HOUSE OF COMMONS
CHAMBRE DES COMMUNES
CANADA

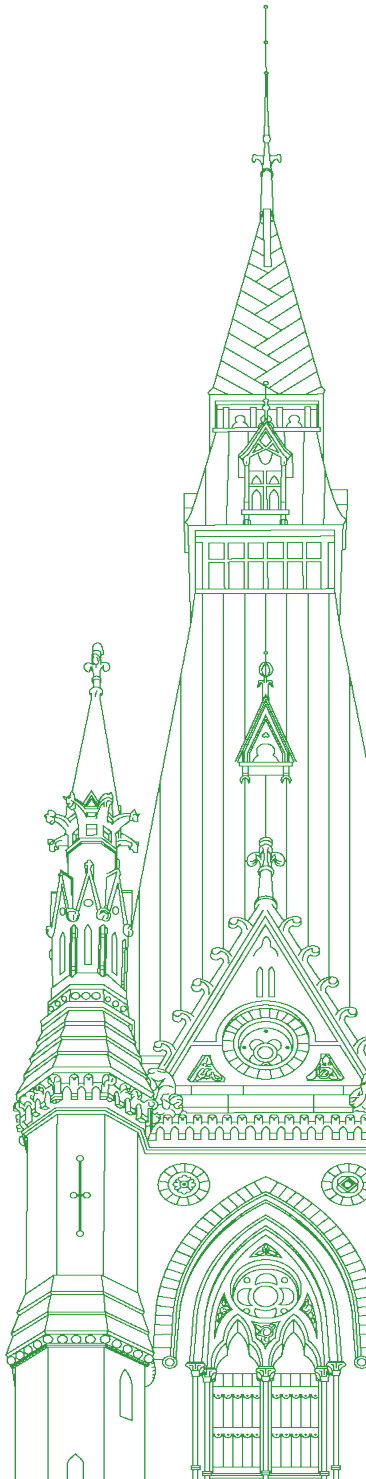
44th PARLIAMENT, 1st SESSION

Standing Committee on Agriculture and Agri-Food

EVIDENCE

NUMBER 013

Monday, April 4, 2022



Chair: Mr. Kody Blois

Standing Committee on Agriculture and Agri-Food

Monday, April 4, 2022

● (1100)

[*English*]

The Vice-Chair (Mr. John Barlow (Foothills, CPC)): I call this meeting to order.

Welcome to the thirteenth meeting of the House of Commons agriculture, agri-food and food security standing committee.

I want to start with a few reminders for the witnesses. I'm sure our members are well aware of some of these things.

Today's meeting is taking place in a hybrid format, pursuant to the House order of November 25, 2021. The proceedings will be made available via the House of Commons website. The webcast will always show the person speaking rather than the entirety of the committee. Neither screenshots nor photos of the screen are permitted. For members participating in person, keep in mind the Board of Internal Economy's guidelines for mask use and health protocols.

I would like to make a few comments for the benefit of the witnesses. Members and witnesses may speak in the official language of their choice. Interpretation services are available for this meeting. If interpretation is lost, please inform me immediately. We will ensure that interpretation is properly restored before resuming proceedings.

Before speaking, please wait until I recognize you by name. If you are on the video conference, please click on the microphone icon to unmute yourself. For those in the room, your microphone will be controlled, as normal, through the proceedings and verification officer. When speaking, please speak slowly and clearly. When you are not speaking, your mike should be on mute. All comments by members and witnesses should be addressed through the chair.

We are beginning our second panel on the environment study. We have two witnesses with us today. Pursuant to Standing Order 108(2) and the motion adopted by the committee on Monday, January 31, 2022, the committee is resuming its study of the environmental contributions of agriculture.

I would like to welcome the witnesses for our first panel today. Our first witness via video conference is Dr. Angela Bedard-Haughn. She is dean and professor at the College of Agriculture and Bio-Resources at the University of Saskatchewan.

Welcome, Doctor. Thank you very much for being with us today.

Our second witness is Dr. Jean Caron, agronomist, professor, Natural Sciences and Engineering Research Council of Canada industrial research chair in conservation and restoration of cultivated organic soils, Université Laval, soil sciences and agri-food engineering department.

That is a very big title, Dr. Caron Thank you very much for taking the time to be with us.

You will each have up to five minutes for your opening remarks, after which we'll proceed with rounds of questions by each political party. I will signal to you when there is one minute left, so if you don't mind, just keep an eye on your screen. When you see this yellow card, that means you have one minute left. After that, unfortunately I will have to cut you off, but hopefully you'll get the end of your remarks in through the questions.

Ms. Bedard-Haughn, I will now invite you to make an opening statement of up to five minutes, please. The floor is yours.

Dr. Angela Bedard-Haughn (Dean and Professor, College of Agriculture and Bioresources, University of Saskatchewan, As an Individual): Great. Thank you very much, Mr. Chair. Good morning, everyone.

I speak to you from Treaty No. 6 territory, the traditional homeland of the Métis in the centre of the prairie provinces.

A bit about myself: I grew up in rural Saskatchewan and did my first two degrees here before moving to Davis, California, for my Ph.D. I returned to the University of Saskatchewan as a professor of soil science and eventually started as dean of agriculture and bioresources in summer 2020.

My comments today regarding the environmental contribution of agriculture come from all of these perspectives: as a dean whose college transcends any perceived boundary between environment and agriculture; as a farm kid; and as a soil scientist whose research has always focused on the interplay between soils and the environment.

To talk about agriculture's carbon footprint and the role that soils play in the fight against climate change, we must talk about the Prairies, which are home to 81% of Canada's farmland.

As we know, soil performs many ecosystem services, only one of which is supporting plant growth. Soil plays a crucial role in global water and nutrient cycles, in particular carbon and nitrogen cycles, which are essential for plant growth but problematic when mismanaged.

Here on the Prairies we celebrate the no-till success story, a widespread change in management that served to drastically reduce erosion, conserve water and nutrients and increase carbon storage. The high rate of adoption was driven by producers, including producer-run organizations like the Saskatchewan Soil Conservation Association, which also has one of the best long-term carbon monitoring studies with benchmark measurements back to 1996. They can provide really important learnings about best practices and challenges in carbon monitoring approaches.

Their prairie soil carbon balance study found that spatial variability can be very high in both the short range within a few metres, and long-range across climate gradients from semi-arid to subhumid. Furthermore, the time-related or temporal variability of soil processes can be very high due to management practices and things like multi-year droughts which lead to crop failure. When we add in consideration of greenhouse gases, the spatial-temporal variability is exponentially greater, and understanding what drives carbon dynamics, both the quantity and persistence of carbon stored, is essential for us to account for that variability.

That said, please don't let my discussion of variability alarm you. Soil management can be and in many areas already is part of the solution to climate change. But we need to be sure we have the resources and tools available to meaningfully quantify carbon sequestration, which brings me to my first key point for this group.

My first key point for the group today is that implementing policy based on soil carbon levels will require rigorous measurement and monitoring standards that recognize these sources of spatial and temporal variability. There are a couple of more things to keep in mind about variability. First, it's a challenge everywhere, not just for the Prairies, as B.C., Ontario, Quebec and the Maritimes all face similar challenges. Second, the best practices for increasing soil carbon will also vary widely across the country. There's no one-size-fits-all solution. What works for the St. Lawrence Lowland is not necessarily appropriate for the Alberta plains.

My second key point is that we're hearing a lot right now about managing soils to optimize soil health through approaches like regenerative agriculture. But as we think about agriculture and the environment, we also need to find a way to reward those who have been doing the right thing for a while, incentivize continued best practices to be sure that the carbon they have already accumulated stays sequestered, and not simply focus on new carbon accumulation from 2005.

Here in the west, no till has resulted in tremendous improvements in soil health since its widespread adoption in the 1980s and 1990s, but early adopters were part of the solution decades before we set an arbitrary baseline of 2005. How can we reward those early adopters, as well as encourage late adopters to get on board?

My third and final point is there are many creative minds looking for the next great carbon-saving environmental solution, but as we brainstorm, let's not lose sight of the trade-offs. One example that comes to mind is proposals that involve the removal of crop residue from fields to produce energy. This would serve to reduce the amount of carbon returned to the soil and ultimately result in a net loss of soil carbon as carbon dioxide. We need to think about agriculture as a system.

Henry Janzen from Ag Canada most eloquently described the soil as a conduit for the soil energy captured through photosynthesis. If we lose sight of the full cycle we run the risk of undoing past benefits or worse.

● (1105)

In closing, Prairies researchers and our farmers are already part of the climate change solution and are willing and able to do more, but we need the right tools to track our progress, the recognition that there is no one-size-fits-all approach for a country like Canada, and the policy to support meaningful action, including recognition of what's already been done. Together we can and will dig deeper and explore new ways forward.

Thank you.

The Vice-Chair (Mr. John Barlow): Thank you, Ms. Bedard-Haughn. I appreciate your testimony.

[*Translation*]

We will now go to Mr. Caron, who has five minutes.

● (1110)

Dr. Jean Caron (Agronomist, Professor, Natural Sciences and Engineering Research Council of Canada Industrial Research Chair in Conservation and Restoration of Cultivated Organic Soils, Université Laval, Soil Science and Agrifood Engineering Department, As an Individual): Thank you very much for the invitation to appear before your committee this morning.

I am a professor at Université Laval. I've worked on soil structure in Quebec, Ontario and throughout North America, which has given me a bird's-eye view of soil health based on observations that have been made.

I was very pleased to be asked to provide an expert opinion and to hear that a Senate committee was going to look at soil health. In fact, I've submitted a document in English and French that summarizes the three points I will be addressing this morning.

I've been in the field for 36 years. Throughout my career, I've observed certain things about the soil health situation.

First, the study by the Standing Senate Committee on Agriculture and Forestry and the work the House of Commons is undertaking today will play a critical role, because the soil health issue is largely underestimated by the general public.

The problem is not new. In 1984, the Standing Senate Committee on Agriculture, Fisheries and Forestry, chaired by Senator Herb Sparrow at the time, addressed the issue of soil health and put forward significant points for change.

In the 1990s, soil health became a priority issue. In fact, a number of programs were established with encouraging results.

Then, in the early 2000s, we gradually abandoned the efforts that had been initiated, owing to a lack of public and private support.

The soil health issue still exists, however. Over the years, the problem has gone unnoticed because we have conducted very little structured, organized monitoring. In addition, we have no program to compile soil health statistics, much like Statistics Canada does to track the health of Canadians.

