ANNUAL REPORT 2017.2018

Novalait

Research Catalyst

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COMPANY PROFILE

A STRONG VISION

Created by **Quebec dairy farmers** and **processors** to invest in research, **Novalait** develops solutions and the **expertise** that dairy companies need to innovate.

A UNIQUE BUSINESS MODEL

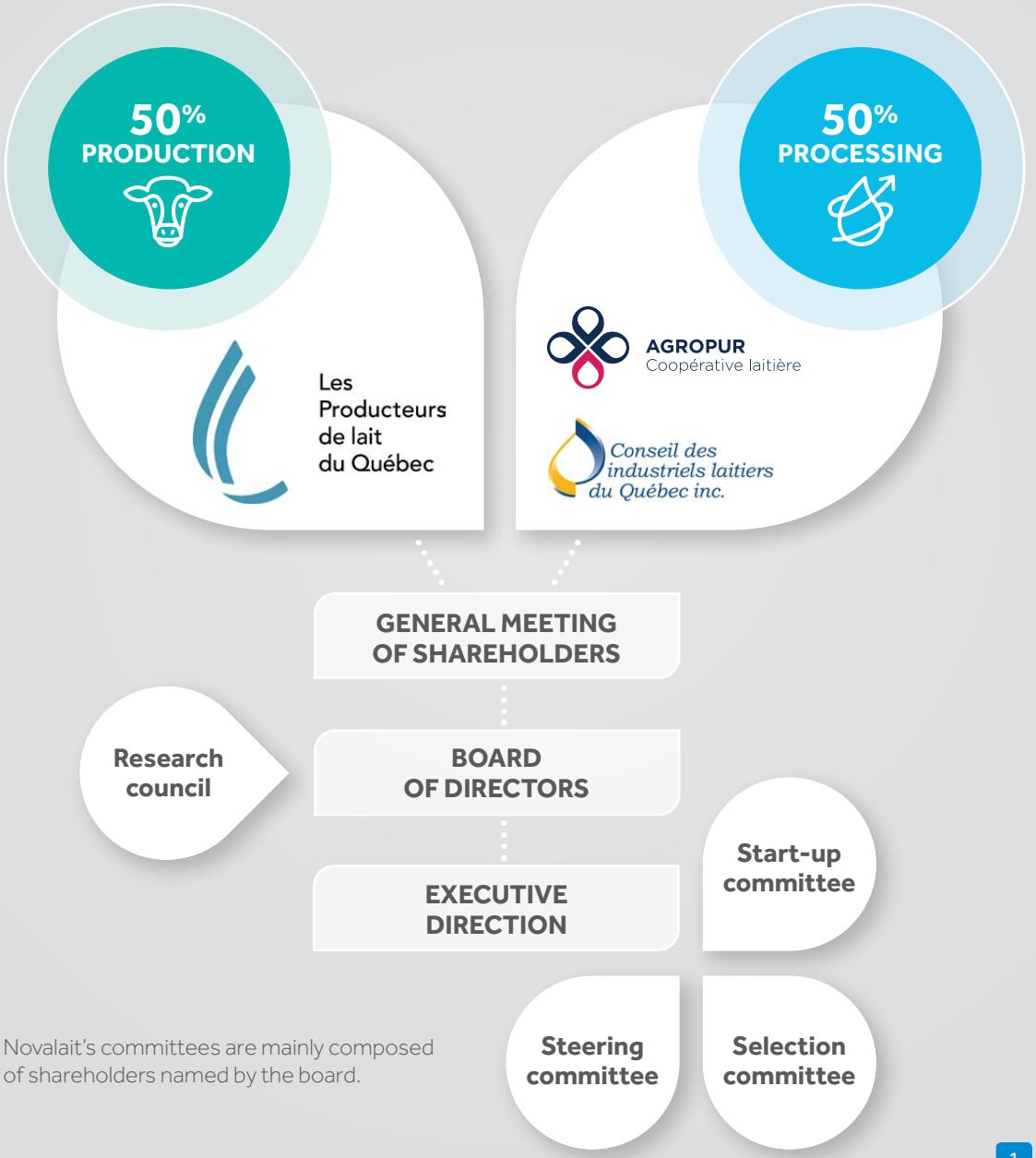
Novalait brings together all businesses that produce or process milk in Quebec – from small-scale cheese factories to family farms to multinational companies – making contributions to the research investment fund equivalent to ¢1.27/100 l of managed milk. They are represented within Novalait by three groups of shareholders. Les Producteurs de lait du Québec holds 50% of Novalait's shares. Agropur Cooperative, 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.

Calling upon the creativity and expertise of researchers from all disciplines and horizons, Novalait ensures that it meets its shareholders' research priorities. Novalait's committees evaluate the proposals received according to the potential for commercial 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 transfer of research results. In everything it does, Novalait aims to optimize benefits for dairy farmers and processors.

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

- **Establishing research priorities**
- **Selecting and monitoring projects**
- **Transferring research results**

SHAREHOLDING AND ORGANIZATIONAL STRUCTURE



Novalait's committees are mainly composed of shareholders named by the board.

BOARD OF DIRECTORS
2017-2018

Novalait is governed by six experienced administrators who represent the three groups of Novalait shareholders.

President
Charles Langlois
Conseil des industriels laitiers du Québec

Vice-President
Simon Robert
Agropur coopérative

Administrator
Alain Brassard
Les Producteurs de lait du Québec

Administrator
Michel Couture
Agropur coopérative

Administrator
Geneviève Rainville
Les Producteurs de lait du Québec

Administrator
Carole Thibault
Conseil des industriels laitiers du Québec

A WORD FROM THE PRESIDENT

Out-of-court settlement with the Canada Revenue Agency

On November 24, 2017, just a few days before their hearing at the Tax Court of Canada, the Canada Revenue Agency (CRA) and Novalait reached an out-of-court settlement. We must recall that, in 2012, the CRA refused to grant Novalait tax credits claimed on its R&D expenditures. Since its creation in 1995, Novalait's R&D expenditures always qualified for tax credits, both at the federal and provincial levels. Believing that its rights had not changed, Novalait appealed the CRA's decision to the Tax Court of Canada. The out-of-court settlement ended the appeals process. In the months that followed, the CRA reassessed the five years in dispute, from 2012 to 2016, and paid out the credits granted.

