

CARBON SEQUESTRATION AND RELATED TECHNOLOGY IN BRITISH COLUMBIA'S AGRICULTURAL SECTOR

SELECT STANDING COMMITTEE ON
AGRICULTURE, FISH AND FOOD

APRIL 2024



LEGISLATIVE ASSEMBLY
of BRITISH COLUMBIA

FIRST REPORT
FIFTH SESSION, 42ND PARLIAMENT



April 11, 2024

To the Honourable
Legislative Assembly of the
Province of British Columbia

Honourable Members:

I have the honour to present herewith the First Report of the Select Standing Committee on Agriculture, Fish and Food for the Fifth Session of the 42nd Parliament. This report covers the Committee's work in regard to its examination of carbon sequestration and related technology in British Columbia's agricultural sector.

Respectfully submitted on behalf of the Committee,

Rick Glumac, MLA
Chair

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COMPOSITION OF THE COMMITTEE

MEMBERS

Rick Glumac, MLA, [Chair](#)
Port Moody-Coquitlam

Ian Paton, MLA, [Deputy Chair](#)
Delta South

Susie Chant, MLA
North Vancouver-Seymour

Megan Dykeman, MLA
Langley East

Coralee Oakes, MLA
Cariboo North

Kelli Paddon, MLA
Chilliwack-Kent

Roly Russell, MLA
Boundary-Similkameen

Aman Singh, MLA
Richmond-Queensborough

Jordan Sturdy, MLA
West Vancouver-Sea to Sky

COMMITTEE STAFF

Karan Riarh, Committee Clerk

Katey Stickle, Senior Research Analyst

Mary Heeg, Committee Researcher

Alexa Neufeld, Parliamentary Committees Coordinator

TERMS OF REFERENCE

On February 26, 2024, the Legislative Assembly agreed that the Select Standing Committee on Agriculture, Fish and Food be empowered to examine carbon sequestration and related technology in British Columbia's agricultural sector and make recommendations with respect to:

1. Opportunities to increase carbon content in agricultural soils in British Columbia.
2. Supports for British Columbia's agricultural technology sector as they relate to carbon sequestration.
3. Supports and incentives for encouraging the use of made-in-BC agricultural technology innovations to enhance carbon sequestration.

That, in addition to the powers previously conferred upon Select Standing Committees of the House, the Select Standing Committee on Agriculture, Fish and Food be empowered to:

- a. appoint of its number one or more subcommittees and to refer to such subcommittees any of the matters referred to the Committee and to delegate to the subcommittees all or any of its powers except the power to report directly to the House;
- b. sit during a period in which the House is adjourned, during the recess after prorogation until the next following Session and during any sitting of the House;
- c. conduct consultations by any means the Committee considers appropriate;
- d. adjourn from place to place as may be convenient; and
- e. retain personnel as required to assist the Committee.

That any information and materials received by the Committee during the 4th Session of the 42nd Parliament for the same purpose be referred to the Committee.

That the Committee report to the House by April 11, 2024; and that during a period of adjournment, the Committee deposit its reports with the Clerk of the Legislative Assembly, and upon resumption of the sittings of the House, or in the next following Session, as the case may be, the Chair present all reports to the House.

Foreword

The Select Standing Committee on Agriculture, Fish and Food was tasked with undertaking this inquiry amid rising global greenhouse gas emissions and increasingly serious effects of climate change. The devastating wildfires, drought, and flooding BC has experienced in recent years were certainly in our thoughts as we undertook this work. We recognize that meeting BC's emissions reductions targets will require sustained efforts in all sectors, including agriculture. We heard that there are many opportunities for farmers, ranchers, and producers to sequester carbon in the soil using various practices and technologies. These efforts to sequester carbon can help to address atmospheric warming and climate change, while also offering other benefits related to soil health, productivity, resilience, and climate adaptation.