A network of soil test plots was set up in the 1990s to monitor soil from 1990 to 2005. The project was gradually abandoned, such that we're now missing some critical information.

As Ms. Bedard-Haughn mentioned earlier, changes have been successful out west, especially the transition to reduced tillage and carbon storage. However, things are slightly different in eastern Canada. We're seeing soils get more compact, crops are being rotated less and less, and soils are losing organic matter. As a result, the soil degradation issue continues to grow, and this is going to have significant long-term consequences on soil health.

That brings me to my second point: By 2050, we will need to achieve gains in productivity for our soils, whose health is deteriorating in general.

The major barriers are the costs associated with crop rotation and the price of commodities such as corn and soybean, which is primarily controlled by an external exchange. We have very little control over that. Therefore, the lack of financial incentives and the financial pressures on prices are causing the gradual disappearance of crop rotation, which has negative repercussions on biodiversity, the accumulation of organic matter and soil compaction.

The third major point that concerns us is greenhouse gas emissions. There's no question that soils act as carbon sinks. Carbon storage could help us meet our greenhouse gas reduction targets. However, we must understand that if soils become more and more compacted, we will end up with some nitrogen, the most commonly used fertilizer, that denitrifies and is lost to the environment, contributing to global warming. The main source of nitrous oxide in Canada is N_2O, which mainly comes from nitrogen fertilizers applied to agricultural land.

In recent years, partly because of a growing soil compaction problem, we've seen a gradual increase in the amounts of nitrogen applied regularly. Therefore, nitrous oxide emissions from agriculture are likely to increase, especially if we don't keep an eye on compaction issues.

Therefore, I feel it's important to introduce incentives in agri-environmental advisory clubs to help them quantify ecosystem services provided. This will deliver a clearer picture and restore benchmark sites, monitoring statistics and the state of soil health, much like what they do to monitor the health of Canadians.

● (1115)

Lastly, I feel it's important that we finally reward those who have adopted good practices in the past that are helping us to accelerate the transition to more sustainable agriculture. This will also help us reduce greenhouse gas emissions and capture more carbon.

Once again, thank you for giving me the opportunity to share my perspective.

The Vice-Chair (Mr. John Barlow): Thank you, Mr. Caron.

[*English*]

Thank you very much for your testimony as well.

We will now move to the questions, starting with the Conservative Party and, I believe, Mr. Lehoux for six minutes.

Go ahead, please. The floor is yours.

[*Translation*]

Mr. Richard Lehoux (Beauce, CPC): Thank you, Mr. Chair.

I'd like to thank the witnesses for being with us this morning.

Mr. Caron, as the previous speaker also mentioned, there are some pretty significant differences, particularly between the land in eastern and western Canada. Soil compaction is perhaps the most glaring issue in Quebec and Ontario. You mentioned it a number of times.

You mentioned providing incentives to advisory groups and reinitiating studies abandoned in the early 2000s.

What would you recommend specifically in this regard, Mr. Caron?

Dr. Jean Caron: The laboratories have been dismantled and we need to do more. Last week, we surveyed farmers as part of a study we're doing. They aren't fully aware of the environmental and productivity gains they could make if they adopted better practices. One reason for that is they don't put enough financial resources into this type of monitoring.

We do a lot of that type of monitoring at the university, not for commercial purposes but as part of projects. It can easily cost $250-$300 per hectare. However, surveys show that, because they underestimate the long-term gains which are very hard to see, farmers think it would be impossible to spend more than $15-$20 per hectare on monitoring. This results in widespread underinvestment.

Incentives are already available through a number of programs. I don't know the programs in Western Canada. I can say that in Quebec, support is available to consulting firms so that we can get a clearer picture and conduct better monitoring. It's not just the farmers themselves who can do it.

However, and I'm referring to my second point, farmers have adopted soil improvement practices—

Mr. Richard Lehoux: You're getting ahead of me, Mr. Caron. That was part of my second question.

You say that the incentives are already out there. The problem is that farmers aren't familiar with these new work methods?

What would be the best approach to showing them these new methods so that they can take advantage of these programs?

Dr. Jean Caron: I spoke a great deal about the importance of transfer mechanisms. In many cases, the most effective way to do it is to get testimonials by producers from model farms that have adopted these new methods. Of course, it's done in cooperation with research teams who provide real, on-the-ground data confirming that these changes work.

When transfer or compensation programs that quantify ecosystem services provided are introduced, they should reward not only gains in productivity, but also contribution to biodiversity, carbon storage and reduced use of pesticides, which in turn improves water quality. They should reward those who have been applying these methods for several years as much as those who are planning to do it gradually.

Mr. Richard Lehoux: With respect to nitrous oxide emissions, you pointed out that compacting was a really major factor. However, you said that there was a significant difference between western and eastern Canada.

Do you have any recommendations for the committee on this whole issue?

Has this gap between western and eastern Canada been measured? Do we know why eastern Canada is lagging so far behind?

● (1120)

Dr. Jean Caron: It hasn't been measured very consistently, and that's the problem. More monitoring should be done to assess long-term productivity losses associated with soil erosion. There haven't been enough studies on the subject. Some were done in the 1980s, but they need to be updated.

Another problem is that tractors are getting bigger all the time. Because there are fewer and fewer farm workers, we tend to use bigger vehicles with over three tonnes load per wheel, which leads to greater and greater soil compaction. That's put us in a downward spiral where heavier tractors are causing more compaction and fertilizers don't work as well.

Mr. Richard Lehoux: We understand, Mr. Caron, but what solutions can be applied on the ground? The labour problem isn't going to get any better. The size of tractors and the load carried by each wheel are important factors, but how can we improve productivity? What solutions would you recommend?

Dr. Jean Caron: We need to reduce the size of equipment and accelerate automation. That way, smaller independent units will be able to move around the field and better assess soil quality prior to tilling. Of course, we're talking about long-term measurement. Results are expected on a 5- to 10-year scale, but the way of the future is truly automation. It will allow for small units able to do more localized work and interventions—

Mr. Richard Lehoux: Thank you, Mr. Caron.

The Chair (Mr. Kody Blois (Kings—Hants, Lib.)): Thank you, Mr. Caron and Mr. Lehoux.

[*English*]

Thank you, Mr. Barlow, for filling in. It was a tough time getting out of Halifax this morning.

We're going to move now to Ms. Taylor Roy.

Ms. Leah Taylor Roy (Aurora—Oak Ridges—Richmond Hill, Lib.): Thank you very much, Mr. Chair.

Thank you to both of our witnesses. It's really encouraging to hear the work that's being done in academia on these very important issues.

Dr. Bedard-Haughn, I think you're amazing an academician. I love the fact that you're a farm kid from Saskatchewan. It really roots you in the practicalities of a lot of this as well. I realized you did research on soil, but I must admit that until today I didn't really know that pedology was all about soil. Thank you for that.

I have a question for you. Right now, Saskatchewan is the second largest emitter. I also realize it's one of the largest agriculture producers, so it makes sense. There's a lot of potential to decrease emissions in Saskatchewan.

We know that soils play a role as a carbon sink. We've heard from previous witnesses, from you and from Dr. Caron that measuring and trying to track the carbon content is a real challenge. You've added to that today by talking about the spatial and temporal variability, which concerns me even more.

Do you have any specific ideas on how we can address this? We did hear from prior witnesses who said our measurement systems are outdated and outmoded and that we don't have good data. Of course we know how important data is in solving a problem.

Do you have specifics? How might the federal government be able to help with this very challenging issue?

Dr. Angela Bedard-Haughn: Thank you. That's an excellent question and one that we are certainly grappling with as a discipline. When I think about how we can best address this challenge, there are a few key components I would speak to.

The first is with respect to having some clear standards in place. As an example, when we talk about measuring soil carbon, we want to make sure that we have a clear understanding of how we can standardize those measurements across a region. Right now, I do a study. Dr. Caron does a study, and maybe one of our colleagues in Alberta does a study. We need to make sure those are comparable to each other in terms of how we are doing them and the methodologies we use and that there is that standardization.

A second piece is to be able to actually collect that data. It's a little bit like crowdsourcing our results. One approach would be to go out to do a widespread sampling of absolutely everything, but you would need to take into account that spatial and temporal variability and the temporal piece. It's not like we could do this all in the space of a month across the whole country. There would be temporal variability as we moved through that. It's thinking about how we can consolidate some of this data together. We have more and more technology now, computational techniques that allow us to work with large datasets. That type of work is also essential.

A third piece, and I know a number of my colleagues work in this space, is coming up with methodologies that allow us to do more rapid assessments. There are new spectroscopic techniques constantly emerging and being tested. I'm probably approached every month by companies wanting us to collaborate with them on a new technology they're developing. The key there relies on being able to link it back to some of that high-quality in situ data to start with, so having a proper soil database so you can build what we refer to as a spectroscopic library. There again, with the spectroscopic library, if we're going to use some of these new techniques, you need regionally specific databases. The one that works here in Saskatoon would look different from what would work best around Winnipeg. If we're going to move to some of these new techniques we're hearing about, we need to be able to build all of this data together.

There are projects getting rolling in that space. I think one of roles the federal government can play in this is finding ways for regions to work more effectively together. You have the benefit of that bird's eye view that looks across the country, so creating opportunities for us to transcend some of those boundaries and work more effectively together, and in particular, through some of those opportunities to consolidate data and practices. It's prioritizing that.

Sometimes when you submit a grant, it doesn't look particularly exciting, for example, to be measuring carbon after carbon in a sample, but it is through the building of that database and the organization of that important data that we're able to identify some of those larger patterns. Being able to link that as well with some of the key management data is where we're going to find those great learnings. As an example, when we think about that prairie soil carbon balance study I referred to earlier, one of the challenges they had was in between measurement periods. They would go back every few years, and if the land had changed hands in between sampling dates, there might be a loss of some of that management history data, whether it's the cropping rotations or if there was a disease outbreak or something else happened in that field that might have affected the results.

That's what we need to be able to fully address this. Data management, while it might not sound particularly interesting, is absolutely essential to really get at some of these underlying questions.

● (1125)

Ms. Leah Taylor Roy: That's great. Thank you very much.

I agree. I think the data management is very important for understanding what the problem is and what progress we're making.

One other—

The Chair: Ms. Taylor Roy, I apologize. We're at about six minutes and 10 seconds. I tried to give you notice. We had great testimony.

[*Translation*]

Thank you.

We now go to Mr. Perron.

