

<b>2. Actual funding 2015</b>	<b>Actual</b>	<b>Budget</b>
2.1 Own funding (academia)	1 642 618	2 917 000
2.2 Other public funding	0	50 000
2.3 Private funding (partners)	4 618 644	8 047 000
2.4 International funding	100 950	322 000
2.5 Research Council	1 257 597	2 000 000
<b>Sum actual funding 2015</b>	<b>7 619 810</b>	<b>13 336 000</b>

## Appendix 3:

### Presentations and press coverage

#### Presentations

2014

Date	Title	Presenter	Event	Place/Organiser	Dissemination
10.06.14	Presentasjon av forskningsprosjektet "Foods of Norway" og Bionær-prosjektet "FeedMileage"	M. Øverland	Conference	NMBU/Follorådet	Popular
09.09.14	Fra tre til filet	M. Øverland	Conference	NMBU/Akershus Fylkeskommune	Popular
23.10.14	Skogen og havet; fremtidens förressurser – utfordringer og muligheter	M. Øverland	Seminar	TINE	Academic
02.12.14	Skogen, fremtidens fiskefôr – utfordringer og muligheter	M. Øverland	Guest lecture	Nordfjord Forskningsstasjon	Academic
17.12.14	Presentation of Foods of Norway	L.T.Mydland	Seminar	NMBU/CIGENE	Academic

2015

Date	Title	Presenter	Event	Place/Organiser	Dissemination
26.03.15	Foods of Norway	M. Øverland	Biotown	Hamar/Hedmark kunnskapspark m.fl.	Academic
16.04.15	Biorefinery & enzyme technology	V. Eijsink	Kick-off møte i Foods of Norway	Vitenparken/ NMBU	Academic
23.04.15	Foods of Norway - nytt senter for forskningsdrevet innovasjon ved NMBU	M. Øverland Knut Røflo	Næringslivs-konferansen i Follo 2015	Vitenparken/Follo rådet	Popular
28.04.15	Hva skal fisken spise? Fôrhistorie – og fremtid	M. Øverland	Seminar: Akvakultur-historien – en suksess-historie for forskning og næringsutvikling	Vitenparken	Popular
28.04.15	Perspectives from Foods of Norway	L.T. Mydland	PROMAC Kick-Off Meeting	Ålesund	Academic
05.05.15	Bioteknologisk utvikling av bærekraftige förressurser for havbruksnæringa	M. Øverland	Seminar: Landbruks-basert og marin bioteknologi	NMBU	Academic
07.05.15	Nye fôrråvarer fra skog og hav	M. Øverland	I fremtiden spiser vi trær	Vitenparken	Popular
20.05.15	Foods of Norway	M. Øverland	Bioeconomy: Potentials for new growth	Be Nordic days. Milan, Italy	Popular
26.05.15	Bioøkonomien - Bioteknologisk utvikling av bærekraftige förressurser	M. Øverland	Årsmøtet i Norges Skogeierforbund	Clarion Hotel, Gardermoen	Popular