In addition to providing extensive documentation on its research projects and management practices, Novalait was able to rely on the solid testimony of its founders, directors, experts on its committees and research partners. Their unanimous support of Novalait's business model was critical to the dispute's outcome.

An enthusiastic response to the 2018 Forum Techno

The 2018 edition of the Forum Techno attracted a record number of participants. Many were filled with optimism about the benefits that Novalait's key event could bring to their companies. Through presentations and interviews, participants enjoyed learning about students' motivations and the practical expertise acquired during their research. Participants also connected to a network of leading researchers mindful of the dairy industry's priorities. Attendees came away from the event with new ideas and avenues to explore for better milk production and processing.

REPORT FROM THE EXECUTIVE DIRECTOR

Élise Gosselin, CEO
Charles Langlois, president of Novalait

AT THE FORUM TECHNO, PARTICIPANTS ENJOYED LEARNING ABOUT STUDENTS' MOTIVATIONS AND THE PRACTICAL EXPERTISE ACQUIRED DURING THEIR RESEARCH. ATTENDEES CAME AWAY FROM THE EVENT WITH NEW IDEAS AND AVENUES TO EXPLORE FOR BETTER MILK PRODUCTION AND PROCESSING.

Diversifying our resources ... to support students

The Canadian Dairy Commission (CDC) has granted Novalait an envelope of $500,000 to manage a scholarship program in Quebec. Novalait is responsible for launching the calls for applicants and selecting scholarship recipients based on their abilities and the relevance of their research topics. It is the third scholarship program that the CDC has entrusted to Novalait. Previous competitions have resulted in 32 scholarships, a total financial support of $1,250,000 for the training of new dairy experts. Most of the scholarship recipients have pursued a career in the industry or with suppliers, providing technical support to dairy farmers. One of the recipients is now a researcher.

... to fund research

New commitments made by Novalait and its partners in 2017–2018 to four research projects total $1,005,933. The Quebec Consortium for Industrial Bioprocess Research and Innovation (CRIBIQ) funds up to 40% of the project costs. As part of this collaboration with CRIBIQ, all of Quebec's dairy farmers and processors can take advantage of the consortium's services and R&D funding programs, with no registration fee required. The partnership also highlights the participation of farms and plants in research since funding from the Natural Sciences and Engineering Research Council matches the in-kind contribution from dairy companies, in addition to Novalait's contribution. A new call for research projects was also launched this year.

... to bring results

Novalait received a grant from MITACS to fund a post-doctoral fellowship with the goal of finalizing a software prototype for the evaluation of the eco-efficiency of milk processing methods. The potential uses of the prototype garnered a large amount of interest at the Forum Techno. The objective is to make the software accessible to the dairy industry and to make sub-licencing possible for non-dairy applications by agri-food companies.

Strategic planning

Novalait began a strategic planning process that will be completed in 2018–2019. This exercise complements the sectoral strategic planning currently underway in the dairy industry.

2017–2018 Summary

As we review this particularly intense and productive year, it is striking to note the exceptional results that the dairy industry derives from its limited but judiciously invested funds for research. Since projects are selected based on the potential benefits to all dairy farmers and processors, every dollar that Novalait invests in research is matched by public funds. Long-term investments have secured a network of researchers and a pool of students interested in and curious about the challenges faced by dairy farms and plants. Research findings and solutions are often the result of a continuous exchange of ideas and strategies.

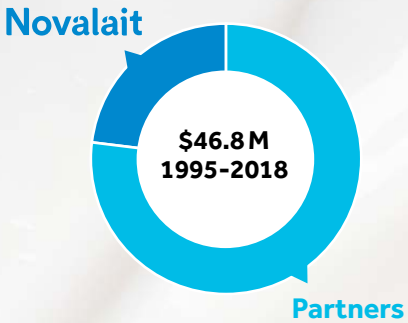
To conclude, we would like to highlight the small team behind Novalait that relies on the exceptional work of the dairy farmers and processors involved in our many committees. Their expertise is essential to developing, selecting and guiding research according to the challenges faced by the sector. Thank you to the researchers and students for expressing their enthusiasm and creativity in our calls for projects. Lastly, we would like to thank the members of the Board for their continued commitment and rigorous governance.

NOVALAIT IN NUMBERS

R&D OVERVIEW 1995–2018

Total investment in R&D

Since 1995, Novalait and its partners have backed 115 research projects, a total investment of $46.8 M.

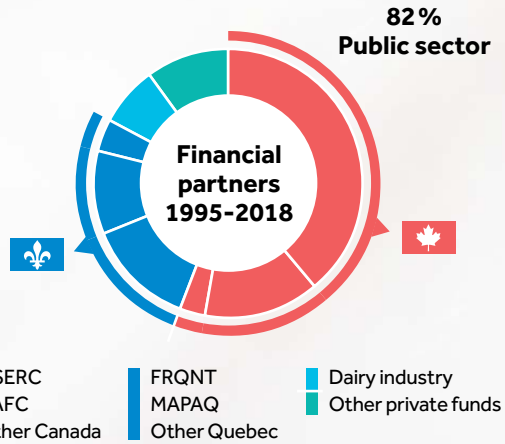


Investment leverage

For every $1 invested in research, Novalait on the whole obtained more than $3.50 in funding thanks to the partnerships developed.

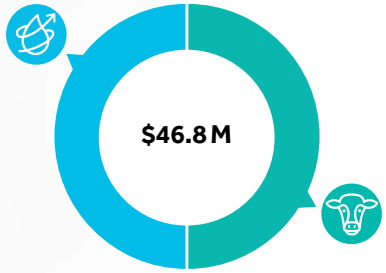
Novalait's financial partners

Since Novalait's creation, more than 50 organizations have contributed funding to research projects. Eighty-two percent of these funds come from the public sector.



