GROWING OPPORTUNITY

Canada's plant-protein potential

PROTEIN INDUSTRIES CANADA

A MESSAGE FROM CEO BILL GREUEL

Protein Industries Canada is, by nature, a future-focused initiative. We were founded on the principle of building a better Canadian plant-protein sector, which will help build a better Canada.

Thanks to the work of our members and partners, we're well on the way to seeing that happen. With 17 active technology projects, we've co-invested almost three-quarters of our allotted $153 million of federal funding; the remainder is expected to be committed this year. It's a testament to the faith in our sector that industry has invested additional dollars in these projects. Their supporting capital brings this commitment total to more than $320 million, a significant amount that will help Canada take its first steps toward becoming a global leader in plant protein.

This investment begins to take Canadians to a positive future. One with more jobs, more food options, more innovation, and a stronger economy.

At Protein Industries Canada, we're aiming to add 5,000 jobs to the Canadian landscape, directly and indirectly through the projects we invest in. We're also planning to add $4.5 billion to Canada's GDP while strengthening the plant-protein ecosystem.

$320M

PIC & INDUSTRY INVESTMENT

$209M

LEVERAGED

856

EXPECTED DIRECT JOBS CREATED

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We're halfway toward meeting these targets. Already, our 17 active projects are expected to create more than direct 850 jobs, 240 new products and 46 new patents. Several of these projects have also increased Canada's processing capacity—a positive step forward, as we know that if we process an additional 20 per cent of Canada's crop production, we can add more than $12 billion per year to our economy.

Canada is primed to claim its position as a global leader in plant protein. We hope you'll continue to join us on our journey to help it do so.

Cover photo: Twin screw extruder at the Saskatchewan Food Industry Development Centre. Provided by the Saskatchewan Food Industry Development Centre.

DISTRIBUTING THE SEEDS THAT PROVIDE PROTEIN TO THE WORLD

For the past 10 years, SeedNet has been providing Canada's plant-protein sector with high-quality genetics that produce commodities sold across the country and throughout the world. The company focuses on working collaboratively with seed breeders to provide top-quality products, in order to help meet growing consumer demands for sustainably produced, nutritious food.

"There are few constants in the world today, but one of them is the need for safe and nutritious food," SeedNet General Manager Elizabeth Tokariuk said. "Economical, stable, manageable protein is crucial to providing sustenance not only for populations that cannot access traditional sources of protein, but also for those that choose alternative diets."

An awareness of this need led the company to recently partner with DL Seeds and Sightline on a project aimed at developing new yellow pea varieties. With a co-investment from Protein Industries Canada, the companies intend to develop varieties that combine high yield potential with high protein content. Together, they will utilize DL Seeds' yellow pea parent lines, Sightline's algorithms and proprietary frameworks, and SeedNet's marketing and distribution abilities.

> A new variety always offers so much hope to seed growers to be a game-changer in terms of yield, quality and value in the food chain.

While SeedNet's role will primarily come later in the development process, Tokariuk said the company is already seeing exciting work come out of it.

"It has been fascinating to realize the use of seemingly unconnected technologies in the development of efficient systems for variety breeding," she explained.

Photo provided by Seednet

"Once a suitable variety becomes available to SeedNet, our members will immediately begin the process of multiplying the seed. When quantities are suitable for distribution, the higher generation seed will be offered to our network of seed growers throughout the Prairies for production of Certified seed that will go to commercial producers."

The importance of increasing both the yield potential and the protein content of the new varieties comes down to several factors. The demand for plant-based protein products is rising, and expected to grow to more than $80 billion by 2035. With a constant supply of commodities available to meet that demand, processors can rest assured they'll be able to fill consumers' plates with the healthy, nutritious plant-protein meals they're asking for.

"SeedNet members are very much looking forward to evaluating the varieties as they come on-stream," Tokariuk said. "A new variety always offers so much hope to seed growers to be a game-changer in terms of yield, quality and value in the food chain."

As long as the varieties that are developed provide their members with profitable, high-protein crops, Tokariuk said, SeedNet will consider the project a success.

"The main benefit of this project for SeedNet will be the success of our seed growers and their customers, who will use the varieties to realize stable, profitable yields on their farms, and who will also achieve the peace of mind that comes from providing an essential ingredient to a hungry world."

