matís

Annual Report 2014

4 Science and innovation are the currency of tomorrow

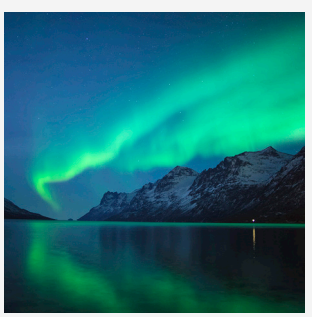
Sveinn Margeirsson, CEO, Ph.D.

The year of 2014 has been the year of the knowledge based bioeconomy. Never before have we realised better the importance of science and innovation in tackling the grand challenges of food security and developing a sustainable bioeconomy.

6 Bioeconomy in the North

Sigrún Elsa Smáradóttir, Program Director

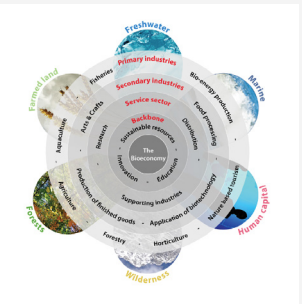
The project is aimed at innovation, product development and improved possessing for increased value and sustainability in the bioeconomy.



10 European Bioeconomy Panel

Hörður G. Kristinsson, Chief Science Officer, Ph.D.

The Bioeconomy Panel was established to answer the Europe 2020 strategy calls for a bioeconomy as a key element for smart and green growth in Europe.



Publisher: Matís, www.matis.is
Editor: Steinar B. Aðalbjörnsson
Text: Eydís Arnviðardóttir, Steinar B. Aðalbjörnsson and others
Photographers: iStock photo, Torfi Agnarsson and others
Design and layout: Kristín Edda Gylfadóttir, Steinar B. Aðalbjörnsson
Printing: Pixel ehf.

Matís homepage

A few of Matís' Partners

Table of Contents

“Consumers today are smart. They want real information about their food.“

SVEINN MARGEIRSSON, CEO, Ph.D.

Science and innovation are the currency of tomorrow

The year of 2014 has been the year of the knowledge based bioeconomy. Never before have we realised better the importance of science and innovation in tackling the grand challenges of food security and developing a sustainable bioeconomy. Matís has had emphasis on the blue bioeconomy and plays a key role in that field, domestically and internationally.

In our globalised world, international collaboration among scientists and entrepreneurs is a key to building competive companies, resilient economies and prosperous societies. Science and innovation do not only increase resource utilisation and support product and service development, but also support marketing and improves value chain transparency and coordination.

Food production is one of the most important parts of the bioeconomy and food safety is the basis of value creation in that field. In 2014, Matís had an outstanding collaboration with the German institutions BfR and LAVES in building our food safety analytical capacity. With the support of the Icelandic minister of Fisheries and Agriculture and the German minister of Federal Ministry of Food and Agriculture huge steps were taken toward an even more food safe future for Icelandic consumers and buyers of Icelandic food products worldwide. It is my pleasure to thank our collaborators for their excellent work and support.

Collaboration with our Nordic "cousins" has always been important to us Icelanders. It was even more so in 2014 than most years, as Iceland chaired the Nordic Council of Ministers, with main focus on the Bioeconomy in the Chairmanship Program "Innovation in the Nordic Bioeconomy". The opportunities in the Nordic and Arctic bioeconomy were the focus of conferences organised by Matís, "Nordtic - Nordic Bioeconomy and Arctic Bioeconomy" in June and "Arctic Bioeconomy" in November, with keynote presentations from dr. dr. Andreas Hensel and dr. dr. Christian Patermann. It is important for the Nordic countries and their neighbours to stay in the forefront when it comes to seizing the opportunities and mitigating the risks related to changing climate conditions in our part of the world, not least when it comes to the bioeconomy. Creating favorable conditions in those areas for innovative companies, and thereby job opportunities for highly skilled knowledge workers, will play hand in hand with increasing the value of biological resources and increasing global food security, both being high on the international political agenda.

Growth of international operations at Matís was characterizing for 2014. International collaboration widens our scope, keeps the scientists at Matís world class and supports value creation in the food and biotech industries domestically and abroad. But international projects do not only support scientists and established companies. They also enhance real regional development with spin-off companies, job opportunities and international market relations for small companies. Farmers and fishermen coming in contact with designers and developers are some of the success stories we can tell from our international operations. Bridging the gap between academia and industry as well as between Europe and N-America are other success stories.

Icelandic seafood producers have a reputation of high quality and responsible utilisation. Matís is proud to have collaborated with them through the years to obtain that reputation. Seafood producers, as well as other food producers, thrive from innovation and we should be proud to communicate the innovative nature of food production. If we continue to be aware of both the potential risk of innovation and the importance of food safety, innovation will be a part of the Icelandic seafood identity in the years to come.

Consumers today are smart. They want real information about their food. Food safety scandals, increased education and the power of social media have changed the food industry for good. And those kind of changes will continue, as consumers become more and more aware of different choices, trade barriers are broken and e-commerce reaches new heights. The consumers of tomorrow will require scientifically obtained information on nutrition, chemical contamination, health effects, social responsibility and environmental impact of food production. With that future in mind, I believe that science and innovation will become the currency of tomorrow´s food industry.

“The project is aimed at innovation, product development and improved possessing for increased value and sustainability in the bioeconomy.”

SIGRÚN ELSA SMÁRADÓTTIR, PROGRAM DIRECTOR

Bioeconomy in the North

The chairmanship of the Nordic Council of Ministers (NCM) rotates between the five Nordic countries and is held for a period of one year and followed by a three-year chairmanship program. Iceland chaired the NCM in 2014. Matís worked closely with Icelandic authorities on the development and implementation of the presidency program "NordBio". The focus of the Icelandic chairmanship program is on the bioeconomy, which is the basis for almost all research and innovation projects at Matís. The main tasks of the presidency hinged on innovation in the Nordic bioeconomy with the aim to strengthen regional economic growth.

Matís leads the innovation and product development projects under NordBio during the presidency program. Sigrún Elsa Smáradóttir, Program Director at Business Development, is the project manager.

The project is aimed at innovation, product development and improved possessing for increased value and sustainability in the bioeconomy. Focusing on underutilized bioresourses and waste, means are sought to increase production of biomass to use for example in biorefineries and to introduce new technologies, including biotechnology, to increase the value of products from biological resources.

In cooperation with industry partners, Matís has already made good progress in creating value from underutilized resources and still attempts to improve utilization of resources that are already utilized, by active research and innovation as well as by actively supporting entrepreneurs and industries. Innovation projects within the chairmanship program are therefore a natural extension of Matís's goals. Also, this combines Icelandic and Nordic knowledge with the aim of identifying opportunities, decreasing waste and increasing the value of the bioeconomy.

The innovative programs within the chairmanship program are selected and designed on the basis of analyses carried out in a Nordic cooperative effort. Part of this work was regional analyses, done in certain regions of the Nordic countries by Nordregio, a Nordic research institute specializing in research on settlement issues. Nordic Innovation, a Nordic institution that works to improve international trade and innovation, has also done some analytical work in this field. There is also ongoing Nordic taskforce, with representatives from Matís, working on identifying opportunities and industry needs connected with bio refineries and biofuel production in the Nordic countries.

The first part of the innovation projects under the chairmanship program was based on the project "Arctic Bioeconomy". The project was led by Sigrún Elsa and was completed in December 2014 and focused on the bioeconomy of the West Nordic, focusing on Iceland, Greenland and The Faroese Islands. This was a two year project where bio resources were mapped to identify opportunities within the bioeconomy of the West Nordic countries.

The goal of the project was to compile information about biological resources and utilization in the west Nordic countries and identify opportunities for value creation and societal transformation. The project's conclusions and the action plan put forward will facilitate the participation of this region in Nordic and European cooperation projects in the bioeconomy sector. If successful, this will contribute to more focused policymaking, encourage sustainable utilization of natural resources, promote value creation and minimization of waste in the bioeconomy leading to positive impact on social demography and rural development in the region.

Dr. dr. Christian Patermann a former director at the European commission, often referred to as the father of Bioeconomy in Brussels, wrote foreword to the final report of the project and facilitated the final meeting of the project where the action plan was combined from the project's conclusions.

An interview with dr. dr. Patermann can be found on Matis webpage: *http://www.matis.is/drpatermann*. In the interview dr. dr. Patermann describes the bioeconomy and its importance for the West Nordic Region and the unique features of the West Nordic Region. Further, dr. dr. Patermann reflects on the importance of a West Nordic Bioeconomy Panel in order to focus the strategy and priorities for the region as well as the importance of establishing a Centre of Excellence to optimise the research, and the technological and innovative activities in the region.

See more

The action plan built on the conclusions of the project consists of four main actions:

Action 1

Create a West Nordic Bioeconomy Panel

West Nordic Bioeconomy Panel/Forum from academia, industry and commerce, non-governmental organizations and policy institutions will be formed to identify common key issues important for the West Nordic region, identify opportunities, advice industry, governments and the public and promote common key issues and policy. The creation of this West Nordic Bioeconomy Panel is important for active and targeted participation in larger context such as the proposed Nordic Bioeconomy Panel, the existing European Bioeconomy Panel in Brussels and national bioeconomy panels in Europe. Clear strategy and focus for the region is vital in working towards strengthening the bioeconomy, as well as opening up new opportunities for research and innovation in the region. Focus will be on wide cooperation with existing networks and infrastructures as well as representatives of the proposed Nordic Bioeconomy Panel, national European Bioeconomy panels and the European Bioeconomy Panel. A key action is to establish stakeholder platforms, complementing the advisory activities of the West Nordic Bioeconomy Panel, to discuss industrial opportunities, infrastructure and support system to enhance value creation from bioresources as well as to discuss the balance between use and protection of bioresources and how to secure biodiversity.

Action 2

Establish an interdisciplinary Centre of Excellence (CoE) for the West Nordic region

An interdisciplinary CoE will focus on the regions uniqueness, sustainability, energy and value streams, socio-economic aspects and rural development with active participation of all stakeholders. This CoE will link different expert groups and local/national knowledge centres through a virtual knowledge network/consortium. Comprehensive long term financing and political support is needed to realize this action.

Action 3

Launching the project Arctic Bioeconomy II – Biotechnology

Special project focusing on opportunities in applying biotechnology for value creation in the West Nordic countries will be initiated. One highly interesting aspect of the bioeconomy is the application of biotechnology to increase value from biomass and produce high value products from biomass, including waste streams and underutilized biomass. The project will look at feasible biorefinery feedstock available in the region and opportunities to create multiple value streams from such resources. Emphasis will be on utilizing (1) in utilizing waste streams from traditional industries, such as the fish industry and agriculture, applying new technology with the goal of minimizing waste and maximizing value. Utilizing (2) underutilized natural resources, including macro-algae that can be used as biorefinery feedstock and micro-algae biomass that can be produced specifically for even possible production of biomass for biorefineries such as biorefinery utilization micro-algae production. The conditions and other unique aspects of the region make the high north an extremely interesting source of valuable biomolecules, enzymes and organisms making and bioprospecting opportunities plentiful in the West Nordic counties.

Action 4

Program focusing on "The Blue Bioeconomy"

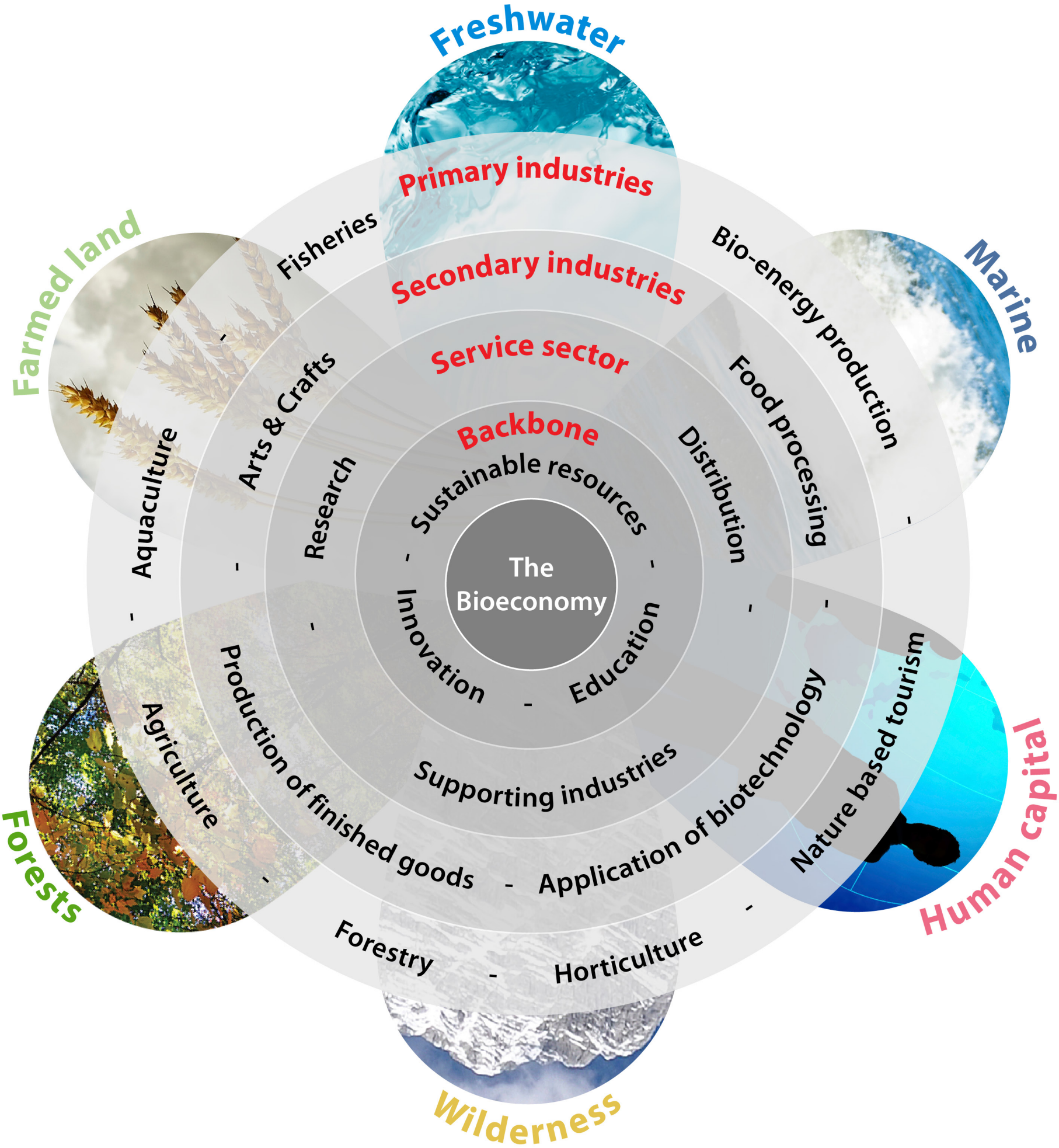
Marine bioresources are the most important biological resources of the West Nordic countries, as fisheries contribute extensively to the GDP in all three countries. In order to have a positive impact on value creation in the West Nordic countries, investment in research, innovation and technology along with strengthening the fish stocks is needed. The aim of the action should be to create a blueprint on how to maximize opportunities in the Blue Bioeconomy in the West Nordic countries. Cross-national collaboration between institutes and industry in the area will be increased by this action.

Further, emphasize was put on streamlining and finding synergies between regional research efforts and funding opportunities in Europe. Further, it is important to monitor calls e.g. SC2 and SC5 under the H2020 and identify collaboration opportunities for innovation in the region. It is also important to use the West Nordic funding bodies to strengthen and promote projects of West Nordic regional interest that will lead to synergic effects with European and pan-European funding bodies.

The above actions will be initiated in the next years and are in various stages of preparation, Matís will have a leading role in shaping and executing these actions. This effort calls for broad collaboration of stakeholders in the Nordic countries as well as abroad. The innovation projects under the Icelandic chairmanship program "NordBio" will also continue to take note of the opportunities identified in the project Arctic Bioeconomy as well as other cooperative Nordic analyses efforts. These exiting tasks have the common goal of having positive effects on the region's economy, environment and inhabitants.

Arctic Bioeconomy
Focus on West-Nordic Countries

See more about the Bioeconomy in the West Nordic region


Freshwater
Farmed land
Marine
Forests
Wilderness
Human capital
The Bioeconomy
Backbone
Sustainable resources
Innovation
Education
Research
Distribution
Service sector
Arts & Crafts
Food processing
Secondary industries
Fisheries
Aquaculture
Bio-energy production
Primary industries
Supporting industries
Production of finished goods
Application of biotechnology
Agriculture
Nature based tourism
Forestry
Horticulture

HÖRÐUR G. KRISTINSSON, CHIEF SCIENCE OFFICER, Ph.D.

