FOODS OF NORWAY

Newsletter from Foods of Norway - June 2022

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Contact us

Phone 67 23 00 00
Fax 64 96 50 01
Email post@nmbu.no

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Campus Adamstuen

Universitetstunet 3
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Newsletter from Foods of Norway - June 2022

With seven years of research activities under our belts, Foods of Norway as a centre has now achieved many milestones and documented a lot of exciting results. Only during the past six months, several large field trials have been completed, and even though we are still awaiting some of the final results, we expect interesting findings.

By Bente Paulson

Read the full newsletter here.

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Fax 64 96 50 01
Email post@nmbu.no
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Newsletter from Foods of Norway - December 2021

2021 has been another exciting year for Foods of Norway. Thanks to the devoted partners in the centre and our many talented researchers and technicians, we have been able to continue our path towards more sustainable feed resources for farmed animals and fish.

By Bente Paulson

One of the main highlights this year was the successful industrial scale-up of 1,600 kg of yeast produced from sugars from Norwegian spruce trees. This was a joint effort by partners Lallemand Animal Nutrition, Borregaard and the Norwegian University of Life Sciences (NMBU). This yeast is now being tested as a protein source in large-scale feeding trials with both Atlantic salmon and pigs. Partners Biomar, Felleskjøpet Fôrutvikling and NMBU have worked closely to develop the feeds and in designing and running the trials.

Read more about the ongoing feeding trial in Sandnessjøen, where 800 salmon are growing on the novel feed, and about the pigs at Vormsund that are showing promising growth performance after eating the feed in the period after weaning (on TV2.no).

Another highly anticipated project this year has been working with Nortura on seaweed in full rations in feed for cattle with the aim of studying the quality of the meat. The centre is also continuously building expertise in seaweed processing. We have established methods for using the entire biomass, and we are currently assessing different components extracted from the seaweed in trials with Atlantic salmon and broiler chickens. For instance, in the chicken trial, we will investigate how fucoidan, a bioactive component found in seaweed, can affect the growth performance and health of the chicks.

Foods of Norway is gaining considerable recognition as a valuable knowledge provider in the public

debate. In August, the Norwegian non-profit environmental organisation Bellona asked the centre to participate in their report “Råvareløftet”, which aims to shed light on a wide selection of candidates for new, alternative feed ingredients.

After six years, there is no doubt that the centre’s research findings and accomplishments are steadily increasing in number. In December, no fewer than three PhD candidates connected to Foods of Norway successfully defended their doctoral theses on topics ranging from insects grown on organic leftovers in fish feed; whether fish health is related to fish behaviour; to how feeding pigs with yeast can promote healthy gut bacteria.

Read the full newsletter here

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Contact us

Phone 67 23 00 00
Fax 64 96 50 01
Email post@nmbu.no

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Universitetstunet 3
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Newsletter from Foods of Norway - June 2021

So far, 2021 has been an eventful year for Foods of Norway. The centre has completed several successful trials, published many of the results achieved and welcomed a new valuable partner.

By Bente Paulson

Thanks to the many talented researchers, technicians, and industrial expertise in the centre we have continued to strive for innovation in our field. One of the main highlights this spring has been the production of several tonnes of cellulose-based sugars at Borregaard that were used by Lallemand to produce 1,600 kilos of yeast. The yeast will be used in large scale field trials with salmon and piglets. Biomar, Felleskjøpet Fôrutvikling and NMBU will work closely together to develop the feed and in designing and performing the field trials.

Foods of Norway is continuously building expertise in seaweed processing. Seaweed Solutions have supplied several tonnes of seaweed which has been processed at NMBU, an important step towards unveiling the potential of the biomass which we have in abundance along the extensive Norwegian coastline. Methods to ensure that the entire biomass can be utilised have been established, and the different components are currently under investigation for industrial and agricultural applications. This autumn we will start several exciting research activities with seaweed, for example in feeds for dairy cows and beef cattle.

Another example of ongoing research is a trial investigating the effects of feeding yeast produced from forestry leftovers to chickens. The 34-day trial was conducted by NMBU and Felleskjøpet Fôrutvikling at NMBU's Livestock Production Research Centre (SHF) in Ås this spring. Although the trial is not yet completed, it shows promising results. Read more about the trial below.

We are also very excited to have the Finnish company eniferBio join us as a new partner in the

centre, bringing on board valuable expertise on how to produce single cell ingredients from forestry leftovers in a profitable and sustainable way. Thus, they fit in perfectly with the centre's value chain.

Read the full newsletter here

Published 29. June 2021 - 12:53 - Updated 29. June 2021 - 13:03

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Fax 64 96 50 01
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Newsletter from Foods of Norway - December 2020

This has been the most challenging year for us, but we in Foods of Norway have risen to the challenges of 2020.

By Bente Paulson

The Covid-19 pandemic aside, we have fortunately been able to go forward with our trials and other scientific ventures, despite some delays due to the lockdown in Norway in spring. Most importantly, we have been able to continue the ground-breaking work in our fields of expertise, and I want to thank all of those involved in the centre for making this happen.

Several trials with yeast in feed have been carried out during 2020, including trials with piglets, cows and salmon. There are a lot of logistics involved when starting up a trial, and you can read more about the day we began one of our salmon trials in the article below.

Trials with yeast in pig feed showed good results, and the feed had a positive effect on the intestinal health of the pigs. We have also cooperated with the FeedMileage project, looking into the effects of feeding local rape seed to pigs. The centre has developed and upscaled methods for biorefining seaweed, including extracting bioactive substances with beneficial health effects. Experiments have also been carried out with sugar kelp in total mixed rations for lambs during the last five weeks before slaughter, with a positive effect on the nutritional value and product quality of the meat.

Read more about some of our achievements in this newsletter. The coming year will also present some challenges for us in Foods of Norway, but I know we will be able to meet them head-on and continue our good work.

Read the full newsletter here.

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Fax 64 96 50 01
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Newsletter from Foods of Norway - June 2019

So far, 2019 has been an eventful year for Foods of Norway. Together with our partner AquaGen, we have achieved groundbreaking results on feed efficiency in salmon.

By Bente Paulson

Our pioneering method can be used in breeding programs to develop more robust and feed-efficient fish – with major implications for the aquaculture industry.