29.05.15	The bioeconomy potential for sustainable growth in aquaculture	M. Øverland	Seminar Series on Sustainable Aquaculture	UC Santa Barbara	Academic
03.06.15	Foods of Norway – den nye bioøkonomien	T. Steine	Årsmøte	Gardermoen/Industrial Biotech Network-Norway	Popular
12.06.15	Jordbruksrådet i bio-økonomien	V. Eijsink	Dialogmøte	Vitenparken	Popular
15.06.15	Nye anvendelser av skogråstoff	S.J. Horn	Bionær Programstyre	Ås/NFR	Academic
25.08.15	Nytt i Hvitost	S.B. Skeie	TINE Top Summit	Oslo	Academic
15.09.15	Fiskefôr vokser i skogen	L.T. Mydland	Ungforsk 2015	Ås/Akershus fylkeskommune	Popular
16.09.15	Presentasjon om Foods of Norway og FeedMileage	M. Øverland	Seminar for Landbruksdepartementet	Ås Gård, NMBU	Popular
18.09.15	Kvelds[latter]: Oppdrag Matforskning	L.T. Mydland	Forskningsdagene 2015	NFR/Hendrix Ibsen, Oslo	Popular
25.09.15	Bioraffinering - med bioteknologi mot en grønnere fremtid	V. Eijsink	Foredrag for Bioteknologistudenter ved NMBU	NMBU	Academic
25.09.15	Kvelds[latter]: Oppdrag Matforskning	L.T. Mydland	Forskningsdagene 2015	NFR/Smelteverket, Oslo	Popular
29.09.15	Presentasjon av Feed Mileage-prosjektet og Foods of Norway	M. Øverland	SHF-seminar	Ås	Academic
08.10.15	Use of tree (lignocellulosic/plant) biomass for feed	V. Eijsink	Kickoff-møte	NMBU/Vitenparken	Academic
08.10.15	Development of novel feeds and processing	V. Eijsink	Kickoff-møte	NMBU/Vitenparken	Academic
08.10.15	Impact of novel ingredients on animal nutrition and health	L.T. Mydland H. Volden C.M. Press H. Sørum	Kickoff-møte	NMBU/Vitenparken	Academic
08.10.15	Impact of novel feed ingredients on product quality of milk and meat products	S.B. Skeie P. Berg	Kickoff-møte	NMBU/Vitenparken	Academic
13.10.15	Nye råstoff til fiskefôr – hva forskes det på?	M. Øverland	Marine Innovation Day 2015	Oslo/MarLife	Popular
28.10.15	Nye førråvarer fra skog og hav	M. Øverland	Pensjonistmøte	Vindafjord pensjonistlag	Popular
29.10.15	Prosesser for å omdanne «ikke-mat» til mat av høy kvalitet	L.T. Mydland	Fagdag for realfagslærere	SEVU-NMBU, Vitenparken	Popular
30.10.15	Hvordan kan norsk husdyrproduksjon bidra til mer bærekraftig mat?	M. Øverland	Frokostseminar	Vitenparken/ Matsatsingen	Popular
05.11.15	Nye fôrressurser fra trær og makroalger kan sikre videre vekst i oppdrettsnæringen	M. Øverland	Det 12. norske fiskernæringsseminar	Bergen/NIFES	Academic
06.11.15	Fremsidens fiskefôr vokser i skogen	L.T. Mydland	Guest lecture	Hvam VGS	Popular
10.11.15	Hvorfor og hvordan la forskningen ved IHA grunnlaget for SFI	T. Steine	Fra forskning til ny næring	NMBU/ Vitenparken	Popular

10.11.15	Målene for Foods of Norway - hva skal vi oppnå og hvordan	M. Øverland	Fra forskning til ny næring	NMBU/Vitenparken	Popular
10.11.15	Hvorfor og hvordan la forskningen ved IKBM grunnlaget for SFI	A. Aastveit V. Eijsink	Fra forskning til ny næring	NMBU/Vitenparken	Popular
12.11.15	Hvordan kan skogen bli den nye oljen - et bioteknologisk perspektiv	V. Eijsink	Naturviterdagen	Oslo	Popular
12.11.15	Foods of Norway	M. Øverland	Levende Landbruk	Midtnorsk landbrukskonferanse/Stjørdal	Popular
18.11.15	Bærekraftig kjøttproduksjon - utfordringer og muligheter	M. Øverland	Kjøttets tilstand 2015	Animalia/Oslo	Academic
23.11.15	Nye fôrressurser fra hav og skog	M. Øverland	Hurtigruteseminaret 2015	NIBIO/Bodø	Popular

## In the media

2014

Date	Title	Medium	Platform
24.11.14	Foods of Norway skal erstatte soya fra Brasil	Landbruk.no	Internet
24.11.14	Nytt forskingssenter for fôrressurser Regjeringen.no/nb/dep/lmd/aktuelt/nyheter/	Regjeringen.no	Internet
25.11.14	Foods of Norway – et nytt senter ved NMBU	Nmbu.no/aktuelt/	Internet
25.11.14	Foods of Norway ny SFI	Forskningsradet.no/prognett-bionær/	Internet
25.11.14	Nytt forskningssenter ved NMBU	Østlandets Blad	Avis
25.11.14	Foods of Norway til Ås	Gardsdrift.no	Internet
26.11.14	Skal forske på foods of Norway	Norsklandbruk.no	Internet
27.11.14	BioMar har store forventninger til Foods of Norway	Intrafish.no	Internet
27.11.14	SFI på fremtidsrettet fôr	Kyst.no	Internet
27.11.14	På lag med Foods of Norway	ilaks.no	Internet