Investments in dairy production and processing

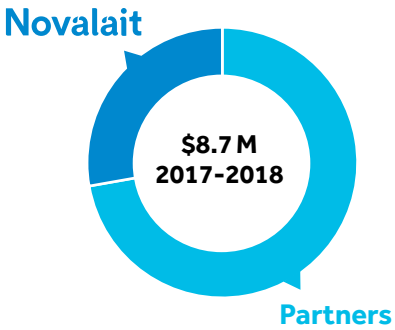
Novalait selects research projects based on merit, without considering the sector to which their results apply. The investment ratio by sector varies from one year to the next, based on opportunities. However, since its creation, Novalait's funds have been equally distributed between dairy production and dairy processing.



R&D OVERVIEW 2017–2018

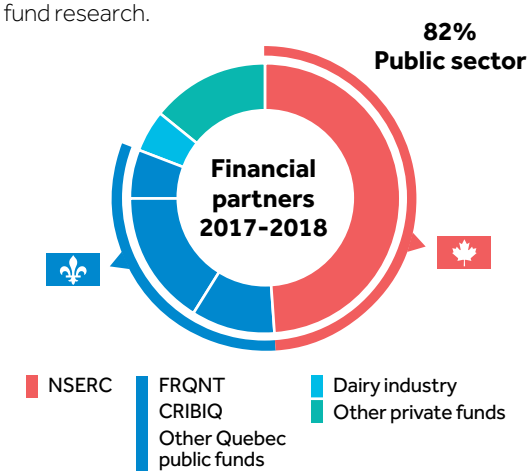
Investment in R&D projects currently underway

Novalait and its partners invested a total of $8.7 M in 15 projects and three chairs underway in 2017–2018.



Evolution of financial partnerships

The 1995–2018 global portrait presents changes in the composition of Novalait's partners. In recent years, NSERC has become Novalait's main partner at the federal level. At the provincial level, CRIBIQ ranks at the top. Novalait also seized the opportunity to invest in research with suppliers in the industry and other industry sectors that share the same scientific challenges. Novalait was able to maintain its powerful financial leveraging and adjust to these changes by developing new collaborations to fund research.



Highlights 2017–2018

Novalait's expert committees are responsible for evaluating proposals and supervising its R&D projects. This fiscal year, Novalait organized 12 committee meetings to evaluate 19 research proposals and analyze the results of 3 chairs and the 15 R&D projects underway. Thank you to the dairy farmers and processors who make up the largest part of Novalait's committees.

Startup of 4 new R&D projects

$1,005,993
invested in total

13 farms
involved

5 students
will be trained
4 master's students and one PhD student

COMMUNICATIONS

New at Novalait.ca

23%
Increasing number of visitors

60%
Visitors come through natural referencing

Lait'Xpress

6 newsletters published
More than 300 subscribers

Subscribe today!

FORUM TECHNO 2018

More than 180 participants
A record attendance!

RESEARCH

NEWLY LAUNCHED PROJECTS

First Novalait–CRIBIQ special call for proposals brings results

Not long ago, Novalait and the Quebec consortium for industrial bioprocess research and innovation (CRIBIQ) decided to come together to fund research projects responding to the priorities established by dairy farmers and processors. The first call for proposals resulted in the implementation of projects with strategic potential.

Projects selected based on the potential benefits for dairy companies

Novalait first evaluates the research proposals in terms of their capacity for development or problem-solving on farms or in dairy plants. The evaluators are experts in the sector designated by the dairy industry. The projects retained are then analyzed by scientific committees recruited from Canada and abroad based on the research expertise required.

Detecting ruminal acidosis through milk analysis

Being able to quickly screen for the early detection of ruminal acidosis would be a major asset for dairy farms. Unfortunately, this silent disease is often difficult to diagnose and expensive to treat. Intensive herd management increases the risk of experiencing an episode, specifically for highly productive cows and cows at the start of lactation. This research aims to develop an easy-to-use, inexpensive test based on an analysis of the milk's fatty acid profile. The experimental protocol implemented on 11 commercial farms calls for large-scale data collection–no less than 3,000 milk samples will be analyzed. Thank to you to the innovative dairy farmers who have opened their doors to this valuable research.

NO LESS THAN
3,000
MILK SAMPLES WILL BE ANALYZED

Is alfalfa with increased digestibility profitable?

Dairy farmers are still showing great interest in better alfalfa cultivars, especially those that are selected for their increased digestibility. But is the investment worth it? This project aims to evaluate the growth and yields of these varieties in Quebec's climatic conditions, as well as their performance in dairy cow rations. It will also measure the economic impact of using this type of alfalfa on farms in Quebec.

Choosing the best heifers thanks to growth data

Early heifer selection is not an easy task, given that they're only in their second week of life. Farmers could nevertheless make better choices if the animals' growth parameters were more precise. This research will compile measures such as feed consumption, average daily weight gain and weight assessments on young heifers using tape measures. We would like to thank the dairy farmers who have made their 500 female calves available for data collection. By the end of the study, dairy farmers will have a new tool that will allow them to choose their heifers earlier, in addition to providing data on the economic impact of early selection.

A home-style protein diet for Quebec's cows

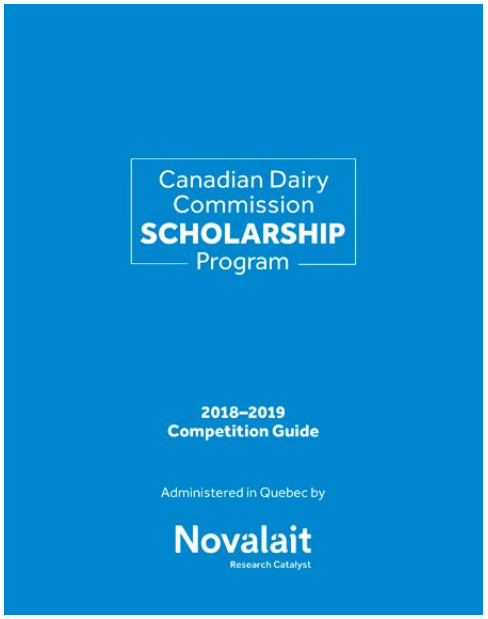
A healthy diet for dairy cows is based on the efficient use of protein, which is expensive. Farmers must be able to meet their animals' needs while giving them only what they need and avoiding surpluses that go to waste. It is possible to reduce the amount of raw protein in rations without compromising milk yield while optimizing the quantity of amino acids available to the cow. The goal of this research is to validate this concept in three dairy ration formulation models. It presents a unique advantage by comparing the predicted values to the values actually observed on Quebec dairy farms. The project will integrate the positive results produced over several years of research on the efficient use of proteins in cow rations.