This winter, we also produced cheese, ice cream and butter from a feeding trial with dairy cows. Yeast, that can be produced locally from spruce, was the main protein source in the novel diet for the dairy cows. The aim of this experiment is to evaluate how the yeast-based feed affects milk yield, rumen function and to demonstrate that product quality is unaffected by the replacement of soy with yeast. Documentation from the trial will be important in the commercialization of this novel feed ingredient. The results from this promising experiment are expected by the end of 2019.

A further promising event for Foods of Norway has been the recent establishment of a partnership with BioMar, one of the leading suppliers of feed to the aquaculture industry. BioMar will help Foods of Norway reach our goal on sustainable feed resources, and we are delighted to have them on board!

Read the full newsletter here.

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Fax 64 96 50 01
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Newsletter from Foods of Norway - December 2018

The year 2018 marks one of the most fruitful years in Foods of Norway.

By Bente Paulson

Collaborating closely with our industrial partners, we have now reached several key milestones that are in line with the overall goals of Foods of Norway – to contribute to growth and value creation in the aquaculture, agriculture and forestry industries by developing sustainable feed ingredients. In particular, the recent upscaling of the production of yeast is an important step towards commercialization.

You can read more about that and other highlights from the last semester in this Newsletter.

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Newsletter summer 2018

Photo: Kollasj: Gunn Evy Auestad / SINTEF Ocean

Wondering what`s new in Foods of Norway since 2017? Here are some not-to-miss highlights from an exciting half year.

By Gunn Evy Auestad

So far, 2018 has been a productive year with important results regarding feed efficiency in Atlantic salmon. Foods of Norway has also made good progress on developing methods to evaluate the effect of yeast produced from Norwegian biomass on growth performance and health in both Atlantic salmon and pigs.

The pigs liked the novel yeast-feed derived from norwegian spruce trees. Photo: Gunn Evy Auestad

Successful pig trials

The Centre has conducted an experiment to evaluate how a growing-finishing pig diet based completely on local feed resources will affect growth performance and pork quality. The pigs were first fed a yeast diet during the weaning period and then switched to a local diet during the growing-finishing period. The yeast diet was derived from Norwegian spruce trees, while the local diet was based on cereals, rapeseed and field beans.

Preliminary results are promising. The pigs had good appetite, they grew well, and were healthy.

“Woody” pig meat served for the first time

The pork meat from the experiment was enjoyed by participants at the congress Skog & Tre at Gardermoen on May 31st. Foods of Norway was highly visible at the congress, attended by the Norwegian Minister of climate and environment, Ola Elvestuen and approximately 300 other participants.

Centre leader Margareth Øverland was one of the speakers at this annual conference, aimed at the forestry and the wood-industry. As a part of her introduction, the Norwegian Forest Owners’ Association had prepared a short film about Foods of Norway.

"Woody" pig meat served at Skog & Tre 2018. Photo: Gunn Evy Auestad

New spin-off project on seaweed

Challenges in the production of seaweed, results from research and the potential of seaweed in feed were some of the topics at an internal seminar arranged by Foods of Norway this spring. Sugar kelp is a common type of seaweed in Norway that can be used in feed production, but genetic improvement is needed to make kelp suitable for large-scale cultivation.

The main goal of a new spin-off from Foods of Norway – "Breed4kelp2Feed" – is to establish an efficient breeding program for sugar kelp.

The one year pilot project is funded by the Research Council of Norway`s Large-scale Programme on Aquaculture Research (HAVBRUK). If successful, the project could be granted additional funding for further research. The project includes five partners in addition to NMBU: Sintef Ocean, Seaweed Energy Solutions, University of Los Lagos in Chile, the Scottish Association of Marine Sciences and Aquagen.

A spin-off project from Foods of Norway was initiated this May. "Breed4Kelp2Feed" aims to establish an efficient breeding program for sugar kelp.

Photo: Seaweed Energy Solutions AS

Sandeep Sharma`s PhD proves that salmon can be raised on a feed derived from Norwegian seaweed and spruce trees.

Photo: Gunn Evy Auestad

Important PhD on seaweed as salmon-feed

PhD candidate Sandeep Sharma recently submitted his thesis “Production of microbial protein from brown seaweed and spruce wood and its use as a novel feed ingredient in aquaculture”.

His research demonstrates that brown seaweed and spruce wood can be used to produce microbial protein ingredients for Atlantic salmon diets. Thus, Norwegian bio-resources can reduce our dependency on imported soy and fishmeal. His thesis is a part of the BIOFEED project and is highly relevant to Foods of Norway.

Sharma will defend his thesis on June 29th at 12.15 hrs in Urbygningen at NMBU, Campus Ås.

Breakfast seminar on science-industry collaboration

Collaboration between science and industry was the topic of a breakfast seminar arranged at NMBU on March 9th by Foods of Norway, Centre for Digital Life Norway (DLN) and ARD Innovation. The question up for debate was how to capture the innovative potential in research and make it attractive for industry to further develop and commercialize it.

A brief summary and a video recording is available here.

Foods of Norway in Gran Canaria

Foods of Norway made their presence felt at this year’s International Symposium on Fish Nutrition and Feeding (ISNFN) meeting in Las Palmas at the beginning of June with an oral presentation entitled “Novel feed resources from blue and green biomass”. The Centre also presented four posters about the effect of yeast on health, robustness and improved feed efficiency in salmon and how drying and processing of yeast affects nutritional value and digestibility.

Foods of Norway`s contribution was well received and reaffirmed that Foods of Norway`s research is gaining international recognition.

Foods of Norway at ISFNF2018, Gran Canaria. Photo: Foods of Norway

Vacancies

- PhD position in monogastric animal nutrition.
- PhD position in fish nutrition.

Closing date for applications: 21.06.2018

New staff

A new communications advisor has joined the staff. Gunn Evy Auestad replaced Liv Bjergene in February and will work in a 40 percent position with Foods of Norway.

Hanne Fjerdingby Olsen started in a tenure track position at NMBU, Faculty of Biosciences, this spring, and will work with Life cycle assessment (LCA) in Foods of Norway.

Peng Lei is working on establishing in vitro screening models based on intestinal epithelial cell lines from rainbow trout as a tool to evaluate efficiency of bioactive components isolated from yeast, macroalgae or other novel feed resources.

Adrijana Skugor is working on documenting the effect of yeast produced from Norwegian spruce trees in diets for piglets on gut function in relation to enzyme activity and expression of genes related to digestive function and immune status.