Mr. Perron, you have the floor for six minutes.

Mr. Yves Perron (Berthier—Maskinongé, BQ): Thank you, Mr. Chair.

I'd like to thank the witnesses for being with us. It's very interesting, because our two witnesses complement one another.

Mr. Caron, spatial and temporal variability are used to measure soil quality and conditions. I heard that, due to humidity levels, it's harder to store carbon in eastern Canada, particularly in Quebec and Ontario.

How will we ever come up with a standard unit of measurement?

We will have to start with a solid, indisputable base so that we don't penalize those who have already been doing things right. I was very pleased to hear both witnesses mention it this morning. We have to be able to work with that for a long time. I'd like to hear what you have to say about it.

Dr. Jean Caron: That's a very good question.

Agriculture in the east and agriculture in the west are very different, because of the very different climates and because of the different types of soils. It is obviously very difficult to have a uniform criterion.

As Ms. Bedard-Haughn made very clear, these parameters need to be regionalized, because the types of production environments are very different from one another, so the targets need to be adapted regionally to reflect this reality.

Mr. Yves Perron: Is this regionalization already well designed?

Do you have a clear idea of what it might be?

● (1130)

Dr. Jean Caron: I can't comment on the value, because I'm not a carbon expert.

Soils in eastern Canada, so in Ontario, Quebec and New Brunswick, are worked under very wet conditions. This is also the case for soils in British Columbia's Fraser Valley. In general, soils in the east become much more sensitive to compaction than soils in the west, where there are greater water deficits.

A soil health study, based on a sample of 470 profiles, has just been conducted in Quebec. It clearly shows that the problem of compaction has increased. About 60% of the soil is affected by compaction. I don't think the numbers are as high in western Canada. It's really a problem in eastern Canada. However, organic matter levels are generally higher in eastern Canada because the climatic environment is more conducive to biomass production. So the link is not direct. The decline in organic matter in the east at some level is not as critical as it may be in the west. There are really significant differences there.

Mr. Yves Perron: Okay.

You put a lot of emphasis on the compaction issue. Mr. Lehoux asked you about this earlier. You mentioned that the size of the machinery should be reduced. Are there other things that can be done to encourage that?

You are appearing before a committee of the Government of Canada. What recommendation would you make to the government to improve the situation?

Dr. Jean Caron: As Dr. Bedard-Haughn mentioned earlier, better monitoring and access to databases are needed. That can be problematic. It's very difficult to negotiate that, because private data, particularly on farms, are not consistent. In addition, they can also be subject to significant financial interests and even put the health of a business at risk. A neighbour or another company could learn about a company's financial situation because of certain parameters that could be revealing. We have a lot of problems with the use of available business data, so we need to have access to independent data sets and monitoring programs. These programs were put in place in the 1990s, including the establishment of benchmark plots. I think we should continue to support them.

I know that the federal government supports national programs, including those related to Agriculture and Agri-Food Canada researchers and through various research funding programs. However, in terms of monitoring soil health, it was limited to certain indices. I emphasize soil compaction, but that isn't the only problem. There is also the loss of biodiversity, pesticide contamination, loss of organic matter and erosion, to name a few. There are a number of issues, and they've all been raised before.

As for the future of future generations, the most serious issue, which isn't addressed here, is the famous conservation policies for the production area, that is to say the laws and regulations on agricultural zoning. It's all well and good to try to reduce the deterioration of soil health, but we must understand that there is also a deterioration in the production area. Globally, only 2.5% of Quebec's land is cultivated. In Ontario, it's 5%. If we want to guarantee our food self-sufficiency, we can only produce our food on limited areas that cannot be significantly expanded. This issue also threatens the food self-sufficiency of Canadians and the future of the nation.

Mr. Yves Perron: Thank you. We'll continue this conversation later.

The Chair: Thank you, Mr. Perron and Dr. Caron.

Mr. MacGregor now has the floor for six minutes.

[*English*]

Mr. Alistair MacGregor (Cowichan—Malahat—Langford, NDP): Thank you, Mr. Chair.

Thank you to our witnesses for helping our committee make its way through this study. Your testimony has truly been very valuable to us.

Dr. Bedard-Haughn, I'd like to start with you.

Australia has just embarked on its first-ever national policy on soil. This is a framework that's really going to govern how Australians value, manage and improve their soil for the next 20 years. It's a strategy that has been launched in co-operation with state governments, with many industry and agricultural stakeholders and the larger community. There is going to be a lot of data collected from this initiative that they're going to make sure that they share, and really try to identify the priorities through research to figure out how they're going to manage this incredibly valuable resource.

I find this to be a helpful example because Australia's federal system of government is remarkably similar to what we have in Canada. They have their national capital in Canberra and they have their state governments just like we do here in Canada with our provinces. The distribution of powers is remarkably similar to what we have in Canada.

What is your opinion of Australia's national soil strategy, and do you think that is a model we could use here in Canada?

● (1135)

Dr. Angela Bedard-Haughn: I certainly do think that type of distributed approach would be very valuable.

In some of my own research, where we're looking at soil information systems, we often talk about what we refer to as a “federated model” as being one of the ideals, just given some of those regional differences, because if you centralize it to a single location, you lose some of that regional expertise.

To me, in an ideal world, if we're looking at a national soil information system, it would be built off of harmonization of regional systems. There are certainly plenty of data models for this, but that federated system, then, is such that information from Quebec, the Prairies and the Maritimes can be brought in and then essentially be harmonized. Ideally you have some standards, as I mentioned earlier, in place so that when the data is collected in the first place, it can be more readily compared with each other.

The other piece to keep in mind with that—and I think this is some of what Monsieur Caron was touching on—is that given some of those regional differences as well, it is important to make sure that we are measuring the right things. It may be having a good handle on nitrous oxide as well as soil carbon, as well as some of the other risk factors when we're looking at soil health. All of those various factors play into the overall picture of soil health.

When I am describing soil health, while carbon is a common indicator, it's so much more than that. It's really about the optimal function of the soil. It would be a distributed system that allows us to look at a soil in the context of what is the optimum function for that soil, such that for some of the organic soils that are used for agriculture in Quebec, their optimum function would look different from the P.E.I. potato fields.

There's what do we need to measure across these different areas, but I think the database could draw from the regions, so there would need to be that regional support. That would be the only risk. If you have differences in priorities among the different regions you would have to be sure there was that regional support in place so that you have the quality data that could feed into the federated system. That's one of the things that Australia has done very well.

Mr. Alistair MacGregor: Thank you very much.

Dr. Caron, in one of the previous questions you were asked about soil productivity and how that works with compaction.

Just to inform this committee, can you just elaborate on that? What happens to the soil's ecology and micro-organisms when that compaction occurs, and what does that do to nutrient cycling and a plant's ability to grow?

You mentioned that in highly compacted areas, farmers are forced to use more fertilizer. I would like to invite you to delve a little bit deeper into that to help inform this committee's study.

[*Translation*]

Dr. Jean Caron: When the soil becomes compacted, the amount of air inside the soil is reduced. Initially, microbes use oxygen, but when they run out of oxygen, they start to take nitrogen from the soil and use it to breathe. At this point, they emit either nitrogen gas, N_2, or nitrous oxide, N_2O.

Work by Nimlesh Balaine in New Zealand on soil compaction has shown that as soils become more compacted, they could lose 10% to 60% of the nitrogen applied in the form of N_2 or N_2O. This is a huge amount.

As soils become more compacted, the likelihood of this happening becomes greater,especially in the context of climate change, where rainfall that used to occur once every two years 20 years ago is now occurring up to four times a year. This means that the soil remains wetter for longer and is more oxygen deficient, which means that more and more nitrogen is likely to be emitted at the beginning of the season.

We aren't sure yet, but according to the indicators on the situation in Quebec in the recent study on soil health, 60% of the soil was below this value.

● (1140)

The Chair: Dr. Caron, your time is up.

Thank you, Mr. MacGregor.

Mr. Epp now has the floor for five minutes.

[*English*]

Mr. Dave Epp (Chatham-Kent—Leamington, CPC): Thank you, Mr. Chair.

Thanks to both witnesses for their excellent testimony this morning.

I'd like to begin with Dr. Bedard-Haughn.

I will be lobbying my committee members to ensure that all three of your recommendations and points end up in the final report. I really do feel that they are very timely and accurate.

Being a farm boy from southern Ontario, from vegetable producers, I also appreciate the dirt-under-the-nails perspective that we bring to the settings that we find ourselves in. I'd like to begin by talking about Canada's participation in a lot of international discussions around some of the climate challenges and some of the soil challenges that we're facing.

Can you provide your assessment of some benchmarking as to where Canada is, relative to the other breadbaskets? Obviously, Ukraine is much in the news now but there are also the U.S.; Australia, which we've talked about a bit, and Brazil as other major food- producing areas.

Where are we at in our soil preservation, and in our storing our carbon and our gas emissions from agriculture? Can you provide us with a rough benchmark?

Dr. Angela Bedard-Haughn: The challenge of course becomes that of regionality. If I were to provide a generalization, it might be true for one region but not for another.

When I think very broadly in terms of some of the work we've done in the west, certainly we have stored a lot of carbon here through mechanisms like conservation tillage. If I look south of the border to the U.S. at our comparators for the northern Great Plains, there is quite a bit of conservation tillage in parts of the more semi-arid Great Plains. If you go further south and east into some of the corn country and beyond, it gets to be much more straight ahead with intensive tillage and high fertilizer use, and there would still be a lot of greenhouse gases being emitted in those very intensive production systems. There is a lot of risk associated with those.

Again, Brazil is probably comparable to Canada in a lot of ways in terms of the mix of systems there. One of the challenges that you would see in parts of Brazil is where there is continued deforestation. There is going to continue to be a lot of carbon emitted in association with that as more and more land is cleared. That represents one of the biggest periods of carbon loss associated with the system.

Mr. Dave Epp: Thank you, Dr. Bedard-Haughn.

I hate to cut you off, but what I'm hearing you say is that there is a lot of variability, and for that reason, we have to be careful that we don't import across-the-world solutions to address the problem.

Dr. Angela Bedard-Haughn: Yes.

Mr. Dave Epp: You talked about benchmarking measurements being so important.

Can you talk about the dynamics between private and public lab testing and the understanding of soil fertility?

With all the change and growth, is there unanimity in those perspectives from those sectors?