European Bioeconomy Panel

The European Bioeconomy Panel was established in 2013 by the European Commission with the aim to improve coherence and synergies between policy areas related to the bioeconomy and to pave the way for more innovative and resource efficient thinking. The Bioeconomy Panel consists of 30 members, all experts in their field of bioeconomy.

Hörður G. Kristinsson, Chief Science Officer at Matís, is a member of the panel. He says that after the establishing of the Bioeconomy Panel a discussion on the bioeconomy has opened. The bioeconomy touches many areas and the Bioeconomy Panel is therefore very important to support interactions among different policy areas, sectors and stakeholders in the bioeconomy.

"The Bioeconomy Panel was established to answer the Europe 2020 strategy calls for a bioeconomy as a key element for smart and green growth in Europe. We at Matís, however, want to highlight the importance of talking about both the green and blue growth", says Hörður. "Blue refers to the marine and freshwater environment and is of particular importance to Iceland and our neighbours sharing the Atlantic Ocean resources and holds great untapped future potential for sustainable utilization and added value. The interplay between the green and blue is also of great importance as land and aquatic based resources often have strong connections. People working in each area can benefit and learn much from each other, introducing new ideas and innovations from one area to another. The Bioeconomy Panel will facilitate this transfer of technology and information between different disciplines.

Europe is facing many challenges at the moment, such as increasing global population, increasing age and age related diseases, climate related issues, potential depletion of many resources and increasing environmental pressures. Therefore, Europeans needs to rethink how they treat the environment and radically change the approach to production, consumption, processing, storage, recycling and disposal of biological resources. Our goal is to maintain a healthy and sustainable bioeconomy in Europe which has a positive impact on our citizens.

These kind of challenges can, however, inspire new thinking and innovations and lead to new discoveries. The bioeconomic thinking will support industrial development in rural areas as well as positive population growth. This will also awaken Europeans about the necessity of improving the management of renewable biological resources and be aware of how they affect the bioeconomy in every step they take, which can open up new markets for sustainable food and bio-based products. It is also necessary for primary producers to rethink their methods and do all they can to become more sustainable and environmental friendly.

When proposing new types of food or new raw material sources and asking food producers to become more sustainable we are not only ensuring environmental protection but also addressing food security and safety at the same time."

Hörður says that the Bioeconomy Panel also encourages the creation of national and regional bioeconomy panels. "The importance of better and increased sustainable utilization of our biological resources has never been as important as now, and requires great efforts by the research community, companies and governments. More innovation and value addition is needed to make the smartest and most use of our limited resources. Transnational collaboration is the key to accomplish our goal of meeting growing demands on products from our biological resources. Many countries share the same resources and therefore it is of much importance to create coordinated regional efforts which work in sync with the European bioeconomy initiative.

As an example, the Nordic countries are working on establishing a bioeconomy panel which addresses our shared and unique Nordic and Arctic bioresources. In addition, it is essential for us to work closely with other countries, for example our neighbors to the west, US and Canada, who share many of our resources and face similar challenges.

The Bioeconomy Panel's biggest projects include creating a Bioeconomy Observatory, with the goal to map and track the progress and impact of the European bioeconomy and create tools with a long term vision that can help develop our bioeconomy further. We have also put significant work into defining, mapping and coming up with recommendations on the biomass supply that is available to us in Europe. This work is very important in order us to make the most use of bioresources in a sustainable and high value manner. Our bioresources are highly diverse, with broad applications in the food, feed, energy, and pharma and agricultural industries, each with its own unique challenges. In this analysis, we have to take into account various economic, social and environmental considerations, which makes this task quite complex. Our aim is to come up with several key prioritized recommendations for the European Commission on the European biomass supply and its utilization."

The bioeconomy panel has put forward a strategy and an action plan built on the Seventh Framework Programme for Research and Technological Development (FP7) and the EU Framework Programme for Research and Innovation (Horizon 2020).

See more about the Bioeconomy Action Plan

ÁRNI Í TEIGI GK 1

2390

Gæði og ferskleiki í fyrirrúmi

International cooperation

International cooperation is the key item in Matís's activities and the precondition for many projects. International funding has increased yearly, in 2014 it made up more than one third of Matís's income. Every year, Matís takes part in various foreign projects and the company has become a well-liked partner. Good reputation has opened up partnership opportunities with companies that operate in similar sectors, such as the large food companies PepsiCo and Nestlé.

"Foreign projects have increased Matís' capacity to serve Icelandic industry," says Oddur Már Gunnarsson, Director of Business Development. "Furthermore, the success of the projects that Matís has worked on, has made the company a popular partner both in Iceland and abroad, as is reflected in the number of projects that are carried out every year at Matís. In addition, Matís employees are in a good contact with scholars in their field around the world, and every year a number of foreign scientists come to Matís to work.

All cooperation, in Iceland or abroad, influences the company's operations in one way or other, resulting in increased knowledge and skills of employees. Modern technology has made it much easier for companies located in Iceland to work in an international environment. During the first years of Matís's operation, international cooperation was mostly Nordic based but today more and more projects are part of European collaboration. We have also been working on strengthening business relationships across the Atlantic, and the Galway Statement on Atlantic Ocean Cooperation will support that.

We are also very pleased with how many projects which were started here in Iceland have attracted attention in the Nordic countries and subsequently in Europe. Examples of such projects are EnRichMar and MareFrame, but the latter will earn Matís one million euros in four years."

Oddur says that other nations look to Iceland when it comes to fisheries, "Iceland is one of the largest fishing nations in Europe and other countries look to us for information, technology, fisheries management and full utilization of products. This gives us a strong ground to stand on in all cooperation. Furthermore, it cannot be overlooked that our position here in the center of the Atlantic can be useful in the event of greater cooperation between Europe, the United States and Canada.

Matís has contributed much to the development of research strategy in fisheries management and we work closely with the Icelandic government in many fields, for example: bioeconomy, fisheries management, aquaculture, food and feed. Foreign politicians and governments have also been consulting with Matís, which strengthens our international cooperation and also makes ground for new collaborators and new projects.

Matís employees are prominent in executive committees, councils and boards that are concerned with food security, sustainable agriculture, marine, maritime and bioeconomy. This has given us good opportunities to speak on behalf of Iceland abroad.

Matís has also placed considerable emphasis on co-operation with the NDF "Nordic Development Fund", where the main focus has been on improving the utilization of fish in Tanzania to increase food security and at the same time pay more respect to the raw material and the resources which they come from.

Matís has put a lot of effort into cooperation with foreign educational institutions and now cooperates with: NTNU in Trondheim, University of Lund, DTU in Copenhagen and the University of Florida. Matís is also a large cooperation partner in the teaching at the United Nations University of Fisheries. Matís is therefore not only a bridge between education and industry but a bridge between continents as well."

The world faces a challenge in food production

Eygló Harðardóttir

Minister of Social Affairs and Housing

I see great opportunities in food production for Iceland and I think we should take a note of what the Swedes are doing with their "Sweden, the food country" project. The vision of the Swedish authorities is that Sweden becomes the new "food country" in Europe, based on Swedish food tradition, valuable nature and culture, unique raw materials and chefs with great international achievements. We could do all this as well. In the Government's manifesto, emphasis is laid on actions to increase Icelandic food production with special emphasis on export and Iceland's uniqueness regarding cleanliness and quality of raw materials.

Through increased sustainability and environmentally friendly food production we cater to a fast growing group of consumers, both domestically and abroad. Increased domestic food production provides an opportunity for increased economic growth and employment. The opportunities lie in food processing, export and tourism as well as in the agricultural sector.

Fresh food makes our position unique. The country is large and we have ample access to clean water. High quality raw materials are the key to everything in food production, and there we can rely on the agriculture and unspoiled nature.

The world faces a challenge when it comes to food production, but new development in food production must respect quality and food safety. Governments should attempt to increase the number of producers, both large and small.

The government is the principal buyer of food and this entails great responsibility. Public policy is very important when food is bought for the thousands of meals that are served every day in schools, hospitals and retirement homes.

In reality, a refreshed awareness is called for in the selection of food and companies and institutions must apply attentiveness when recruiting and training employees for the purchase and processing of food. Emphasis must be laid on thrifty use of raw materials and economical procurement, without affecting the quality of the meals.

Food is a large part of our experience when visiting other countries. We must exploit this fact here in Iceland. It might even be said that the sale of food to foreign visitors is a form of export. Klaus Kretzer's spicy lamb sausages are an excellent example of this. The sausages have become a part of the experience of the tourists visiting Skaftafell and Öræfi. While creating his sausage Klaus received assistance from the staff of Matís's Food Lab in Höfn. We must do more of this. Therefore, it was very pleasing that the project "Arctic Bioeconomy" was part of the Icelandic chairmanship programme under the Nordic Council of Ministers. The project created almost 30 new products that were created in cooperation with Matís.

The government is under obligation to safeguard Iceland's uniqueness. The reputation of Icelandic food is part of this uniqueness and we must support development in this sector. We can do this by assisting Icelanders taking part in international culinary competitions, publishing of cookbooks and TV programs and of course by operating a wide variety of Icelandic restaurants. That is how we promote our food, motivate people to visit Iceland and support Icelandic food production.

The bioeconomy touches all life on earth

Sigurður Ingi Jóhannsson
Minister of Fisheries and Agriculture

In 2014 Iceland held the Presidency of the Nordic Council of Ministers and focused on bioeconomy. Several research projects in the field were launched. The objective of these projects is, among others, to find new ways to improve utilization of our resources and to avoid waste.

The bioeconomy includes all biological resources where raw materials can be found, that is the ocean, pastures, wilderness, human resources, forests and freshwater. Means must be found to utilize these resources better and thereby reducing waste. At the same time, we need to ensure a healthy ecosystem so it can withstand load, such as natural disasters. Sustainable use and development of biological resources can contribute to reducing consequences of natural disasters, if the utilization is organized with that in mind. For example, forests and estuaries decrease flooding and forests bind volcanic ash.

The bioeconomy touches all life on earth. Therefore, the importance of its preservation is beyond dispute. The day of the environment in April was devoted to the title: "Stop wasting food" as one of the prerequisites for protecting the bioeconomy is not to take more than we need. The Food and Agriculture Organization (FAO) estimates that annually 1.3 billion tons of food are wasted, which is about a third of the world's food production. At the same time one of every seven people in the world go hungry to sleep and over 20 thousand children die daily from malnutrition. Food wastage is a moral problem, not least in the western world.

It is important to raise public awareness of the consequences of food waste and find ways to counteract it. This requires a new thinking in all production and we are obliged to use the raw materials as well as possible. It is also important that innovation companies seek ways to fully utilize raw material which until now has been wasted. Food is wasted in all stages of the food chain. It is estimated that in the developing countries the waste takes place mostly during processing while in the western countries the waste happens at consumption stage.

This calls for the application of life cycle thinking in all policy- and decision-making for waste management, at government level as well as in production of goods. For this reason, I proposed a bill in the parliament in November 2013, amending the law on waste management. The proposal calls for the setting of priorities in waste management and a regulation for the management and policies of waste management. The bill firstly deals with measures to prevent waste, followed, in order of priority, by regulations for reuse, recycling, other recovery, such as energy production, and finally disposal.

There are various reasons for food waste, such as overproduction, inadequate storage techniques, unsuitable dosage and lack of consumer awareness, such as when food decays in the fridge. Individuals can contribute to the fight against food waste, for example by better organization of grocery shopping, checking expiry dates and use the leftovers instead of discarding them.

Matís projects relating to the improved utilization of raw materials and processing are important for the community as such projects contribute to a better utilization of resources while minimizing the negative impact on nature. By ending food wasting, individuals and the society as a whole gain substantial financial profit and it is morally and socially proper not to waste food at the same time as a great number of people in the world are starving.

The Nordic countries possess much ingenuity and creative thinking and by cooperating, the countries have demonstrated beyond doubt that they have all the prerequisites to be leaders in many areas. The aim of Iceland's Presidency Program, and the projects that are undertaken within the framework, is and will be to further strengthen the position of the Nordic countries.

Employee statistics

Education | Degrees	Number
Ph.D.	29
M.Sc.	32
B.Sc.	18
B.A.	1
Cand. Oecon	1
Specialty	12
Other Education	9
Total	102

Number of Employees per Division	Positions	Number
Analysis and Consulting	17.15	18
Biotechnology and Biomolecules	21.58	23
Food Safety, Environment and Genetics	19.65	20
Resources and Products	18.4	20
Business Development	9	9
Finance	4.8	5
Operation and IT	6.18	7
Total	96.76	102

General Information	
Number of Employees	102
Number of Positions	96.76
Average Age of Employees	43.99
Average Number of Years at Matís	10.1
Total	96.76

matís

Board
Chairman
Friðrik Friðriksson

CEO
Sveinn Margeirsson

Chief Science Officer
Hörður G. Kristinsson

Resources & Products
Arnljótur B. Bergsson

- **Product Development & Markets**
  - Guðmundur Stefánsson
- **Value Chain & Sustainability**
  - Jónas R. Viðarsson
- **Quality & Processes**
  - Magnea Karlsdóttir
- **Aquaculture & Bio-resources**
  - Rannveig Björnsdóttir

Biotechnology & Biomolecules
Hörður G. Kristinsson

- **Biotechnology**
  - Guðmundur Óli Hreggviðsson
- **Biomolecules**
  - Rósa Jónsdóttir
- **Bioactives**
  - Eva Kuttner

Food Safety, Enviroment & Genetics
Anna K. Daníelsdóttir

- **Risk Assessment**
  - Helga Gunnlaugsdóttir
- **Genetics**
  - Sarah Helyar
- **Microbiology**
  - Viggó Þór Marteinsson

Analysis & Consulting
Franklín Georgsson

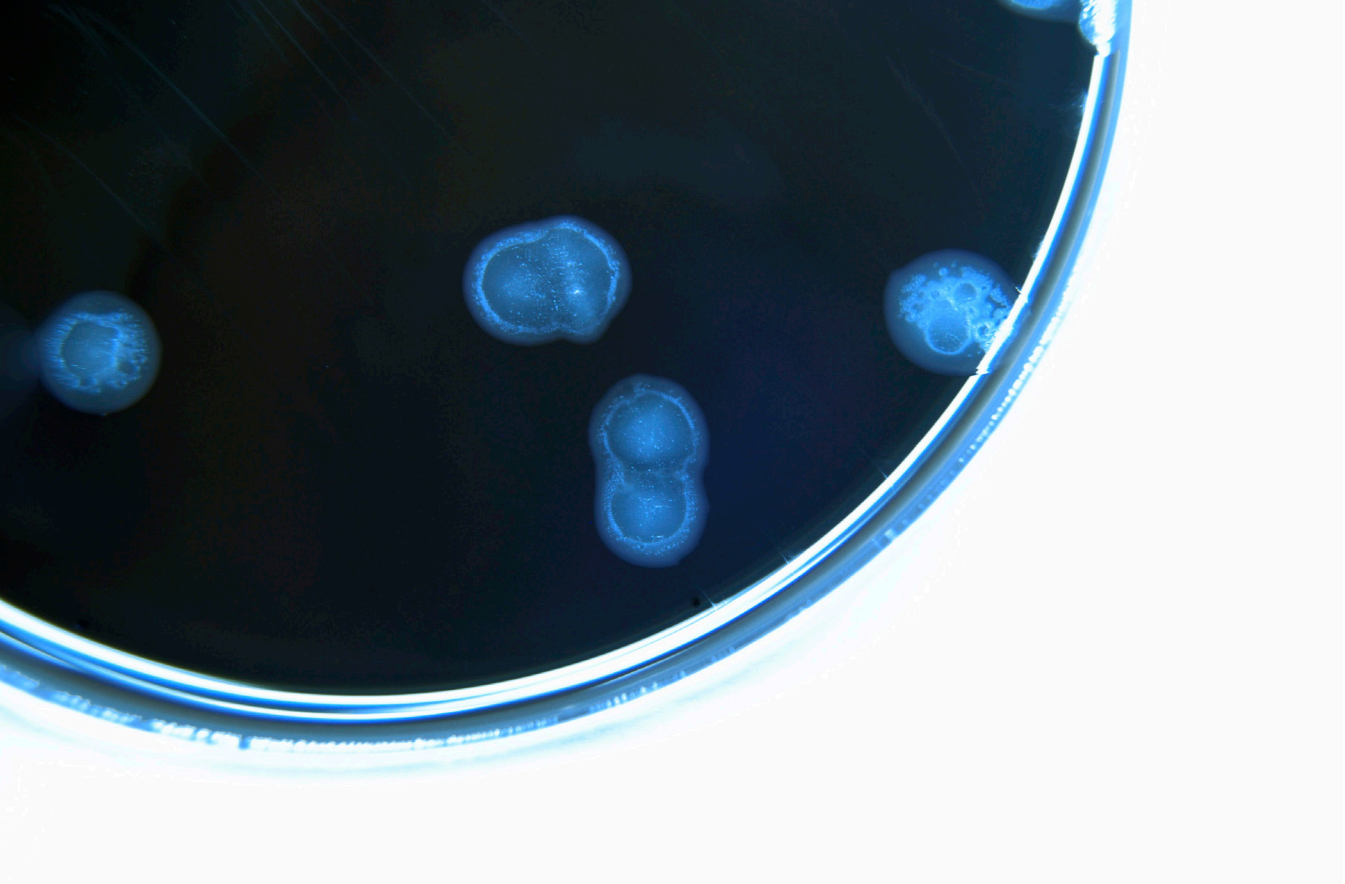
- **Chemical Analysis**
  - Heiða Pálmadóttir
- **Microbiological Analysis**
  - Margrét Geirsdóttir
- **Consulting & Dissemination**
  - Margeir Gissurarson

Business Development
Oddur M. Gunnarsson

- **Food Production & Education**
  - Guðjón Þorkelsson
- **Business Development & Consultancy**
  - Emilía Martinsdóttir
  - Páll Gunnar Pálsson
  - Ragnar Jóhannsson
  - Sigrún Elsa Smáradóttir
  - Sigurjón Arason
- **Marketing & Public Relations**
  - Steinar B. Aðalbjörnsson
  - Kristín Edda Gylfadóttir

Operations & IT Jón H. Arnarson

Finance Kristinn Kolbeinsson



Analysis and Consulting

The division has two main emphases: service testing and research analysis on the one hand and consultancy on the other. The division has the most modern analytical laboratory equipment in Iceland providing priority and safety services for commercial, research and governmental clients.