PROCESSING AND THE NEED FOR CAPITAL INVESTMENT

The plant-protein ecosystem is wider than many people tend to assume. There are those with their hands right in the bags of peas: the farmers growing protein-rich crops and the processors turning commodities into ingredients. There are those whose hands aren't in the bags but are nearby: the researchers developing new crop varieties, innovators coming up with new technologies and marketers selling products to global customers.

Then there's an entirely different group, those you often must remind yourself play a role: the businesses and investors who may not even see the bags, but who invest in plant-protein projects because they believe Canada's plant-protein sector has the potential to become a global leader as an ingredient supplier.

These investments, however, are necessary for the development of Canada's processing sector.

"In Verdient Foods' case, the marriage of foreign direct investment and domestic capital created the foundation to build something amazing," Verdient Foods Inc.'s Senior Advisor Blair Knippel said. "The FDI brought with it both the human and financial capital to create a successful, scalable, sustainable world-class business. Both were needed and without one, the other would not have come to the table."

> "Converting pulses to ingredients in Canada is a highly sustainable to further support the economic growth of the entire agri-food sector.

When working to raise enough capital to build its plant in Vanscoy, Sask., Verdient Foods began through seed capital provided by a foreign investor. This led to attracting domestic investment from a Saskatchewan family office and a Canadian financial institution in the facility's earlier years. Ultimately, both were necessary to obtain additional FDI when Verdient expanded in 2018.

Ingredion Inc., also located in west of Saskatoon at Vanscoy's Plant Protein Innovation Park, experienced a similar capital attraction path. The processor sourced its own FDI before focusing on domestic investment, eventually launching their processing plant in 2020.

Ingredion Inc.'s and Verdient Foods' processing facilities. Photo provided by Ingredion Inc.

Having sought investment for a Saskatchewan-based path a few years later than Verdient may have made finding capital slightly easier.

"Western Canada, and Saskatchewan in particular, were not the hub of food processing that it is today. In fact, often the question was, 'Where is Saskatchewan?' " Knippel said. "Over time, what first appeared to be diamonds in the rough—for example, Saskatchewan Food Industry Development Centre—took their rightful place in the spotlight, and it was easier to show that Saskatchewan-based businesses and technologies were actually already shining on the global stage along with other world-class organizations."

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Today, both Verdient and Ingredion process a variety of pulses at their plants, including peas, lentils, faba beans and chickpeas—commodities chosen because of their health benefits, environmental sustainability and consumer appeal. Much of this processing will occur as part of a partnership between Ingredion, Ingredion Plant Based Protein Specialties (Canada) Inc., Verdient, T Base 4 Investments and O.M.D. Food Products, with a co-investment from Protein Industries Canada, in a project to improve the functionality of pulse-based ingredients.

"Providing our global customers with a broad range of high-quality, pulse-based ingredients is important to ensure we can meet the taste, texture, environmental and nutritional requirements for today's consumers," said

Beth Tormey, Ingredion's vice president of plant-based proteins.

In addition to helping increase the plant-protein based options available to consumers, the expansion of Canada's processing sector also helps strengthen the country's economy. From the building of the facilities to their everyday workings, they create jobs, bring in revenue and drive innovation.

"Converting pulses to ingredients in Canada is a highly sustainable to further support the economic growth of the entire agri-food sector," concluded Tormey.

Knippel agreed, adding that "growing the domestic plant-protein food processing sector provides additional opportunities for local producers to sell their crops at a premium, develop innovative techniques to produce crops and manufacture ingredients designed specifically for global food processors and create a hub of crop-to-finished product expertise that will eventually rival many other jurisdictions."

It's these benefits along the value chain that make investing in processing facilities such an attractive idea. And it's only by pairing such investments with processing opportunities that the plant-protein sector will continue to grow, creating a stronger, better economy for all Canadians and positioning Canada as a global leader in plant protein.

EXPANDING CANADA'S PLANT-PROTEIN MARKETS BY ADVANCING TECHNOLOGY

Photo provided the University of Saskatchewan; credit to Seungbum Steve Ryu

Canada's plant-protein sector is supplying the world with delicious, nutritious food, but farmers and processors can't do this alone. Countless innovators are helping them develop products using technology that's increasingly sustainable in order to get that food onto the plates of consumers.

