Strategy 2022

Danish Dairy Research Foundation

Increased competitiveness **through dairy research**

TABLE OF CONTENTS PAGE

Editors: Danish Dairy Research Foundation Board and Grith Mortensen, Danish Agriculture & Food Council (Editor-in-Chief)
Layout: Marianne Kalriis-Nielsen, SEGES
Print: Rosendahls

Summer 2018

Focus areas for dairy research

The aggregate Danish milk production totaled 5.5 billion kg in 2017. The dairy sector plays a significant socio-economic role. Just under 30 Danish dairy plants undertake processing of milk for a range of products sold to customers and consumers in Denmark and on approx. 150 markets worldwide. The Danish dairy sector's sales in Denmark total approx. DKK 10 billion with an export revenue of approx. DKK 20 billion, corresponding to approx. 16 percent of the aggregate export value of Danish foods (2017). In addition, there is a significant, globally-oriented downstream industry with strong connections established with the Danish dairies – to include ingredients, packaging and processing equipment. The dairies and the downstream industry have a long tradition for optimal utilization of raw materials and by-products – i.e. producing more with less – and for supplying safe, natural and healthy products.

Strong research and development collaboration efforts between the dairy sector, knowledge institutions and suppliers are vital in order that the dairies, looking forward, can meet the challenges of tomorrow and thereby remain competitive. Since the Foundation was established in 1990, the dairy sector has invested a DKK amount totaling three-digit millions into research at the universities via the Danish Dairy Research Foundation (DDRF).

The Danish Dairy Research Foundation initiates and coordinates basic research interacting closely with the dairy industry and e.g. universities, hospitals and the suppliers. The projects are pre-competitive in nature and underpin research-based innovation at the dairies – having the result that the dairies are able to boost their competitiveness. The Danish Dairy Research Foundation is a non-commercial foundation administered by the Danish Agriculture Food Council and the Danish Dairy Board.
In addition, the objective of supporting dairy research is to secure relevant, research-based training and education of future candidates, to include dairy engineers, and secure education of PhD's and postdocs of relevance to the dairy industry. The dairy industry feels convinced that a strong and dynamic dairy research environment nourishes strong candidate, PhD and postdoc programs, which also in the future will remain attractive to young people and secure the recruitment basis for the sector.

The Danish Dairy Research Foundation consists of a Board of Directors and a Secretariat. The board consists of 13 members from the dairy industry and the Danish universities. The board establishes the strategic objectives of the foundation which is also reflected in the strategy and the annual call for expressions of interest. The secretariat facilitates – in close cooperation with the researchers – effective implementation of the projects supported and ensures communication of results to the relevant stakeholders.

Thus, 'Strategy 2022 – Danish Dairy Research Foundation' sets out the focus areas for the pre-competitive research to be carried out by the dairies towards 2022.

Enjoy your reading!

Key challenges

In cooperation with the rest of the food industry, the dairy sector is the author of 'World-Class Food Innovation towards 2030 – Bringing Danish Research Solutions to the Global, Sustainable Food Production'. The strategy identifies the following future challenges which, via research and development, underpin the future competitiveness of the sector:

- **Supply of high-quality raw materials in a circular economy** – A substantial increase in the global population and scarcity of raw materials and resources entail that we must produce more with less, secure high utilization and valorization of all product streams and reduce food waste.

- **Products for the global consumer** – Local consumer preferences in a global world and new purchasing and distribution patterns place heavy demands on a diversified portfolio and new ways to secure quality and shelf life, also when the products are outside the cold chain.

- **Food Safety 2.0** – Increased requirements for high and documented food safety levels follow in the wake of an increasing number of food product adulterations, greater risks of rapid spreading of diseases due to globalization and development of new product formulas and production and distribution methods.

- **Foods for a healthier life** – A healthy, individually tailored diet has proven to be one of the solutions to avoid numerous lifestyle diseases, and our diet is key in our efforts to stay top-tuned throughout our entire life. Milk and dairy products play a critical role in providing the essential nutrients.

- **Efficient and agile production** – It is imperative that we continue to develop and invest in digitalization, automation technologies and implementation of new technologies in order to improve productivity, boost capacity utilization and remain competitive.

- **Faster and safer to market through utilization of big data** – Utilization of large and often complicated data streams (big data) will be a determinant relative to innovation and competitiveness of the individual company and sector; therefore, being first movers on this front is also key.

These challenges will also be considered in 'Strategy 2022 – Danish Dairy Research Foundation'.

VISION

The Danish dairy industry has a leading edge within sustainable production of differentiated, safe and healthy milk-based products.