The laboratory provides analytical services with international accreditation and each year thousands of samples from competent food and environmental authorities and the industry are tested for chemical and microbiological parameters. The analysis cover quality and safety tests for food-, feed-, pharmaceutical- and biotechnological industries as well as tests related to health and environment.

The laboratory is a reference laboratory for Iceland in the field of microbial testing in shellfish and testing of *Salmonella* in food. The Ministry of Industries and Innovation in Iceland designates laboratories that are to become reference laboratories that in turn work in partnership with other reference laboratories in the EEA.

The statutory role and main duties of reference laboratories are diverse and include harmonisation of testing activities in officially appointed testing laboratories in EEA. This implies among other things, consultancy and guidance on testing methods, participation in the development and verification of testing methods and organization of proficiency testing. It is expected that the laboratory will also be designated as reference laboratory in the field of pathogenic *E. coli* bacteria, *Listeria monocytogenes* and *Staphylococcus aureus* in 2015.

The laboratory is one of the most advanced in the country and can meet different needs of customers with a broad scope of accredited measuring methods in many different areas. The laboratory is also very well connected to many foreign laboratories and often makes use of their services at favourable prices with rapid delivery for tests that cannot be provided in Iceland.

The analytical laboratory has an extensive database of test results that benefits clients in analysing and processing their data as well as researchers and government regulators. The database is an important long-term documentation and has multiple processing possibilities for the test results and other associated data.

The divisions' data collection is very important for the bio-economy because it attempts to prevent human and animal consumption of harmful substances and microorganisms. New ideas for processing of products and sustainability may involve certain risks and challenges, because of the usage of new material previously classified as waste or material that has not been utilized before. In this context there are considerable uncertainties, especially when the demands for sustainable and organic production is the case, and the means to clean food or to use preservatives are limited. It should as well be kept in mind that new foods needs to be researched, and data information needs to be recorded, because new foods may contain previously unknown toxins or the mixing of different raw materials may make products detrimental to one's health.

In addition to our analytical services, training courses and consulting on the behalf of the division has been increasing. Consultation for individuals and national companies in the food industry has increased rapidly in recent years with main emphasis on how distribution of harmful microorganisms can be prevented and on identification of current and emerging infection risks. Each year there has also been a considerable increase in consulting services abroad and if the trend continues Matís will soon become one of the key consulting companies in the field of food quality and food safety in Europe.

Specialized and general courses that the division has developed and offered for companies in the food industry on how to enhance the food quality and improve food safety have been well attended and have without a doubt helped many companies to implement quality control that meets the requirements of regulators and buyers.

The division is also responsible for the organization of all the teaching carried out at Matís for the quality line at the UNU Fisheries Training Program which takes place in Iceland. The main emphasis of the courses given is placed on food quality and safety, evaluation of the quality of raw materials and how the utilization and value can be improved by processing the material by drying and smoking. The division has also organized and directed many similar and/or customized courses in developing countries in partnership with UNU and local educational institutions, with the aim that the developing countries themselves will be able to implement the courses and make them sustainable in the future.

Employees of the division of Analysis and Consulting have participated in many research projects at Matís both as service providers for analysis and as consultants for customized solutions related to the implementation of specialized preparation and testing methods for many projects. The development of testing techniques and expert consulting on monitoring of pathogens in food and the environment has been a key element in increasing the safety of consumers.

The division has worked in collaboration with other divisions at Matís in improving the current processes of drying and smoking fish in Tanzania and Kenya with the aim of increasing utilization, ensuring the availability of safe food and increasing food security through methods that are inexpensive to implement and make use of simple equipment that can by produced from materials available in these countries. The results from this project have been very promising and the plan is now to expand the scale of this project for the next three years so that these technologies will be introduced in other regions in Tanzania and Kenya as well as in other countries in Africa.

Successful projects

In the year 1999, after a wave of *Campylobacter* infection in Iceland the control of domestic broilers was intensified. Today, samples are taken from every herd of broilers that are to be slaughtered 2-5 days before the planned slaughter. If the bacteria is detected all the broilers from that specific herd are frozen right after slaughter. The reason why this control procedure was chosen is based on studies that showed that by freezing the broilers the bacteria declined in numbers up to 99% (Table 1). Since this method was implemented the risk and the infections posed by handling of raw chicken and the possibilities of cross infection have decreased considerably.

Since frozen broiler products are sold at much lower prices than fresh, poultry farmers worked harder on introduction of improved biocontrol actions that soon lead to drastic decrease in *Campylobacter* contamination of broiler herds. These actions as well as educating the public on how to handle raw poultry products correctly have resulted in total turnover in the annual number of domestic cases of *Campylobacter* and the number of domestic cases are now only a fraction of what was diagnosed in 1999. At the same time the number of broiler herds analysed with the bacteria is also only a small fraction of what it was before freezing action was implemented in 2000.

Through these efforts, Iceland is in a unique position when it comes to infrequent *Campylobacter* infection. No other country has managed to reduce the number of infections in the same manner and in such a short time. This success has attracted much attention and other countries, including Norway, are working on the installation of a similar system of interventional measures.

Salmonella contamination in poultry in Iceland has decreased dramatically in recent years and has become very rare. This achievement is a result of good collaboration of all stakeholders i.e. poultry farmers, abattoirs, food control authorities, government and consumers that have ensured that contaminated products are not distributed. Matís and Mast (Icelandic Food and Veterinary Authority) organized a very through and extensive surveillance of fresh chicken products in retail in 2012-2013 with results that did not give any positive samples for *Salmonella* or *Campylobacter*.

Because of the planned nomination of Matís as a reference laboratory for various food-borne pathogens in 2015, preparation started in 2014 for installation of specific methods for analysis of these bacteria. Special focus was devoted to preparation and installation of specialized test methods for Shiga toxin producing *E. coli* bacteria that cause the most dangerous infections induced by pathogenic *E. coli* bacteria. In recent years a few cases of disease caused by these bacteria have occurred here in Iceland, so it is clearly time to examine the spread of this dangerous pathogen in animals, food products and in the environment.

Our laboratory unit has over the years specialized in quality and safety tests for the pharmaceutical industry. This activity includes microbial testing of pharmaceutical products, raw materials for pharmaceutical products and environmental samples from pharmaceutical manufacturing environment. Many of the methods used for these samples are specialized for the pharmaceutical industry and in many cases the laboratory needs to implement these methods specifically to meet the requirements of the pharmaceutical industry. The knowledge that has been created in the laboratory has proved to be extremely valuable and the pharmaceutical industry in Iceland and related activities are now extremely important for the laboratory.

Amylomics

Scientists searched the genomes of microbes in Iceland's volcanic regions to find candidate enzymes for industrial use. Surviving harsh conditions and temperatures in the wild could be beneficial in the factory as well. The project was funded under FP7-KBBE and selected as a RTD Success Story.

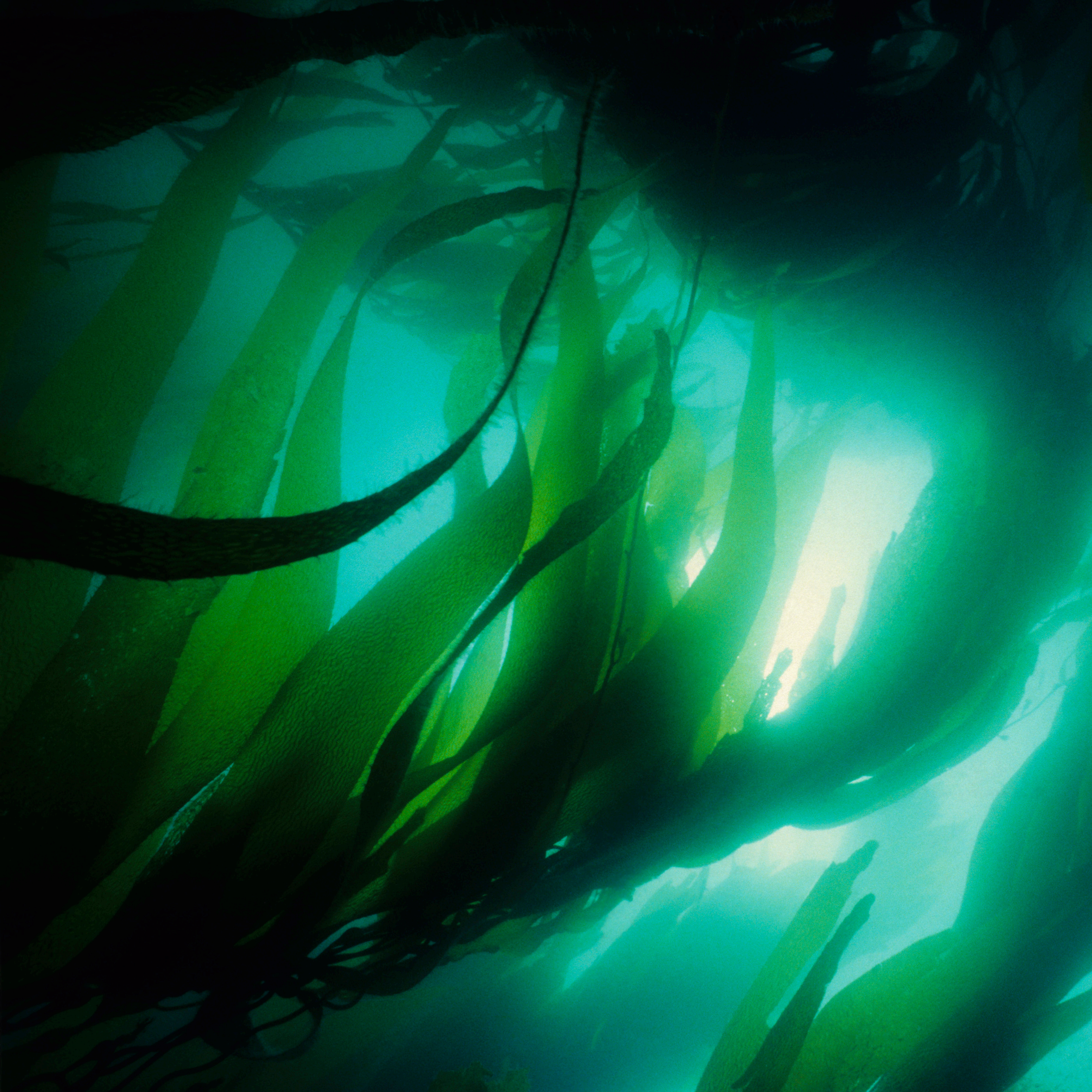
The discovery and extraction of enzymes found among the volcanoes of Iceland could lead to more efficient and greener industrial processes. A number of these enzymes have already been patented, ushering in a new generation of biocatalysts.

Iceland's dramatic volcanic landscape continues to inspire and enthral locals, tourists and scientists alike and remains one of the best places on earth to study geothermal energy (heat energy generated and stored in the earth). The beautiful terrain also happens to be teeming with microscopic enzymes tailored to cope with these harsh conditions. A group of EU-funded scientists wanted to discover whether some of these tough enzymes could be used to improve industrial processes that turn carbohydrates into consumer products.

"The underlying aim of AMYLOMICS has been to help increase economic growth and sustainability of European industry by improving the efficiency of these bioconversion processes," explains project coordinator Gudmundur Oli Hreggvidsson, Professor of Microbiology at the University of Iceland and head of the Biotechnology Section at Matis. "The technology developed in this project has enabled the rapid retrieval of novel gene-encoding enzymes from extreme resources, for a variety of uses."

Harvesting the natural bounty of Iceland's volcanoes – Enzymes from Iceland help revolutionise industrial processes involving carbohydrates

See more about the Amylomics project and RTD Success Story



HÖRÐUR G. KRISTINSSON , DIRECTOR, Ph.D.

Biotechnology and Biomolecules

Matís is leading in research and development of biomolecules, biotechnology and bioactive substances. Our research is focused on how to promote sustainable use of Icelandic nature for the production of desired biochemicals and enzymes and how to use anti-oxidants and protein-rich by-products and thereby increase their value and utilization.

To support biotechnology researches a biotechnology center was set up in Saudarkrokur, a small town in the north of Iceland. The biotechnology center houses the most advanced laboratory in Iceland, which has played a significant part in Matís' work and the progress of biotechnology research and innovation in Iceland.

Matís' research of biotechnology concerns bioeconomy and its safeguarding. We are constantly developing strategies and processing methods to screen for, isolate and make valuable biomaterials from natural raw materials. Our main focus has been on underutilized raw materials and by-products.

Processing of marine products produces large amounts of underutilized material that is either used in low value products, such as fishmeal, or discarded with all the adverse effects it has on the environment. Valuable products can be made from all this extra material, such as ingredients for dietary supplements and functional food.

Not only has the processing of by-products created new valuables, but has also had positive effects on rural development and economic life. Increased use of seaweed in Iceland has for example provided valuable products as well as creating a variety of jobs throughout the supply chain, such as seaweed harvesting and processing, production of bioactive substances and making of skin care products. All this has contributed to the increased diversity of the Icelandic economy.

Iceland is in a unique position when it comes to biotechnology and biomolecules due to its diverse and distinctive nature. The division has therefore also focused on investigation of the microorganisms that live in geothermal areas as well as on the continental shelf. We are therefore working with microorganism that are only found in Iceland and not known elsewhere.

Our research results have motivated the growth of start-ups like Iceprotein and Marinox that already have become a positive supplement to the Icelandic economy.

Much has been achieved in the study of active biomaterials from Icelandic seaweed, which is one of the most underutilized and possibly one of the most undervalued natural resource in Iceland. Research has shown that Icelandic brown seaweed is particularly rich in interesting and valuable bioactive materials. The first products containing such bioactive substances recently entered the market after years of research.

Our goal is to make market suited products from Icelandic biomolecules, given the fact that many of them have bioactivity not known elsewhere and are therefore already in great demand from domestic and foreign producers. Researches have already proved positive effects of using biomolecules in food and chemical industry. They could therefore be used in health products for the prevention of various ailments and diseases, such as hypertension, cancer as well as heart and vascular diseases.

Presently a specialist group on biomolecules is working on numerous projects related to the development of biochemical and bioactive substances. The main focus has been on algae research and seeking new ways to utilize biomass in various products. "New natural antioxidant from the sea," is an example of project in progress, this project is funded by the Icelandic AVS fisheries research fund and worked in cooperation with Marinox and companies from the fishing industry. The project is about the development and production of new natural antioxidants from Icelandic seafood to enhance the stability of various seafood. The project is based on many years of research on algae, which resulted in the foundation of Marinox, which specializes in research, development and production of bioactive substances from marine algae and products containing such substances. Their first product line was UNA skincare™ launched in 2012.

Increased value of algae processing is another cooperative project of Matís and Marinox, funded by AVS. The goal is to find ways to make valuable products by utilizing the byproducts of algae processing, that have not been used before. These products could be useful base compounds for chemical process and a carrier for food supplements and/or protein processing.