The people at each Precision.ai, Sure Growth Solutions, Exceed Grain Marketing and the Global Institute for Food Security (GIFS) at the University of Saskatchewan feel this connection closely, which is why they've recently undertaken a project to help make it easier to grow plant proteins as sustainably as possible.

> "All of the research that we do, if it stays on a lab bench, it contributes to knowledge, but it doesn't change the world. Being able to partner with industry through PIC allows us to be able to deliver on the promise of food security.

"We're most looking forward to helping achieve meaningful chemical cost reductions for the farmer, as well as sustainable food," Precision.ai founder and CEO Dan McCann said.

The partners are together investing $13.4 million into the project, with Protein Industries Canada investing an additional $12.8 million dollars. While the partners began work on the technology approximately two years ago, Protein Industries Canada's recent investment will both speed up its completion and expand the technology's potential.

Together, the partners are creating artificial intelligence technology that detects crop pests when passing over a field. It then sprays only what it detects, reducing pesticide use by up to 95 per cent.

Once it reaches the farm level, the partners expect it will help save farmers up to $52 per acre each growing season by targeting only pests during spraying. However, this reduction in pesticide use is expected to provide a second benefit: The opening and expansion of markets for Canada's plant-protein sector, helping build the country's reputation as a global leader as a supplier of high-quality ingredients.

Terry Aberhart, CEO of Sure Growth Solutions, looks over a field upon which the project technology was tested

"Maximum residue levels are just getting tighter and tighter every year, and the customers' expectations are getting higher and higher," Exceed Grain Marketing president Derek Squair said. "With technology, we're not reducing yield. We're still keeping yield high and staying below those maximum residue levels."

The technology is coming together thanks not only to the innovative minds behind it, but also to the partners' willingness to collaborate and share intellectual property.

> "I truly believe if you surround yourself with amazing people, you can accomplish amazing things. We're very excited about working with the partners in this project, leveraging each other's strengths to create something that we couldn't do individually.

The artificial intelligence technology portion of the end product began under Precision.ai, while its phenotyping capabilities stem from GIFS's work. By merging the two sets of software, then pairing it with Sure Growth Solution's farming and agronomy expertise and Exceed Grain Marketing's international market expertise, the partners are creating technology that's uniquely positioned to benefit the full plant-protein value chain.

"I truly believe if you surround yourself with amazing people, you can accomplish amazing things," Sure Growth Solutions' CEO Terry Aberhart said. "We're very excited about working with the partners in this project, leveraging each other's strengths to create something that we couldn't do individually."

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Chris Barker, director of business development at GIFS, agreed with this sentiment, and added that being a partner in the project presents a particularly interesting role for an academic institution.

"All of the research that we do, if it stays on a lab bench, it contributes to knowledge, but it doesn't change the world," he said. "Being able to partner with industry through PIC allows us to be able to deliver on the promise of food security."

With market and sustainability benefits for farmers, processors and consumers alike, the release of this new technology is highly anticipated. While a release date hasn't been shared, the partners have begun field tests and will share more information as it develops.

A sprayer testing out the technology being developed as part of the project undertaken by Precision.ai, Sure Growth Solutions, Exceed Grain Marketing and the Global Institute for Food Security

DEVELOPING A MORE SUSTAINABLE PLANT-PROTEIN ECOSYSTEM

As technology in the plant-protein sector advances, so do the opportunities it presents. But these opportunities don't only present themselves as new products or processes; quite often, advancements in technology lead to a more sustainable sector.

While Protein Industries Canada's ultimate goal is to help make Canada a global leader in plant protein, one important aspect of this is ensuring the sector is building itself up sustainably. This largely involves investing in projects that incorporate sustainability efforts into their work, be they economical, environmental or social.

Those efforts are working. Take environmental sustainability as an example; of Protein Industries Canada's 17 active technology projects, 65 per cent are expected to improve environmental outcomes.

"We all have a responsibility to incorporate the latest technologies in agriculture to sustain a profitable and safe food supply in an environmentally sustainable way," Precision.ai founder and CEO Dan McCann said. Precision.ai is currently working with Sure Growth Technologies, Exceed Grain Marketing and the Global Institute for Food Security at the University of Saskatchewan to develop technology that uses artificial intelligence to detect and spray for pests in a field. In addition to reducing pesticide use, McCann explained, the technology will also help reduce fuel use and water use, as well as contribute to economical sustainability by reducing farmer input costs.