THIS RESEARCH WILL PROVIDE CRUCIAL INFORMATION BY COMPARING THE PREDICTED VALUES TO THE VALUES ACTUALLY OBSERVED ON QUEBEC DAIRY FARMS.

New Canadian Dairy Commission scholarship program in collaboration with Novalait

The Canadian Dairy Commission (CDC) has entrusted Novalait with the administration of its scholarship program in Quebec. The program came into effect on April 1, 2018, for a period of three years. Novalait was granted a budgetary envelope of $500,000 and launched a first call for applications in fall 2018. The scholarships offered can reach up to $20,000 per year for two years for full-time master's studies, and $30,000 per year for three years of PhD studies.

The CDC has provided this financial support to promote the development of highly qualified, diversified workers able to respond to the current needs of dairy farmers and processors.



CURRENT RESEARCH PROJECTS 2017–2018

Fifteen research projects and three industrial research chairs generated a substantial amount of research activity in 2017–2018. The projects currently underway are grouped according to the different partnerships developed by Novalait to fund them.

PRODUCTION PROCESSING

Industrial Research Chairs

CRSNG NSERC

2016 2020 **In Sustainable Life of Dairy Cattle**
Elsa Vasseur, Université McGill

Novalait

2016 2021 **Metabolic Activity and the Functionality of Bioprotective Lactic Cultures**
Ismail Fliss, Université Laval

Novalait

2014 2018 **On Process Efficiency in Dairy Technology**
Yves Pouliot, Université Laval

Novalait

Partnership agreement for innovation in dairy production and processing

NOVALAIT – FRQNT – MAPAQ [2011-2017]

2014 2017 **Improving fodder grass in the context of climate change**
Édith Charbonneau, Université Laval

2013 2016 **Impact of the dynamics of the process and composition of fermented dairy products on their stability and rheological qualities**
Sylvie Turgeon, Université Laval

2013 2017 **Prevalence of microorganisms in silage and raw milk and their impacts on dairy product quality**
Denis Roy, Université Laval

2014 2017 **Greek yogurt production and its impacts on co-products**
Gisèle Lapointe, Université Laval

2014 2017 **Systems biology applied to cheddar**
Sylvain Moineau Université Laval

2014 2017 **Improving eco-efficiency in milk processing by optimizing the usage of milk components: the case of Greek yogurt**
Yves Pouliot, Université Laval

NOVALAIT – CRIBIQ – FRQNT [2015-2020]

2016 2018 **Improving the history of health and fertility traits in dairy cattle**
Claude Robert, Université Laval

2016 2019 **Pushing back the insemination of cows in metabolic stress to day 120: an idea to validate for the health and profitability of herds**
Marc-André Sirard, Université Laval

2017 2020 **Can milk analysis predict the level of well-being and health of dairy cows?**
Elsa Vasseur, Université McGill

2017 2020 **Recycled manure bedding: recommendations for safe use to protect milk quality**
Simon Dufour, Université de Montréal

2016 2019 **Searching for the microflora of local milks and cheeses**
Steve Labrie, Université Laval

NOVALAIT – CRIBIQ [2016-2021]

2018 2021 **Using the fatty acid profile of milk to detect and prevent ruminal acidosis in cows**
Stéphanie Claveau, Agrinova

2018 2021 **New avenues for the early selection of heifers and better calf management**
Édith Charbonneau, Université Laval

2018 2021 **Improving cows' protein diet through new models tested in Quebec**
Doris Pellerin, Université Laval

2018 2021 **The benefits of using new, more digestible alfalfa for Quebec's dairy farms**
Caroline Halde, Université Laval

RESULTS

Four projects came to a close during 2017–2018, and three industrial research chairs continued their research activities. The results that follow will drive further innovation for farms and dairy plants.

Production

Climate change-resistant grass

In Quebec, experts are predicting a lengthening of the growing season combined with a considerable increase in thermal units, which vary from region to region. Timothy grass is the most widely used grass in Quebec, but its regrowth gradually decreases after the first cutting. It is a plant that does not tolerate drought or heat, and its harvest periods are now less synchronized than before with alfalfa's harvesting periods. The team led by Édith Charbonneau, a professor at Université Laval, gave itself the challenge of finding an alternative solution.

The project aimed to evaluate whether replacing timothy grass with tall fescue, meadow fescue or meadow bromegrass would affect cows' dairy performance. The test compared four different rations consisting of either a single grass or each species mixed with alfalfa. Each of the rations was served in the form of haylage. Testing the fescue also responded to dairy farmers' concerns regarding the palatability of the fodder.