2015

Date	Title	Medium	Platform
Jan 15	Skogsvirke mest sannsynlige soya-erstatter	Samvirke 1, 2015	Fagblad
Jan 15	Jakter på kortreist protein	FK Agri årsrapport 2014	Årsrapport
xx.15	Fra tre til filet	Pan Innovasjon	Internet
05.01.15	Suksess med flis og tare	Grannar	Avis
06.01.15	Forskar med flis og tare	Grannar.no	Internet
07.02.15	Den grønne oljen varer evig	Klassekampen.no	Internet
15.02.15	Fra tre til filet (artikkel)	Buskap 1, 2015	Fagblad
17.02.15	Biomasse fra sitkagran kan bli til laksefôr www.nationen.no/naering/biomasse-fra-sitkagran-kan-bli-til-laksefar/	Nationen	Internet
17.02.15	Omdiskutert gran kan bli nytt fiskefôr	NRK Nordland	Internet
18.02.15	Sitkagran kan bli fiskefôr	Skog.no	Internet
21.02.15	Vil gjøre skogen til føde for fisk og pattedyr	Nationen	Internet
23.02.15	Flaks for norsk laks	Nationen	Internet
27.02.15	Vil lage kraftfôr av tang og tare	Nationen	Internet
02.03.15	Dilemma for landbruket	Nationen	Internet
05.03.15	Brygger opp til sjøslag om kraftfôr	Nationen	Internet

20.03.15	Sitkalaks underveis	Helglands Blad	Avis
21.03.15	Skog som fiskefôr?	Helgelendingen	Internet
23.03.15	Marine Harvest vil ha skog som laksefôr	Nrk.no/nordland	Internet
10.04.15	Norsk soyalaks stjeler jord i Brasil <a href="http://www.bt.no/meninger/kronikk/Norsk-soyalaks-stjeler-jord-i-Brasil-3331004.html">http://www.bt.no/meninger/kronikk/Norsk-soyalaks-stjeler-jord-i-Brasil-3331004.html</a>	Bt.no	Internet
Apr.15	Moteriktig fôr	Naturviteren 1, 2015	Fagblad
04.05.15	Fôr må lages av råvarer som ikke er egnet som menneskemat	Kyst.no	Internet
28.05.55	Foods of Norway	Kapital Spis	Tidsskrift
31.05.15	Melker norske kyr «soyamelk»?	Aftenposten - debatt (H Volden)	Avis
01.06.15	Norsk Landbruksvirke og Eat skal samarbeide	Bondebladet.no	Internet
01.06.15	Her er kuas nye beite - under vann	Aftenposten - nyheter - innenriks	Avis
02.06.15	EAT og landbruket lanserer klimasamarbeid <a href="http://www.dn.no/nyheter/politikkSamfunn/2015/06/02/1349/Eat/eat-og-landbruket-lanserer-klimasamarbeid">http://www.dn.no/nyheter/politikkSamfunn/2015/06/02/1349/Eat/eat-og-landbruket-lanserer-klimasamarbeid</a>	Dn.no	Internet
12.06.15	Norge viser verden vei til bioøkonomi 2.0	Energi og klima	Internet
Juni 15	Fremtidens husdyrfôr dyrkes kanskje i havet	Mediaplanet/innovasjonogforskning.no	Temaavis
17.06.15	Fremtidens husdyrfôr dyrkes kanskje i havet	Kyst.no	Internet
04/15	Tang og tare gir muligheter	Aftenposten Mat fra Norge	Tidsskrift
17.06.15	Landbruks- og matministerens innlegg i Stortingets behandling av Jordbruksavtalen 2015	Regjeringen.no	Internet
18.06.15	Innovative Norwegian agriculture: Foods of Norway <a href="http://www.tvp.pl/informacje-rolnicze/agrobiznes/wideo/18062015-1205/20254328">http://www.tvp.pl/informacje-rolnicze/agrobiznes/wideo/18062015-1205/20254328</a>	TV Polen	TV
19.06.15	Godhetstyranniet skal mette ni milliarder	Dagbladet	Avis
22.06.15	Mange innspill til nasjonal bioøkonomistrategi	Regjeringen.no	Internet
30.06.15	Vi har løsningen	Rogalands Avis	Avis
07.07.15	Tang og tare på forbrettet til Dagros	Bondelaget.no	Internet
11.07.15	Tang og tare kan bli mat for Dagros	NRK Hordaland	Internet
12.07.15	Vil lage fôr av tang og tare, cellulose og biogass	Ilaks.no	Internet
August 15	Feeding the future salmon industry with trees <a href="http://thefishsite.uberflip.com/i/553469-sustainable-aquaculture-digital-august-2015">http://thefishsite.uberflip.com/i/553469-sustainable-aquaculture-digital-august-2015</a>	TheFishSite.com - Sustainable Aquaculture Digital	Internet
03.08.15	Sats på alle tre primærnæringer	Dagens Næringsliv	Avis
06.08.15	Papirtiger uten landbruket	Trønder-avisa	Avis
26.08.15	Alt som kan lages av olje, kan lages av trær	Aftenposten Viten	Tidsskrift – kronikk
01.09.15	Det grønne skiftet – hva er det?	Forskning.no	Internet - blog
08.09.15	Landbruk er bioøkonomi!	Bondelaget.no	Internet
10.09.15	Bioøkonomi som en del av det grønne skiftet	NRK Hedmark og Oppland	TV
10.09.15	“Grønt” potensial	Ås Avis	Avis
17.09.15	Foods of Norway klar til start	Gardsdrift.no	Internet
18.09.15	Feeding the future salmon industry with trees <a href="https://aquabounty.com/feeding-the-future-salmon-industry-with-trees/">https://aquabounty.com/feeding-the-future-salmon-industry-with-trees/</a>	Aquabounty.com	Internet
28.09.15	Alt klart for Foods of Norway	Geno.no	Internet
06.10.15	Kan private selskaper redde klima?	Nationen	Internet
07.10.15	Ber politikarar bla opp risikokapital	Nationen	Avis
08.10.15	Gjennomført kick-off for Foods of Norway	Matsatsingens nyhetsbrev	Temaavis
08.10.15	Jubler for Foods of Norway	Nmbu.no/aktuelt	Internet
09.10.15	Stolt rektor sparket i gang «Foods of Norway»	Ås avis	Avis