Gergely Kosa started as a post-doc in March to work on yeast fermentation. He is employed at the Faculty of Chemistry, Biotechnology and Food Science.

Fanny Buffetto, also a post-doc, has been working on brewers spent grain since January. She is also employed by the Faculty of Chemistry, Biotechnology and Food Science.

Alex Crawford is working on developing zebrafish as a tool to evaluate efficiency of bioactive components in yeast, macroalgae or other novel feed resources.

News coverage

Er et kosthold med melk og meieriprodukter bærekraftig? 05.06.2018

Derfor importerer vi soya. 16.02.2018

I fremtiden må også husdyrene spise kortreist mat. 14.02. 2018.

Det grønne skiftet handler om mer enn bare nye energikilder. 14.02.2018

Norsk fôr av gjær kan styrke dyrehelsen hos gris og laks. 10.02. 2018.

Felleskjøpet jakter på kortreiste kraftfôrråvarer 08.02.2018

Kan norske trær, tang og tare løse fremtidens største utfordring? 02.02. 2018.

You can find all of Foods of Norway`s scientific publications here.

Foods of Norway`s Annual report 2017.

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Fax 64 96 50 01
Email post@nmbu.no
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Newsletter 4 2017 Foods of Norway

Photo: .

2017 has been a productive year for Foods of Norway. This newsletter gives you an update on some of our research and outreach activities.

We would like to take this opportunity to wish you all the best for the holiday season!

By Liv Røhnebæk Bjergene

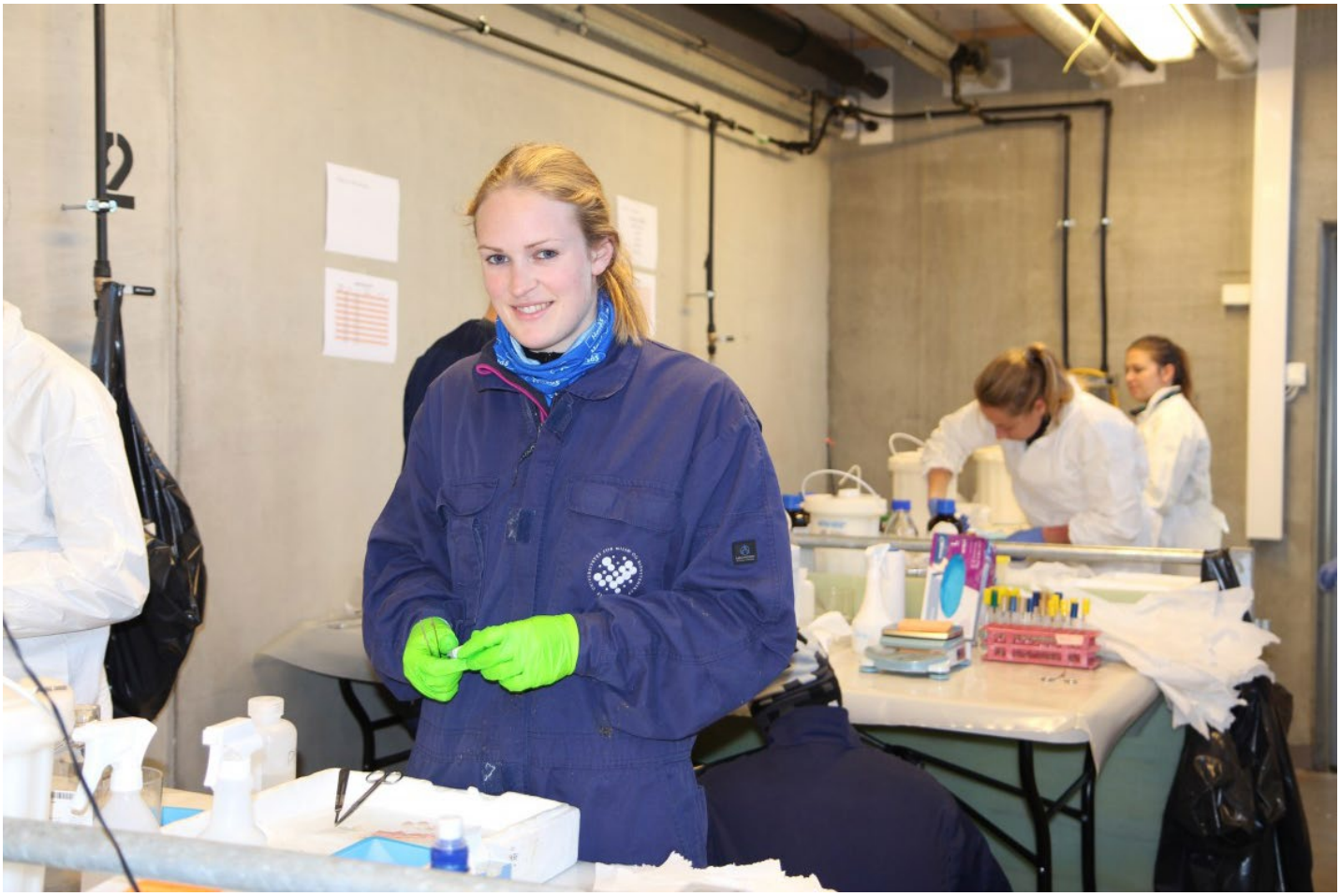
Research updates

Foods of Norway aims 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.

During 2017, we have produced yeast from Norwegian biomass at the NMBU biorefinery laboratory made of Norwegian biomass solely. Together with world leading experts on yeast, we work to

optimalize yeast as protein source in animal feed. So far, our findings look promising:

- We have developed plans for converting seaweed and animal co-products from Norilia and Nutrimar to hydrolysates. Yeast strains grown on media based on Norwegian tree and seaweed biomass have been evaluated in diets for salmon. Salmon fed yeast produced from spruce trees and seaweeds at NMBU's biorefinery laboratory had high nutrient digestibility and growth rate.
- Salmon fed yeast also had a healthy gut similar to those fed the fish-meal based control, while those fed the plant-based diet had inflammation in the distal intestine.
- We have performed a piglet experiment to evaluate how piglets perform when they are fed yeast during the critical time at weaning when they are taken away from their mothers and switched from sow's milk to a dry feed. The results suggest that the pigs liked the feed, they ate and grew well, and had fewer problems with post-weaning diarrhea, especially the first week after weaning.