Processing of proteins is also a large part of the division's work. Matís has partnered with MPF Iceland to develop a new product - Fish Tofu. The raw material in Fish Tofu is a protein mass obtained by isolating proteins from trimmings of fish filets. The product is a good example of sustainable utilization of living natural resource. Instead of using the cuttings for low priced products such as animal feed as has been the norm, a high quality and valuable product is made, that fits well with today's needs.

Amylomics, a project funded under EU FP7 and coordinated by an employee at Biotechnology and Biomolecules division finished this year. Amylomics placed large emphasis on developing starch processing enzymes and more than 800 novel starch processing genes were retrieved in the project. Amylomics has been selected as a RTD Success Story. The discovery and extraction of enzymes found among the volcanoes of Iceland could lead to more efficient and greener industrial processes. A number of these enzymes have already been patented, ushering in a new generation of biocatalysts.

EcoFishMan

Novel strategy to increase fishery productivity

The Ecofishman project was based on a quest to make European fisheries more efficient. The project proposes a significant increase of their productivity by switching from an outdated micro-management system to results-based management (RBM). The project was funded under FP7-KBBE.

The objective of the 'Ecosystem-based responsive fisheries management in Europe' (EcoFishMan) project was to develop a new system of fishery management where stakeholders have an essential role. To achieve that, the project team provided a platform to organise stakeholder meetings. The team also presented individual case studies to illustrate the superiority of RBM management over the old system.

The team analysed the discards situation worldwide and considered specific reasons for fish discarding, discard mitigation, stakeholder participation and economic incentives for discards reduction. The team compiled a list of more than 200 indicators (ecological, social, governance and economic) that was classified against 9 screening criteria by a selection of fisheries and social scientists. Each fishery was rated based on the list of indicators in order to establish an optimal approach for the entire industry. Notably, ecological-based indicators were weighted more than the productivity of the fishery, whereas the governance and social indicators achieved slightly lower mean scores.

"The EcoFishMan project will not only improve the productivity of fisheries across Europe, it will also minimise negative effects due to fish discards, overexploited fish stocks, fleet overcapacity, a low degree of compliance and other problems," explains project coordinator dr. Anna Kristin Danielsdottir, director of Food Safety, Environment and Genetics at Matís, „the project will benefit society by implementing novel strategies in ecologically friendly and efficient management of the fishery business."

"The direct impact from EcoFishMan will be on policy and governance, industry economics as well as other stakeholders, as their input and involvements will be obtained," explains dr. Anna Kristin. "Another direct impact of the project activities will be an input to the development of the Common Fisheries Policy (CFP) and in particular of the new discard policy."

See more about
the Ecofishman project

ANNA KRISTÍN DANÍELSDÓTTIR, DIRECTOR, Ph.D.

Food Safety, Environment and Genetics

The aim of the Food Safety, Environment and Genetics at Matís is to lead food and environmental research in Iceland to improve food safety and the competitiveness of Icelandic food products on the global market.

Our cutting edge chemical, microbiological and genetic research in food, feed and the environment provide important information regarding the status of Icelandic food for the Icelandic government, food producers, markets and consumers. Our risk assessments raise awareness and encourage informed decision making in relation to food and production practices. In addition, our genetic research supports improved sustainable resource management and traceability. Our goal is to expand our expertise in response to emerging threats, including climate change, industrial activities and novel organisms.

The majority of our projects are performed in co-operation with European partners, institutions, universities, governments, domestic and foreign food producers as well as other parties servicing the food industry. We offer direct expert services to customers such as chemical contaminant analysis, microbial diversity and animal disease identification as well as genetic analysis for parental assignment, stock structure and species identification. Our staff supervises M.Sc. and Ph.D. students and many students and experts do their internships with us.

Ensuring the food appropriateness with chemical analysis

The chemical analyses we are capable of ensure both the safety and quality of food in relation to nutrition and contamination in food, feed and the environment. Our capability is constantly improving through research and development of new analytical methods, which is very important for quality monitoring and screening of undesirable substances in food and feed through the whole supply chain.

Microbiological research has also provided important information on the safety and wholesomeness of Icelandic products by investigating the microbial diversity in food using culture and molecular methods. In our research we use the latest technologies in breeding and molecular biology to improve understanding of the origin and means of contamination of food pathogens and spoiled food.

Our microbiological research also covers the diversity of the Icelandic ecosystem, ranging from studies of the genome and diversity of marine microorganisms in the sea around Iceland to studies of microorganisms from extreme environments such as hot springs, glaciers and volcanoes. The goal is to gain better understanding of the role and function of microorganisms in a dynamic environment and climate. Such research can give useful information on how these microbes can be utilized within biotechnological research and innovation.

Within Matís we collect and store long-term monitoring data such as heavy metals, pesticide residues, and microorganisms that can among other things detect whether the concentration of pollutants in the marine has changed over the years.

Genetic research in innovative projects in Icelandic fisheries, agriculture and food processing can provide valuable information on stock structure of all utilized fish. We are aware of how delicate the Icelandic bio-economy is, and, therefore, we also focus our research on the effects of climate change, and in particular, the impacts of the colonization of new species on the resource management. It is very important for the primary industries that these new challenges are met to ensure food security and safety.

Valuable facts about Icelandic seafood

For the last ten years Matís has been screening for and collecting data about undesirable substances in seafood. Every year the results have been compiled and published in a report in English, available for all who are interested, on Matís' webpage. The same results have as well been published in a brochure called "Valuable facts about Icelandic seafood", which has been distributed to stakeholders at home and abroad. These information have been very important for exporters, fisheries, regulators and others to show purchasers of Icelandic seafood the status of the material with regard to the health and nutritional value. This project has therefore been very important for the marketing of Icelandic seafood.

Participation in large European FP7 project

The most recent European FP7 project is EcoFishMan, which finished in 2014 and promoted a new approach to fishery management in Europe that is called „Responsive Fisheries Management System (RFMS)". Matis coordinated the project that was in collaboration with key research institutes and stakeholders in European fisheries.

The aim of RFMS is to transfer the responsibility for sustainable fisheries management to the fishermen

(resource users), provided that they document and achieve specified management objectives. Ecological, economic, social and legal aspects are taken into account, as well as ways to improve cooperation and mutual understanding between policy makers and stakeholders to facilitate its implementation. Stakeholders involvement is strengthened by taking into account their knowledge and requirements.

The RFMS is implemented in stages and customized for each fishery. EcoFishMan assessed the feasibility of different policy options as a first step to recommend alternatives for each fishery. Stakeholders confirmed that there is an interest in using RFMS as a process for involving the industry in management and data collection, and recommended that this should be initiated in suitable pilot cases in Europe. It also provides a template for drafting discard mitigation plans as part of the current reforms of the European Common Fisheries Policy (CFP).

Understanding the oceanic-scale, ecological and ecosystem processes

SALSEA-Merge is another large European funded project that the division participated in. Over the past two decades, an increasing proportion of North Atlantic salmon are dying at sea during their oceanic feeding migration. Arguably the greatest challenge in salmon conservation is to gain insight into the spatial and ecological use of the marine environment by different regional and river stocks. The SALSEA-Merge project included partners from nine European nations, and was designed to advance our understanding of oceanic-scale, ecological and ecosystem processes.

A part of the project in which Matís was heavily involved, comprised producing genetic profiles for some 26,813 salmon from 467 locations, in 284 rivers across Europe. This has enabled the identification of stocks from individual rivers and regions, which is of direct and immense practical value to the river manager. Many of the questions that managers deal with on a day-to-day basis are confused by the lack of detail in relation to the number of populations contained either within a large river system or within a coastal region. Decisions in relation to commercial exploitation of fish, sport fisheries exploitation and the overall impact of planned developments in salmon catchments will be greatly improved by the availability of a genetic assignment methodology. Harvest decisions will become clearer as a result of the techniques developed in SALSEA-Merge and in the case of the remaining commercial fisheries for wild salmon, assessments of stock composition will facilitate, for the first time, the management of discrete stocks.

The genetic techniques developed within SALSEA-Merge have also shown their ability to separate wild stocks from escaped farmed stocks caught at sea. This ability to quickly separate out the two forms of salmon will add greatly to the manager's ability to assess the overall impact of fish farm escapes on ocean feeding grounds and also estimate the levels of returning adults of farmed origin entering wild salmon rivers and their impacts on wild spawning stocks. In the context of large juvenile pen rearing facilities in freshwater lakes, the new genetic assignment tools will facilitate an assessment of the level of impact of leakage/escapes from these net pens into the neighboring freshwater systems.

Registration of more than 400 thousand horses

Matís is also closely involved with many agriculture breeding projects, helping farmers to improve their stocks; Matís performs the genetic analysis of the Icelandic horse for the WorldFengur database. WorldFengur is the official FEIF register of the Icelandic horse breed. It was established in year 2000, and consists of unique DNA identification of each horse, pedigree information, and information on breeders, owners, offspring's records, photos, results on breeding evaluations on the Icelandic stock and results from assessments. Currently there are more than 400,000 horses registered in WorldFengur from across Europe and the USA. The backbone of the database is the unique identification number (FEIF ID-number) of each horse, paired with its genotype, this allows a record and pedigree for all Icelandic horses, allowing their sale, entrance into shows, and for better breeding programs.

In addition Matís is the only Icelandic provider of the test for the DMRT3 mutation. This mutation indicates whether or not a horse has the ability to perform both pace and tölt (Icelandic) which is a form of slow trot. Most Icelandic horses with two copies of the A variant (AA) can perform both gaits, while horses with one copy (CA) can only perform tölt. This means that we can now genetically test a horse's potential ability to perform these gaits. This testing can be done when the horse is very young (i.e. before training is started). It can also be carried out on the stallion and broodmare to determine if they are a good combination to breed.

Sheep farmers have also profit from Matís researches, as Matís offers testing for the 'þokugen' gene, which increases fertility in ewes, allowing farmers to increase the productivity of their flocks. Matís is as well enabling a practical test for sheep breeders to detect Scrapie. Scrapie is a fatal degenerative disease that affects the central nervous system in sheep and can be passed from sheep to sheep. Positive diagnosis of Scrapie can result in a flock being quarantined and animals destroyed. Fortunately, sheep can have genetic resistance to Scrapie that can be detected with a simple and inexpensive DNA test. By offering DNA testing to farmers, breeders can select for, and breed resistant animals. Buyers can also be assured that they are buying resistant sheep.

Using quantitative genetics to help select individuals for breeding in aquaculture

Matís is also using its genetics expertise to help Aquaculture, with ongoing projects aimed at improving aquaculture brood stock by using quantitative genetics to help select individuals for breeding. Marker-assisted selection (MAS) is the process of using the results of DNA testing to assist in the selection of individuals to become parents in the next generation. The genotypic information provided by DNA testing helps to improve the accuracy of selection and increase the rate of genetic progress by identifying animals carrying desirable genetic variants for a given trait at an earlier age. This can be particularly important for traits such as flesh quality, where the phenotypic values cannot be measured until after processing. Using genomics, high quality individuals can be selected at an early age and used for breeding, so improving the bloodstock at a faster rate than would otherwise be possible. Matís is currently applying these techniques in Arctic charr aquaculture (in collaboration with Hólar University) and Sea cucumber farming (in collaboration with the Sæbýli farming company) to allow faster and more precise selection on traits of interest and thereby increase the value of these commercially farmed species.

taste

The Application of Edible Seaweed for Taste Enhancement and Salt Replacement

The main objective of the TASTE project was to develop flavour ingredients from edible brown seaweeds, i.e. Ascophyllum nodosum, Saccarina latissima and Fucus vesiculosus, with the potential to replace sodium in food products that traditionally contain high levels of sodium.

Health authorities worldwide have recommended reducing salt in processed foods in order to reduce the risk of high blood pressure. Salt, i.e. sodium chloride, is a recognised flavour potentiator. Thus, the reduction of salt in food leads to reduced flavour besides a lack of salty taste. Seaweeds have a naturally salty taste being abundant in minerals like potassium, magnesium besides sodium. This salty taste improves the flavour profile of foodstuffs. In addition, some seaweeds contain a range of potential flavour components that can naturally enhance the flavour of the food.

The aim of the project is therefore to produce flavour-active building blocks from seaweeds by applying suitable processing and to develop flavour ingredients with these for application in different salt-reduced foods. By doing so, this project offers innovative processing solutions, new healthy flavour ingredients and novel approaches to meeting salt reduction targets to a group of SMEs in the food sector.

„Scientific advances, which occurred very late in the project, were recognised by the SME group to show some commercial potential," explains project coordinator Rósa Jónsdóttir, Research Group Leader, Biotechnology and Biomoleculs. „The SME group remains positive to the potential use of seaweed ingredients for salt reduction and flavour enhancement and have agreed that further research and development is required to advance the work that has been carried out under the TASTE project."

See more about
the Taste project

Resources and Products

The Resources and Products division of Matís exists because of the importance of bioeconomy improvements for prosperity of the Icelandic society and at the same time, the division seeks to strengthen the competitiveness of Icelandic companies through research and development of the value chain as well as the exploitation of innovation and discovery in the production of food. The aim is to enhance the value, viability and sustainability for the benefit of the food industry and consumers.

The marine sector is the largest sector within Icelandic bioeconomy. Projects connected to fisheries are the most predominant, including the value chain of seafood with emphasis on processes, quality and sustainability.

The division deals with various multifaceted challenges within the agro-food sector in Iceland, primarily based on fisheries and fish processing and associated operations. The agro-food sector is a value chain where raw materials are collected form natural resources, cultivated or harvested in sustainable manner and transformed into products by processing – beneficiaries of product development. An holistic approach to the agro-food sector is carried out according standards of quality requirements, using benefits of traceability, to increase profitability. Collaboration on technological solutions within the agrofood sector is important.

Climate change is a constant challenge in remote regions such as Iceland, although this might also provide new opportunities and even the potential for increased food production, both in relation to fisheries and agriculture. It is important to respond to the challenges and potential problems before the effects are felt. The division works on resolving various challenges in food production with the aim of protecting food quality through the processing chain and supporting the harvesting of raw materials in an environmentally sound and sustainable manner. Furthermore, the division promotes traceability with the aim of increasing value at foreign markets.

Improved quality of food processing has increased yield as well as food safety and nutrition security both in Iceland and in foreign markets where Icelandic products are sold. Demographic trends underline the importance of adequate processes at source as demand for seafood by the European consumer increases. When the producer respects the consumer, the food is safe and the consumer is satisfied, resulting in profitable business for food processing.

The division supports individuals, start-ups and existing companies through consultations, especially regarding fish processing, fisheries and feeding in aquaculture. The division hosts ÍSGEM, the Icelandic Nutrition Database for food.

The division has successfully applied systemic collaboration in its ongoing projects including assessments of interactions between fisheries and aquaculture.

Current work includes mapping the bioeconomy in the Arctic. Experience of handling quantitative data as part of modelling in integrating socio-economic and bio-physical factors from previous work of the division reflects prevailing factors: supply and demand at different geographic scales.

In short, Resources and Products division is all about:

- Broaden food industry
- Inspire entrepreneurs to innovate through product development
- Optimize food product quality with traceability
- Explore underutilized opportunities in aquaculture
- Create more value sustainably from resources
- Orchestrate practicing of appropriate sustainable methods
- Navigate food products to market opportunities
- Outline, interpret and explain the benefits of Research & Development for stakeholders
- Motivate stakeholders to meet consumers demand on markets
- Yield efficiency of value chain management in food processing

Following are among others the main tasks of Resources and Products at present.

Enhancing the value of mackerel with proper and effective cooling

This is a continuation of the project "Increasing the value of pelagic fish", and aims at maximizing the quality of raw mackerel, to make it fit for human consumption, instead of being solely used for fishmeal and fish oil production. This project runs alongside the project of optimizing quality of frozen mackerel products.

Local Ingredients for fish feed

A project with the aim to reduce the environmental impact of aquaculture and make it more sustainable, as well as investigating the possibilities of utilizing local ingredients to feed fish without compromising the quality of the product.

Blue whiting for human consumption

Market analyzes from the National Oceanic and Atmospheric Administration for dried fish, indicate possible market opportunities in the Asian market. The project aims to develop new valuable edible products of blue whiting for the Asian market.

Whitefish

The aim of the project is to develop and validate a method for Batch-based calculation of sustainability impact of cod and haddock products. The project is especially developed for the benefit of SMEs in the cod and haddock supply chain so that they can document the sustainability of their products and processes, and thereby gaining competitive advantage through improved market access, price and consumer preference.

WhiteFishMarineLivingLab

The aim of this project is to build a branding platform for groundfish from the North Atlantic and develop means for the consumer to obtain information about the origin and processing of the fish all the way from fishing until the fish arrives on the consumer's dish.