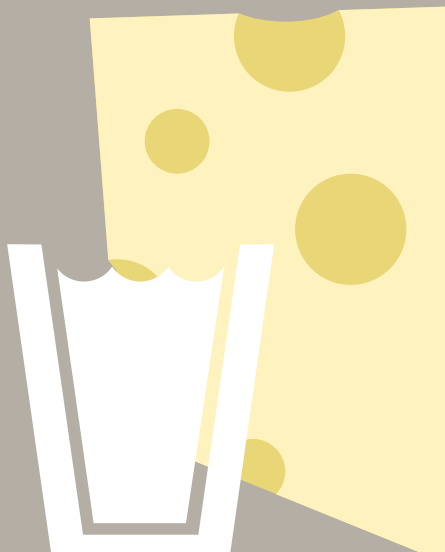
Sustainable production can be described as production in which raw materials and resources are utilized effectively, where production impacts nature and environment minimally and where all value streams are optimally utilized – without compromising on quality and competitiveness.

Differentiated products can be described as products meeting the perceived and unintended needs of the customers.

Healthy products can be described as products that in principle are documented to be nutrient dense, products that can meet the nutritional needs of the consumers and form part of a healthy and varied diet.

MISSION

To stimulate the competitiveness of the Danish dairy industry by supporting high-level dairy research initiatives.



The Danish Dairy Research Foundation supports applied dairy research

Projects must benefit the entire Danish dairy sector. Furthermore, the significant objective of the foundation is to retain and develop dairy-related education programs in Denmark via research-based education.

The research initiatives of the Danish Dairy Research Foundation focus on four strategic core areas:

- Food design, technology & biotechnology
- Food safety & analyses
- Health & nutrition
- Food aid & better food for more people

Interdisciplinary research activities are carried out in collaboration with the Danish Dairy Research Foundation, universities, hospitals, Advanced Technology Groups, and to a great extent relevant dairy partners and other industries. We welcome international cooperation, and the Danish Dairy Research Foundation has a significant role in maintaining international network and collaboration relationships.

The Danish Dairy Research Foundation annually initiates research projects supported by funding totaling DKK 12-14 million. This is done partly via the foundation's own funds and partly via applications submitted to the Milk Levy Fund and the Dairy Rationalization Fund. A typical project will receive funding totaling DKK 1-3 million and generally continues over a 1-5-year period. The Danish Dairy Research Foundation will finance up to 50 percent. The remainder must be provided by the applicant, from external, public and private grants, contributions from participating businesses and/or research institutions. Current focus areas and selection criteria are reflected in the call for expressions of interest. In principle, it is of importance that the projects are high-level research projects, that they have clear objectives and dairy relevance.

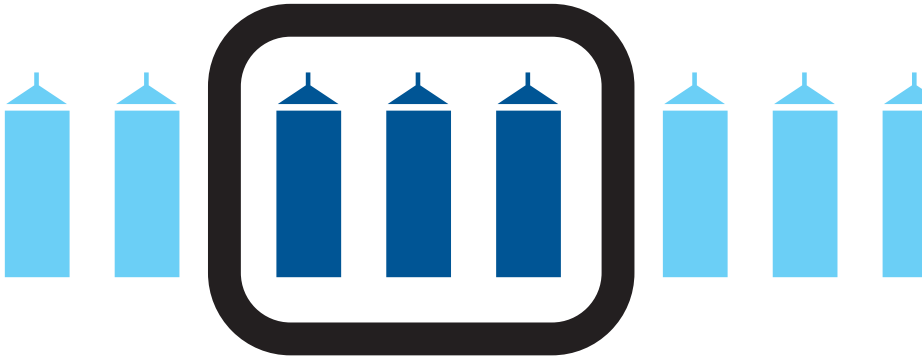
The Danish Dairy Research Foundation does NOT support

The strategy primarily focuses on utilizing the raw milk product from the time it arrives at the dairy until, and inclusive of the time, it is used by the consumers or further processed by the customers. The quality of the raw milk product commands the awareness of the industry and is handled under the auspices of e.g. SEGES Kvæg.

The Danish Dairy Research Foundation does not support projects encompassing product and process development.

For financial reasons, and in principle, the Danish Dairy Research Foundation does not support major equipment investments.

The Danish Dairy Research Foundation does not support projects which solely relate to communication of research results.



This is how the Danish Dairy Research Foundation functions

The primary activities of the Danish Dairy Research Foundation focus on projects. The life of a project and the annual cycle of the foundation are outlined on the next page, schematically shown and subject to changes in schedule. Please also check the Danish Dairy Research Foundation Project Guide, which can be accessed at our home page.