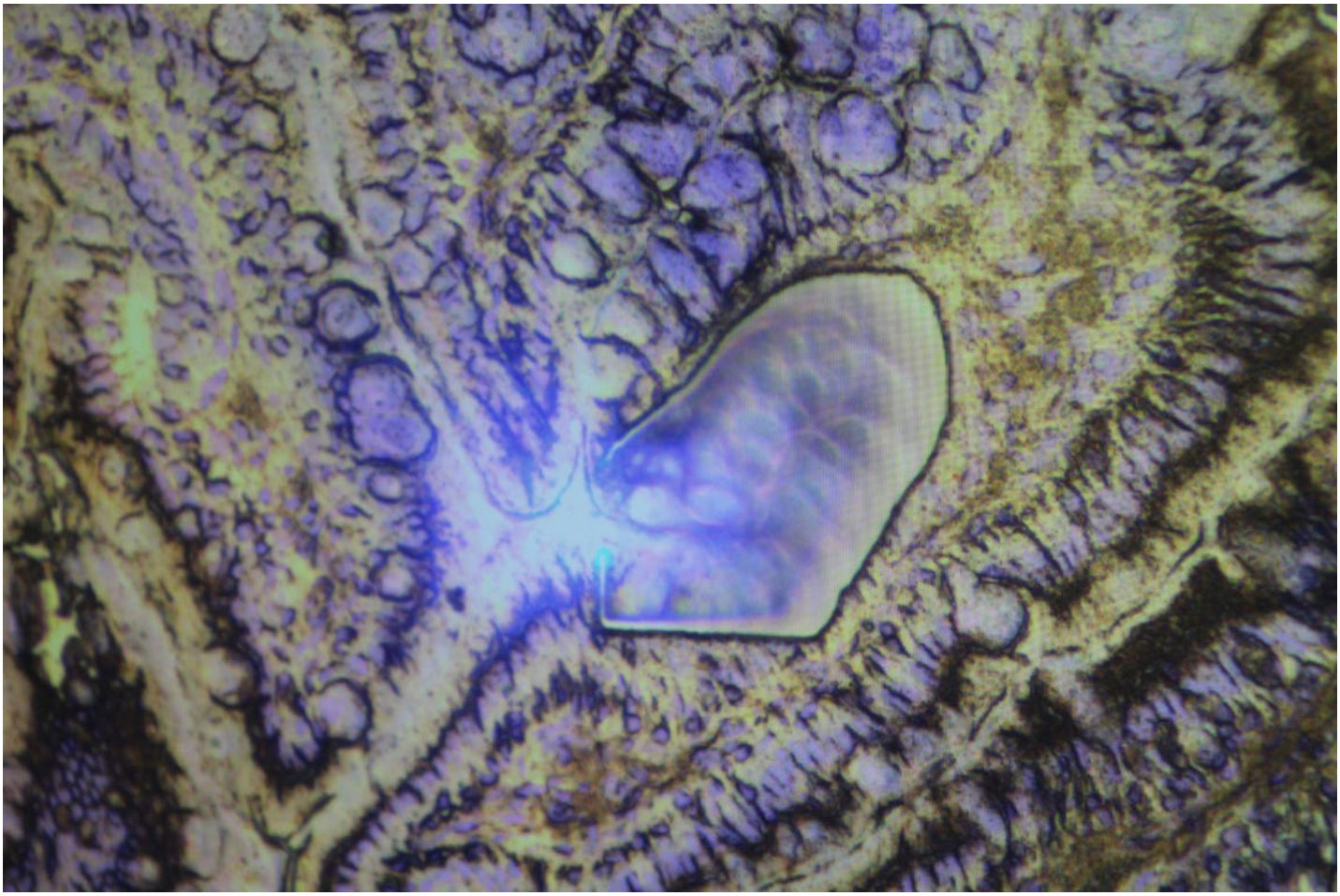


In a mobile laboratory, Ingrid Marie Håkenåsen and her colleagues in the Foods of Norway team take lots of samples from the gut of the piglets.

Photo: Liv R. Bjergene

We are also:

- Upgrading the nutritional value of grass silage. Together with TINE and local Norwegian farmers, grass silage bales from 100 farms around Norway have been collected. In this project, we are using robust methods based on mechanical, chemical and enzymatic pretreatment. We are currently working on a small scale to provide knowledge for a large-scale experiment with dairy cows.
- Developing methods to directly select for improved feed efficiency. In close collaboration with AquaGen, two experiments with salmon have been performed to establish methods to measure new phenotypes that can be used for future breeding programs. The methods developed will form the basis for a large-scale salt-water experiment.
- Developing methods to evaluate the effect of the novel feed ingredients on gut health, including detailed high-resolution studies on microorganisms in the gut, gut metabolites, and gene expressions in specific areas of the digestive tract.



. Photo: .

SusPig kick-off

The kick-off meeting for SusPig EraNet project was held on 23 October 2017 in Madrid where SusPig members, project coordinators and stakeholders were present to get an overview of the role of each partners and to discuss joint activities. A major aim is to support future sustainable pig production systems. The consortium will also organize an international workshop in feed efficiency in 2018/2019.

The Foods of Norway Team

Many people are involved in our Centre for Research-based Innovation, Foods of Norway. In a series of short interviews we present the team members to learn more about their responsibilities, work and what they hope to accomplish.

Outreach

. Photo: .

The theme of this year's Forskningstorget was 'values'. Foods of Norway was present at Forskningstorget in Oslo 22.-23. September 2017, demonstrating and explaining to school children and other visitors how trees and seaweed are converted to feed.

New staff members

Alemayehu Kidane Sagaye. Research area: Ruminant nutrition, feed efficiency and greenhouse gas emission.

Leidy Lagos. Research area: Pig nutrition, health.

Vladana Grabez. Research area: Muscle/meat biology, meat quality and lipid nutrition.

Alexander Kashulin. Research area: Gut microbiota analysis, metagenomics, metatranscriptomics.

Stine Gregersen Vhile Research area: Animal nutrition and health and physiology.

Brankica Djordjevic. Research area: Fish nutrition and physiology. Planning and running fish and pigs trials.

Ôzgûn Candan Onarman Umu works primarily at the FeedMileage-proejct, but research in Foods of Norway and FeedMileage is interlinked. Research area: Muscle/meat biology, meat quality and lipid nutrition.