Dr. Angela Bedard-Haughn: The short answer is no. There's quite a bit of difference when we think about public testing, because we tend to be looking at trying to understand the system, as opposed to trying necessarily to find quick answers. As a whole, we tend to look a little bit more at those variability pieces. That said, there are private companies now that are increasingly recognizing the importance of that variability, particularly when we think about precision agriculture as an important tool that we can implement so that we're not applying excess fertilizer across the whole field. We're applying it where it has the most impact and the least likelihood of being lost through nitrous oxide, for example, or through leaching.

I think that as the viability and impact of those continue to grow, we're going to see more of that appropriate landscape-focused sampling take place, but, at this point, I would say it's fairly disparate.

● (1145)

Mr. Dave Epp: Thank you.

I definitely heard the plug for precision ag, and I'm assuming that's one area that governments can certainly help the industry move forward on.

Dr. Caron, I'd like to move to a bit of discussion on compaction. I grew up on a vegetable farm in southern Ontario, beginning more years than I want to recount with small equipment. We've greatly increased our equipment size, but we've also increased our tire pressures, and a lot of our neighbours have gone to tracking.

Would you agree that certainly footprint and kilograms per square centimetre—pounds per square inch is what I'm more used to—would be a greater consideration when talking about the size of the equipment? There are certainly a lot of advantages to automation. Could you give a quick comment, please?

[*Translation*]

The Chair: You have 30 seconds left.

Dr. Jean Caron: The weight, the axle load, should be reduced to less than three tonnes per wheel, according to the latest expert recommendations.

Earlier you mentioned the analyses. There are good databases for chemical parameters, but there is very little measurement of chemical and microbiological parameters in soils. Even if we could have access to the private producers' databases, a lot of that data would not be there, for example, the aeration and drainage indicators. We would benefit by being able to obtain them.

The Chair: Thank you, Dr. Caron.

Thank you, Mr. Epp.

Now, Mr. Louis, you have the floor for five minutes.

[*English*]

Mr. Tim Louis (Kitchener—Conestoga, Lib.): Thank you, Mr. Chair; I appreciate that.

Thank you to both our witnesses. Your study is showing us that it is really our responsibility when borrowing and taking care of this land for future generations.

Dr. Caron, I want to let you continue. You were on a roll, and maybe you could take another minute to continue answering that question.

[*Translation*]

Dr. Jean Caron: Regarding Mr. Epp's question, right now we have very few biodiversity assessments. However, metagenomic techniques are increasingly available. Since we are not monitoring the situation, it's as if we didn't have statistics on the health of individuals. It's very difficult to develop public policy based on a picture that is inaccurate.

I would therefore like to take this opportunity to make our decision-makers aware of the importance of having a statistics program that would take regional realities into account when making decisions or recommendations. More effort or investment is needed to encourage follow-up analyses that are necessary for the development of these portraits.

[*English*]

Mr. Tim Louis: Thank you.

Dr. Bedard-Haughn, I'm hearing both of you say that more data is necessary. We are also hearing that more public awareness is necessary and addressing costs to our farmers.

If I were to go back to the first point on more data, could you help me understand if farmers themselves would be participating in these samples, or is this something that would require more levels of technology than an average farmer has? How would we get down to the actual ground level?

Dr. Angela Bedard-Haughn: I think there are two components there. One of the challenges we face, given the wide range of spatial variability associated with soil carbon, with asking a farmer to do this without providing a lot of important context to them is just knowing how to collect the sample properly, because collecting a soil sample for analysis.... If you over-compact it, for example, or you get too loose of a sample, that's going to influence your results. As well, there's going to be a big implication from where in the field you collect the sample, so a farmer might inadvertently overestimate the amount of carbon they have depending on where they collect that sample.

I think a combination of a more controlled or government-organized data sampling strategy would be important, but it could be complemented with some of those other techniques. For example, as we build that spectroscopic database that I was referring to earlier, there may be more opportunities for producers to collect more of those samples themselves, or in partnership with the agronomist they might hire to help with their work as well.

Mr. Tim Louis: Given your level of expertise, what would your best-case timeline be? What would you like to see? How fast can we move on this one?

I saw you smiling.

● (1150)

Dr. Angela Bedard-Haughn: That depends how much we want to invest in it. That's always the challenge. We can move fairly quickly if we throw enough money at a problem, as we saw with the COVID vaccines. We can move very quickly if we have the right resources, but we need to....

It takes a good bit of time to get out...it's 81% of the farmland here in the Prairies. That's a big area if we want to get a systematic sampling carried out.

Mr. Tim Louis: If I could switch to Dr. Caron, you mentioned that a major barrier to adopting the agricultural practices that support soil health is the price of commodities themselves, which remain low. That makes it difficult for the growers to be able to afford the costs.

Sometimes we hear that rotations are disappearing, not only because of the cost, but also because of the disappearance of mixed agriculture. Initiatives like agroforestry—I think you mentioned that in your statement—and agricultural systems providing better biodiversity and additional rotations are needed.

Can you address why rotations might be different and disappearing like that? How can we encourage agroforestry or more diversity among farms, as they're becoming more and more focused on one crop?

[*Translation*]

Dr. Jean Caron: That's a very good point and an excellent question.

In fact, we do a lot to encourage grain corn and soybean production in the east. However, these grains are often grown by people who specialize in this sector. But in some sectors, such as dairy and pork production, producers also sometimes grow other products that they need on the farm. In many other cases, however, producers focus exclusively on grains such as corn, soybeans, wheat or barley in their rotation sequences. However, these rotations bring very little organic matter back to the soil and are regularly done with Roundup herbicides, which tend to restrict the range of crops that can be grown. So there is a real need to encourage the introduction of third and fourth crops. The development of crops such as legumes, protein crops, such as peas, should be encouraged to diversify production.

The Chair: I'm sorry, Dr. Caron and Mr. Louis, but your time is up.

Mr. Perron, you have two and a half minutes.

Mr. Yves Perron: Thank you, Mr. Chair.

Dr. Caron, I'll let you finish your previous answer in 30 seconds, please.

How do we encourage diversification of production? Are positive measures enough or should there be a timetable that would give people a stronger incentive to rotate crops more?

Dr. Jean Caron: I think there should be incentives for introducing rotations. There are already local programs that encourage the adoption of green fertilizers, which would be a good incentive. Producers should be rewarded for taking initiatives in this direction, because the gains are only seen in the long term. If we don't encourage migration, we won't meet the targets.

We have no choice but to offer incentives not only to producers who will make this migration, but also to those who may have already started it and who have achieved certain indicators, such as percentages of organic matter or biodiversity indicators. So it's not just subsidies and direct assistance that should be provided to producers, but also related technical support that allows them to make gains they would not otherwise be able to see.

Mr. Yves Perron: I'm glad you brought that up, because I was going to bring it up in my next question.

How can technical advice be improved? We hear all kinds of things, including producers being advised by product retailers. In your opening remarks, you talked about advisory groups and the strategic mistake made by the government when it got out of the business.

Can you sort out what is true and what is not true and what role the government should have in this area?

Dr. Jean Caron: Right now, there is quite a dilemma. I don't know to what extent this applies to the rest of Canada, but in Quebec, the Agrologists Act has just been amended. Agronomists could receive a percentage on the sale of fertilizers or pesticides. At the same time, they provided advice. It was a very clear conflict of interest situation, which this new bill will eliminate.

There are networks of independent advisory clubs. I used to see this in the United States on a regular basis. We have this elsewhere in Canada, such as Alberta and Ontario. They should be helped, because they have less of a conflict of interest. In general, most have difficulty offering advice other than that associated with liming or fertilizer recommendations, because the other services are much more expensive.

Let's take the example of drainage plans. In most cases, producers think they have drainage problems, but often they also have very significant compaction problems. This goes undetected, because no one is doing the analysis necessary to carry it out. Obviously, if you don't do the analysis to detect the problem, then you're not fixing the problem properly.

These services are not offered by fertilizer retailers, but rather by independent advisory clubs.

● (1155)

The Chair: Thank you, Mr. Perron and Dr. Caron.

Mr. MacGregor, you have the floor for two and a half minutes.

[*English*]

Mr. Alistair MacGregor: Thank you very much, Mr. Chair.

Dr. Bedard-Haughn, in your opening remarks, you made mention of the use of crop residue as a potential fuel source and how that might be quite detrimental to soil carbon efforts. In this Parliament and the previous Parliament, we have been tasked with looking at the issue of finding alternative fuel sources, particularly for grain dryers. There are technologies out there that are trying to use crop residue as a fuel.

Could you expand on your opening comments? I think those are going to be very helpful to us. Just expand on your opening remarks, but also on any suggestions you may have on what we should be pursuing.

Dr. Angela Bedard-Haughn: Sure. I'll focus it on two things.

The first would be that we need to make sure we're doing a complete life-cycle analysis when we're promoting these approaches: looking at where in the region we're placing this and then figuring out that if we are capable of the sciences, saying, okay, if we start to remove the residues, what will be the implications in the long term? Is it a matter of saying, no, you can only remove your residues this many times in a number of years and sell it to this plant, or is it only certain types of residues that can be used for that? That's one piece.

The other piece that I think we really need to be thinking about is that there are lands, particularly here in the Prairies, that aren't great for growing crops. We have a lot of salinity, for example. There are lands that aren't great for growing annual crops that might be well suited to producing other types of feedstocks.

Monsieur Caron mentioned agroforestry, for example. Are there fast-growing woody biomass crops, for example, that we could be growning in those spaces, or other types of residues that we could be producing on these more marginal agricultural lands and using those instead?

We want to make sure that we do a full life-cycle analysis and look at what are the implications of removing these residues based on the soils we are dealing with.

Mr. Alistair MacGregor: Thank you for that clarification.

Chair, I'll wrap up there. Thank you.

The Chair: Thank you, Mr. MacGregor.

To our witnesses, Ms. Bedard-Haughn and Mr. Caron, thank you so much for your presence and your testimony here today. As members have expressed, I know that it has been beneficial to us.

Colleagues, we're going to move quickly to our second panel in just two or three minutes. Don't go far.

I will turn it over to the clerk to do some sound checks. Thanks.

● (1155)

_____(Pause)_____

● (1200)

The Chair: We are going to get started with our second panel. Joining us virtually via video conference today, from BioIndustrial Innovation Canada, we have A.J. (Sandy) Marshall, who serves as the executive director.

Welcome.

From the Canadian Canola Growers Association, we have Mike Ammeter, who is the chair, and Dave Carey, vice-president, government and industry relations.