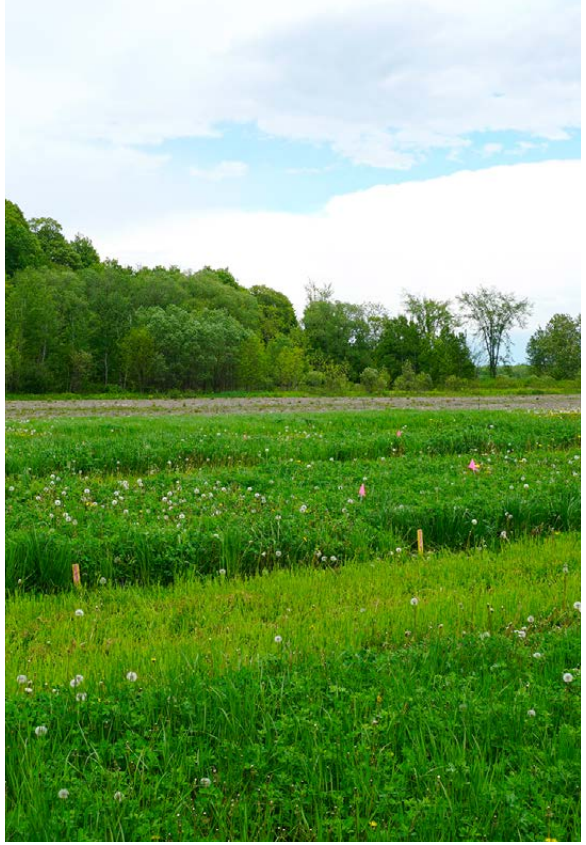
The results are convincing. The cows consumed just as much timothy grass as they did fescue and meadow bromegrass, without any impact on their food intake. They nevertheless preferred the alfalfa/timothy grass and alfalfa/fescue mixes. With these mixes, the voluntary consumption of dry matter increased, as well as forage milk and milk production. These clear results serve to support the longstanding practice of using fodder mixes on Quebec dairy farms.

Semi-dry tall fescue silage

Timothy grass and alfalfa haylage

The project also studied the ideal method for preserving fescue by testing two forms of the grass's rations: haylage and semi-dry silage. The test produced surprising results. The voluntary consumption of dry matter decreased for semi-dry silage compared to haylage. However, this decrease did not reduce milk production, which remained stable.

The modelling exercise also made it possible to quantify the impact of these different diets on a farm's net profit. The alfalfa/fescue mix proved comparable to the alfalfa/timothy grass mix. An interesting fact: harvesting the grass mixes at the early-bloom stage of alfalfa maximizes profits.



TALL FESCUE COULD EFFECTIVELY REPLACE TIMOTHY GRASS TO FEED DAIRY COWS IN THE CONTEXT OF CLIMATE CHANGE.

Industrial Research Chair on Sustainable Life of Dairy Cattle

Optimizing cow comfort in tie-stalls: such is the mission of the chair on the sustainable life of dairy cattle supervised by researcher Elsa Vasseur from McGill University. The team has been a scientific leader for dairy farmers for more than three years. From developing experiments to interpreting their results, it is regularly in touch with farmers and advisers in the field. The chair has also trained more than 20 students. Here are the first of its research findings on improving cow well-being.

Tie-rail position

Tie-rails can limit a cow's movements when standing up and laying down, in addition to causing neck injuries. The chair tested four height and position combinations for this component. To date, none of the positions have reduced injuries, which were displaced along with the bar. Installing the tie-rail 14 inches away from the animal was not enough to reduce the amount of pressure on the neck. Creativity is therefore in order to find the ideal position as well as a material that reduces the number of repeated contacts. The good news is that, with each change in the tie-rail position, sleep quality improved starting the third week, which shows that the cows are able to adapt to the system.

100 cm chain on the left and 60 cm chain on the right

Paying out the chain

With a longer chain, do cows explore their environment more and move around more easily in their stalls? Farms in Quebec normally use a 60-cm-long chain. The research team tested chains measuring both 100 cm (the current recommendation) and 140 cm. The cows did not experience fewer injuries, but they were able to lie down faster, which suggests that they were more comfortable. These results confirm the rationale behind extending the chain to 100 cm, as recommended. Why not try it on a few cows to see how they like it!

Better rest before calving

The research team also examined alternatives to tie-stalls for animals in the dry-off period in preparation for calving. It compared the behaviour of cows housed in pens to those in stalls. The cows in pens did not spend more time resting, but they adopted a larger number of postures associated with relaxation, which indicates they were more comfortable and were getting better rest. Housing cows in dry-off pens therefore helps them get in better condition for the next lactation. This practice has already been adopted by Quebec dairy farmers.

Aerial view of a cow in posture associated to relaxation

To stay up-to-date on the chair's activities, subscribe to the blog cowlifemcgill.com or visit novalait.ca

Processing

Rich and velvety stirred yogurt

Stirred yogurt undergoes multiple production stages before it arrives on grocery store shelves. Researcher Sylvia Turgeon and her team at Université Laval tested specific combinations to establish a link between the composition, resistance, shearing and quality of the final product. In an innovative approach, all of the parameters were tested on a testbed that reproduced industrial production conditions.

The research team discovered that milk composition modulates the properties of stirred yogurt. The higher a product's fat content, the more it conserves its homogeneity, firmness and viscosity when stored at 4 degrees Celsius. These characteristics that guarantee a silky texture are also modified by certain production stages. In fact, yogurt develops different properties if the smoothing stage is completed either before or after chilling.

As a result, the project has helped improve the efficiency of the stirred yogurt production process by gaining better control over its parameters. Processors will eventually be equipped with indicators to analyze their production process and accelerate the development of new formulations. Already, they can utilize the testbed—another benefit of the study—to test yogurts and other products in pilot projects.

Processing

Industrial Research Chair on Process Efficiency in Dairy Technology

This chair aims to develop an innovative industrial approach to optimizing eco-efficiency in dairy production processes. In 2017–2018, the research team led by Yves Pouliot, a professor at Université Laval, continued its research activities for a fourth year. Three young professionals obtained their diplomas during that time. Many new results were also presented at the Forum Techno. Here are just a few.

Cheesemaking properties of dairy concentrates

Controlling for dairy concentrates obtained through ultrafiltration or reverse osmosis remains a major challenge in cheesemaking. To better understand the differences between the two processes, the chair evaluated how the addition of salt and lactose to concentrates affects rennet coagulation and cheese properties. Salt was shown to increase coagulation time while decreasing the maximum firming speed. It also reduced fat retention and, as a result, cheese yield. The addition of salt therefore has a significant impact, similar to the use of a reverse osmosis concentrate. On the other hand, the addition of lactose had little impact on the concentrates' properties. The researchers were therefore unable to identify the differences obtained through ultrafiltration versus reverse osmosis.

