annual report 2021.2022 VS



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Vision

Novalait accelerates the development of scientific knowledge and skills for the dairy industry of tomorrow.

Mission

Novalait ensures-through its leadership, knowledge, and investments in researchthe development and promotion of knowledge to stimulate innovation and foster the sustainable growth of Quebec's dairy industry.

Conception and credits

Redaction: Novalait Design: Isabelle Jobin, graphiste Photos: Les Producteurs laitiers du Canada

A unique business model

Novalait brings together all of the businesses that produce or process milk in Quebec–from small-scale cheesemakers to family farms and multinational companies. They are represented within Novalait by three groups of shareholders. Les Producteurs de lait du Québec hold 50% of Novalait's shares. Agropur coopérative, which represents dairy cooperatives, and the Conseil des industriels laitiers du Québec, which brings together private dairy processors, split the other half of Novalait's shares.

Novalait draws on the creativity and expertise of researchers to respond to the research priorities established by its shareholders. Novalait's committees evaluate the proposals received according to the potential for opportunities and applications on farms and in plants. Novalait invests in the development and monitoring of the R&D projects selected. It collaborates with actors in the sector for the successful transfer of research results.

Novalait involves its shareholders in all of its activities, including:

Establishing research priorities;

- > Selecting and monitoring projects; and
- > Communicating, transferring and applying results.

Shareholding and organizational structure



2021.2022 Board of Directors

Novalait is governed by six directors who represent each of Novalait's three shareholder groups



President Charles Langlois Conseil des industriels laitiers du Québec



Administrator Jean-Marc Bertrand Conseil des industriels laitiers du Québec



Administrator **Chantal Fleury** Les Producteurs de lait du Québec



Administrator Alex Berthiaume Agropur coopérative



Administrator David Poulin Les Producteurs de lait du Québec

A Word from the President

Dear Shareholders,

On behalf of the Board of Directors and the Novalait team, I am pleased to present the 2021–2022 annual report.

Again this year, Novalait maintained its pace of research investment through the continuous development of new projects and funding partnerships. Thank you to the scientific community for responding to Novalait's calls for proposals with an abundant, diversified and high-quality research offer. Thank you to our financial partners for their funding contributions that are essential to project implementation, as well as the added value of their research expertise.

This year, Novalait contributed to responding to a strategic issue in the dairy sector: sustainable development. As part of Novalait's mission since its creation, sustainable development is one of the criteria for the selection of research projects whose benefits are evaluated in economic, social and environmental terms. During the year, Novalait increased its involvement in supporting dairy farmers and processors in the implementation of their commitments towards carbon neutrality 2050. Together with its partners, Novalait developed a letter of intent for Agriculture and Agri-Food Canada's program entitled "Agricultural Climate Solutions – Living

> Novalait increased its involvement in supporting dairy farmers and processors in the implementation of their commitments towards carbon neutrality 2050.

Administrator

Claudine Martel

Agropur coopérative



Laboratories." \$100,000 in funding was granted to Les Producteurs de lait du Québec who mandated Novalait to develop an ambitious carbon-neutral milk living laboratory built on the involvement of dairy farmers and a vast network of community partners and researchers. The initiative aims to validate and develop farming and herd management practices on commercial farms to sequester more carbon and reduce greenhouse gas emissions.

In closing, I would like to highlight the generous and knowledgeable contributions of Novalait's directors. The Board of Directors has been greatly reinvigorated with new directors in recent years. As the outgoing directors pointed out during a recognition activity in spring 2022, Novalait's vision of innovation is unifying and materializes through the actions it takes to serve as a research catalyst Thank you to the management team for their endless enthusiasm.



Charles Langlois President of Novalait

Report from the Executive Director

To maintain a continuous flow of new projects in response to the research priorities established by its shareholders, Novalait is active on several fronts through its involvement with calls for proposals, project development, and the continual fielding of letters of intent. All of these opportunities culminate with the relevance committee for the evaluation and recommendation of funding. In 2021–2022, the relevance committee met six times to evaluate the large number of research proposals received: a total of 22. Once the projects are selected, Novalait supports the research teams to obtain complementary funding, a process that is often long and arduous.