Mr. Carey, I think you've given quite a lot of testimony before committees. Welcome back.

From Oberland Agriscience Inc., in my home province of Nova Scotia, we have Greg Wanger, who serves as the founder and chief executive officer.

Welcome to all of you. You will have five minutes for opening remarks.

We're going to start with Mr. Marshall for five minutes.

It's over to you, my friend.

[*Translation*]

Mr. A. J. (Sandy) Marshall (Executive Director, Bioindustrial Innovation Canada): Good afternoon.

[*English*]

Thank you very much, honourable chair and members of the Standing Committee on Agriculture and Agri-Food, for this opportunity to speak today.

Bioindustrial Innovation Canada, known as BIC, is a nationally focused, not-for-profit organization based in Ontario, but with a track record of success across Canada. We are a leader in the development of the Canadian bioeconomy, providing critical strategic investment advice and services to business developers, mostly start-ups, on clean, green and sustainable technologies.

In particular, BIC is focused on enabling Canada to become a globally recognized leader in sustainability by converting renewable resources, such as agricultural and forestry co-products and residues, into value-added bioproducts, such as bioenergy, low-carbon hydrogen, renewable natural gas biofuels, biochemicals and biomaterials. These industrial bioproducts find their way into a wide range of commercial applications which support Canada's commitment to reach net zero by 2050.

Low-carbon hydrogen, renewable natural gas, and biofuels generated from renewable resources are reducing the carbon intensity of the energy pool used for housing and mobility. Biochemicals and biomaterials can be used to produce materials to replace fossil-based alternatives for advanced manufacturing applications, such as automotive, truck and bus, aerospace and construction.

Low-value, sustainably sourced renewable resources can also be converted into stable biocarbon, which can be used as an excellent soil amendment for agriculture and sequester carbon for generations. Advancing Canada's circular bioeconomy through these innovative technologies will have a significant climate change impact through reduced greenhouse gas emissions.

BIC has a proven track record in this area. We have helped create jobs and made strategic investments in companies by building clusters and developing biomass-based value chains. Since inception, BIC has invested $19.5 million in 32 early-stage companies that have created more than 5,000 jobs, leveraged over $350 million in third party investment and more than $1.8 billion in follow-on investment. These actions have contributed to the transition towards a sustainable, low-carbon, circular economy.

Our portfolio companies have reduced a documented one megatonne of CO2 emissions and are projecting to further reduce that by more than 13 megatonnes by 2030. In 2021, Canada announced a plan to reach a 40% to 45% reduction in GHG emissions by 2030, and enshrined in legislation is Canada's commitment to reach net-zero emissions by 2050. These are ambitions that Canada and BIC share, and we know that the government is looking for all available options to find these reductions.

While it is important that all sectors and industries play a role, the government needs to ensure that the start-ups are not forgotten in the process.

Canada has the abundant and sustainable biomass resources and is highly adept at generating value from them. These abundant natural resources have shaped the country from coast to coast. Historically, Canada's traditional industries, forestry, agriculture, fisheries and mining, have been the economic drivers creating much of the fabric of Canadian business and culture.

It is estimated that Canada generates more than 50 million tonnes per year of sustainable agricultural residues that are available for conversion into bioproducts. In addition, co-products from food and protein production, such as starch, fibres and oils, are valuable feedstocks for industrial bioproducts such as plastics and resins.

To help Canada reach net zero by 2050, the government should build a national green business accelerator initiative, which mission would be to make more capital seed funding available. Such a government-backed investment should have specifically targeted funds for business opportunities with the potential to have the highest impact on reducing emissions in communities from coast to coast. This would give private investors and accelerators the confidence they need to commit themselves to put start-ups on track for success.

In summary, BIC wants to continue to partner with government and the agricultural sector in Canada by investing in early stage businesses to help them innovate and reach our goal of net zero. Canada has the world's most abundant and sustainable biomass resources and is highly adept at generating value from them. This reality presents an opportunity that we need to leverage, and we have the experience and track record to help. We can work together to address the ways in which Canada's competitive advantages, including access to biomass, global leadership in forestry and agriculture, sustainable resource management and a skilled workforce, can make Canada a world leader.

I look forward to answering your questions.

● (1205)

The Chair: Thank you very much, Mr. Marshall.

We're now going to, I believe, Mr. Carey, who's going to have opening remarks on behalf of the canola group.

It's five minutes over to you. I'll let you decide who wants to go first.

Mr. Dave Carey (Vice-President, Government and Industry Relations, Canadian Canola Growers Association): Go ahead, Mike.

Mr. Mike Ammeter (Chair, Canadian Canola Growers Association): Thank you very much, Mr. Chair, for the invitation to speak today.

My name is Mike Ammeter and I'm the chair of the Canadian Canola Growers Association. I farm at Sylvan Lake, Alberta, which is an hour and half north of Calgary. I grow canola, pulses, wheat and barley on approximately 1,400 acres of land.

With me today is Dave Carey, CCGA's vice-president of government and industry relations, who is based in Ottawa.

CCGA is the national organization representing Canada's 43,000 canola farmers. Canola is Canada's most widely seeded crop, generating the largest farm cash receipts of any agricultural commodity and earning farmers over $12 billion in 2021. Ninety percent of our crop is exported as seed, oil and meal. The canola sector contributes $29.9 billion to Canada's economy every year and supports over 200,000 jobs.

Canola farmers are committed to a sustainable future and play an important role in advancing our collective environmental ambitions. By 2025, canola farmers plan to reduce their fuel usage by 18% per bushel, increase land use efficiency by 40% per bushel and sequester an additional five million tonnes of CO2 using 4R nutrient stewardship practices on 90% of canola acres. They continue to safeguard the more than 2,000 beneficial insects that call canola fields and surrounding habitat home.

To reach these goals, we need all the tools in the tool box in terms of access to innovative technologies and practices that will help us continue to soften our environmental footprint while ensuring our farms remain economically sustainable and competitive.

Farmers have a proven track record of adopting innovation that benefits the environment, like conservation tillage or zero till. Over a decade ago, I personally began to practice zero till on my farm as a way to use finite resources more efficiently and to improve soil conditions. By voluntarily adopting this practice, farmers like myself have improved soil cover, sequestered carbon and reduced soil erosion risk while reducing fuel and labour requirements. In 1991, 7% of Canadian farmland was seeded with no-till practices. By 2016, this number had increased to over 60%.

To accomplish these sustainability goals and practices, the canola sector has also set a production target to reach 26 million tonnes and 52 bushels per acre of canola by 2025. Not only is this a sector goal, but it also aligns with the Government of Canada's own objective of expanding agri-food exports to $85 billion by 2025. It will be difficult to increase production given that farmers are also tasked with meeting the target of reducing absolute levels of fertilizer emissions by 30%.

The announcements to expand crush capacity domestically—adding up to an additional seven million metric tonnes of demand annually—illustrates that industry is willing to invest in Canada and the canola sector. However, they need to feel confident that the regulations in the clean fuel standard enable canola production as a feedstock for biofuel and that we can also meet our own production goals to see these investments become a reality. Agriculture clearly has a unique role to play in expanding Canada's economy, but production will need to continue to increase to meet demand.

To meet government and industry targets, farmers will need to invest in our operations—in new technologies or equipment—and potentially take risks on implementing new practices. Farmers will make these investments when they are confident in the economic stability and sustainability of their operations. Specifically, government can help facilitate this by ensuring farmers have access to predictable and reliable risk management programs, such as AgriStability and AgriInvest.

Another way to encourage farmers to invest in new technologies and practices is by supporting Bill C-234. By providing relief from carbon pricing on natural gas and propane, those dollars that would otherwise be paid by farmers can be invested in technologies that will have a positive environmental outcome. Rebates will not make up for the costs incurred by carbon pricing.

Lastly, it is vital that the government stick to science-based decision-making, especially when reviewing pest control products and associated maximum residue limits. Streamline approval processes for seed varieties where possible, so Canadian farmers can remain competitive and sustainable.

● (1210)

In conclusion, it's vital that the focus of sustainability be not just environmental but also economic to ensure that our collective goals are achieved. Canola farmers take pride in how we care for our natural resources. No one has more of a vested interest in the environment and in ensuring the sustainability of our farms to be able to pass them on to the next generation than we do.

Thank you for the opportunity to appear today. I look forward to questions.

The Chair: Thank you Mr. Ammeter.

We'll move now to Mr. Wanger for five minutes, please.

Dr. Greg Wanger (Founder and Chief Executive Officer, Oberland Agriscience Inc.): Thank you to the chair and thank you to the committee for this opportunity to address you today.

I am part of what's a relatively new agriculture industry here in Canada, and that's the insect farming industry. Oberland Agriscience was incorporated in 2017, and we're just breaking ground on our first large-scale facility here in Halifax. Across Canada there are about 25 insect farms of varying scales.

As to what we do, most of us take in organic waste and organic residues. We use that to make feed for our insects, which then go to help the food system in three main ways to boost its resiliency. One, we help in the reduction of food waste by the upcycling of that food waste into nutritious feed for our insects. We also produce a high-quality protein product, which then goes into agriculture, aquaculture and the pet food industry. Finally, we produce a product that usually comes out the back end of the insect. That is a very good fertilizer, or very good soil amendment. The talk this morning has been about soil health, and that is an area where the insect industry can really help.

I'll tell you a little bit about myself. I'm a recovering academic, as I like to say. I have a Ph.D. in microbiology, and now I've transitioned into the entrepreneur space. It's been really interesting to bring the research background that I have into this field right now.

At Oberland Agriscience we're striving to be a zero-waste facility. Everything that comes into our facility has a saleable home. Our new facility will be powered by 100% renewable energy, which actually allows us to produce protein at among the lowest CO2 equivalence per kilogram of protein at production.

This is an exciting and interesting industry across the world, but really so in Canada. Canada has some of the largest insect farms in the world right now, particularly out on the west coast. One farm in Calgary, Enterra, is one of the largest in the world. There are several others—Quebec in particular has several large ones—that we are all pushing to scale. We are trying to meet the rising demand for protein and these agricultural products.

I look forward to all the questions that may be posed to me. Thank you again for this opportunity.

● (1215)

The Chair: Thank you very much, Mr. Wanger.

That ends our opening statements. We will move to questions.

I believe it will be either Mr. Barlow or Mr. Falk who will start. I apologize. It's Mr. Falk, perhaps; I don't know. It's the Conservatives, anyway.

Mr. Barlow, it's over to you.