Filtration model system, Université Laval

The fight against biofilms

Biofilms that form on the surface of milk filtration membranes are gradually revealing their secrets to the research team. Using a bioreactor, tests helped determine the growth stages of these microorganism films according to temperature. Cold temperatures proved effective in slowing their formation. It was revealed that an exponential bacterial growth phase begins after 7 to 10 hours of membrane functioning. At 50 degrees Celsius, spore-forming bacteria appeared around the tenth hour of use. The end result: a useful indicator to determine how long the material can be used until it must be cleaned.

Eco-efficiency software

During the year, a number of processors participated in the validation of a software prototype for evaluating milk processing eco-efficiency. The software has been shown to generate mass and energy balances similar to those observed in industrial conditions. The software is currently in the process of being scaled and optimized.

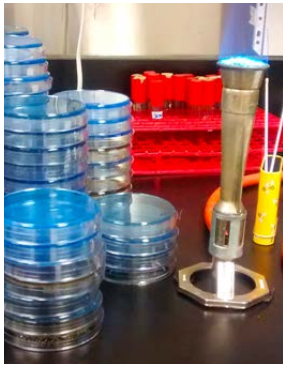
An antioxidant ingredient derived from Greek yogurt?

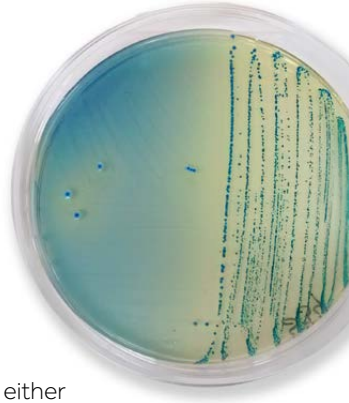
High protein content (HPC) yogurt, commonly known as Greek yogurt, has gained in popularity among consumers in recent years. However, its development generates a by-product: whey permeate. The team led by researcher Gisèle LaPointe, from the University of Guelph, has developed an innovative way to add value to this resource.

The technique consists of adding cereal fibres to the whey permeate and letting the mixture ferment. The result is a bio-ingredient that's rich in polysaccharides (compounds that present numerous health benefits) and has a high antioxidant potential. Thanks to biological recycling, valorizing the by-product requires less energy and resources for fermentation. It remains to be seen through a pilot project if it is possible to produce this value-added substance in industrial conditions.

ADDING CEREAL FIBRES TO THE WHEY PERMEATE AND LETTING THE MIXTURE FERMENT.

In addition, the scientific team examined the impact of two manufacturing processes on HPC yogurt's microbiological and sensory quality, as well as its probiotic cultures. The work revealed that centrifugation promotes the survival of probiotic strain *Lactobacillus helveticus* R0052. Ultrafiltration, for its part, reduced concentrations of the contaminant *E. coli*, as well as lactose content.





From silage to cheese: the journey of bacteria

The microbiological quality of milk is a constant concern both on the farm and in the plant. Some lactic acid bacteria strains contained in cow rations can also be found in unpasteurized milk. The research team led by Denis Roy, a professor at Université Laval, has developed a protocol to determine the prevalence and diversity of microorganisms in silage and unpasteurized milk, as well as their effect on dairy product quality.

The research team visited 24 farms to collect hay or grass and corn silage samples that were either uninoculated or inoculated with lactic acid bacteria. It then analyzed the milk produced. The milk proved to contain bacteria that were also present in the silage and hay at a rate of 50 to 80%. However, certain species were much less prevalent in unpasteurized milk, such as *Lactobacillus buchneri*, which is very common in silage. The study also confirmed that the inoculation practices used by dairy farmers are safe since there is a lower chance of transmitting undesirable microbes to milk from processed silage.

Two lactic acid bacteria strains, *Lactobacillus casei* and *Lactobacillus plantarum*, were shown to be heat resistant and did not disappear with pasteurization. They did not affect the acidification process. However, in a curd model, they produced volatile compounds during the ripening stage which can influence the taste and texture of cheese in the making.

While lactic acid bacteria are generally very useful, certain species can prove harmful in cheesemaking. These results present new avenues for helping processors identify suspects when a defect arises.

To learn more, consult the French article in the journal Le Producteur de lait québécois, no. April 2018

Metabiolac Industrial Research Chair in Metabolic Activity and the Functionality of Bioprotective Lactic Cultures

Leveraging the antimicrobial power of lactic acid bacteria is the mission of the Métabiolac chair, supervised by researcher Ismail Fliss at Université Laval. The team has already trained more than a dozen graduate students. Among its findings, it has identified a number of lactic acid bacteria strains whose antibacterial and antifungal activities help combat pathogenic flora and alterations in dairy products. Here are two concrete applications that are in the process of being validated.

Putting a stop to butyric swelling in cheddar

Clostridium tyrobutyricum is the main agent responsible for butyric swelling, a developmental defect that creates large bubbles and cracks in cheeses. The chair found eight lactic acid bacteria that show strong potential for preventing its growth in cheddar. Biocompatibility tests with starter cultures were completed on model cheeses, and the protective effect proved positive. It is a step in the right direction in the quest for a natural alternative to the use of nitrates to prevent swelling. The next step will be to validate the effectiveness of isolates in cheesemaking on the pilot scale.

Preventing yogurt contamination

Mould is a major source of alteration in dairy products. Currently, the industry is looking for alternatives to the chemical agents used to control the problem. The chair has identified bacterial strains that produce reuterin, a compound that demonstrates antifungal activity. Two of the strains, at high concentrations, inhibited the growth of mould for 21 days. At a lower concentration, fungal development was delayed by three days. A future pilot project will validate the effectiveness of reuterin in yogurt production.

Next steps

The chair is continuing its research to optimize the use of protective cultures that improve the production of natural antimicrobials and their purification. To date, eight compounds of interest to the dairy sector have been discovered. An innovative application is also in the process of being developed to control bovine mastitis.