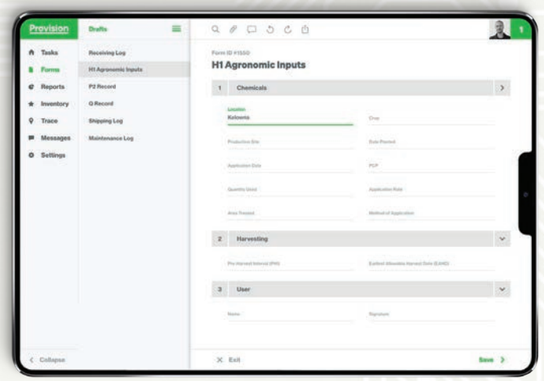
It's a project that well-complements sustainability work being done by others in the plant-protein sector.

Imagery from a test run of the artificial intelligence technology being developed by Precision.ai, Sure Growth Solutions, Exceed Grain Marketing and the Global Institute for Food Security. Image provided by Precision.ai.

Lucent BioSciences and AGT Foods and Ingredients, for example, have been working together to turn coproducts from plant-based protein processing into Soileos, a new micronutrient fertilizer. In recent field trials, Soileos was shown to help increase yield, stand count and micronutrient density in crops, while also being carbon neutral. Taken together, its benefits make it a true economical and environmental sustainability success story.

"I like this term, what I call 'Sustainable Sustainability,' " Lucent BioSciences Chief Technology Officer Peter Gross said. "If we're going to create an activity, a product, anything that has a positive environmental benefit, the only way it's going to self-sustain … it has to generate an economic benefit."

Provision Analytics' new platform, which is expected to help improve sustainability in the agriculture industry. Provided by Provision Analytics.



Tracking whether an activity or input is both environmentally and economically sustainable isn't always easy, however. That's where projects like that undergone by Provision Analytics, Coutts Agro, Verge Technologies and Skymatics help. Together, these partners are using data to improve on-farm logistics and food traceability along the value chain.

What's more, according to Provision Analytics co-founder and CEO Erik Westblom, the platform they're helping develop will not only help track sustainability efforts within the plant-protein sector, but also improve the sustainability results.

Preparation of Lucent BioScience's Soileos product. Photo provided by Lucent BioSciences

"Across the supply chain, many operations run on instinct, lacking the data they need to make informed decisions for quality control. That affects not only margins and product quality, but also impacts food loss, water consumption, carbon output and more," said Westblom. "Provision software extracts data from regular food safety forms and traces all the variables to their outcomes. This advanced operating insight can shape the future of Canadian food, starting from a farm and carrying through transportation, processing and production."

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That initial goal isn't the only sustainability-related work Provision Analytics has in mind. In the future, they're also hoping to expand their machine learning offerings, both within Canada and in international markets.

Precision.ai and Lucent BioSciences, too, have plans for their sustainability work beyond their current Protein Industries Canada projects. Precision.ai plans to repurpose their spraying technology for areas such as fertilizer, irrigation, seeding and harvest; Lucent BioSciences, meanwhile, is investing R&D money into a variety of potential new projects.

Regardless of what each company develops next, however, it's clear they're on the right path—one that helps make the plant-protein sector, and Canada, more sustainable for generations to come.

HOW AGRIBUSINESSES ARE EXPANDING CANADA'S INTELLECTUAL PROPERTY

Mera Food Group's processing facility. Photo provided by Mera Food Group.

Intellectual property can be a complicated aspect of business to tackle. When taking initial steps, business owners must determine not only how to go about their strategy, but also what form of intellectual property protection to seek.

As with most businesses, Protein Industries Canada's members generally choose their initial strategies based on which options would best protect their processes or products. For Mera Food Group, this meant utilizing a diversified intellectual property protection strategy.

"We took patents on our hydrodynamic cavitation process, and we further protected by using trademarks, additional patents and trade secrets," Mera Food Group Manager of Business Development Charles Goranson said.

Other members, meanwhile, initially chose to go with a single type of intellectual property, due largely to its natural fit for their products.

"We have filed a composition of matter patent," Lucent BioSciences Chief Technology Officer Peter Gross said. "It's very difficult to get around a composition of matter patent because the patent covers the material of subsequent applications, even if they're not foreseen by the inventor of the material."