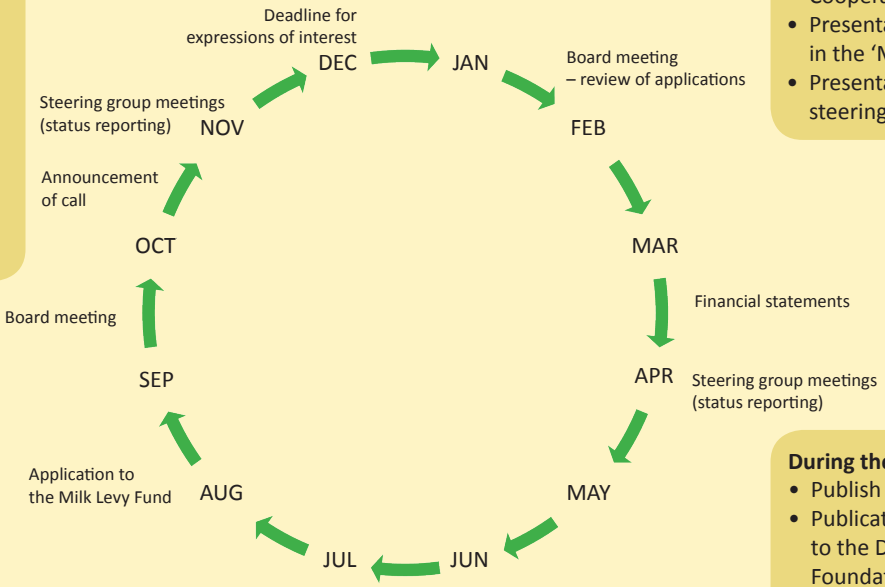
FIGURE 1 It is difficult to make accurate forecasts about the future; however, the 2018 annual cycle of the Danish Dairy Research Foundation looks mainly like the figure depicted on the next page.

At project start:

- Documentation of total financing
- Cooperation agreement
- Presentation of project in the 'Mælkeritidende'
- Presentation of project at steering group meeting.

At project completion:

- Submit final report in writing
- Final oral reporting provided at steering group meeting
- Latest financial statements provided
- Article on project results forwarded to the 'Mælkeritidende'.



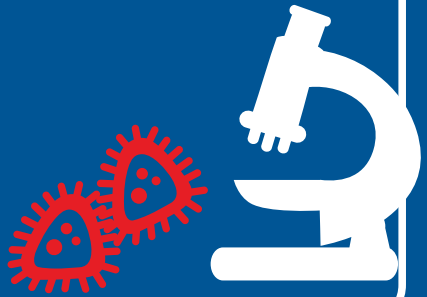
During the project process:

- Publish and disseminate results
- Publications to be forwarded to the Danish Dairy Research Foundation secretariat prior to submission
- Copy of published material to be submitted to the secretariat.

THE FOUR FOCUS AREAS

food design, technology & biotechnology

food safety & analyses

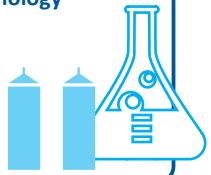


health & nutrition

food aid & better food for more people

The four focus areas are further described at the following pages. They do not constitute a complete list of areas where the dairies have research requirements, but alone reflect focus to be had on significant areas within pre-competitive research – areas where the dairy sector, suppliers, universities, hospitals, etc. hold a much stronger position through concerted efforts.

food design, technology & biotechnology



Food design can be explained as the intentional and systematic design and production of foods all the way down to the molecular level – foods that meet consumer demands.

MASTERING **FOOD DESIGN** is paramount to fulfill consumer and customer demands. It is still vital to understand the molecular properties of the milk ingredients and the way they interact with other components in the food matrix during processing, storage and at the end-user. In addition, we must understand structure, functionality and the interrelationship with sensory analysis and shelf life to develop new eating experiences for consumers and customers. In this way, it will be possible to design natural (clean label) dairy products, healthier dairy products (e.g. bioactive products or products with lower salt or sugar content), high-quality dairy products (e.g. changed or improved texture) and products with longer shelf life.

A better understanding of how processing, packaging and storage impact product quality is also key relative to developing future products and dairy processes.

Biotechnology, to include positive microbiology and fermentation and enzyme technologies, constitute key research areas with a view to developing and controlling the quality of dairy products, to include creating taste and texture experiences addressing different consumer and customer needs. The natural microbiological diversity allows for e.g. development of a range of products with specific taste and texture properties.

There is a heavy demand for tailored foods intended for different types of consumers worldwide. This requires a hyper-flexible production setup and use of the digital potential. In addition, it is important to understand how quality can be secured and controlled through a quality by design approach.

In a world where resources are under pressure, it is important to consider how we can produce more with less, in fact, utilize raw materials – but also resources like water and energy – in the best possible way. In short, address the circular economy concept and establishment of sustainable value chains from raw material to final product. The Danish Dairy Research Foundation wishes to support documentation of dairy products and the function of milk ingredients as set out in the UN Sustainable Development Goals #6, Clean Water and Sanitation, and #12, Responsible Consumption and Production.