Collaboration between HB Grandi & Matís

Collaboration is in projects like "Decision support tool for fleet management in the Icelandic fishing industry" as well as a project about changing HB Grandi's operation, and improvements on the deck of freezing trawlers. The projects laid foundation for changes in fishing patterns, in light of regulatory and legislative changes in respect of tariffs, which provided better treatment of catch. Many fisheries companies have followed HB Grandi example and put greater emphasis on delivering better-chilled gutted fish ashore, instead of frozen fillets.

Chill-on

In this project thermal strain in normal Styrofoam boxes was studied and led to the development of a Styrofoam box with rounded corners which protects the product better from thermal strain. The project was a part of a larger study aimed at improving cooling and supercooling. Proper work practices, on board and in fish processing and packaging of fish that are transported under controlled conditions, have led to a sharp increase in exports of fresh fillets both by sea and by air.

EcoFishMan

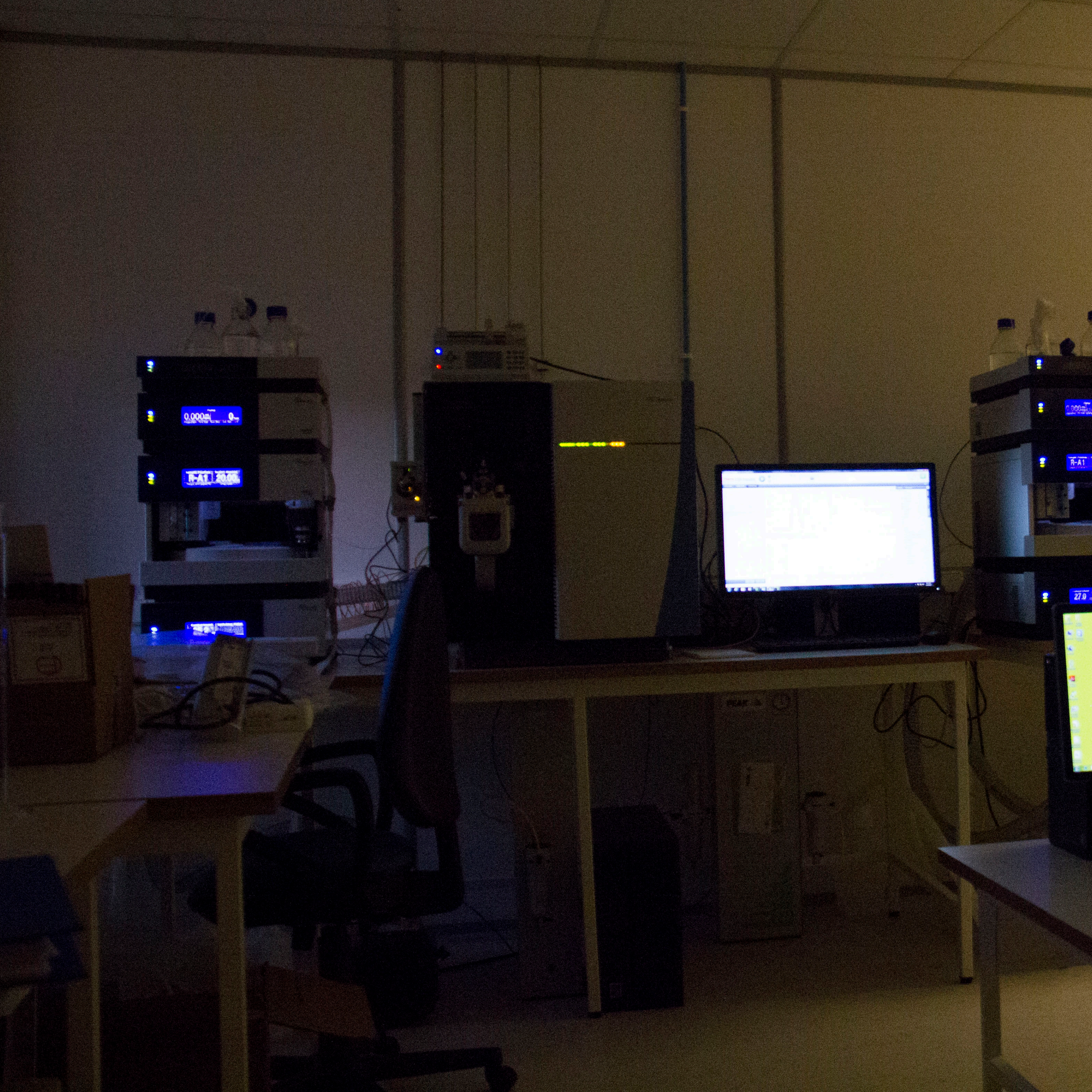
Matís led the EU funded research project EcoFishMan – Ecosystem based responsible fisheries management. Indicators were developed for policymakers to facilitate sustainable utilization of marine resources, including modeling with different time-span forecasts consisting of various alternative future scenarios. The work, which consisted of model making, was done in cooperation with the University of Iceland and the National Association of Small Boat Owners.

Control of drying processes - Enzyme treatment of liver canning

Full utilization of the raw material is the key for beneficial processing of food. Limited availability of raw materials puts the onus on manufacturers to make the most of the raw material. This has encouraged new developments in production processes and improved equipment. With the aim to fully utilize the raw materials, Icelandic producers have demonstrated in practice respect for nature.

The required protein for charr

This is a project that looks for ways to lower the cost of feed for farmed charr. The goal was achieved by studying the protein requirements of two size classes of charr in fresh and brackish water. Also were studied effects of different protein content (25-40%) on growth rate, feed utilization, digestibility and health of the fish as well as the chemical composition of whole fish and sensory quality of fish flesh.


0.000mL
0
R-A1
20.00
R-A1
27.9

There is no Food Trade without Safe Food

Food businesses that participate in the global food trade must ensure that their food products are safe and competent authorities must implement food safety measures according to international standard in order to ensure consumer protection.

A bilateral project between Germany and Iceland that came to an end in 2014 has contributed to the strengthening of food safety in Iceland. This bilateral project has been carried out in collaboration between the Federal Ministry of Food and Agriculture, Federal Institute for Risk Assessment (BfR) and Lower Saxony State Office for Consumer Protection & Food Safety (LAVES) from the German side and the Icelandic Food and Veterinary Authority (MAST), Matís and the Ministry of Industries and Innovations from the Icelandic side.

The main priorities of the bilateral project were to improve and implement the analysis of pesticide residues, food contaminants such as PCBs as well as the detection of genetically modified food and feed. Another important aspect was the establishment of modern analytical methods for detecting marine biotoxins in shellfish. To achieve this goal, new state of the art laboratory equipment for chemical analysis was set up at Matís and the relevant staff has been trained on site to carry out official analytical methods according to EU standards. A number of experts from the German partner institutions supported this comprehensive training.

Another focus was to develop methods of food monitoring in collaboration with the Icelandic Food and Veterinary Authority. These included support from German experts regarding risk assessment and risk management in official controls, for both the central monitoring authorities (MAST) and the ten independent local authorities, responsible for controls at the retail level. The program also included internships and training professionals from the Icelandic surveillance authorities in Germany. This part of the project was under the responsibility of the Lower Saxony State Office for Consumer Protection and Food Safety and was carried out by pursuing a practical approach, in which the Icelandic visiting scientist were working on location in the field in Germany.

See more about
the Safe Food project

Education and Food Production

The Division of Education and Food Production manages collaboration between Matís and schools that are offering vocational training, diplomas or undergraduate and postgraduate degrees to their students.

Matís is in a sense the link between the academia and the different segments of the food industry through local and international research and development projects.

Gudjon Thorkelsson, the director of the division, believes that this link through lecturing, training and internships strengthens research and innovation, focusing on competitiveness of the industry as well as public health and food safety.

„Another reason for collaborating with educational institutions is efficiency in shared personnel and facilities. It is important for Matís and companies to get students to work on practical research projects, thereby obtaining the skills needed to become future employees within the sector. Matís is one of the biggest research companies in Iceland and it has expert knowledge and experience that is important to utilize, both for students and society. Our headquarters in Reykjavík and our branches throughout the island offer good facilities for students“ says Gudjon.

Many of Matís's employees have planned and taught in several courses, both in Icelandic and English, at undergraduate and graduate levels. Most of them come from the Faculties of Food Science and Nutrition and Industrial and Mechanical Engineering at the University of Iceland but also from the United Nations University Fisheries Training Program and in the University of Akureyri, the Agricultural University of Iceland as well as Bifröst University. Many of the student have been trained at Matís through industrial B.Sc., M.Sc. and Ph.D. projects.

The food industry in Iceland is growing very fast and the demand is increasing for highly qualified and skilled staff dealing with safety, quality, environmental issues and product development.

Matís's vision is to increase the value of food processing and food production, through research, development, dissemination of knowledge and consultancy, as well as to ensure the safety and quality of food and feed products. To fulfil these aims it is important for Matís to cooperate with schools by teaching and training students.

Universities collaborating with Matis, located in Iceland

University of Iceland

A contract of collaboration between the University of Iceland in Reykjavík and Matís was renewed in 2013. It addresses teaching, research and joint staff members. It is the foundation for strengthening the ties with faculties within the University. The strong link with the Faculty of Food Science and Nutrition with 4 joint staff members and a number of supervisors and part time teachers was also formalised. Matís undertakes lectures and practical work in certain BSc courses and runs and hosts an international M.Sc. program in food science and employs Ph.D. students.

Many students of industrial engineering also do their MSc and Ph.D. projects at Matís and tailor made courses in fish processing and engineering are taught by staff members of Matís. Valuable enzymes have been extracted from extreme environments of the country. Linking basic research and industrial applications is one of the strengths of Matís. The good links with bio- and environmental sciences are very valuable. And when it comes to the big picture of managing natural resources, sustainability and the bioeconomy, collaboration with social sciences and mathematics becomes important.

However, the economic impact is most important. Matís needs skilled students to participate in demanding local and

international projects at the same time as they get training and skills for being employed in a fast growing and very competitive food industry in Iceland. The first group of M.Sc. students in the new food science program has graduated and all of them have been employed.

The collaboration has strengthened both parties. About 90 joint research papers have been published in peer rewieved journals for the last three years and at the same time 10 Ph.D and 15 M.Sc. students have graduated from the Univeristy doing their thesis at Matis. Currently there are 8 Ph.D. students and 19 M.Sc. students from the University working at Matis. Many of the thesis are a part of larger international projects where the University and Matís are the Icelandic partners.

University of Akureyri

Matís and the University of Akureyri have had a long standing relationship through joint staff members and other staff members of Matís who teach and supervise students. This cooperation was renewed by signing of an agreement in January 2014. It will strengthen research and education in fisheries science, biotechnology and bioeconomy with emphasis on the Arctic regions. The aim is to become leading in these fields in Iceland, to finance projects through domestic and international funds with strong industrial involvement and to attract more scientists and students. The focus is on sustainable use of natural resources by integrating research in process technology, biotechnology, food safety and public health. The agreement also involves sharing of facilities and technical equipment.

United Nations University Fisheries Training Programme

Matis is one of the partner institutes of the UNU-FTP that was established in 1998 through a tri-lateral agreement between the United Nations University, the Icelandic Ministry for Foreign Affairs, and the Marine Research Institute of Iceland. Matís experts manage courses in fish processing, quality and safety and supervices fellows in a six months traing programme offered every year in Iceland. They have also been involded in short courses contributing to fisheries development in the partner countries of the country. Some of the fellows have also been supported for M.Sc. and Ph.D. studies at universities in Iceland, some of them doing projects at Matís. About 300 students from 50 countries have received training from the programme.

Universities collaborating with Matis, located outside Iceland

Matis collaborates with many universities in other countries through research projects where involvement and training of graduate students is often included. Scientists at Matís have been opponents at doctoral defences at several universities. The closest collaboration is with universities in the Nordic countries, University of Florida and universities in EU.

See more about Matís and university cooperation

University of Florida

Hörður G. Kristinsson, Chief Science Officer at Matís, is an adjunct professor at the University of Florida. There he has been instructor for both masters and doctoral students who have worked in joint projects between Matís and UF. Good cooperation has been between Matís and the University of Florida and various projects have benefited from it. Students from the University of Florida have also worked on summer projects at Matís. The cooperation has as well given professors from UF opportunity to come to Matís for work and to lecture.

Tokyo University of Marine Science and technology

In 2014 the declaration of collaboration between University of Iceland, Matís and Tokyo University of Marine Science and Technology for teachers and student exchanges was renewed.

Nha Trang University

In 2014 Matis signed an agreement with Nha Trang University in Vietnam based on the MoU signed by the United Nations University-Fisheries Training Programme and the Nha Trang University (NTU), Matís and the Faculty of Food Technology at Nha Trang University agree to enter into a cooperation activities during the term of five years (2013-2018).

Graduated Matís students

Student	Professor	Speciality	Title	Degree	University
Ásta H. Pétursdóttir	Helga Gunnlaugsdóttir	Chemistry	Inorganic and lipophilic arsenic in food commodities with emphasis on seafood	Ph.D.	University of Aberdeen
Magnea Guðrún Karlsdóttir	Hörður G. Kristinsson	Food Science and Nutrition	Oxidative mechanisms and stability of frozen fish products	Ph.D.	University of Iceland
Varsha Kale	Ólafur Friðjónsson	Pharmacy	Bioactive sulfated polysaccharides from the sea cucumber *Cucumaria frondosa* and enzymes active on this class of biomolecules	Ph.D.	University of Iceland
Adriana Matheus	Hörður G. Kristinsson	Food Science and Nutrition	Antioxidant activity of phenolic fractions extracted from the brown algae *Fucus vesiculosus* in washed minced tilapia muscle	M.Sc.	University of Florida
Ásta María Einarsdóttir	Hörður G. Kristinsson	Food Science and Nutrition	Edible seaweed for taste enhancement and salt replacement by enzymatic methods	M.Sc.	University of Iceland
Berglind Heiður Andrésdóttir	Guðjón Þorkelsson	Food Science and Nutrition	Development of probiotic fruit drinks	M.Sc.	University of Iceland
Berglind Ósk Alfreðsdóttir	Helga Gunnlaugsdóttir	Food Science and Nutrition	Polycyclic aromatic hydrocarbons in mussel from Iceland – Food Safety and environmental aspect	M.Sc.	University of Iceland
Harpa Hrund Hinriksdóttir	Kolbrún Sveinsdóttir	Food Science and Nutrition	Bioavailability of n-3 fatty acids from enriched meals and from microencapsulated powder	M.Sc.	University of Iceland
Helga Franklínsdóttir	Sigurjón Arason	Food Science and Nutrition	Application of water jet cutting in processing of cod and salmon fillets	M.Sc.	University of Iceland
Magnús Kári Ingvarsson	Sigurjón Arason	Mechanical Engineering	Airflow and energy analysis in geothermally heated conveyor drying of fishbone	M.Sc.	University of Iceland
Matthildur María Guðmundsdóttir	Sigurjón Arason	Mechanical Engineering	Improvements in conveyor drying of rockweed and kelp	M.Sc.	University of Iceland
Sesselja María Sveinsdóttir	Guðjón Þorkelsson	Food Science and Nutrition	Safety and quality of lettuce on the market in Iceland	M.Sc.	University of Iceland
Steinunn Áslaug Jónsdóttir	Sigurjón Arason	Food Science and Nutrition	High quality redfish fillets for export: Improving handling, processing and storage methods to increase shelf life	M.Sc.	University of Iceland
Telma B. Kristinsdóttir	Sigurjón Arason	Food Science and Nutrition	Mackerel *(Scomber scombrus)*, processing properties. Effect of catching seasons, freezing and cold storage on physical and chemical characteristics of mackerel after heat treatment	M.Sc.	University of Iceland
Valgerður Lilja Jónsdóttir	Guðjón Þorkelsson	Food Science and Nutrition	Ready to eat meals enriched with omega-3 fatty acids – Product development and consumer study	M.Sc.	University of Iceland

United Nations University – Fisheries Training Programme

The UNU Fisheries Training Programme is a postgraduate training program that offers applied training in various areas of the fisheries sector for practicing professionals in the less developed countries. Matís plays an important role in the program.

The programme was established in 1998 after a feasibility study conducted by the UNU and has since then offered over 220 fellowships to qualified fisheries experts from over 40 countries, and developed short courses on important topics in fisheries in partner countries. The programme is led by the Marine Research Institute in a formal cooperation with the Matís - Food and Biotech R&D, University of Iceland and the University of Akureyri. UNU-FTP draws expertise from both the academia and also from the fishing industry to assist fellows to study issues of great importance to their home countries.

From the day the United Nations University Fisheries Training Programme (UNU-FTP) was established here in Iceland, Matís has handled the specialist training in Quality Management of Fish Handling and Processing part of the program.