Ingrid Marie Håkenåsen is studying for her doctoral degree on novel protein sources for pigs.

Selina Hellestveit is studying for her doctoral degree looking at the effects of new feed ingredients on the intestinal immune system of weanling piglets.

Ricardo Tavares Benecio. Technician.

Alexandra Göksu. Technician.

Do you want to see the whole Foods of Norway team? Click here!

Vacancies

Communication advisor for Foods of Norway (40 %) and BIOTOUR (60 %)

Application date: 02.01.2018.

News Coverage

Vil avle fram gris som tåler norsk fôr (11.12.2017 forskning.no)

Trær, tang og tare er den nye proteinrike maten (07.12.2017 Aftenposten Viten)

Stordugnad for det norske graset (28.11.2017 ABC Nyheter)

Stordugnad for det norske graset (27.11.2017 Agenda Magasin)

Sjekker om grisen tåler å spise trær og tare (30.10.2017 Nationen)

Tåler husdyr mat laget av trær av og tare? (30.10.2017 forskning.no)

- Protein fra tømmer billigere enn fiskemel (10.10.2017 IntraFish)

Bioøkonomi til frokost (16.09.2017 Morgenbladet)

Grisen spiser seg fet på trær (09.09.2017 forskning.no)

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Fax 64 96 50 01
Email post@nmbu.no
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Newsletter 3 Foods of Norway 2017

Photo: Håkon Sparre

Can pigs eat trees? This experiment with 48 piglets at Ås gård, large-scale trials with grass and research to improve feed efficiency are just some of Foods of Norway's research activities during spring 2017. In this newsletter you can read more about our research and outreach activities.

We would like to take this opportunity to wish you all a nice summer!

By Liv Røhnebæk Bjergene

Research updates

Photo: Liv R. Bjergene

Piglets test feed from trees

Yeast grown on sugars from tree biomass has proven to be a sustainable protein source in fish diets. Will piglets thrive on a diet where the protein source is yeast derived from Norwegian tree biomass?

This winter 48 piglets at the university farm, Ås gård, were fed four different experimental diets with yeast level 0,10,20 and 40 percent of the protein from the protein-rich feed ingredients.

"This is a dose-response study, where the piglets will be fed increasing levels of proteins from yeast. For us, this is the first time we test such high amounts of yeast for piglets", Foods of Norway researcher Adrijana Skugor explains.

Parameters that will be documented include feed intake and growth rate, as well as the effects on health. Yeast contains high amounts of anti-oxidants. The positive effects this might have on the storage quality of the meat will also be documented.

. Photo: Janne Brodin

Selection method for efficient animals in aquaculture production

Improved feed efficiency is the most imperative trait in animal breeding and genetics. Foods of Norway focuses specifically on developing breeding strategies to increase feed efficiency of farm animals.

One of the goals of Foods of Norway's research is to select fish that utilize feed more efficiently. In other words, more fish produced per unit of feed. Improved feed efficiency implies that the fish reach slaughter weight sooner, and this reduces the need for feed.

Previously, selection for improved feed efficiency was based on improved growth rate, which is an indirect method. A direct method depends on recording individual feed intake, but this is close to noe feasible with fish.

In Foods of Norway we aim to improve selection by developing alternative methods to directly phenotype for feed efficiency (phenomics). Foods of Norway's PhD student Hanne Dvergedal has

recently carried out an experiment to investigate a specific phenotyping strategy in 23 different salmon families. Specifically, she is looking into whether individually recorded phenotypes are heritable and how they relate to feed efficiency.

In addition to phenotyping for feed efficiency, the project also focuses on gaining an in depth understanding of the biological mechanisms that explain the differences in feed efficiency among the fish and fish families, which are all important elements in a systems-analytical approach to our research.

Based on the insights generated from this experiment, a large-scale experiment with salmon in the sea will be planned in 2019.

The experiments are run in close cooperation with Foods of Norway's industry partner AquaGen.

. Photo: Håkon Sparre

Research to improve grass silage quality and digestibility

The natritional value of forage is often limited by its high fiber content. With Norway's challenging

climatic, harvesting and topographical conditions, traditional methods to improve the nutritional quality of forage are limited. Foods of Norway therefore applies more robust methods to improve the digestibility of grass. This could contribute significantly to better resource utilization, improved feed efficiency, and lower feed costs, which are major goals for Foods of Norway's research.

Together with industry partner TINE and local Norwegian farmers, grass silage from 100 farms all over Norway has been collected. This effort forms the basis for an ongoing large-scale experiment where digestibility of ruminants is measured and where more robust methods based on mechanical, chemical, and novel enzymatic pretreatments are applied.

NMBU-researcher Liv Torunn Mydland is in charge of the experiment.

"This is a big trial. As far as I am aware of, this many silages of different qualities has never been studied in such detail before as TINE and our research group are doing now", Mydland says.

All these silage samples from the 100 farms will also be stored in a 'grass silage bank' for future research and optimization of new methodology.

Seminars

. Photo: Sandeeep Sharma

In April, Foods of Norway, SINTEF Ocean and SIG Seaweed joined forces to hold a joint seminar on seaweed. More than 100 people packed the meeting room to learn and exchange knowledge. Foods of Norway and SINTEF Ocean will continue to exchange knowledge on seaweed.

"Closer collaboration with Foods of Norway is very important for us. The Centre has extensive knowledge on seaweed as a feed ingredient for salmon and farm animals as well as insights into processes to optimize the low base level of protein in seaweed. The potential for cultivating seaweed is considerable. In order to exploit the whole value chain, there is a need for bulk products such as feed," Jorunn Skjermo in SIG Seaweed explains.

Planned research activities autumn 2017

Pig experiment to evaluate Norwegian feed resources

A large experiment will be performed with pigs from weaning all the way to slaughter. The aim is to document the effect of using Norwegian feed resources on growth performance, health and the quality of the pork.

Fermentation and enzymology

Research will mostly be focusing on nitrogen rich residues;

1) Scaling up the production of meat and fish hydrolysates in new 30 liter hydrolysis tanks.

2) Using these hydrolysates as nutrient sources for yeast.

3) Using enzymes to increase the release of sugars from seaweed more efficiently.