09.10.15	Her brygges den nye oljen	Nationen	Avis
09.10.15	SFI Foods of Norway er i gang	Forskningsrådet	Internet
15.10.15	Innovasjon på NMBU	Ås avis	Avis
26.10.15	Bioboom (Dagens gjest)	Nationen	Avis
26.10.15	Spiser du kjøtt hvis dyrene er føret opp på trær eller alger?	Aftenposten - meninger	Internet
27.10.15	Bioøkonomiens muligheter	Nationen	Avis
27.10.15	Spiser du kjøtt hvis dyrene er føret opp på trær eller alger?	Aftenposten – debatt	Avis
Nov 15	Fliegen retten Fische	Technology Review	Tidsskrift
11.11.15	Spranget til grønn næring	Nationen – debatt	Avis
12.11.15	Statsbudsjettet 2016: Varsler behovet for en grønnere økonomi <a href="https://www.felleskjopet.no/presse/">https://www.felleskjopet.no/presse/</a>	Felleskjopet.no	Internet
18.11.15	Overlege skrøt av dyrehelsa	Bondelaget.no	Internet
25.11.15	Miljøvennlig dyrefør på Ås	NRK P2 Ekko	Radio
29.11.15	Biomasse fra hav og skog omskapes til fôr	Mediaplanet/matproduksjon.no	Temaavis

## Appendix 4:

### Members of the board, 2015-2016

<i>Representatives for the industry partners</i>	<i>Member</i>	<i>Organisation</i>	<i>Deputy</i>	<i>Organisation</i>
TINE	Eirik Selmer-Olsen	TINE	Johnny Ødegård	TINE Rådgivning og medlem
Norske Felleskjøp, Felleskjøpet Fôrutvikling, Agrifirm	Knut Røflo	FKF	Kari Ljøkkel	FKF
Nortura, Animalia, Norilia	Morten Sollerud	Norilia	Per Berg	Nortura
AquaGen, Norsvin, Geno	Nina Santi	AquaGen	Eli Grindflek	Norsvin
Borregaard, Viken Skog, Yara, Seaweed Energy Solutions	Gudbrand Rødsrud	Borregaard	Ole Petter Løbben	Treklyngen/Viken Skog
<i>Representatives for the academic partners</i>	Ragnhild Solheim	NMBU - Research dept.	Colin Murphy	NMBU - Research dept.
	Are Aastveit	NMBU - IKBM	Anne Storset	NMBU - MatInf
	Torstein Steine	NMBU - IHA	Dag Inge Våge	NMBU - IHA
<i>Observers</i>				
Supporting partners	Ola Hedstein	Norsk Landbruks-samvirke	Marit Valseth	Innovasjon Norge
Research Council of Norway	Kirsti Anker-Nilssen	RCN		