Mr. John Barlow (Foothills, CPC): Thanks, Mr. Chair. You got a late start on the day, with horrible flights, so I can understand that you'd be a bit off; no problem at all.

I'm going to start with the canola growers.

Mr. Ammeter, you were talking near the end of your presentation about the importance of making science-based decisions when it comes to policy and regulations put forward by the government. One issue that we really haven't talked about yet, although certainly we're early in the study, is the importance of new technology and innovation right to the very beginning—seed development and those type of things.

I believe our climate goals and our biodiversity goals are achievable, but you need to ensure that the roadblocks are out of the way for you to achieve those goals. How important is it to have those science-based decisions on things like GMOs, gene editing and those types of things to allow us to meet our environmental goals and still meet our commitments in terms of yield, especially when we have a potential food security crisis around the world?

Mr. Mike Ammeter: We look to science all the time. I'll take the very simplest thing I can think of, which is soil testing. If I don't know what I'm doing, then I'm guessing. When it applies to seed technology and innovations like that, I need the science that backs that up and to trust the science.

On the innovations that you talked about, I think a lot of those things come out of “proven science”, if you like. It's kind of a bad way to put it—“proven science”—but we look to those things and adopt them. I'll go back as far as zero till. That was stuff we did that we recognized had a benefit to us, and we adopted that right away. It was backed up by good science, if you will.

Dave, I don't know if you want to wade in on anything about that.

Mr. Dave Carey: I will just say that there's no silver bullet. The key things are crop protection and the products. Herbicides and pesticides actually have an environmental benefit, because using a small amount of herbicide allows for no till. The latest and greatest seed innovation may be canola that's able to produce some of its own nitrogen, use less water or stand up to diseases. They're all part of the tools in that tool box that Mike alluded to earlier. Those are critical. That's how we're going to innovate.

I think we need a regulatory environment that allows that to be brought to market and encourages the investments to be made here in Canada, because those companies compete globally for dollars to be brought to the Canadian marketplace.

Mr. John Barlow: With that, Mr. Carey and Mr. Ammeter, one of the things we often hear is how long it takes to get approvals for some of this new technology and innovation, and we tie that to reaching our environmental goals. Are there some recommendations that you would have on roadblocks that need to be removed, or some obstacles that need to be streamlined to ensure that we can reach some of these goals and our potential?

Mr. Mike Ammeter: Offhand, John, I can't think, of any. Some of the details of how these things get done get a little bit lost in the woods.

I am a farmer, so I see the effect of it and I know what's going on. I know it's a drag by regulation. I don't always understand the intricacies or the nuances inside of that, but I do understand the net effect, which is that sometimes we get these roadblocks. As I say, they would affect a producer. This just leads to some frustrations as to why this is taking so long. As I say, I don't have enough knowledge of the intricacies of some of those things and the various departments within government, etc., and why they take so long. That said, I do know they take a bit longer than what we think they probably should.

● (1220)

Mr. John Barlow: Thanks, Mike. I appreciate that.

You mentioned the willingness, let's say, of farmers wanting to invest to improve their equipment, to improve their own technology on a farm to meet their environmental goals, to remain sustainable not only environmentally but also, certainly, economically. You also mentioned that to do this there needs to be some confidence in the economic stability of the business and farm itself.

We saw the emissions reduction plan that was released last week, and according to the Parliamentary Budget Officer's report, this carbon tax is going to be taking more than a billion dollars out of the pockets of farmers but is not actually going to reduce emissions. Can you elaborate a little bit more on why it's more important to have that money in the pockets of farmers to invest in their operations rather than government taking that out of the pockets of farmers?

Mr. Mike Ammeter: The first thing that pops into my mind is.... I think, perhaps, a number of you, if not all, have had a chance to go a regional farm show where equipment was being showcased. It's a little bit of a problem for farmers. It's worse than a candy store for children. We go there and we see the new equipment and new technology. We have an extremely long history of adopting new technology, and it's not just for fun, because we see the value of that. So if you leave the money in our pockets, we will adopt that.

The Chair: Thank you, Mr. Ammeter. We're at time. I apologize.

Thank you, Mr. Barlow. I appreciate it.

Mr. Ammeter, while we're here, I did speak with the clerk. We're having a little bit of a technical issue with your sound. Our interpreters are doing their best. When you're asked questions henceforth, if you could try to be a little bit slower in your delivery, that would probably help. That's what we've been asked to do. Thank you.

I will go now to Ms. Valdez for six minutes.

Mrs. Rechie Valdez (Mississauga—Streetsville, Lib.): Thank you, Mr. Chair.

Thank you to all of the witnesses for your testimony on this very important environmental study.

Mr. Wanger, congratulations on breaking ground at your new facility. The work you're doing at Oberland is really going to make a positive contribution to our planet.

We spoke to Mrs. Lockwood from Lockwood Farms in a previous committee meeting. She had made the choice on her farm to feed her hens with black soldier fly larvae, or BSFL, as opposed to using soy crops. She commented that the choice she made was for reasons like sustainability, being conscious about climate change and animal health and welfare.

Can you describe the main advantages for farmers to use BSFL in its different uses, like feeders, fats or protein?

Dr. Greg Wanger: BSFL, or black soldier fly larvae—I'm glad that you said black soldier fly larvae and not blackfly larvae, because we'd be run out of Canada if we actually started rearing those—is a very good species of insect to feed to multiple livestock animals, such as chickens, poultry, swine, and also aquaculture.

Particularly in chickens, one of the requirements they have for laying hens is high calcium. Calcium is important, of course, for shell development in laying hens. The soldier fly naturally accumulates very high amounts of calcium. As an insect species it accumulates thousands of ppm—parts per million—of calcium within its body, and when fed to livestock or poultry, it is a very readily absorbable bioavailable source of calcium.

Particularly for chickens and laying hens, the soldier fly is an ideal supplement to the local feeds. It's something that's been long known in the backyard chicken industry, but now, as more soldier fly farms grow to scale, we can start to supply some of the larger producers. That's really where our role is; it is providing good nutrition for those animals.

It's also been shown in the hog or swine industry that feeding a supplement of black soldier fly larvae to the hogs actually reduces intestinal distress and that leads to healthier and more productive pigs on the farm. It's likewise in the salmon industry. Out here in Nova Scotia, we're very linked to the aquaculture industry. Salmon naturally in the wild would spend a lot of their time in rivers eating insects in the rivers, so their metabolism is geared towards that kind of feedstock, so supplementing their feed with soldier fly is great as well.

One of the things that's really nice about the soldier fly is it's being fed on food waste and residuals coming out of other food manufacturing and grocery stores, so the food waste that would typically either end up in a landfill or low-grade compost, we are able to upcycle that and turn it into a very high-quality protein product that can feed multiple industries.

● (1225)

Mrs. Rechie Valdez: Thank you.

Can you touch on—I think you mentioned it in your opening statement—the impact on the environment as it relates to BSFL's high production yield in how you're producing it?

Dr. Greg Wanger: I'm currently sitting in our pilot facility which is 7,000 square feet. That's the whole production facility. The actual area in our facility where we're rearing the soldier flies is about the size of a tennis court. In that area we are able to produce the same amount of protein as about 140 to 160 acres of corn.

Our new facility, which is located just across the street here, will be about three acres in size, or one and a half hectares. We will be able to produce the same amount as about 5,000 hectares of corn. It's a massive amount of production in a very small area. We can do this because we use the principles of vertical farming.

Our larvae are grown in bins that we can stack. The soldier fly has a tremendously rapid growth rate. It grows about 8,000 times its size in 10 days. One of my employees did the calculation and this is the equivalent of a human baby growing up to the size of a blue whale in 10 days. We have a massive production in a very small area. That's why we can do what we claim we can do.

Mrs. Rechie Valdez: Thank you.

Europe is leading the way in this industry, so what assistance do you need to scale up or to help get more of your product into the market?

Dr. Greg Wanger: Definitely, one of the things we actually get from a lot of industry that are looking to sign offtake agreements with us on the protein and on the frass side of things is: Can you get to scale and how quickly can you get to scale? On the protein side, we have several large industrial players in the United States. Cargill and ADM are now looking at soldier flies.

Here in Canada we also have some very large industry groups looking at it. They're all waiting for the industry to scale. I mentioned that in Canada there are about 25 insect farms of various scales. Three to five of them are actually producing large volumes, and several of us are in the process of scaling to that first large-scale industrial process.

One of the things we do need is help getting a lot of these smaller companies out of the R and D phase and into their commercialization phase. In Atlantic Canada we've been very fortunate. There are a lot of government programs that really help a lot of these companies. I'm thinking about ACOA and the funding that we received early as a company that really helped us launch from the R and D phase into the first commercialization phase. It's projects like that where the government can really help.

The other is helping us with the research. Currently, we have about four projects going on with universities to help define and prove out our products. It's through grants, and I think about the most recent NSERC missions grants—

The Chair: I'm sorry. We're going to have to leave it there. I wanted to give you a few extra seconds, and I did, but I'm sure you'll get more questions.

[*Translation*]

I'll now give the floor to Mr. Perron for six minutes.

Mr. Yves Perron: Thank you, Mr. Chair.

I'd like to thank all the witnesses for being with us.

Mr. Wanger, I'll let you continue your intervention.

You've heard the discussions about soils. There are questions about how we're going to get an accurate measurement and find out who we're rewarding, who we're not rewarding and who we're encouraging to improve.

In your sector, soil quality can't be measured. How do you see that? You seem to have an excellent yield for small acreage, but how can the government assess that?

[*English*]

Dr. Greg Wanger: The insect industry is one of those. We tick a lot of boxes, especially when it comes to climate change and meeting ESG goals for our partners, both upstream and downstream. There is a lot that we can do.

What can be done is helping with the data. It was mentioned earlier on. It's the collection of data. All of the soldier fly farms and insect farms in Canada have research projects that are currently going on.

With soil health, I mentioned the frass. We produce a fertilizer product that we alone have shown to be tremendously good at helping with soil health. It is getting to a farm before we try our applications and then during, and then it's a question of what we should be measuring. We need guidance and help to be told of the variables that we should be measuring and training the farmers to take the measurements correctly, because the adage of “garbage in, garbage out” is very applicable to data.

We need to make sure that all parties—industry parties, like me and others, the agriculture industry and the farmers—are working from the same playbook. That's crucial. That help comes a lot with the public-private partnerships between us and the university researchers.

● (1230)

[*Translation*]

Mr. Yves Perron: Thank you very much.