Spin-off projects in Foods of Norway

In February, "SusPig" was approved for funding by EU's ERA-Net SusAn Co-funded call. The network gathers top research expertise on nutrition and feed efficiency and will be a boost for NMBU's nutrition research.

Master degrees spring 2017

Ingrid Marie Håkenåsen: "Feed intake, nutrient digestibility, growth performance and general health of piglets fed increasing levels of yeast".

New staff members

. Photo: Private

Milena Bjelanovic is a research technician and has worked for Foods of Norway since January 2017. She is involved in several of Foods of Norway's work packages. She investigates the nutritional value and potential health benefits of novel feed ingredients in feed to fish and other domestic animals. She also takes part in the planning and sampling of Foods of Norway experiments, as well as regular work in the laboratory. Bjelanovic holds a masters degree in food science at NMBU and works on her PhD on meat quality.

. Photo: Janne Brodin

Ana Cruz started in September 2016 as a PhD student under the Research Council of Norway's industrial PhD programme. She is an employee at Felleskjøpet Fôrutvikling. The working title of her

thesis is "Novel protein sources produced from advanced bioprocessing for monogastric animals".

Vacancies

Postdoctoral fellowship in feed ingredient processing and animal nutrition

Deadline: August 7, 2017.

Postdoctoral fellowship in monogastric animal nutrition and health

Deadline: August 7, 2017.

News coverage

Media's interest for Foods of Norway continues.

During January and February Foods of Norway research was promoted in the TV programme "Utan mat og drikke", shown three times on NRK 2 and NRK 1 and awarded Bondevettsprisen by the Norwegian Farmers Union. More detailed information on Foods of Norway's research using timber and seaweed as novel protein sources was published at NRK Ytring.

In March the research trial on pigs testing novel protein souces from trees, was published on NRK Østlandssendingen and NRK Dagsrevyen 21.

On our website you will find updated lists of electronically accessible news items. These are some of the latest items (in Norwegian):

Ekspertpanel: Utfordringer og løsninger i matindustrien (28.06.2017 Mediaplanet, distribuert i Aftenposten)

Tømmer og tang på matfatet (04.05.2017 Viken Skog)

Grønt gull i skogen (02.05.2017 Dagsavisen)

Skogen - en underutnyttet ressurs (21.04.2017 Norsk Landbrukssamvirke)

Kan oppdrettslaksen fôres med alger, treflis og insekter? (23.03.2017 Framtiden i våre hender)

Griser gomler grantrær og redder regnskogen (07.03.2017 NRK Østlandssendingen, nett)

Grantrær blir til dyrefôr (07.03.2017 NRK Østlandssendingen, radio)

Kampen om det grønne karbonet (22.02.2017 Dagens Næringsliv og NMBU)

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Norwegian University of Life Sciences

Contact us

Phone 67 23 00 00
Fax 64 96 50 01
Email post@nmbu.no
More contact info

Visit us

Campus Ås
Universitetstunet 3
1430 Ås
View on map

Campus Adamstuen
Ullevålsveien 72
0454 Oslo
View on map

Instagram

Newsletter 2 2016 Foods of Norway

Photo: Håkon Sparre

2016 has been a productive, initial year for Foods of Norway. This newsletter gives you an update on some of our research and outreach activities.

We would like to take this opportunity to wish you all the best for the holiday season!

By Liv Røhnebæk Bjergene

Seminars

Jon Øvrum Hansen.
Photo: Håkon Sparre.

During 2016, Foods of Norway researchers have given 50 talks at seminars and meetings, including Aftenposten's annual climate conference, which this year focused on the oceans.

Some 1200 people heard Foods of Norway researcher Jon Øvrum Hansen talk about how biomass like spruce and macroalgae is being converted to novel, sustainable animal feed ingredients.

Research updates

Research collaboration Foods of Norway - Chile

During 2016, research collaboration between Foods of Norway and the University of Chile was established and strengthened.

Research collaboration between Foods of Norway and University of Chile.
Photo: Liv R. Bjergene

Cristina Ravanal, a researcher at the University of Chile, Institute for Cell Dynamics and Biotechnology, visited NMBU in September. Ravanal's research visit was part of a strategic collaboration between Foods of Norway and ICDB to develop new technologies for producing bioactive compounds, chemicals, feed and food ingredients and biofuel from seaweed.

Foods of Norway visits Chile.
Photo: Shutterstock

In November, the collaboration was futher strengthened when researchers from Foods of Norway visited Chile and had meetings with the University of Chile, potential industry partners and the Norwegian Embassy, among others. The aim is to maximise the use of biomass.

Feed efficiency

. Photo: NMBU

To improve feed efficiency for farm animals is a central part of Foods of Norway. By 2030, more than 50 % of all fish and seafood products will originate from aquaculture. One way to increase production is to select for the most efficient animals. Together with researchers at NMBU and Aquagen Phd-student Hanne Dvergedal is developing a direct selection method for genetic selection.

Fish feed for food security

Peyman Mosberian Tanha
Photo: Liv R. Bjergene

On October 27, Peyman Mosberian Tanha defended his PhD degree with his thesis on how environmental challenges aggravate the negative effects on a plant-based diet in fish. In conjunction with his defence, Foods of Norway arranged the seminar Fish

feed for food security.

Planned research activities 2017

Partners Photo: Janne Brodin

In October, all partners met to plan the Foods of Norway activities for 2017. Based on the discussions, the annual plan for 2017 was approved by the board in November.

Gris. Photo: Håkon Sparre

2016 emphasized research on the development of novel feed ingredient for fish. In the coming years, we will apply this knowledge for other farm animals, such as pigs and cows.

During 2016, one ton of yeast processed from trees has been produced. This yeast will be used in a feed experiment as a potential protein source for pigs. The project will study health effects, meat quality and growth, amongst others.

We are also planning:

- an experiment to upgrade the nutritional value of grass silage for dairy cows.
- downstream processing of yeast in order to learn more about autolysis, cell cracking, fractionation and drying processes.
- feed effiency eperiement with salmon.

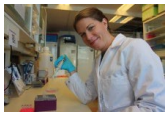
Granted spin-off projects in Foods of Norway

- Genetic improvement of feed utilization in cattle and pigs.
- Nordic Centre for Sustainable and Resilient Aquatic Production, SURAQUA
- OXYTRAIN - Harnessing the power of enzymatic oxygen activation, Horizon 2020, Marie Curie ITN

Scientific publications 2016

During 2016 three scientific publications and one masters thesis associated with Foods of Norway have been published.