During the training in Quality Management and Fish Processing, students receive daily lectures from specialists at Matís and are given assignments under their supervision. Students that stand out may be offered to enter the Master or Ph.D. programmes at the University of Iceland or universities in other countries. The connections that have been established between Matís and the United Nations University Fisheries Training Programme mean a great deal both to Iceland and to our company. Through this cooperation Matís has received projects in many developing countries directly through partnership with the United Nations University Fisheries Training Programme and former students. For example arecourses that have been held in Uganda, Tanzania, Kenya and other developing countries.

See more about
UNU-FTP


Like
Social network

Business Development

The Business Development division participates in policy and strategy making for Matís and takes care of internal coordination as well as distributing information within the company and to the government. The division is involved in acquisition of projects, work scheduling as well as assistance with grant applications and funding.

Business Development activities overlap all other divisions at Matís and therefore the division is an important link that connects different operations of the company. The division plays an important role as an advisor to the government and is also an active participant in international cooperation, including SAFE Consortium and Nordic Bioeconomy Initiative, which has a strategic impact on the functioning of Matís.

The division is also responsible for marketing. Participation of Matís's staff in public debate is encouraged as Matís' scientists are often the foremost experts in their fields of speciality in Iceland. The division also emphasizes that employees publish their work, which is done in collaboration with graphic designers and the marketing director. The division is also responsible for the website *www.matis.is*, where regular news and articles appear in Icelandic and English as well as reports on Matís' activities.

The division is responsible for international cooperation, which has grown considerably in recent years. In 2014, one-third of Matís' income came from foreign funds, due to foreign collaboration. Matís has from the beginning sought to participate in international projects. The good success of these projects has earned the company a good reputation and made it a popular partner in a global context.

International cooperation has mostly included the Nordic Countries and Europe, as well as collaboration with the United Nations University Fisheries Training Program. In 2014, however, important steps were taken to increase cooperation with firms and organizations in Canada.

The division is actively promoting food science education in Iceland by publishing educational material and organizing courses. Although the company is not an educational institution in actual sense, a large number of employees are teaching at universities across the country and abroad. Matís also offers students in food science or related subjects to work on their projects at Matís or to participate in projects that the company is working on.

Projects

SAF21

The SAF21 project provides research, training and networking opportunities for early stage researchers who will use latest research tools, such as simulation and participatory approaches, with an aim to inject social intelligence into EU fisheries management systems. EU Horizon 2020 project.

POLSHIFTS

POLSHIFTS Conference will be held in Reykjavík 2015. The goal is to gather specialists of the pelagic complex species, genetics, fisheries management and global climate changes to prepare future collaborations on the effect of global climate changes on the distribution of the pelagic complex species. In addition, genetic tools to identify populations of origin of new colonising species around Faroes Islands, Iceland and Norway will be introduced.

Strengthening the Bioeconomy in the NORA region

The purpose of the project is to strengthen the Bioeconomy in rural areas in NORA region by focusing on local production. The economy of the NORA region depends heavily on the utilization of biological resourses, therefore this Nordic focus on Bioeconomy is a welcomed opportunity for the NORA countries to strengthen their foundational industries and thereby having a positive economic impact.

Optimization of fresh fish transport

The project aims to improve the handling of fresh fish in transport containers to increase the shelf life and increase the possibilities of maritime transport from Iceland. Shelf life of fresh fish transported in tubes cooled with slush will be compared with the shelf life of fish in 3-7 kg styrofoam boxes with regards to temperature control, product quality, transport costs and environmental impact.

The BSR-Nordic Sustainable Protein Production Initiative

The overall objective is to contribute to create sustainable jobs, prosperity and environmental balance in livestock and aqua-cultural production by identifying potential new cross-sectorial value chains in Nordic bioeconomy.

FoodIntegrity

The objective of the project is to develop methods to detect and prevent food fraud within Europe. FoodIntegrity is the state of being whole, entire, or undiminished or in perfect condition. Providing assurance to consumers and other stakeholders about the safety, authenticity and quality of European food (integrity) is of prime importance in adding value to the European agri-food economy. The integrity of European food is under constant threat from fraudulently labelled imitations that try to exploit that added value. The project will directly address this issue and will be an international focal point for harmonisation and exploitation of research and technology for insuring the integrity of European food.
EU FP7 project.

QualiFish

The overall objective of the project is to develop necessary knowledge and technology to increase sustainability and profitability of Atlantic cod production, enabling actors to meet market demands for safe products with high quality and at sufficient volumes all year round.

Arctic Bioeconomy

The Nordic project "Arctic Bioeconomy" is about mapping the bio recourses in the artic, evaluation of the results, comparison and analysis across regions. The focus will be on Greenland, Iceland and the Faroe Islands, as well as northern Norway, Sweden and Finland. Food production will be examined with regard to food security and innovation possibilities in the areas will be assessed.

EnrichMar

The goal is to increase the value and nutrition of fast-food/prepared meals by enriching them with natural supplements that are produced from by-products from seafood. Biomaterials like algae extract with defined biological activity, fish protein and omega-3 fatty acids in powder form are examples of products that will be used for this purpose. EU FP7 project.

Coastal communities in the North Atlantic

Coastal communities in the North Atlantic have experienced difficulties over the past years and the fishing industry in many of these places has been struggling. Few young people seek jobs in the industry, most of them are moving away. These communities have had to relay on small fishing boats sensitive to the bad weather, which is common there. The project aims to examine the value creation in these areas and how it affects the economy of the country and its importance for rural development.

MareFrame

MareFrame seeks to remove barriers preventing a more widespread use of an Ecosystem-based Approach to Fisheries Management (EAFM). It will develop assessment methods and a Decision Support Framework (DSF) for management of marine resources and thereby enhance the capacity to provide integrated assessment, advice and decision support for an EAFM. EU FP7 project.

Better utilization of groundfish species

The aim is to develop a solution to increase utilization and value of groundfish onboard freezer vessels and in land processing when using Marin Vélfags filleting machines. As an outcome of the project prepared by start-up company in Ólafsfjörður, Icelandic fishing villages and fisheries will get new tools for automate processing of by-products both onboard and in land processing.

SeaBiotech

SeaBioTech is an EU-FP7 project designed and driven by SMEs to create innovative marine biodiscovery pipelines as a means to convert the potential of marine biotechnology into novel industrial products for the pharmaceutical (human and aquaculture), cosmetic, functional food and industrial chemistry sectors. Matis has a large role in the poject mining Icelandic genetic geothermal resources for novel organisms, developing enzymes for industrial applicaiona and identifying biaoctive microbial components for use in health, feed, food and comsetic industries. EU FP7 project.

Marine protein processed from fish and seaweed

The goal is to develop and market aquatic protein products that contains protein powder composed of bioactive fish peptides and antioxidants from Icelandic seaweed, the protein has various bioactive properties. The problem in the production of bioactive fish peptides so far has been rancidity. New methods have been developed for production of fish peptides by using antioxidants from seaweed that minimizes this problem. The seaweed also possess interesting bioactive properties that potentially increase the healthful effects of end products. The result will be protein powder that is of consistent high quality that can be used in all kinds of health products. A comprehensive market study will be executed and used for product development and marketing of the aquatic protein products.

Marine bioactive peptides and Icelandic seaweed

The objective is to start production and marketing of dietary supplements that contain marine bioactive peptides and Icelandic Seaweed. The Icelandic seaweed has antioxidant properties that protects the marine bioactive peptides against oxidation. The result will be a consistent high quality health products on the market, made from underutilized Icelandic seafood.

Processing cod heads on board

Nordic research project that investigates, whether Icelandic technology/machines for cutting heads can become the basis for efficient production on board. This will be achieved by seeking information from the industry about the technology and former experience in the production of gills and cheeks.

Microbial energy

The aim of this project is to develop an efficient system, based on a genetically engineered thermophilic bacterial strain, for production of bioethanol from cellulose. This will be done by introducing two cellulase genes into a previously engineered ethanol producing strain. If the gene insertion is successful the strain should be able to degrade pre-processed cellulose for production of ethanol through fermentation. The development of such strain is an important step towards economical and ecological processing of cellulose waste to bioethanol.

Increased value of mackerel through systematic chilling

The projects aim is to maximize the quality of mackerel products by optimized chilling during different catching- and processing methods. Different chilling processes will be investigated and chilling protocols and equipment for different ship types will be developed.

Production of biochemicals from seaweed using thermophilic microorganisms

The aim is to develop a system for the production of valuable chemicals from seaweed biomass using powerful, thermophilic, anaerobic fermentative bacteria. Ethanol will be produced from seaweed sugars. The production of other valuable biomolecules might be possible as well.

New breeding and feed technology for Ezo abalone

The goal of the project is to create feed for Ezo abalone containing high protein, bioactive substances and probiotic bacteria that ensures that Ezo abalone grow rapidly and at the same time develop normally. These new ways might enhance the competitiveness of Ezo abalone manufacturing in Iceland.

Total Diet Study- Exposure (TDS expousure)

In this project methods will be developed to assess how much unwanted contaminants from food people receive from their daily diet. This project is important for risk assessment and all those interested in the effects of contaminants on human health. EU FP7 project.

Arsenic: Essential element in seaweed?

Seaweed is growing in popularity in various sectors, e.g. in the food sector it is used for cooking, eaten as a snack or used as food ingredient. Seaweed is nutritious with a high protein and vitamin content, however, the total arsenic (As) concentration in seaweed can be very high. Arsenic can be carcinogenic, depending on species i.e. inorganic arsenic (iAs). However, As is mainly found as arsenosugars in the seaweed, which are not suspected to be toxic. It is also found to lesser extent as arsenolipids in seaweed. The proposed project aims at investigating the nature and significance of lipid-soluble As and arsenosugars in algae.

Better utilization for char feed

Feed utilization makes a huge impact on the cost of aqua farming. Former experience shows up to 40% difference in feed utilization of fish that are from the same stock and are reared in comparable conditions. This project will seek explanation of this difference in feed utilization.

WhiteFish

The aim of the project is to develop and validate a method for Batch-based calculation of sustainability impact of cod and haddock products. The project is especially developed for the benefit of SMEs in the cod and haddock supply chain so that they can document the sustainability of their products and processes, and thereby gaining competitive advantage through improved market access, price and consumer preference. The project is funded by the European Commission. EU FP7 project.

Projects

WhiteFishMall

The main goal is to build a branding platform for whitefish from the North Atlantic that differentiates in terms of sustainable production and superior consumer benefits. Also demonstrate how a Living Lab can be established in the marine sector, dealing with a specific innovation challenge, where the solution is co-created, explored, demonstrated and evaluated with a user-centric approach in real-world environments. The project is collaboration between Norway, Iceland, Faroe Islands and Canada.

Coastal fishing in the North Atlantic

The focus of this project is on coastal vessels under 15 meters in the N-Atlantic i.e. Norway, Faroe Islands, Iceland, Greenland and Canada. The aim of the project is threefold: 1) to analyse the coastal fishing fleets in the above mentioned countries in respect to fleet composition, catch, gear, on-board handling, processing, logistics, marketing etc. 2) facilitate networking between key stakeholders in these countries. 3) initiate improvements in the value chain of pilot cases where knowledge is transferred and equipment and processes adopted and/or adapted.

Eco balance of fresh cod loins

The aim of the project is to carry out a Life Cycle Assessment for fresh Icelandic cod-loins that are sold at markets where sustainable sourcing and mitigating environmental impacts are emphasised. The results can be used by suppliers and their customers to favour low impact alternatives, to demonstrate to wholesalers and retailers that measures are being taken to improve environmental impacts and to compare Icelandic cod-loins with competing products.

Is microplastics the major threat in Icelandic environment?

Microscopic litter particles are found everywhere in the marine environment and are considered to be a serious threat to the marine ecosystems. These can consist of microplastic, metallic particles and other anthropogenic particles whereas main focus has been on microplastic. Waste water treatment plants (WWTPs) have been suggested to be, not sources for microlitter but important entrance routes for many kinds of anthropogenic particles to the environment. Six WWTPs, two in each of the countries Iceland, Sweden and Finland are included in the study, and analyses are done on the concentrations and the character of anthropogenic particles in incoming and effluent water.

ResUrch

Sea urchin roe is a good source for protein and healthy fat, and is considered a luxury product. The growing demand for sea urchin roe over the past decade has resulted in heavy overfishing and virtual depletion of sea urchins in many fishing areas. Hence, there is a rapidly growing interest for aquaculture production of sea urchins, with intensive production of the green and the purple sea urchin currently under development. EU FP7 project.

Operating characteristics of mackerel

The project aims to improve the knowledge of the effects of chemical, physical and operating characteristics of mackerel on quality of consumer products. The results will increase the knowledge of Icelandic mackerel production, processing utilization and product quality. These information are very important for marketing of frozen and chilled mackerel and gives valuable guidelines for productions and highlights the impact of processing on raw material.

Full utilization of proteins from lumpfish

More value could be gained from lumpfish by producing valuable protein products from raw materials derived from the processing of lumpfish roe. Development of three products will be tried; isolated protein for surimi, dried protein additive and hydrolysed proteins to use as additives and/or supplements.

The missing link

The project aims to promote the health of the Icelandic nation and the part of the world, that has good economic conditions but are at risk, or have lifestyle-related diseases because of an incorrect diet. The start-up company Foodoit, will develop web application that will help people to succeed when changing their diet to the better.

A new natural antioxidant from the sea

The goal of the project is to develop and produce new natural antioxidants from Icelandic seafood that will be used to increase the stability of different fish products. There is a great demand for new potent natural ingredients to enhance the stability of food products and the market is always growing.

MaCuMBA

Marine microorganisms form an almost untapped resource of biotechnological potential. However, its use is hindered by the low success rate of isolation of novel microorganisms and often by poor growth efficiency. Hence, the vast majority of marine microorganisms has not been cultivated and is often considered as 'unculturable'. MaCuMBA aims at improving the isolation rate and growth efficiency of marine microorganisms from conventional and extreme habitats, by applying innovative methods, and the use of automated high throughput procedures. EU FP7 project.

Nordic cereals - New opportunities

The project Nordic corn, a new opportunity is funded by the Nordic Atlantic Cooperation (NORA). The project aims to promote the growth and sustainability of the Arctic through the development of grain production and utilization of grain. The project will promote cooperation between Iceland, the Faroe Islands, Northern Norway, the Orkneys and Newfoundland in grain research and utilization of grain. Partnership opens opportunities for farmers and businesses for increased grain production for the benefit of grain production regions. Results of growing experiments under different conditions will reveal which grain types suits best for each area. This provide farmers and researchers with important information on how to start cereal production in new areas.

Isolation and processing of astaxanthin

The project aims to develop a separation processes required for isolation and production of Astaxanthin that is incurred in the discharge of liquids from the processing of Chitosan and from the primary processing of shrimps which contains quite amount Axtaxanthin. This will contribute to increased yields and sustainable utilization of seafood.

Ecological effects of seaweed on bioactive substances and their use

The goal is to investigate the effect of environmental factors on the quantity and bioactivity of: Fucoxanthin, polysaccharides and polyphenols in Laminaria saccharina, Alaria esculenta, Ascopyllum nodosum and Fucus vesiculosus to enhance the knowledge of ecological chemistry of these species and to increase the efficiency of the isolation of biomolecules, detailed analysis and utilization of bioactive measures.

Distinction of herring stocks in Icelandic waters

The aim of the project is to develop SNP genetic markers for herring in order to identify different stocks and provide useful information for the management of sustainable fisheries and ecological preservation. Furthermore, these markers will be suitable for monitoring the herring around Iceland, and distinguish different spawning in mixed fishing.

MicroB3 - To understand the world from the perspective of microbe

New knowledge based on advances in microorganism research and genetics of microbes leads to increased understanding of basic of the earth's largest ecosystem, the ocean. There we have a great opportunity to utilize organism without risking depleting the resource. MicroB3 goal is to compile the latest biological and environmental data about reactions and the development of microbe communities in seawater. The project is funded by the EU 7th research fund. EU FP7 project.

Blue trainfarm

The objective is to investigate whether it is possible to process new types of medicine from sponges. Sponges are known to protect themselves by chemical warfare. The aim is to see if this feature may be utilized to manufacture a medicine. Already some 7000 bioactive molecules have been identified in sponges. The main challenge is to find ways to isolate enough amounts of bioactive substances to be used for manufacturing.

Small fatty pelagic fish as functional food

In this project the overall aim is to set a strategy for the development of novel functional high value food products that will provide a basis for a more focused product development from small pelagic fish in upcoming bio-economy projects. The objective is also to gather information on novel uses of small fatty pelagic fish species in the production of nutrients and health supplement products.

Local raw materials in fish feed

The project is designed to examine the effects of the use of local raw materials in fish feed. The goal is to reduce the environmental impact of aquaculture and make it more sustainable by finding a way to use local raw materials for feeding fish without compromising the quality of the product.