Follow-up is provided on the projects that receive funding at least once a year, from the start-up phase to the final report, by steering committees composed of Novalait shareholder representatives and experts. In 2021-2022, Novalait's steering committees met nine times to review progress with 16 research teams. In addition to these meetings, research chair scientific committees met four times per year.

Novalait's research portfolio is growing, projects are diversifying, the network of researchers is expanding and financial arrangements are becoming more complex. An analysis already underway on the future evolution of Novalait's human resources accelerated with the departure at the end of the fiscal year of Valérie Bélanger, whom we thank for her seven years of exceptional contributions in the position of Knowledge Transfer Coordinator.



Lastly, the management team is pleased to have contributed to obtaining \$100,000 in funding for Les Producteurs de lait du Québec for the development of a Carbon-Neutral Living Laboratory. This far-reaching initiative for the dairy sector will occupy a prominent place in the 2022–2023 agenda.

Thank you to our shareholders and inspiring partners for all of our achievements at Novalait!

Élise Gosselin Directrice générale

Novalait in numbers

Since 1995

Since its creation, Novalait and its partners have invested \$64.2 million in research.

2021-2022

Maintaining a high leverage effect

Commitments by Novalait and its partners to ongoing research in 2021–2022 totalled \$14.2 million, including \$5.9 million for new projects.

Diversification of funding partnerships

The projects that Novalait selects are successful in obtaining government funding for research. Novalait also collaborates with dairy partners from other provinces and other agri-food stakeholders to share the risks and costs of research.



From small to large-scale projects

Novalait invests its funding according to different formulas depending on the objective: solving a targeted problem (team projects); validating R&D results on the farm or in the plant (pilot projects); mobilizing scientific and financial resources to address large-scale issues (initiatives); and creating or renewing research positions (Chairs).





Committee activities

Numerous meetings were held to develop and monitor the R&D projects selected.

08 meetings Board of Directors

99 meetings and 16 projects monitored Steering committees



meetings and 22 project proposals evaluated Relevance Committee



meetings to review Chair progress Scientific committees

Communication

Lait'Xpress

06 newsletters with all the latest news on Novalait's research and activities





Novalait gets involved

The Novalait team is involved in multiple organizations as a committee or board member:

- > Planification stratégique de la filière laitière québécoise
- National Dairy Research Council (Dairy Farmers of Canada)
- > Quebec Cheese Expertise Center (CEC)
- Quebec Consortium for Industrial Bioprocess Research and Innovation (CRIBIQ)
- > Dairy Cattle Committee (CRAAQ)
- > PLC Transfer Committee
- > Fondation de technologie laitière du Québec

Current research projects

Newly launched projects

Alliance Lait

Gisèle Lapointe, Guelph University

Novalait has joined the partners of Alliance Lait, a research initiative in milk microbiology directed by Gisèle Lapointe, a researcher at the University of Guelph. This project brings together the Dairy Farmers of Ontario, Dairy Farmers of Canada, Lallemand Inc., Lactalis Canada and Novalait with the common goal of ensuring dairy product quality and functionality through better control of microbial ecosystems. In particular, the project aims to better understand the impact of on-the-farm management practices on the microbial flora of milk, which in turn influences dairy processing activities. New strategies are needed to ensure animal health and food safety while meeting the objectives of reducing the use of antibiotics on farms. Alliance Lait's multidisciplinary approach is to integrate knowledge throughout the value chain, from production to processing, with potential impacts to improve animal and consumer health. The objectives are based on the four themes of Canada's National Dairy Research Strategy, aimed at developing the capacity to control microbial ecosystems between production and processing and supporting dairy product functionality. The first theme focuses on animal nutrition, through the development of cow feed ingredients that improve feed efficiency while reducing methane emissions. The second theme focuses on animal health and welfare through the development of innovative products to increase the quality of silage, bedding and the animals' environments. The third theme focuses on understanding on-the-farm management practices that influence

processing and milk's shelf life, providing scientific support for developing the regional taste of Canadian cheeses and reducing product loss. Finally, the fourth theme covers strategies for controlling food pathogens and reducing the persistence of antimicrobial resistance genes in the gastrointestinal microbiota of animals and humans. Dairy farmers and processors will benefit from improved communication of the constraints from each perspective with access to advanced genomics data and tools.