> "We've had some unexpected results, and because of that we're now pursuing some additional patents to cover that IP.

Regardless of how many or what type of intellectual property protection strategy each member company first utilized, however, the end result has been the same: the development of their Canadian-made processes, technology and products, helping propel the Canada plant-protein sector toward its position as a global leader.

Mera Food Group's intellectual property protection strategy journey began outside of the country, with a core piece of intellectual property that they've since enhanced and protected within Canada and the United States. This, Goranson said, has been beneficial to both the company and the sector, and is a route they would easily go again, as they believe "it is very important to search the world for innovative cross industrial technologies and to secure them here in Saskatchewan."

While Mera Food Group is primarily using their intellectual property to develop new plant-based protein products as part of the project announced with Protein Industries Canada, Mera Developments and Benson Farms in November 2020, they see further potential for it in the future.

"Through the Protein Industries Canada project and commercial development, we believe we can increase the portfolio of commodities we can process," Goranson said. "In addition, we believe we can add value to by-products of existing producers on the prairies."

Lucent BioSciences, meanwhile, has seen their intellectual property protection strategy undergo more of a change throughout its lifetime. The company currently has one piece of intellectual property protection filed, but expects to see more since beginning work on the project it's been working on with Protein Industries Canada and AGT Foods and Ingredients.

"We've had some unexpected results, and because of that we're now pursuing some additional patents to cover that IP," Gross said. He added that the company has gained additional knowledge over the last year, related to their Soileos product, that will remain trade secret rather than become a patent.

While Lucent's BioSciences didn't fully expect the intellectual property path they went down, they wouldn't change it. If they had any advice for other businesses pursuing an intellectual property protection strategy, it would be to follow a similar route, including reaching out to external resources, as well as to talk about your intellectual property without revealing too much.

> "Through the Protein Industries Canada project and commercial development, we believe we can increase the portfolio of commodities we can process. In addition, we believe we can add value to by-products of existing producers on the prairies.

Goranson had similar advice.

"Canada has an excellent reputation and network of trade representatives through our embassies and consulates," she said, adding that businesses should reach out to them. "They have provided us with introductions to technology developers and competent legal and business advisors in each unique environment."

Production equipment for Lucent BioSciences' Soileos product. Photo provided by Lucent BioSciences.

ULIVIT: SMALL BUSINESS GAINING BIG ATTENTION

It's been approximately six months since ulivit began working with AGT Food and Ingredients to develop new, Canadian-made and -grown plant-protein products. Since the launch of this partnership, the small, sister-owned company based out of Alberta has been getting a significant amount of attention—and not without cause.

"We've been in R&D and completed a sample run of our Plant Protein 2.0, not an easy thing during COVID times," ulivit owner Laura Gustafson said. "This opportunity to collaborate with AGT also creates a really unique opportunity for ulivit: a true farm to fork. AGT is the largest processor of pulses in the world, continually researching and creating innovative ingredients, and ulivit makes delicious and innovative products using AGT's sustainable pulse ingredients, creating value-add for our farmers. It's a great partnership."

It's not only ulivit's partnership that's led to their recent attention, however. The company won AWESOME's inaugural Achievement Award for demonstrating success during the start-up and growing phase of their business, along with 11 other Prairie Female Food Entrepreneurs. They were also selected to take part in Ag-West Bio's Building Entrepreneurial Leadership program and the Women Entrepreneurs of Saskatchewan Founders Table program.

While these accolades will help advance ulivit, Gustafson is hoping she can give back by helping advance the sector. She participates on an Advisory Board for the Plant Protein Alliance of Alberta, Western Economic Diversification Canada's Saskatoon Food & Ingredient Manufacturing Cluster Steering Committee and was recently voted in as a board member of the Plant-Based Foods of Canada.

"It's inspiring to be at the forefront of environmentally friendly food and advocate alongside other game changers to create Canada's regulations for plant-based food," she said. "The future of plant-based foods is very bright, and we want to continue to provide more plant-based choices for Canadians."

JOIN US IN BUILDING A **STRONGER AGRIFOOD SECTOR**

Canada is poised to become a global leader in plant-based food. Discover how Protein Industries Canada is partnering with agrifood leaders and innovators to help make the most of this opportunity.

ProteinIndustriesCanada.ca/opportunity