Shelf life of lightly salted frozen fillets

The goal of the project is to increase the value of fish by analyzing the ideal conditions for storage of lightly salted cod and pollock fillets, while increasing the stability of those products considering the season and quality of the raw material. Very little research has been done on these factors and the project will therefore give important information and in the continuance, more stable and higher valued products.

Treatment for the root of the problem - Chitosan

The goal of the project was to demonstrate the functions of chitosan to improve the quality of seafood. The company Primex extracts chitosan from shrimps and researches show that it is possible to exploit chitosan in various ways including to improve the quality of seafood. In this project, the product was treated as soon as the fish was onboard the vessel. The sooner the treatment occurs, the better effectiveness and longer shelf life it gives.

Tool for measuring the quality of fish

The project is conducted in collaboration with Nofima in Norway and has the goal of generating standardized methods to assess the quality of fishery products for retailers and consumers. This was done in three ways by sensory measurements, express microbe measures and spectroscope.

ChemoBacter

The objective was to establish a rapid microbeactivity measurements that have been in developement at Matís. Furthermore a diagnostic kit was made for others that want to use the technology. More info at: chemobacter.is

SNPFish

Is about development of SNP genetic markers for important commercial stocks. The purpose of this project is to develop and establish a new geneticmethod at Matís genetics laboratory. The method will be used for kinship studies of major commercial fish stocks around Iceland and will also be useful for genetic studies of various species, both wild and farmed.

StrepSynth

STREPSYNTH aims to set-up a Streptomyces-based new industrial production platform (SNIP) for high value added biomolecules. Streptomyces lividans was chosen as a bacterial host cell because it has been shown to be highly efficient for the extracellular production of a number of heterologous molecules that vary chemically; has a robust tradition of industrial fermentation and is fully accessible to genetic intervention. SNIP is a modular platform that can be repurposed for diverse future applications. EU FP7 project.

Novel saccarides

The objective is to generate new modified carbohydrate products using novel enzymes with (i) bulking properties and (ii) neutral flavour profiles for various beverage products.

Genetic markers used on Icelandic breeding charr

Charr is ideal for farming, especially in the Arctic because of how well it grows at low temperatures and for the high value it has on markets. Icelanders are the largest charr producers in the world and annually produce about 3,000 mt. Breeding improvements of the stock have contributed to Iceland's advantage in this area. In this project we plan to develop techniques to accelerate breeding progress.

Bluegenics

BlueGenics has the aim to analyse marine sponges and their symbiotic bacteria, as well as free-living marine bacteria, to discover novel bioactive compounds. Many such compounds have already been successfully isolated worldwide and marketed as products for the medical, biotechnological and cosmetics industry, such as anti-bacterial, anti-inflammatory or UV-protective substances. Most of these substances have though been isolated from sponges from warm or temperate regions but Matís is focusing on cold-water sponges from Icelandic waters and bacteria from extreme environments, like hot vents, as sources for novel bioactive metabolites. EU FP7 project.

Safe Consortium

SAFE Consortium is a European cooperative research forum in the field of food safety. In 2012 Matís took over the management and operation of the SAFE Consortium. 2013 SAFE Consortium gave a report on the strategic research priorities and the importance of food safety. The report was delivered to the European Commission, there the importance of food security to be placed in the foreground of all food researches is reaffirmed.

Publications

- Cyprian, O. O., Sveinsdottir, K., Magnusson, H. Arason, S. Johansson, R., Martinsdottir, E. 2014. Development of Quality Index Method (QIM) scheme for frarmed tilapia fillets and its application in shelf life study. *Journal of Aquatic Food Product Technology*. 23(3), 278-290.

- Davies, N., et al. 2014. The founding charter of the Genomic Observatories Network. *GigaScience*. 3(2).

- Dellarosa, N., Laghi, L.m, Martinsdóttir, E., Jonsdottir, R., Sveinsdottir, K. 2014. Enrichment of convenience seafood with omega-3 and seaweed extracts: Effect on lipid oxidation. *LWT - Food Science and Technology*. Advance online publication 08/2014.

- Halldorsdottir, S.M., Sveinsdottir, H., Freysdottir, J., Kristinsson, H.G. 2014. Oxidative processes during enzymatic hydrolysis of cod protein and their influence on antioxidant and immunomodulating ability. *Food Chemistry*. 142, 201-209.

- Halldorsdottir, S.M., Sveinsdottir, H., Gudmundsdottir, A., Thorkelsson, G., Kristinsson, H.G. 2014. High quality fish protein hydrolysates prepared from by-product material with Fucus vesiculosus extract. *Journal of Functional Foods*. 9, 10-17.

- Helyar, S.J., Lloyd, H.D., Leake, J., Bennet, N., Carvalho, G.R. 2014. Fish product mislabelling: failings of traceability in the production chain and implications for Illegal, Unreported and Unregulated (IUU) fishing. *PLoS ONE*. 9(6): e98691.

- Hinriksdottir, H.H., Jonsdottir, V.L., Sveinsdottir, K., Martinsdottir, E., Ramel, A. 2014. Bioavailability of long-chain n-3 fatty acids from enriched meals and from microencapsulated powder. *European Journal of Clinical Nutrition*. Advance online publication 11/2014.

- Hjörleifsdottir, S., Blöndal, Th., Ævarsson, A., Fridjonsson, O.H., Ernstsson, S., Hreggvidsson, G.O., Mäntylä, E., Kristjansson, J.K. 2014. Isothermal DNA amplification by a novel and non-ubiquitous Thermus polymerase A. *Current Biotechnology*. 3(1), 76-86.

- Hjörleifsdottir, S., Ævarsson, A., Hreggvidsson, G.O., Fridjonsson, O.H., Kristjansson, J.K. 2014. Isolation, growth and genome of the Rhodothermus RM378 thermophilic bacteriophage. *Extremeophiles*. 18, 261–270.

- Imsland, A.K., Olafsson, K., Skirnisdottir, S., Gunnarsson, S., Oddgeirsson, M., Vandamme, S., Helyar, S.J., Skadal, J., Folkvord, A. 2014. Life history of turbot in Icelandic waters: intra- and inter-population genetic diversity and otolith tracking of environmental temperatures. *Fisheries Research*. 155, 185-193.

- Jörundsdottir, H.O, Halldorsson, T.I., Gunnlaugsdottir, H. 2014. PFAAs in fish and other seafood products from Icelandic Waters. *Journal of Environmental and Public Health*. Article ID 573607.

- Jörundsdottir, H.O., Jensen, S., Hylland, K., Holth, T.F. Gunnlaugsdottir, H., Svavarsson, J., Olafsdottir, A., El-Taliawy, H., Riget, F., Strand, J., Nyberg, E., Bignert, A., Hoydal, K.S., Halldorsson, H.P. 2014. Pristine Arctic: Bacground mapping of PAHs, PAH metabolites and inorganic trace elements in the North-Atlantic Arctic and sub-Arctic coastal environment. *Science of The Total Environment*. 493, 719-728.

- Karlsdottir, M. G., Arason, S., Kristinsson, Hordur G., Sveinsdottir, K. 2014. The application of near infrared spectroscopy to study lipid characteristics and deterioration of frozen lean fish muscles. *Food Chemistry*. 159, 420-427.

- Karlsdottir, M. G., Sveinsdottir, K., Kristinsson, H. G., Villot, G., Craft, B.D., Arason, S. 2014. Effects of temperature during frozen storage on lipid deterioration of saithe *(Pollachius virens)* and hoki *(Macruronus novaezelandiae)* muscles. *Food Chemistry*. 156, 234-242.

- Karlsdottir, M..G., Sveinsdottir, K., Kristinsson, H. G., Villot, G., Craft, B.D., Arason, S. 2014. Effect of thermal treatment and frozen storage on lipid decomposition of light and dark muscles of saithe *(Pollachius virens)*. *Food Chemistry*. 164, 476-484.

- Kelly, L.C., Thorsteinsson, Tk., Marteinsson, V., Stevenson, J. 2014. Pioneer microbial communities of the Fimmvörðuháls lava flow, Eyjafjallajökull, Iceland. *Microbial Ecology*. 68(3), 504-18.

- Krebs, J., Vaishampayan, P., Probst, A., Tom, L., Marteinsson, V., Andersen, G., Venkateswaran, K. 2014. Microbial community structures of novel Icelandic hot spring systems revealed by PhyloChip G3 analysis. *Astrobiology*. 14(3), 229-40.

- Milano, I., Babbucci, M., Atanassova, M., Cariani, A., Carvalho, G.R., Espiñeira, M., Fiorentino, F., Geffen, A.J., Helyar, SJ, Nielsen EE, Ogden R, Patarnello T, Stagioni M, FishPopTrace Consortium, Tinti F, Bargelloni L. 2014. Outlier SNP markers reveal fine-scale genetic structure across European hake *(Merluccius merluccius)* populations. *Molecular Ecology*. 23(1), 118-135.

- Musil, S., Petursdottir, A., Raab, A., Gunnlaugsdottir, H., Krupp, E., Feldmann, J. 2014. Speciation without chromatography using selective hydride generation: inorganic arsenic in rice and samples of marine origin. *Analytical Chemistry*. 86(2), 993–999.

- Olafsson, K., Pampoulie, C., Hjorleifsdottir, S., Gudjonsson, S., Hreggvidsson, G.O. 2014. Present-day genetic structure of Atlantic salmon *(Salmo salar)* in Icelandic rivers and ice-cap retreat models. *PLoS One*. 9(2), 1-12.

- Olsen, M.T., Pampoulie, C., Danielsdottir, A.K., Lidh, E., Bérube, M., Vikingsson, G.A., Palsbøll, P.J. 2014. Fin whale MDH-1 and MPI allozyme variation is not reflected in the corresponding DNA sequences. *Ecology and Evolution*. 4(10),1787-1803.

- Marteinsson, V., Klonowski, I., Reynisson, E., Vannier, P., Sigurdsson, B.D., Olafsson, M. 2014. Microbial colonisation in diverse surface soil types in Surtsey and diversity analysis of its subsurface microbiota. *Biogeoscience*. 11, 13775-13808.

- Pampoulie, C., Skirnisdottir, S., Olafsdottir, G., Helyar, S.J, Thorsteinsson, V., Jonsson, S.Þ., Fréchet, A., Durif, C.M.F., Sherman, S., Lampart-Kałuzniacka, M., Hedeholm, R., Olafsson, H., Danielsdottir, A.K., Kasper, J.M. 2014. Genetic structure of the lumpfish *Cyclopterus lumpus* across the North Atlantic. *ICES Journal of Marine Science*. 71, 2390-2397.

- Petursdottir, A.H., Friedrich, N., Musil, S., Raab, A., Gunnlaugsdottir, H., Krupp, E.M.,Feldmann, J. 2014. Hydride generation ICP-MS as a simple method for determination of inorganic arsenic in rice for routine biomonitoring. *Analytical Methods*. 6, 5392-5396.

- Petursdottir, A.H., Gunnlaugsdottir, H., Krupp, E.M., Feldmann, J. 2014. Inorganic arsenic in seafood: Does the extraction method matter? *Food Chemistry*. 150, 353-359.

- Plotka, M., Stefanska, A., Kaczorowska, A-K., Morzywolek, A., Fridjonsson, O., Dunin-Horkawicz, S., Hreggvidsson, G.O., Kristjansson, J.K., Dabrowski, S., Bujnicki, J., Kaczorowski, T. 2014. Purification and characterization of a novel highly thermostable lysozyme from Thermus scotoductus MAT2119 bacteriophage Ph2119 that shows amino-acid sequence similarity to eukaryotic peptidoglycan recognition proteins (PGRPs). *Applied and Environmental Microbiology*. 80, 3886-3895.

- Quinto, E.J., Arinder, P., Axelsson, L., Heir, E., Holck, A., Lindqvist, R., Lindblad, M., Andreou, P., Lauzon, H.L., Marteinsson, V.Þ., Pin, C. 2014. Predicting the concentration of verotoxin-producing Escherichia coli during processing and storage of fermented raw meat sausages. *Applied and Environmental Microbiology*. 80(9), 2715-27.

- Ringo, E., Olsen, R.E., Jensen, I., Romero, J., Lauzon, H.I. 2014. Application of vaccines and dietary supplements in aquaculture: possibilities and challenges. *Reviews in Fishery Biology and Fisheries*. 24(4), 1005-1032.

- Sigurdardottir, S., Johansson, B., Margeirsson, S., Vidarsson, J.R. 2014. Assessing the impact of policy changes in the Icelandic cod fishery using a hybrid simulation model. 2014. *The Scientific World Journal*. 2014, Article ID 707943.

- Sigurdardottir, S., Schruben, L. 2014. A new approach to simulating fisheries data for policy making. 2014. *Natural Resource Modeling*. 27(3), 411-428.

- Silva, C., Mendes, H., Rangel, M., Wise, L., Erzini, K., de Fátima Borges, M., Ballesteros, M., Santiago, J.L., Campos, A., Viðarsson,J., Nielsen, K.N. 2014. Development of a responsive fisheries management system for the Portuguese crustacean bottom trawl fishery: Lessons learnt. *Marine Policy*. 52, 19-25.

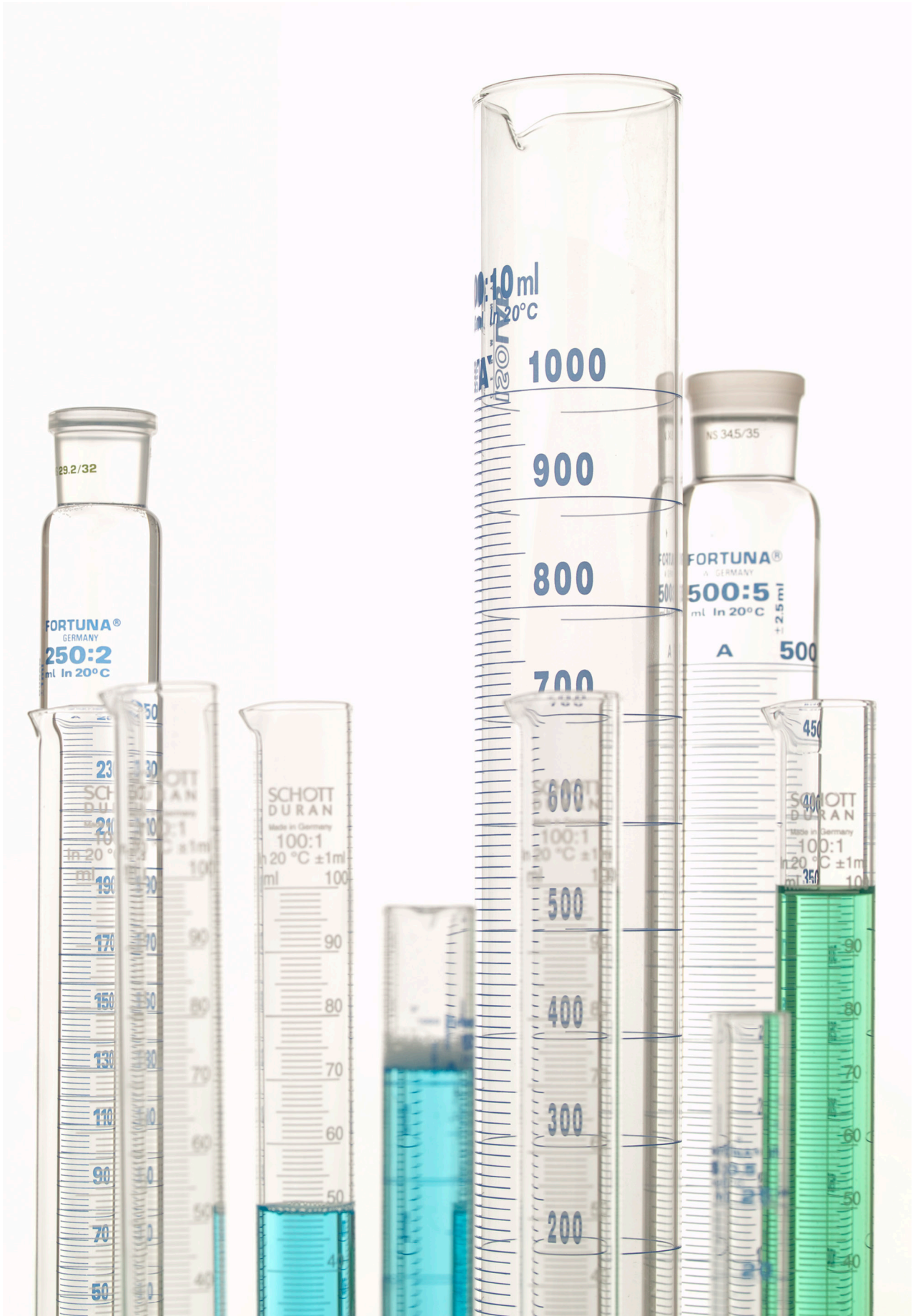
- Stefanska, A., Kaczorowska, A.K., Plotka, M., Fridjonsson, O.H., Hreggvidsson, G.O., Hjorleifsdottir, S., Kristjansson, J.K., Dabrowski, S., Kaczorowski, T. 2014. Discovery and characterization of RecA protein of thermophilic bacterium Thermus thermophilus MAT72 phage Tt72 that increases specificity of a PCR-based DNA amplification. *Journal of Biotechnology*. 28,182-183.