Mr. Marshall, a previous witness told us that when you remove organic matter from the soil, you have to ask how much of it you can remove. We were told to look at this as a whole and leave some of it to conserve carbon.

What about your production with biofuels in this regard? What insight can you give us about this?

[*English*]

Mr. A. J. (Sandy) Marshall: I fully agree with the point she made. It's absolutely critical that we maintain and ensure that we are doing sustainable harvesting, and not removing excessive amounts from and detrimentally impacting the soil. There are a number of studies that have been done that show there is a portion of the biomass that can be removed sustainably. That's where we have to put our focus.

Even once you have the science in place, it's really important that we have the traceability and the ability to track where we're moving the biomass from, so that we can continue to ensure that we're doing it sustainably and appropriately.

When I made my point about 50 million tonnes of agricultural biomass available, that is not the total amount of agricultural biomass that is available. That is based on a significantly reduced factor of the total biomass generated.

I would say that there are only a few crops where we generate sufficient biomass that there's an opportunity to remove it. In the case of us here in Ontario, it's really around wheat straw and corn stover, in particular, where you get excessive amounts of biomass that you can sufficiently remove without having long-term, detrimental effects on the soil.

[*Translation*]

Mr. Yves Perron: Thank you very much. Your clarifications are very enlightening.

My next question is for Mr. Ammeter or Mr. Carey.

You said that there was a lot of rotation in the west, but that there were problems with this in the east.

Can people in the east be encouraged to use the western business model? I'd like a 30-second answer because I have another question.

[*English*]

Mr. Mike Ammeter: I don't know enough about eastern agriculture to suggest, and won't, how farmers run their operations. For us, it's very important. We follow fairly tight crop rotation guidelines. As I mentioned in my opening comments about wheat, canola, barley, peas and fava beans, that means on each individual parcel of land, they'll have one of those crops every so many years.

It's very important for us pest management—

[*Translation*]

Mr. Yves Perron: Thank you. I'm sorry for interrupting you, but I really want to ask my other question.

You mentioned AgriStability and AgriInvest, which you need to ensure stability. Other witnesses, Martin Caron, from the UPA, among others, mentioned the need to raise the AgriStability threshold to 85%. I know it's in the Prairie region where this proposal is stalled.

Can you speak to that? Do you agree with the request for an 85% AgriStability threshold?

[*English*]

Mr. Mike Ammeter: I think I would say yes, I agree with that, and the short answer is borne out by the fact that currently AgriStability's enrolment level is still very, very low. Even the changes that were brought in a year, or year and a half, ago haven't been enough to entice producers to bring the enrolment level up to what we're looking for. The shorter answer is that I think there's room to move on that for better participation.

The Chair: Thank you very much, Mr. Ammeter and Mr. Perron.

[*Translation*]

Now Mr. MacGregor has the floor for six minutes.

[*English*]

Mr. Alistair MacGregor: Thank you, Chair.

I'll turn to Mr. Wanger. I've been looking at your website, and the statistics that Oberland Agriscience posts there are very impressive, as is the fact that you only need 3,000 grams of feed to produce a kilogram of protein compared with 10,000 grams needed for beef. Similarly, the pounds of protein produced per acre of farmland are very impressive statistics.

I have a question: Where does your company source its feed for the larvae?

● (1235)

Dr. Greg Wanger: Our company right now sources its feed from the by-products of other food production industries. There are several organic producers in the Halifax area, and a lot of them are currently paying to have their organics removed by a waste-hauling company that takes them to a composting facility. Nova Scotia has one of the most long-standing composting programs in Canada, so there's already this idea of collecting these organics.

We get a portion of those now, and that's what we're taking in. We're taking in residuals from other production companies. Right now, under the Canadian Food Inspection Agency rules and guidelines, the insect industry is only allowed to take what is deemed pre-consumer organics. This is organic waste that comes out of the back end of a grocery store, such as that bruised apple you didn't eat, or from a food production facility such as a bakery or a brewery. We can take all of that as our feedstock, and that's what allows us to really help close the chain of the food industry here.

We take the organics. We turn them into high-quality protein. We're efficient, and the soldier fly is efficient—my staff is efficient as well, but the soldier fly is really the powerhouse of our industry—at converting that organic biomass into protein biomass. Of all the insect species grown around the world right now on an industrial scale, the soldier fly is really taking over as one of the main species because of its high efficiency and its great feed conversion ratios.

Mr. Alistair MacGregor: In terms of the quantity, when you provide food to your larvae, how much are they able to reduce the mass of food? What is left over percentage-wise? Do you have some ballpark figures?

Dr. Greg Wanger: Sure, I have better than ballpark figures, yes.

For every tonne of wet organic material that comes through our door, we produce about 250 kilograms of wet larvae. This is the larvae prior to drying and turning it into protein powder. We also produce about 250 kilograms of frass, which is the fertilizer material, so it's quite a large reduction in organics.

There are several places around the world that are using the soldier fly as a manure mitigation strategy as well, and you can knock down manure volumes by about 70%. This is something that we're currently working on, a project with the local municipality here. We can't yet do that because of CFIA rules, but we're trying to push the envelope on the science.

It is about a 25% wet weight conversion of organic waste to soldier fly, and then we put it through a drying process, and, for every tonne, we end up with about 80 to 100 kilograms of dried powder.

Mr. Alistair MacGregor: Do you have an estimate on what that might translate into in terms of methane emissions reduction, all that wet organics now being used as a feedstock for insects? Of course, you're diverting it from a compost facility, a landfill, and preventing that particularly harmful greenhouse gas from being produced.

Dr. Greg Wanger: Yes. We do have that number. If I was to be asked next week, we will have our full LCA, which is just about to be completed for our facility.

One great thing about the insect industry and indoor agriculture in general is that because it's done indoors under a very controlled environment, we measure everything. We know exactly how many tonnes of organic come in. We know exactly the conversion rate. We know exactly how many kilograms of protein go out. We can measure the gases in the air that we are taking in to ventilate the facility and that we're releasing to the atmosphere.

From an agricultural perspective, one thing that Oberland really prides itself on is the data collection and sharing our data with both our downstream and upstream partners.

For the upstream partners, the grocery store chains and food producers have all set ESG targets that they are, in some cases, struggling to meet. We can help them by giving them a traceable sink for their organics.

On the downstream side, we have producers that are really trying to determine and minimize their ecological impacts and carbon footprint. For example, we're working with a local salmon farm here in Nova Scotia. One of the easiest ways to do that is to change the feed input of the salmon. We can give a traceable account of all the materials from the source all the way to the sink—from the organics all the way through to the salmon at the end.

● (1240)

Mr. Alistair MacGregor: Very quickly, I know a lot of companies are still in the start-up phase, but has it been pretty easy to get farmers on to your product?

Dr. Greg Wanger: The protein side is well established. I didn't mention early on that among the many other crises the globe is facing right now, the protein crisis is another one. With the rising middle class and more demand for high-quality foods, the push to higher protein foods is dramatic. The insect industry will play a role. We're not going to solve the problem, but we'll play a role.

On that end, we've seen massive uptake on our protein product, mainly in the pet food and agriculture industries. On the frass side, the insect industry has spent a lot of time working on the protein side and we are now, as an industry, really trying to push the frass and the fertilizer side.

On that end, there's still quite a lot of work to do to get widescale adoption. If you look at the data and the research we've had—you can come to my garden in Halifax and see—the results are tremendous, from what our fertilizer can do. We've shown about a 60% increase in root growth—

The Chair: Thank you, Mr. Wanger.

I'm sorry, Mr. MacGregor. We might have to shave a little bit of time off on the back side, but I wanted to let that line of questioning go. Of course, you're always welcome to come to Nova Scotia to visit Mr. Wanger or me.

Mr. Falk, I believe we're going over to you now.

Mr. Ted Falk (Provencher, CPC): Thank you, Chair.

Thank you to all the witnesses for your testimony at committee this morning. It's very informative and very useful for our study.

Mr. Marshall, I'd like to start with you.

You've had a very impressive resumé over the the years regarding chemical issues. I know you have your eye on a lot of balls when it comes to innovation techniques and technology.

Does any technology or technique really stand out to you that's going to meet our climate and environmental objectives while increasing yields for agriculture?

Mr. A. J. (Sandy) Marshall: I don't think there's going to be any single answer here on this.

There's one that is very interesting to me. There's a lot of move afoot around thermal conversion technologies now. People may call it pyrolysis, so I'll just use the term pyrolysis. It's the ability to take materials and basically convert them into fuels and then also to take those materials and convert them into what I'll call biocarbon, which then can be an excellent soil amendment.

I'm finding that right now a number of companies are putting a lot of focus on this area. I think there's real opportunity for taking low-value excess residues, converting them and then putting that carbon back into the soil. In essence, this is speeding up the process of what nature does itself. It's a little bit like what the Incas and Aztecs did 10,000 years ago, where they burned stuff and then buried it to increase carbon in the soil.

By doing that, you also have the opportunity to trap in and collect the nutrients that are there. Nutrient loss is one of the biggest issues farmers have when we talk about this. By incorporating it into these sorts of approaches, the nutrients are locked in and then returned back, so you actually get the fertilizer value.

If there's one little topic I would highlight right now that's popping a lot today, it is that area. I really believe that what's happening now around carbon credits and the price on carbon is actually creating some of the policy drivers to have those economics potentially accelerate and work.

Mr. Ted Falk: Thank you very much, Mr. Marshall.

Mr. Ammeter, you've talked about the importance of crop rotation for the soils. When I was growing up, summer fallow was a very popular thing. That seems to have gone by the wayside. Has the science changed? Is that still happening? Why or why not? Is that something we need to be considering?

● (1245)

Mr. Mike Ammeter: I think the demonstration of that is that back in the day—I know that in my early career in farming we did some summer fallow—that was the technique that we used probably for weed control, weed management and all of that. We have much superior methods to use now, so summer fallow is really as dead as a dodo, if you want to use that term. It still exists, but it's very limited, and I think we've demonstrated that there are far better ways than summer fallow to manage our crops and our fields.

Mr. Ted Falk: You also mentioned that fertilizer emissions reduction will not improve yields. Can you expand on that a little more?

Mr. Mike Ammeter: Yes: certainly not with the technology we have today. In my comments, I referred to the fact that the Liberal government has identified agri-food and agriproducts as a growth sector. If you tell me that I need to reduce my fertilizer emissions and that comes as a result of a direct reduction in fertilizer, those two things are diametrically opposed, and I can't do that with today's technology.