Variability of water quality on Quebec dairy farms and its effects on cow performance

Véronique Ouellet, Université Laval

Novalait has teamed with MAPAQ through its Innov'Action program to support this project, led by researcher Véronique Ouellet at Université Laval, which aims to document the variability in quality of dairy cows' drinking water. The research team will focus on the factors affecting variations in water quality and its links with dairy performance, and will propose solutions to maintain and improve water quality. A guide to equip dairy farmers and consultants on solutions to improve water quality will be developed. The project also aims to generate data to design new research on the use of water as a dairy cattle health tool.



Lipid supplementation in dairy cow diet and its impact on the production, composition and technological properties of milk

Rachel Gervais, Université Laval

Dietary supplements containing saturated fatty acids have been marketed to support cows' needs in the early days of lactation. Can their temporary use in cows' rations have an impact on milk's ability to be processed into butter and cheese? The scientific data on the subject is limited and is not sufficient to provide a confident answer to this question. A team from Université Laval, under the direction of researcher Rachel Gervais, a specialist in dairy cow diet, is tackling this challenge in close collaboration with Guillaume Brisson, head of the butter research component, and Julien Chamberland, holder of the Chair in Cheese Technology. The team also relies on the collaborations of Yvan Chouinard and Éric Paquet, also researchers at Université



Laval, as well as Daniel Rico from the Deschambault Animal Science Research Centre (CRSAD). Lactanet also contributes to the project through its extensive database. This research program aims to identify feeding and milking strategies to produce milk with an ideal composition for dairy products and which meets consumer expectations. Trials conducted on a research farm will evaluate the real impacts of different fatty acid supplements on the composition of the milk produced and its ability to make butter or cheese. The team will also investigate whether other foods in the ration or the number of milkings per day can mitigate unintended effects.

Artificial intelligence tool for rapid and accurate identification of pathogenic mastitis and spoilage microorganisms in milk

Arnaud Droit, Université Laval

This project aims to develop a tool to identify pathogenic or deleterious microorganisms present in milk using a combination of artificial intelligence and new mass spectrometry technologies. The approach aims to identify bacterial and fungal species within one to four hours, instead of the 24 hours or more currently required, with results presenting a high level of specificity and sensitivity. The project focuses on the development of algorithms to identify the main bacterial species responsible for mastitis in cows and spoilage microorganisms (bacteria and fungi) contaminating milk in farms and plants, which have an impact on dairy products. This approach has already proven itself in the medical field (detection of bacteria in urine) and would allow for a routine analysis of milk samples to determine if a sample is contaminated, and if so, by which species of microorganisms. This project involves three research teams specialized in veterinary medicine, microbiology, the food industry, proteomics and bioinformatics.

Carbon-Neutral Milk Living Laboratory

Novalait was mandated to develop the partnerships and carry out the co-creation activities necessary for the submission of a Carbon-Neutral Milk Living Laboratory project under Agriculture and Agri-Food Canada's Agricultural Climate Solutions program. The Carbon-Neutral Milk Living Laboratory aims to equip dairy farmers to achieve the carboneutrality objectives they have set for 2050. The heart of the living laboratory will be composed of a network of twenty pilot farms spread over four regions of Quebec. Dairy farmers will determine the most beneficial management practices to sequester carbon and reduce GHGs to be implemented on their commercial farms in collaboration with a team of experts and researchers. This team of experts will conduct studies on the technical feasibility, economic impacts, environmental benefits and factors affecting the adoption of the practices implemented. An ongoing five-year review and feedback process will also serve to improve management practices. Regional and provincial knowledge transfer activities will encourage the adoption of management practices on farms peripheral to the pilot farms, to reach the largest number of dairy farmers.



Current research projects 2021–2022

The projects underway in 2021–2022 include three chairs, several large-scale initiatives and 16 multidisciplinary team research projects.



Innovative practices on the farm

Bacteriocins from lactic acid bacteria: a natural approach to controlling thermoduric bacteria sporulated in silage

Ismail Fliss, Université Laval

Partners: Agriculture and Agri-Food Canada, Dairy Farmers of Canada

Educational Leadership Chair in Sustainable Agricultural Building Design

Sébastien Fournel, Université Laval

Partners: AAFC-MAPAQ Canadian Agricultural Partnership, Association des ingénieurs en agroalimentaire du Québec, Consultants Lemay & Choinière Inc., Consumaj Inc., Équipements Jolco Inc., Alco Group Inc., Industries et Équipements Laliberté Ltée, Harnois Industries Inc., Lactanet Inc., Les Consultants Mario Cossette Inc., Maximus, Intelia Technologies Inc., Zaxe Technologies Inc.