- Sturludottir, E., Gunnlaugsdottir, H., Jörundsdottir, H., Magnusdottir, E., Olafsdottir, K., Stefansson, G. 2014. Temporal trends of contaminants in cod from Icelandic waters. *Science of the Total Environment*. 476-477, 181-188.

- Uhlmann, S.S., van Helmond, A.T.M., Stefansdottir, E.K., Sigurdardottir, S., Haralabous, J., Bellido, J.M., Carbonell, A., Catchpole, T., Damalas, D., Fauconnet, L., Feekings, J., Garcia, T., Madsen, N., Mallold, S., Margeirsson, S., Palialexis, A., Readdy, L., Valeiras, J., Vassilopoulou, V., Rochet, M-J. 2014. Discarded fish in European waters: general patterns and contrasts. *ICES Journal of Marine Science*. 71(5), 1235-1245.

- Yarnpakdee S., Benjakul, S., Penjamras, P., Kristinsson, H.G. 2014. Chemical compositions and muddy flavour/odour of protein hydrolysate from Nile tilapia and broadhead catfish mince and protein isolate. Original Research Article. *Food Chemistry*. 142, 210-216.

- Yarnpakdee, S., Benjakul, S., Kristinsson, H.G. 2014. Lipid oxidation and fishy odour in protein hydrolysate derived from Nile tilapia *(Oreochromis niloticus)* protein isolate as influenced by haemoglobin. *Journal of the Science of Food and Agriculture*. 94(2), 219-226.



Reports

- Ásbjörn Jónsson, Bjarni H. Ásbjörnsson. Sigurjón Arason. Utilization of offal from the fish industry. Matís Report 08-14, 42 p.
- Birgir Örn Smárason, Jónas R. Viðarsson, Gunnar Þórðarson, Lilja Magnúsdóttir. Life Cycle Assessment on fresh Icelandic cod loins. Matís Report 24-14, 46 p.
- Guðmundur Stefánsson, Jón Trausti Kárason, Aðalheiður Ólafsdóttir, Óli Þór Hilmarsson, Valur S. Pálmarsson. Cold smoked mackarel. Matís Report 28-14, 16 p.
- Gunnar Þórðarson, Albert Högnason, Hólmfríður Sveinsdóttir. Research of superchilling of whitefish. Matís Report 30-14, 11 p.
- Gunnar Þórðarson, Arnljótur B. Bergsson, Gísli Eyland, Jónas R. Viðarsson, Sigurjón Arason, Sindri Magnason. Invest managent in operation of freezing trawlers. Matís Report 17-14, 22 p.
- Gunnar Þórðarson, Jónas R. Viðarsson. Coastal fisheries in Iceland. Matís Report 12-14, 15 p.
- Gunnar Þórðarson. Production of raw material from North Westfjords. Matís Report 29-14, 6 p.
- Heather Philp, Ragnheiður Sveinþórsdóttir, Anna Hjaltadóttir. Changes in visual and textural quality in the redfish species (Sebastes marinus) during different storage regimes. Matís Report 31-14, 19 p.
- Hrönn Ólína Jörundsdóttir, Natasa Desnica, Þuríður Ragnarsdóttir, Helga Gunnlaugsdóttir. Evaluation of inorganic trace elements and aromatic hydrocarbons (PAHs) in blue mussel (Mytilus edulis) and sediment at Grundartangi, Hvalfjörður, 2013. Matís Report 06-14, 33 p.
- Hörður G. Kristinsson, Rósa Jónsdóttir. New bioactive cosmetics. Matís Report 25-14, 8 p.
- Hörður G. Kristinsson. Bioactive surimi from low value and underutilized raw material. Matís Report 26-14, 122 p.
- Jón Árnason, Jón Örn Pálsson, Gunnar Örn Kristjánsson, Ólafur Ingi Sigurgeirsson, Arnþór Gústafsson. Use of canola oil in winterdiets for Atlantic salmon. Matís Report 05-14, 16 p.
- Jón Trausti Kárason, Ragnheiður Sveinþórsdóttir. Product development of dired fish skin for human consumption. Matís Report 32-14, 14 p.
- Jónas R. Viðarsson, Audun Iversen, Edgar Henriksen, Bengt Larson, Carl-Axel Ottosson, Henrik S. Lund, Durita Djurhuus, Auðunn Konráðsson, Tønnes Berthelsen, Heather Manuel, David Decker, Sveinn Agnarsson, Halldór Ármannsson, Staffan Waldo, Johan Blomquist, Max Nielsen, Hrafn Sigvaldason, Bjarni Sigurðsson. Coastal communities and coastal fisheries in the N-Atlantic (Kystsamfund): A summary report on conference proceedings. Matís Report 33-14, 34 p.
- Jónas R. Viðarsson, Ida Grong Aursand, Hanne Digre, Ulrik Jes Hansen, Leon Smith. New technology for the Nordic fishing fleet - Proceedings from a workshop on fishing gear and effective catch handling held in Reykjavik October 1st and 2nd 2013. Matís Report 01-14, 140 p.
- Jónína Þ. Jóhannsdóttir, Jón Árnason, Heiðdís Smáradóttir, Aðalheiður Ólafsdóttir, Rannveig Björnsdóttir. Minimizing the feed cost of Arctic charr. Matís Report 19-14, 14 p.
- Lilja Magnúsdóttir, Óli Þór Hilmarsson, Gunnþórunn Einarsdóttir, Þóra Valsdóttir, Arnljótur Bjarki Bergsson. Spring is in the air. Matís Report 35-14, 12 p.
- Magnea G. Karlsdóttir, Nguyen Van Minh, Sigurjón Arason, Aðalheiður Ólafsdóttir, Paulina E. Romotowska, Arnljótur B. Bergsson, Stefán Björnsson. Effects of bleeding methods on quality and storage life of cod and saithe products. Matís Report 07-14, 32 p.
- Magnús Valgeir Gíslason, Gunnar Pálsson, Sindri Freyr Ólafsson, Arnljótur Bjarki Bergsson, Björn Margeirsson, Sigurjón Arason, Magnea G. Karlsdóttir. Hedinn protein plant and Hedinn oil plant. Matís Report 11-14, 20 p.
- Margrét Geirsdóttir, Aðalheiður Ólafsdóttir, Sóley Ósk Einarsdóttir. Health bars with fish proteins – development and marketing. Matís Report 22-14, 17 p.
- Margrét Geirsdóttir, Aðalheiður Ólafsdóttir. Fish proteins in baked goods. Matís Report 04-14, 21 p.
- Margrét Geirsdóttir, Aðalheiður Ólafsdóttir. Improved processing of dry fish proteins. Matís Report 16-14, 45 pp.
- Margrét Geirsdóttir, Björn Viðar Aðalbjörnsson. Production of bioactive peptides from fish proteins and their in vivo effect. Matís Report 10-14, 40 p.
- Margrét Geirsdóttir. Scale up and marketing of surimi and surimi seafood from mince. Matís Report 03-14, 17 p.
- María Guðjónsdóttir, Ásbjörn Jónsson, Magnea G. Karlsdóttir, Sigurjón Arason, Amidou Traoré. Water distribution in commercial Icelandic heavily salted Atlantic cod (Gadus morhua). Matís Report 14-14, 34 p.
- María Guðjónsdóttir, Ásbjörn Jónsson, Magnea G. Karlsdóttir, Sigurjón Arason, Amidou Traoré. The effects of pre-salting methods on salt and water distribution of heavily salted cod, as analyzed by 1H and 23NA MRI, 23NA NMR, low-field NMR and physicochemical analysis. Matís Report 13-14, 31 p.
- Ólafur Reykdal, Peter Martin, Áslaug Helgadóttir, Hilde Halland, Vanessa Kavanagh, Rólvur Djurhuus. Cereal products and markets in The Northern Periphery Region. Matís Report 21-14, 42 p.
- Ólafur Reykdal, Þórdís Anna Kristjánsdóttir, Jónatan Hermannsson, Peter Martin, Sigríður Dalmannsdóttir, Rólvur Djurhuus, Vanessa Kavanagh, Aqqalooraq Frederiksen. Status of cereal cultivation in the North Atlantic Region. Matís Report 23-14, 47 p.
- Óli Þór Hilmarsson, Gunnar Þórðarson. Production and marketing of „Sætfiskur". Matís Report 20-14, 13 p.
- Páll Gunnar Pálsson. Increased value of data. Matís Report 34-14, 46 p.
- Sigrún Elsa Smáradóttir, Lilja Magnúsdóttir, Birgir Örn Smárason et al. Future opportunities for bioeconomy in the West Nordic Countries: Executive summary & action plan, discussions and conclusions, overview of opportunities identified in the report. Matís Report 38-14, 124 p.
- Roland Körber, Hrönn Ólína Jörundsdóttir, Margrét Björk Sigurðardóttir, Helga Gunnlaugsdóttir. Safe Food: Increased food safety in Iceland. Matís Report 39-14, 9 p.
- Sigrún Elsa Smáradóttir, Þóra Valsdóttir. Nordtic conference report. Matís Report 36-14, 31 p.
- Sigrún Mjöll Halldórsdóttir. Production of valuable products from viscera. Matís Report 09-14, 20 p.
- Sigurjón Arason, Gunnar Þórðarson, Magnea Karlsdóttir, Albert Högnason, Guðbjartur Flosason. Bleeding system for small vessels. Matís Report 02-14, 20 p.
- Þóra Valsdóttir, Fanney Björg Sveinsdóttir, Þorvarður Árnason. A seminar on local food production, tourism and sustainability. Matís Report 15-14, 23 p.
- Þóra Valsdóttir, Guðjón Þorkelsson. Food and sustainable tourism. Matís Report 18-14, 34 p.
- Þóra Valsdóttir, Símon Sturluson. Quality indicators of sugar kelp (Saccharina latissima). Matís Report 27-14, 27p.

Conferences

Workshop on coastal fisheries in the North Atlantic

Researchers and other stakeholders connected to the coastal sectors in Norway, Sweden, Denmark, Faroe Islands, Iceland, Greenland and Newfoundland have been studying the operating environments, main challenges and potential opportunities of their coastal sectors over the past few months. The objective of the workshop held in Matís' headquarters in March was to share the information already gathered on the subject and to compare experiences within the N-Atlantic coastal sector.

Nordtic - Nordic Bioeconomy and Arctic Bioeconomy

Conference on Nordic Bioeconomy and Arctic Bioeconomy was held in June. Matís coordinated the content and scientific part of the conference. Bioeconomy is at the centre of Nordic cooperation in 2014. NordBio, the largest of three programmes under the Icelandic chairmanship of the Nordic Council of Ministers, is aimed at optimizing utilization of biological resources and minimizing waste, thus bolstering the Nordic Bioeconomy.

The Nordtic conference was held in connections with annual meeting of Council of Ministers for Fisheries and Aquaculture, Agriculture, Food and Forestry (MR-FJLS). MR-FJLS is responsible for the implementation of NordBio, in cooperation with the Nordic Councils of Ministers for the Environment (MR-M), Trade, Energy and Regional Policies (MR-NER), Educations and Research (MR-U), and Culture (MR-K).

Nordic Environmental Chemistry Conference - NECC 2014

The scope of the conference was Environmental Chemistry in the Nordic and International Environment. Environmental Chemistry is considered an interdisciplinary research area where international input is essential. Therefore, topics as environmental toxicology and effects, bioaccumulation, transport and transformation processes, modelling, green chemistry as well as monitoring and regulation aspects are welcomed. The conference was intended to bring together leading scientists in the field in order to share information and form networks. NECC 2014 was organized by The Environment Agency of Iceland, University of Iceland and Matís.

Taste the North Atlantic

A culinary/lifestyle show "Taste the North Atlantic" was made for TV and aired in September. Food is a part of what attracts tourists to a certain detination and the aim was to promote a positive image and strengthen the food culture and tourism in Iceland, Norway, Greenland and the Faroe Islands. Eight 30 minute TV episodes on food culture in the countries were created, two for each country. First episode in each country was dedicated to traditional cooking and traditional dishes, the second had the focus on how to make new and innovative dishes from local raw materials.

Fish Waste for Profit - Maximising Return: Utilising the Entire Fish

Matís, together with the ministry of Industries and Innovation, University of Iceland and Mercator Media, organized a conference held in connection with the Icelandic Fisheries Exhibition www.icefish.is in September. Matís has been involved in all IceFish exhibitions since 2007 when Matís was established. IceFish is the largest exhibition in this category in Iceland and brings together all major stakeholders in the fisheries sector both from Iceland as well as from other countries. The exhibition has grown steadily since its beginning in 1984, and it is notable that participants and visitors increased significantly in 2008 and 2011 despite various financial difficulties here in Iceland.

The conference will aim at how we can improve our full utilization of seafood. Icelanders are among the best in full utilization of fish catch and, therefore, many look to Iceland in hope of learning the right techniques. When speaking of cod and full utilization of the raw material, few are as educated and experienced as Sigurjón Arason, chief engineer at Matís. He has over 30 years of working experience within the Icelandic fishing industry studying the full utilization of cod and other species.

Sigurjón Arason and Dr. Sigrún Mjöll Halldórsdóttir, project manager at Matís, gave presentations at the conference. Other interesting presentations were given by Friðrik Sigurðsson, consultant, who has worked in the Norwegian fishing industry for a long time, Hólmfríður Sveinsdóttur, CEO at Iceprotein, and former employee at Matís, and Ingólfur Arnarsson, CEO at Skaginn.

Humber Seafood Summit

The 5th Humber Seafood Summit was held in Grimsby 17 to 18 September. Jónas R. Viðarsson from Matís gave a presentation at the summit. The presentation was titled “Scanning the horizon: trade and technology”, where he discussed relations between Iceland and the Humber area. For centuries, fresh fish from Icelandic fishing grounds has been an important raw material for fish processing plants in the area and fish products that have been imported from Iceland.

Coastal communities and coastal fisheries in the N-Atlantic

Matís organized a conference in September in connection with the Icelandic Fisheries Exhibition www.icefish.is, the conference was a part of a series of events held in connection with the Icelandic presidency in the Nordic Council of Ministers.

The conference was funded by the Nordic Council of Ministers. The organizers and participants came from all the Nordic counties, including for example associations representing small scale fishermen from Norway, Sweden, Denmark, Faroe Islands, Iceland, Greenland and Newfoundland and Labrador.

The proceedings from the conference are now available in a report and the main points have also been published in a summary brochure. All of the proceedings are also available at the project's web-page in a video and pdf format.

Plastics in the Oceans

The Environment Agency of Iceland hosted a conference on plastics in the marine environment in Reykjavík in September.

Iceland holds the chairmanship of the Nordic Council of Ministers in 2014. The conference is a part of Iceland's chairmanship programme and funded by the Nordic Council of Ministers.

The main objective of the conference is to put forward measures on how to minimize plastic garbage in the marine environment with emphasis on the fishing industry.

Arctic Bioeconomy Focus on West-Nordic Countries

The conference is supported by The Nordic Council of Ministers Arctic Co-operation Programme, NKJ (Nordic Joint Committee for Agricultural and Food Research) , AG-Fisk (Working Group for Fisheries Co-operation), SNS (Nordic Forest Research) and NordGen (the Nordic Genetic Resource Center), as part of the project „Arctic bioeconomy“.

Nordregio Forum 2014 - Nordic Bioeconomy and Regional Innovation

The second Nordregio Forum, the meeting place for policy-makers, researchers and practitioners, seeking to ensure sustainable regional development in the Nordic countries was held in November in Iceland. Sveinn Margeirsson, CEO, and Sigrún Elsa Smáradóttir, Research Group Leader, gave presentation on Innovation in the Nordic and Arctic Bioeconomy.

Nordic Artisan Food

November 12th -15th an Artisan food seminar and the first Icelandic Championship in artisan food production was held in Reykjavik.

New Nordic Food II and Matís organized this event and welcomed artisan food producers and others from all the Nordic countries to this event.

Parallel to the championship was a seminar where speakers from all Nordic countries gave valuable insights on how to support and promote local food. The seminar was supported by Promote Iceland, Icelandair and The Nordic House.

A study tour and short courses was held for artisan food producers, supported by the “Innovation project” under Nordbio, the Icelandic chairmanship program of the Nordic Council of Ministers.