Having said that, with investment—somebody referred to it earlier today—and probably investment in canola breeding, where we have a canola that fixes some of its own nitrogen, like some of the other crops.... We don't have that today, but is that possible? Perhaps, with the right amount of investment.

Mr. Ted Falk: Chair, do I still have some time left?

The Chair: You have about 10 seconds, so if you want to be a gentleman and cede it to the committee, that would be great.

Mr. Ted Falk: Thank you.

The Chair: I might not have given you much choice.

Voices: Oh, oh!

The Chair: Mr. Drouin, you have five minutes.

Mr. Francis Drouin (Glengarry—Prescott—Russell, Lib.): Thank you, Mr. Chair.

Thanks to all the witnesses for being here.

I'll start with the folks from the canola association.

Last week, I met with Federated Co-op. They were talking about the opportunity that exists for canola farmers with regard to biofuels.

Mike, are your members talking about this at all? Are they fully on board to participate when we discuss the clean fuel standard and their participation?

Mr. Mike Ammeter: Yes, absolutely, I think. One of the things we talk about, if we can participate at the levels we're looking at, is that it's like having the size of Japan for exports—the amount of canola that Japan takes—and that's basically what that industry could require. Yes, I think it's an exciting opportunity for canola.

Mr. Francis Drouin: Yes, and what they're working on is quite neat. They would extract the oil for biofuel and continue using the feed for other purposes, but they've also talked about a potential natural fertilizer that they can create as a bioproduct, which would technically return to your farm. We're talking about using this product 100%, and I think that's neat.

You've mentioned precision agriculture. Do you have a percentage...? I don't know if you know the number of your members who currently use this practice. I know that it requires a significant amount of investment on the farm to do that, and that's why I ask the question. Do you know what amount of canola farmers currently use that practice?

Mr. Mike Ammeter: The short answer is no. I do not have that number.

I don't know if Dave does.

Mr. Dave Carey: Thanks for the question.

We don't know the exact number, but it would be quite high, Mr. Drouin and Mr. Chair, given that canola is one of the most expensive crops to grow. It does require a significant investment from farmers, both for planting equipment and for the costs of seed and input, so the amount of precision agriculture as an option for canola farmers would be very high, just given the economic intensity that is required to grow the crop.

Mr. Francis Drouin: Okay. Thank you.

I'll move on to BioIndustrial Innovation Canada.

Mr. Marshall, since the inception of that, have you seen more interest from private capital with regard to what you guys are doing?

Mr. A. J. (Sandy) Marshall: I think what continues to be a bit of a challenge in Canada is access to private capital. What we do find, because we also participate within the operations of the companies we're working with and so on, is that our investment wing has been able to attract capital partners to go along with us.

Although the capital is not as readily available as we'd like it to be, we do find that we have a number of VC partners that work with us, share due diligence with us and find these groups that are investing with us. These include groups like BDC and EDC as well, so it's not just private equity, but it's also other investment vehicles we have available to us here in Canada.

● (1250)

Mr. Francis Drouin: I asked the question because I know it's not an issue just in the sector that you're working with, but it seems to be a broad-based issue in Canada. We lose talent and we lose potential high-growth companies down south because of the availability of capital.

From what you're saying, because you have created that group, you have created an easy access for VCs to come to you. You provide that expertise for them to invest in biocompanies here?

Mr. A. J. (Sandy) Marshall: Absolutely. I would say that for us, because we're working a lot with the earlier stage companies, our sweet spot sits in the up to $20-million range of investment rounds.

I find the biggest challenge that our companies and VCs face here in Canada is that when you're dealing with the industrial bioeconomy, you're dealing with large capital assets that need to be built to produce things like biofuels, biochemicals and biomaterials. When you start requiring capital in excess of $100 million to execute a project, it's way beyond the capability of a group like ours to do that, and it does require a significant consortia of groups.

I think that's where you find the biggest problem here. We need to find those levels of funding to tackle those sorts of projects, and this is requiring us to attract international funds into our projects.

Mr. Francis Drouin: Thank you. Sorry, but I'm out of time.

Mr. Wanger, I'm really interested in your frass product. Would you be able to provide some data on how you could see that being applied on the farm and what tools you lack to do that? Does that make sense?

Dr. Greg Wanger: I think it makes sense. Yes, I will try to answer your question as I understood it.

One of the things—

The Chair: Mr. Wanger, sorry, but Mr. Drouin is out of time. We can certainly work this out; I have your coordinates. I think the idea is that we would table some of that information for the benefit of the committee, notwithstanding the challenge we have with timing.

[*Translation*]

Mr. Perron, the floor is now yours for two and a half minutes.

Mr. Yves Perron: I will be extremely generous and allow Mr. Wanger to answer that question in 30 seconds because it interests me.

[*English*]

Dr. Greg Wanger: Yes, I'll answer that question quickly.

One of the challenges we have is how we add this frass to the fields. We're working with local agronomists now to figure out the formulation, and the best way to either broadcast spread or in-furrow the frass. That's one of the great things we are doing right now. We have a wide net, but we're really looking to target to get as much of this frass where it does the best.

Formulations and all that stuff are coming from R and D from all the major insect farms across Canada.

[*Translation*]

Mr. Yves Perron: If you had a specific recommendation for the committee about investing in research, what would you say?

[*English*]

Dr. Greg Wanger: One thing we have seen is that frass is a great way to add carbon back into the soil. It's really standardizing how we measure this. It's really opening up the idea about what crop species frass work best on.

We have several studies going on here with different crops, but we're going to have a limited resource. There are only so many insect farms in Canada, and we can only scale up so much.

Where do we target what I think is a valuable product, and what industry do we target that into? Would it be high-value crops out here in Nova Scotia, be it blueberries or apples, or in the Fraser Valley, or the high-value fruits in the Okanagan Valley, or potatoes? It has been shown to be incredibly good for potato growth, and so we look at the Prairies, and P.E.I. and New Brunswick—out here.

Where do we target and where do we get the best bang for our buck? I think that's where a lot of the research should be going right now.

● (1255)

[*Translation*]

Mr. Yves Perron: Okay.

Thank you, Mr. Wanger.

The Chair: Thank you very much, Mr. Perron.

Mr. MacGregor, you have two and a half minutes.

[*English*]

Mr. Alistair MacGregor: Thank you, Chair.

I'll direct my question to Mr. Ammeter and the Canadian Canola Growers Association. In your opening remarks, you made mention of the fact that farmers will make the investments when they have confidence. I think the same rule applies to processors.

You've had a few interventions and back-and-forth with my colleagues on this. Regarding the goals that we have as a country in establishing the biofuels market, is there anything else you'd like to add about how we, as a committee, can best make recommendations to the federal government to help build that confidence and make Canada that world leader?

If there's anything else you wanted to expand on, I'll give you the time to do so now.

Mr. Mike Ammeter: One of the things is the transition, if you will, and the confidence in a transition. I'm thinking of discussions around using different types of material for my grain dryer. Currently, I use natural gas and it's a bit of a challenge when I'm taxed on it. It takes away my ability to make any kind of a switch, so that's a bit of a challenge. It doesn't work that well for me, to put it gently.

I don't know, Dave, if you want to contribute on that too.

Mr. Dave Carey: Sure, Mike.

In response to biofuels, it's a big opportunity for Canadian farmers, but I want to predicate that the announcements we've heard from Federated Co-operatives and others is that there are not yet shovels in the ground. They are predicated on getting the clean fuel regulations correct, which will be at CGII, Canada Gazette II, any time now.

At the farmer level, we still have outstanding concerns about the land use and biodiversity criteria for farmers. I'm hoping that we can continue.... Mike can grow his canola and sell it to a processor or grain elevator. That's really important. We've been kind of languishing while awaiting the announcement on how Canada is going to regulate gene editing. We understand that it's positive, but we've been waiting on announcements since November 2021. That's another key tool in that innovation tool box.

There are concerns about what's happening with the pest management regulatory agency and the government's approach to the regulation of crop protection products. There's not one thing. We could go on.

Canada is the global leader in canola. We control about 60% of the world's trade, but we need those innovations. We need a regulatory market that's predictable and timely, and we need science to be at the forefront of all of these decisions.

Thank you.

The Chair: Thank you, Mr. Carey.

Thank you, Mr. MacGregor.

That ends our panel.

I'm going to take a 30-second question. I don't do this often, but, Mr. Wanger, one of the questions that I had.... I've had the opportunity to see your facility, and I appreciate the work that you do.

You mentioned CFIA and the rules and regulations around human-consumed food. Right now, you are dealing mostly with agri-food-types of commodities, where there's excess waste food that is part of your feedstock.

As your company grows, and as those 25 companies in the country that you mentioned start to scale up, do you have a concern around feedstock in organics? How is that conversation going with CFIA around human food that could be consumed as well?

Answer in a minute, if you have a chance.

Dr. Greg Wanger: This is a challenge that we face. Our feedstock is the organics and by-products that come from grocery stores and producers. While there is a lot, it is a limited amount. What we are constantly trying to do is push the envelope to try to take more and more of the organics and divert them from the compost or landfill. For that, one of the challenges we have, for instance from the grocery industry, is the single-use plastics. This is something that is a real challenge. We have to pull them out of the products, using technologies, and often hand sifting. It makes it a challenge for us to take more of the organics.

One of the things as well, because we're such a new industry, is that up until recently, insects were something you were trying to keep out of your feedstock. We are the feedstock for a lot of these industries. CFIA is changing, but work with them to help the industry grow together, so that the industry and the regulations grow together.

I mentioned Europe. We should look to Europe. They're ahead of us in the regulations. I think ours is an industry that is looking to be guided or helped by the CFIA through the regulation process.

● (1300)

The Chair: Thank you very much.

Thank you to all the witnesses for their contribution today.

Colleagues, I will just remind you that we will not be meeting on Thursday, because that is the day the Minister of Finance will be tabling the government's budget, so I suspect your occupation and concerns will be elsewhere. We will be coming back when the House comes back.

The final thing I want to say is this is the last day for our clerk, Emma-Leigh Boucher.

I brought a little gift from Nova Scotia and I'll promote Nova Scotia wine while I'm at it . It's from the Annapolis Valley. This is a Planters Ridge, 100% Nova Scotia wine.

To any Canadians watching, pick up some Nova Scotia wine.

Maybe we'll have a round of applause for our clerk for all her good work.

[*Applause*]

The Chair: We'll adjourn. Thanks.