Improving cows' protein diet through new models tested in Quebec

Doris Pellerin, Université Laval Partners: CRIBIQ, NSERC

Optimizing the efficiency of proteins in rations

Cristiano Cortes, Agrinova Partners: CRIBIQ, NSERC

Lipid supplementation in dairy cow feed and its impact on milk production, composition and technological properties

Rachel Gervais, Université Laval Partners: CRIBIQ, MAPAQ

Variability of water quality on Quebec dairy farms and its effects on cow performance

Véronique Ouellet, Université Laval Partners: MAPAQ

Cow welfare, reproduction and health

Using the fatty acid profile of milk to detect and prevent ruminal acidosis in cows

Stéphanie Claveau, Agrinova Partners: CRIBIQ, NSERC

Deciphering the molecular mechanisms behind infertility in lactating dairy cows with subclinical acidosis

Raj Duggavathi, McGill University Partners: CRIBIQ, NSERC

Comparison of cows conceived by *in vitro* fertilization and artificial insemination on fertility, health and productivity criteria

Marc-André Sirard, Université Laval Partners: CRIBIQ, NSERC, Boviteq

NSERC–MAPAQ–NOVALAIT-DFC Industrial Research Chair in Biosafety of Dairy Production

Simon Dufour and Juan Carlos Arango Sabogal, Université de Montréal

Partners: NSERC, MAPAQ, Les Producteurs de lait du Québec





Process technology and eco-efficiency

Educational Leadership Chair in Cheese Technology

Julien Chamberland, Université Laval

Partners: AAFC-MAPAQ Canadian Agricultural Partnership, Agropur coopérative, Centre d'Expertise Fromagère du Québec, Conseil des Industriels Laitiers du Québec, Lactalis, Saputo

Valorisation of co-products

An eco-efficient approach to valorizing buttermilk

Guillaume Brisson, Université Laval Partners: CRIBIQ, NSERC

Prospective study on the valorization of non-fat milk solids and processing co-products

Alain Doyen, Université Laval Partners: CRIBIQ, Canadian Dairy Commission

Alternatives for the preservation of dairy products

Identifying bioprotective cultures that extend the shelf life of dairy products

Marie Filteau, Université Laval Partners: CRIBIQ, NSERC

Development of antifungal ingredients based on natural antimicrobials for the preservation of grated cheese

Monique Lacroix, INRS, Institut Armand Frappier Partners: MAPAQ, Ministère de l'Économie et de l'Innovation, collectif agroalimentaire

Development of a smart platform to identify multifunctional natural ingredients

Salwa Karboune, McGill University Partners: MAPAQ, Ministère de l'Économie et de l'Innovation, collectif agroalimentaire

Development of active packaging solutions for the prolonged preservation of food products

Richard Silverwood, Polytechnique Montréal Partners: MAPAQ, Ministère de l'Économie et de l'Innovation, collectif agroalimentaire

Milk quality

How do milk's natural microflora and composition contribute to cheese quality?

Steve Labrie, Université Laval Partners: Agriculture and Agri-Food Canada, Dairy Farmers of Canada

Presence and impact of microbial biofilms on milk quality, from the farm to dairy plants

Denis Roy, Université Laval Partners: Agriculture and Agri-Food Canada, Dairy Farmers of Canada

Creation of a collection of microorganisms associated with non-compliant and atypical dairy products

Julie Jean, Université Laval Partners: CRIBIQ, MAPAQ

Alliance Lait

Gisèle Lapointe, University of Guelph Partners: NSERC, Dairy Farmers of Ontario, Dairy Farmers of Canada, Lactalis, Lallemand Inc.



Naturalness of food products: better understanding consumer perceptions and behaviours

Joanne Labrecque, HEC Montréal Partners: MAPAQ, Ministère de l'Économie et de l'Innovation, collectif agroalimentaire

For more information on each project, visit <u>novalait.ca</u>



Novalait Research Catalyst

275 rue du Parvis, suite 508 Québec (Québec) G1K 6G7

novalait.ca