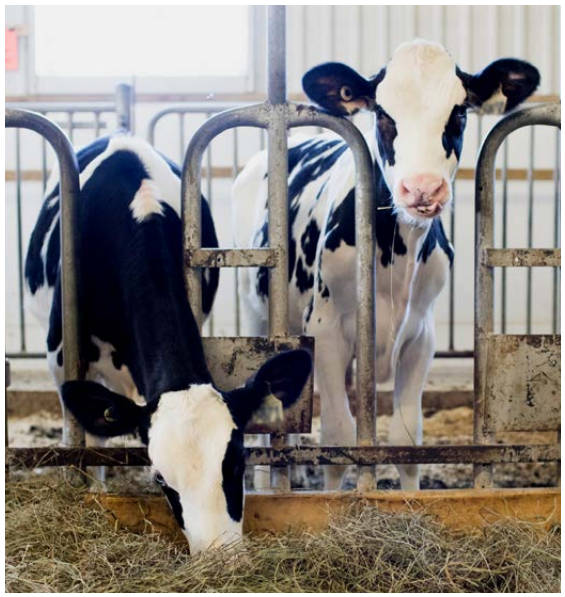
IMPACTS AND BENEFITS

PROMISING PROFESSIONALS FOR THE DAIRY INDUSTRY

Novalait is continuously looking for ways to transfer the knowledge and techniques–developed through the research it funds–to the dairy industry. The professionals trained at the master's and PhD levels, as well as in other capacities, represent an extraordinary resource. Here are four perfect examples!

An agrologist trained on industry issues

As part of her master's studies at Université Laval, Anne-Marie Richard demonstrated that cows take a liking to specific rations containing either tall fescue or timothy grass. Fescue presents better agronomic potential in the context of climate change. Ms. Richard believes that rolling up her sleeves and working with the cows helped her gain a better understanding of the issues faced in the dairy sector.



Anne-Marie Richard

P.Ag., Research professional at Agrinova

"My experience with the dairy production research team, as a master's student at Université Laval, allowed me to expand my scientific knowledge and gain a better understanding of the issues that stakeholders are dealing with. Climate change, the lack of trained professionals and the current economic context are challenges that the rapidly changing dairy industry must face. Every day, I had the opportunity to do research on commercial farms. I use the skills I acquired during my master's studies to respond to the needs of both dairy farmers and people in the agri-food industry."

Concentrated skills

Camile Gavazzi-April analyzed a number of technological options for the production of high protein content dairy concentrates during her master's studies. At the chair in Efficiency of Milk Processing Methods at Université Laval, she determined the impact of membrane cutoffs by comparing two production sequences for a combined ultrafiltration process. In the process, she benefited from numerous exchanges with the chair's industry partners to develop her professional expertise.

Camile Gavazzi-April

Quality control technician at Agropur Coopérative

"I gained so much by completing my master's project in close collaboration with industry partners. I was able to get a grasp of industry issues before entering the labour market. The synergy between my university training and the guidance provided by the chair's partners allowed me to develop critical thinking and problem-solving skills, which are practical skills in my role as a technician. I was well prepared for the day-to-day realities that I face in my work, which allows me to propose innovative ideas and develop on a professional level."

Two recruits well-versed in probiotics

Annalisse Bertsch Socorro pursued PhD studies in agri-food microbiology at Université Laval. She developed new fermentation processes to valorize co-products in the dairy industry. The bio-ingredients produced are rich in polysaccharides and show strong antioxidant activity. Ms. Bertsch Socorro puts her expertise into practice at Biena.

During her master's studies at Université Laval, Andréanne Moineau-Jean tested the growth and stability of two probiotics in high protein content yogurt during storage. She also studied the behaviour of two contaminants. Because processes that concentrate proteins represent an additional step in the production process, there is an increased risk of contamination. Through her research, she discovered the secrets of a number of bacteria, both good and bad, and gained a solid understanding of milk concentration and yogurt production processes. She also gained a mastery of factors affecting the survival of probiotics and selective bacterial counts. She would like to put her skills to use in the food processing sector by focusing on improving food safety and developing ingredients with health benefits.

Annalisse Bertsch Socorro

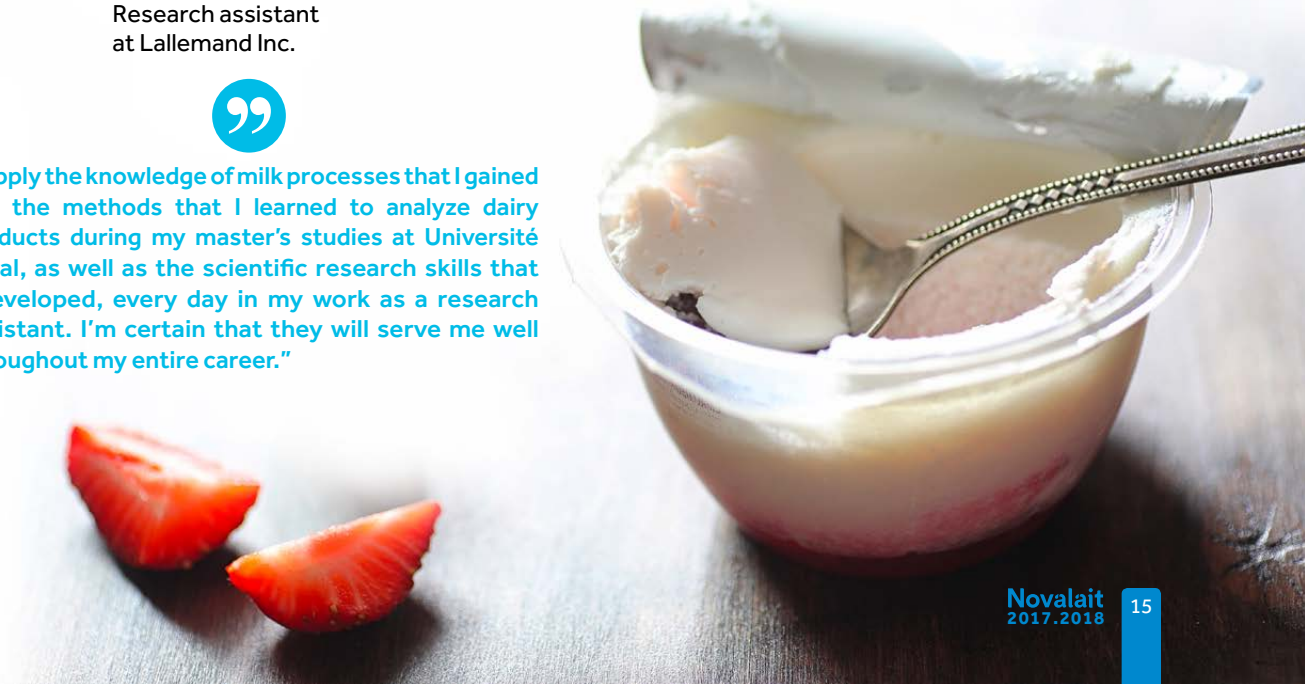
Production technical supervisor at Biena