New staff members



Ragnhild Ånestad. Photo: Liv R. Bjergene

Ragnhild Ånestad is Research Assistant and works closely with Foods of Norway researchers running experiments with fish and farm animals. This autumn Ragnhild has been in charge of developing methods for measuring digestive enzyme activity. By mapping and testing various methods she has selected the most useful methods for the research in the centre.

News coverage

Media interest for Foods of Norway continues to be massive. During 2016 there have been 74 articles about Foods of Norway in Norwegian and international media, including five chronicles.

In January 2017, Foods of Norway research is promoted in the program "Utan mat og drikke". The focus is on food security and follows a family trying to survive for one month on Norwegian produced food solely.

On our website you will find updated lists of electronically accessible news items. These are some of the latest items:

Norwegian press coverage:

Naturviterne-ros til "Grønn konkurransekraft" (05.12.2016 naturviterne.no)

Veikart mot fornybarsamfunnet 2050 Hvordan skal norsk landbruk bidra til økt verdiskaping og og klimareduksjon i 2050? (28.10.2016 Norsk Landbrukssamvirke)

Naturviterne på Stortinget: Bekymret for kutt i Miljødirektoratet! (26.10.2016 Naturviterne)

Bioøkonomi er det grønne skiftet (26.09.2016 Norsk Landbrukssamvirke)

Havets regnskog (19.08.2016 Agenda Magasin)

Produserer 25 tonn i år - Potensialet er millioner (24.06.2016 Kyst.no)

- Norsk teknologi går til USA fordi vi ikke satser (09.06.2016 NRK Nordland)

- Flere norske råvarer kan erstatte importert soya (09.06.206 NRK Nordland)

International press coverage:

More Sustainable Fish Feeds 21.11.2016 Notrade.com)

ICDB organizarà workshop sobre biorrefinería algal en conjunto con Foods of Norway (November 2016 Instituto de Dinámica Celular y Biotecnología (ICDB), Universidad de Chile)

Investigadora ICDB realiza pasantía en Foods of Norway (October 2016 Instituto de Dinámica Celular y Biotecnología (ICDB), Universidad de Chile)

Forest to feed - Norway shining spotlight on yeast protein (27.09.16 FeedNavigator.com - Poultry)

Granar blir ersätter soya (27.09.16 Skogsaktuellt)

About Foods of Norway:

This is the third newsletter from Foods of Norway to update you on progress and events. Foods of Norway is the first Centre for Research-based Innovation (SFI)

at the Norwegian University of Life Sciences. 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.

Foods of Norway will help facilitate the transition to a bioeconomy and find solutions that can address one of the major challenges faced by Norway's fish farming and livestock industries: the dependency on imported feed ingredients, such as soy.

The aim is to develop new, innovative biorefining techniques to convert natural bioresources, such as trees, macroalgae, grass and wet organic co-products into high-quality feed ingredients for fish and farm animals. To ensure more food from feed resource inputs, Foods of Norway has a special focus on breeding strategies to increase the feed efficiency and robustness of fish and farm animals.

Interested in more news from Foods of Norway?

Please follow us on Facebook and Twitter for research updates, as well as our website foodsofnorway.net

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Norwegian University of Life Sciences

Contact us

Phone 67 23 00 00
Fax 64 96 50 01
Email post@nmbu.no
More contact info

Visit us

Campus Ås
Universitetstunet 3
1430 Ås
View on map

Campus Adamstuen
Ullevålsveien 72
0454 Oslo
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Newsletter 1 2016 Foods of Norway

Photo: Espen Solli

About six months have passed since NMBU's first Centre for Research-based Innovation (SFI) was launched. The establishment of a new fermentation platform for feed trials is progressing well. Researchers have tested local feed ingredients on Norwegian Landrace pigs. And Foods of Norway was presented in a keynote talk at the prestigious Global forum for innovations in agriculture in Abu Dhabi in February.

By Liv Røhnebæk Bjergene

Research updates

Boom and boost for seaweed in the North Atlantic

Foods of Norway partner Seaweed Energy Solutions (SES) is a pioneer in Norwegian macroalgae production. Today, the value creation from macroalgae is 1.5 million NOK. By 2050, the estimates are 40 billion NOK.

Feed meal with 5 percent macroalgae

Read how brown seaweed, large kelp and two bioactive compunds extracted from this seaweed are used in feed meal.

Do you want more research updates? Foods of Norway has recently established a Facebook site. We will post messages to update you on our research.

Foods of Norway is well underway, thanks in part to new tools and expertise acquired through ongoing NMBU research projects such as NorZymeD, BIOFEED and FeedMileage. Here are some examples:

Bioeconomy enters the pig pen

To reduce the carbon footprint of pig feed and improve food security, researchers at NMBU are testing new types of feed. The aim is to investigate if some pigs have genes that enable them to thrive more on a Norwegian diet with ingredients such as spruce trees and macroalgae.

Small-scale biorefinery ready for trials

Processing technology is essential to develop novel feeds. Now a small-scale biorefinery is ready for trials that may soon lay the foundation for industrial-scale production.

Innovative enzyme research

Two new studies published in Science and PNAS (Proceedings of the National Academy of Sciences of the United States of America) describe innovative enzyme research which can revolutionize the biorefinery processes. Foods of Norway's Vincent Eijsink is one of the authors of the two scientific papers.

Developed genomic selection – honored with prestigious award

NMBU-professor Theo Meuwissen has had a major impact on the genetic improvement of livestock and crops, highly relevant for Foods of Norway's research. On May 1st he received the John J. Carty Award for the Advancement of Science in Washington DC.

Global forum for innovations in agriculture 2016:

On 16-17 February, Centre Director Margareth Øverland was an invited key-note speaker at the Global forum for innovations in agriculture 2016 in Abu Dhabi. Øverland gave a talk to public decision-makers, private sector champions and civil society leaders on how trees can be converted to salmon feed.

"Aquaculture is by far the most efficient form of animal food production and can play a key role in feeding the world in a sustainable way", Øverland wrote in a blog post published during the conference, which was published on forskning.no, the Norwegian Research Council's main news page and NMBU's blog 'Mat for framtiden'.