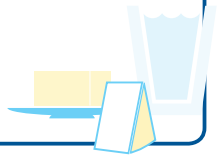
DANISH DAIRY PRODUCTION is characterized by renowned, high food safety standards which are vital for establishing customer and consumer confidence. Therefore, documented high food safety all along the value chain is crucial for getting established on new markets and retaining existing customers. At the same time, new production formulas, modified and longer distribution channels and changed consumer patterns constantly challenge food safety; therefore, it is essential to be at the leading edge relative to food safety. **To understand and be able to predict food safety risks when altering product formula** (e.g. adding new ingredients, reducing sugar/salt content, changing pH or storage temperature) or altering process technologies and packaging constitute a competitive advantage for the dairies.

Documenting that the products are safe to eat is key for establishing and retaining the market position. **New methods for quantitative and qualitative analyses** of product safety, quality and shelf life, and for predicting undesirable growth are key, together with **development of online/at-line technologies** for early control and prediction of product quality and shelf life.

There is a need for establishing **traceability systems** providing transparency through the entire value chain in order to secure documentation of product safety and quality – thereby retaining a high degree of credibility.

The Danish Dairy Research Foundation wishes to support documentation of the role of dairy products and milk ingredients as set out in the UN Sustainable Development Goals #12, Responsible Consumption and Production.

health & nutrition



AN INCREASED PROPORTION OF THE WORLD POPULATION suffers from lifestyle diseases (obesity, Type 2 diabetes, cardiovascular diseases and certain types of cancer), malnutrition, etc. A healthy and varied diet, combined with physical activity, is one of the cornerstones in a healthier lifestyle and is important for improved life quality. Dairy products and their ingredients are important elements in the diet due to their high contents of essential nutrients. **A deeper understanding of the impact the products and their ingredients have on our health, as manifested in the different age groups, is needed**, to include how the diet can be tailored to the individual's needs – from before birth and throughout life.

Focus will be on **which role the dairy products and their ingredients play relative to the growth of children and their cognitive functions, bone health and muscle functions**. In respect of the older group of the population, focus will be on **bone fracture due to osteoporosis,** particularly interacting with development of **age-related muscle loss (sarcopenia)**, and the role of dairy products and milk ingredients relative to **controlling blood glucose**, and the mechanisms behind metabolic syndrome and Type 2 diabetes. Focus is also on the influence of the dairy products and their ingredients on the sensation of **feeling full and on controlling weight**.

It is important to understand **the role of dairy products in the sustainable diet of the future** – i.e. a type of diet allowing for nutritional needs relative to minimal climate impact, minimization of water resources, increased biodiversity and economic and social/cultural aspects.

Finally, **the impact of dairy products and their ingredients, to include lactose, on the intestinal flora**, with children and grown-ups alike, is important with a view to understanding how the composition of the intestinal flora relates specifically to lifestyle diseases and cognition throughout life.

The Danish Dairy Research Foundation wishes to support documentation of the role of dairy products and their ingredients as set out in the UN Sustainable Development Goals #2, Zero Hunger, and #3, Good Health and Well-being.

EXTREME HUNGER AND MALNUTRITION continue to pose enormous barriers to developments in many countries, although the last couple of decades have shown positive developments in this respect. In fact, 2014 estimates indicate that 795 million people were chronically undernourished. Over 90 million children under five years of age were underweight, and every fourth inhabitant in Africa goes to bed hungry.

Research has shown that even small quantities of dairy products or milk components can contribute to remedy critical undernourishment because the nutrient value of the products is of a very high quality.

2.7 billion people live on less than USD 2.50 a day. This emphasizes the need for **research that can support the dairy industry's development of inexpensive but nutritious products** in order to obtain **sustainable solutions to the so-called double burden**, whereby malnutrition during the first year of life can lead to extreme undernourishment and obesity with derived lifestyle diseases.

Specific focus will be on **documentation of economically sustainable foods that can secure better food for more people** – where milk and milk components are significant to the nutrition and health-related character of the products. In addition, it is important to **document the nutrition and health-related effects of the milk components relative to malnutrition** with children (aged 2-12), teenage girls, pregnant and breastfeeding women (the most sensitive groups, as defined by the UN).

The Danish Dairy Research Foundation wishes to support documentation of the role dairy products and milk ingredients play as set out in the UN Sustainable Development Goals #2, Zero Hunger.

WANT TO KNOW MORE?

Please visit our home page. Here you can find information on the secretariat, composition of the board of directors, current and finalized projects, application deadlines and news on research activities. For further information, please visit mejeri.dk/forskning.

Danish Dairy Research Foundation
Danish Agriculture & Food Council
Agro Food Park 13
DK - 8200 Aarhus N
mejeri.dk/forskning