"My experience in the field of probiotics and fermentation processes made me qualified to join the team at Biena. Today, as the manager of the fermentation department, I focus my efforts on increasing productivity and helping Quebec's dairy sector evolve."

Andréanne Moineau-Jean

Research assistant at Lallemand Inc.

"I apply the knowledge of milk processes that I gained and the methods that I learned to analyze dairy products during my master's studies at Université Laval, as well as the scientific research skills that I developed, every day in my work as a research assistant. I'm certain that they will serve me well throughout my entire career."



FORUM TECHNO 2018

The research experience brings conclusive results

Novalait brought together more than 180 participants at its Forum Techno held on May 16, 2018, at the Centre des Congrès de Saint-Hyacinthe. It was a record attendance! Participants immersed themselves in the research experience through presentations on the latest findings, demonstration workshops and poster presentations. This edition offered a selection of our scientific teams' leading solutions and discoveries, as well as applications on the farm and in plants. The enriching exchanges between dairy farmers, processors, students and researchers helped make the day a success.

Researchers and companies link up

Through its investments in research, Novalait creates opportunities to innovate. With collective funds, its scope of activity extends all the way to the delivery of results to dairy farms and plants. At the Forum Techno, a new "Lunch and Learn" session gave dairy companies an opportunity to meet organizations that support innovation. Scholarship possibilities for interns and funding for research and development garnered much interest.

High-level outreach

Clearly presenting scientific results is always challenging. This year, the holders of three industrial research chairs embarked on the adventure. At the Forum Techno, they met with participants to explain the bioprotective properties of lactic acid bacteria, the possibilities of a dairy process eco-efficiency simulation software and the best practices to improve cow comfort. Their animated and accessible approach helped make the research demonstration workshops a popular event. The challenge of bringing research and industry together was successfully tackled at the 2018 edition.

Distinctions for grass research professionals

The Forum Techno is an opportunity to present excellence awards to professionals in training who participate in Novalait-funded research. In a fierce competition, 20 students were evaluated on their mastery of their subject. Congratulations to the four award recipients and the winner of the People's Choice award! We would like to thank the 24 evaluators and the members of the research council who participated on the jury. The friendly approach encouraged dialogue between industry actors and partners.

$200 **Novalait**
Alexandre Jules Kennang Ouamba,
PhD student at Université Laval

$400 **Novalait**
Hélène Pilote Fortin,
Master's student at Université Laval

$500 **FRQNT**
Iris Dussault-Chouinard,
Master's student at Université Laval

Grand Prize **IDF Canada***
Florence Pomerleau-Lacasse,
Master's student at McGill University

180-second People's Choice
Annick Raymond-Fleury,
Master's student at Université Laval

* Subscription and travelling expenses to the World Dairy Summit from International Dairy Federation.

Left to right: Award recipients Alexandre Jules Kennang Ouamba, Annick Raymond-Fleury, Hélène Pilote Fortin, Florence Pomerleau-Lacasse and Iris Dussault-Chouinard pose for a photo with Charles Langlois, president of Novalait.

WHAT PARTICIPANTS THOUGHT...

"It was really great, especially the openness displayed by presenters and students. I came away from the forum full of ideas!"

Luc Savoie, Director of R&D
and Technical Services, Saputo

"I plan to come back to get updated on the latest research being done in Quebec in the field of dairy processing."

Audrée Binette, Technical Supervisor,
La Fromagerie Polyethnique Inc.

FORUM TECHNO 2018

"The Novalait forum is a platform that promotes exchanges with future professionals in the food sector. It's always a pleasure to talk science with the next generation."

Marie-Claude Gentès, Director of Innovation,
Agropur Coopérative

"For me, the 2018 Forum Techno was special because of the many industry actors from the dairy sector who came looking for solutions and discoveries to implement on the farm and in the plant. I was also very impressed by the grass research professionals who led the poster session and promoted exchanges with partners. These young, talented professionals had fire in their eyes and made us feel their passion for their field of research. Hats off to the professor-researchers for transmitting their passion for dairy science. What a promising upcoming generation of scientists."

Charles Langlois, President, Novalait

"What motivated me the most for my first Forum Techno as a Novalait administrator, where I led the workshop on animal comfort, are the results presented to dairy sector stakeholders. People could see the amount of effort invested in improving our practices for the health and well-being of our cows. The Forum is also a meeting for the entire channel, from dairy farmers to processors, as well as students and researchers. Bringing all of these people together to work toward a common goal is Novalait's strength."

Alain Brassard, Dairy Farmer

"Novalait's Forum Techno highlights the dynamic research environment in the dairy production and processing sector and the people who work in it. Bringing entrepreneurs, renowned researchers and new faces together at the same event is sure to motivate the next generation to continue the work that has already been started."

Stéphanie Claveau, Research and Innovation
Project Manager, Agrinova

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