New staff members

Gro Steine is Foods of Norway's centre coordinator working closely with the consortium partners. In addition, Steine is responsible for Work Package 6 on economic and environmental sustainability.

Steine earned her doctorate in Animal Science and Agricultural Economics. For the last three years, she headed NMBU's former "Food for a sustainable future" (Matsatsingen). Steine has also worked for the former Akvaforsk, now Nofima, and for two former research institutes which today are part of NIBIO; the Norwegian Agricultural Economics Research Institute and the Genetic Resource Centre at the Norwegian Forest and Landscape Institute.

Hanne Dvergedal is studying for her doctoral degree on topics linked to Foods of Norway. Dvergedal will study feed efficiency in salmon, integrating genetics and nutrition. Two trials will be conducted at NMBUs new fish laboratory in collaboration with Foods of Norway's partner AquaGen.

Mette Hofossæter will in her PhD study investigate the pathophysiological effects of novel feed from non-food biomasses on the intestinal health of Norwegian production animals. The effect will be evaluated based on morphological and molecular changes of the intestinal mucosa. Experimental material will be collected from *in vivo* trials in Atlantic salmon and pigs.

News coverage:

Media interest for Foods of Norway has been massive. On our web site you will find updated lists of electronically accessible news items. These are some of the latest items:

Norwegian press coverage:

Norske landbrukstopper til Nederland (27.05.2016 Innovasjon Norge)

Nytt forskningssenter for biodrivstoff (26.05.2016 Nibio)

Nytt senter for miljøvennlig energi (26.05.2016 NMBU)

Hvorfor importerer vi soya? (24.05.2016 Felleskjøpet og 21.05.2016 Nationen)

Tilpasser grisen til fôret. Gener kan bidra til å utnytte norskprodusert fôr bedre (24.05.2016 Norsk Landbruk)

Fremtidens superlaks (25.4.2016 Ekko NRK)

Snart kan laksen fôres med trær (19.04.2016 Avisa Nordland)

Akvakultur, tang og tare – kan sikre verdens matbehov (18.04.2016 High North News)

Skogen er et uutnyttet matfat (01.04.2016 Agenda Magasin)

Pionertrålar tar vare på alt råstoff (31.03.2016 fiskebåt - havariflåtens organisasjon)

- Helnorsk fôr vil kreve risikokapital (30.03.2016 Bondebladet)

Matindustrien er positiv til fremtiden (23.03.2016 Norsk Landbrukssamvirke)

Skal ha helnorsk grisefôr innen fem år (15.03.2016 Bondebladet - Gårdsdrift)

Store alger gir ny næring (23.02.2016 forskning.no)

Tryller med trær, alger og gras (22.02.2016 forskning.no)

Kan dyrka meir og betre fôr (26.01.2016 Bondebladet)

International press coverage:

Agrifirm sluit aan bij Foods of Norway (23.05.16 De Molenaar)

Developed genomic selection - honoured with prestigious award (02.05.16 AlphaGalileo)

Emirats arabes unis. Lancement reussi du salon Viv MEA (April 2016 La Revue de L'alimentation animale)

Norge satsar norskt 15.3.16 ATL Lantbrukets Affärstidning - Lantbruk

Norskir laxar munu ete jolatre 14.2.16, www.kjarninn.is)

About Foods of Norway:

This is the second newsletter from Foods of Norway to update you on progress and events. Foods of Norway is the first Centre for Research-based Innovation (SFI) at the Norwegian University of Life Sciences. 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.

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The aim is to develop new, innovative biorefining techniques to convert natural bioresources, such as trees, macroalgae, grass and wet organic co-products into high-quality feed ingredients for fish and farm animals. To ensure more food from feed resource inputs, Foods of Norway has a special focus on breeding strategies to increase the feed efficiency and robustness of fish and farm animals.

Interested in more news from Foods of Norway?

Please follow us on Facebook and Twitter for research updates, as well as our website Foodsofnorway.net.

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Norwegian University of Life Sciences

Contact us

Phone 67 23 00 00
Fax 64 96 50 01
Email post@nmbu.no
More contact info

Visit us

Campus Ås
Universitetstunet 3
1430 Ås
View on map

Campus Adamstuen
Ullevålsveien 72
0454 Oslo
View on map

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Newsletter 1 2015 Foods of Norway

Photo: Håvard Simonsen

This is the first newsletter from Foods of Norway to update you on progress and events during 2015.

By Liv Røhnebæk Bjergene

About Foods of Norway:

Foods of Norway is the first Centre for Research-based Innovation (SFI) at the Norwegian University of Life Sciences. Foods of Norway will help fascilitate the transition to a bioeconomy and find solutions that can address one of the major challenges faced by Norway's fish farming and livestock industries: the dependency on imported feed ingredients, such as soy.

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on breeding strategies to increase the feed efficiency and robustness of fish and farm animals.

Events:

Kick-off

Foods of Norway started up on September 1st and was launched at an open kick-off seminar on October 8th.

"This university is ready to be a cradle for innovation. What Foods of Norway is all about, is to make a difference – for society and for industry", said Mari Sundli Tveit, rector of NMBU.

"Foods of Norway is an important and timely initiative, which can contribute to a more sustainable bioeconomy", said Leif Forsell, Secretary General at the Ministry of Agriculture and Food at the kick-off seminar.

Board meeting

On the 27th of October Foods of Norway's held its first board meeting. Here is the list of board members.

News coverage:

Media interest for Foods of Norway has been massive. On our web site you will find updated lists of electronically accessible news items from national media, international media and news from Foods of Norway.

Partners and people:

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.

Foods of Norway is divided into six Work Packages. The work package leaders coordinate the scientific work. Together they form the Research Management Group, responsible for the annual working plan and to advice on research planning, progress and quality control.

Foods of Norway encompasses many researchers. Here is a list of people at NMBU currently involved with research at the centre.

Three vacancies will be announced soon: a centre coordinator, researcher in animal nutrition/health and a research assistant. All vacancies will be published on our website: foodsofnorway.net.

We would like to take this opportunity to wish you all the best for the holiday season!

Best regards,

Margareth Øverland

Centre Director

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Norwegian University of Life Sciences

Contact us

Phone 67 23 00 00
Fax 64 96 50 01

Email post@nmbu.no
More contact info

Visit us

Campus Ås
Universitetstunet 3
1430 Ås
View on map

Campus Adamstuen
Ullevålsveien 72
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