While our inquiry was focused on carbon sequestration, we also heard that there are many challenges facing the agriculture sector. We recognize the value of agriculture to the province and appreciate the work of farmers, ranchers, and producers in providing food for British Columbians. Food security is vitally important, and we note that supporting local food production can also help with climate mitigation by reducing emissions from transporting food grown outside of the province. In considering what we heard and forming our recommendations, we wanted to ensure that we do not add any undue burdens to those working in the sector or jeopardize food security. Our approach centres the role of farmers, ranchers, and producers, with a focus on offering rewards and lowering barriers rather than imposing prescriptive requirements.

In reflecting on our recommendations, we highlight the importance of working together to foster innovation, increase adoption and refinement of the practices that sequester carbon, raise awareness of how practices and technologies can best be applied in individual production settings, and ensure related programs and incentives are accessible. This work will require a cross-ministry approach as well as collaboration amongst farmers, ranchers, producers, agritech innovators,

non-profit organizations, and post-secondary institutions. Further, we note the importance of data as a foundation for many of our recommendations. Data is required to understand soil health, make informed policy decisions, and measure the effectiveness of different practices and technologies in sequestering carbon.

We are grateful to everyone who took the time to share their ideas and experiences with us during this process. Our hope is that this report and our recommendations identify opportunities to sequester carbon that also benefit farmers, producers, and ranchers.

Executive Summary

The Legislative Assembly empowered the Select Standing Committee on Agriculture, Fish and Food (the “Committee”) to examine carbon sequestration and related technology in BC’s agricultural sector on February 15, 2023. To provide context for its work, the Committee met with ministries, organizations, and individuals with expertise in this area. Following these initial meetings, the Committee collected input through a public consultation, with options to speak at a public meeting or provide a written submission. During this process, the Committee heard from 32 participants.

The Committee makes 12 recommendations to promote the adoption of and share knowledge about practices and technologies that sequester carbon, reduce barriers to government programs and supports, and streamline data collection and soil testing. The report begins with a brief overview of the Committee’s work, followed by a background section which provides context about climate change, carbon sequestration, and BC’s agricultural sector. The report then provides a summary of the information, ideas, and suggestions the Committee heard during its consultation, organized by theme. This is followed by a discussion section reflecting Members’ deliberations on the input they received across multiple themes. Finally, there is a list of recommendations, along with a brief rationale for each, at the end of the report.

During the consultation, the Committee heard that carbon sequestration can help reduce the agriculture sector’s impact on climate change. Carbon sequestration is the process of capturing carbon dioxide from the atmosphere and storing it in solid and dissolved forms. Individuals and organizations described different agriculture practices that sequester carbon, such as wetland and tree management, planting cover crops, reducing tillage, and rotational grazing. The Committee heard that these practices have many benefits for producers beyond carbon sequestration, including increased disaster resilience, financial benefits, enhanced attraction of pollinators and beneficial insects, weed suppression, and reduced erosion. Additionally, individuals and organizations told the Committee about technologies that can be used to

assist with implementing these practices. To promote the adoption of practices and technologies that sequester carbon, the Committee supports ensuring reliable, long-term access to agricultural land, including Crown Land, range tenures, and grazing leases. Members acknowledge that collaboration between ministries that share responsibility for agricultural land is necessary to support this recommendation. Additionally, Members are in favour of facilitating collaboration throughout the agriculture sector to increase the adoption and knowledge of practices that sequester carbon. The Committee also recommends developing policy incentives for farmers to adopt regenerative agriculture practices, which are practices intended to improve soil health and benefit the ecosystem.

Committee Members heard that data is critically important for farmers and policymakers to understand soil health and make informed management decisions. Many individuals and organizations told the Committee that BC does not have adequate soil health data. The Committee recommends enhancing data collection by developing a suite of indicators of soil health, monitoring the long-term effects of different practices and technologies, and collaborating with other levels of government and partners in the agriculture sector. Members recognize that BC agritech can support carbon sequestration in agriculture more broadly. They recommend supporting innovation in the industry by making investments to improve the affordability of soil testing, reducing barriers to research and development, encouraging collaboration and knowledge-sharing between agritech innovators and other groups in the sector, considering opportunities for farming pilot projects, and ensuring awareness of existing funding programs for agritech.

Related to this focus on data collection and technology deployment, the Committee discussed the role of Agricultural Climate Solutions Living Labs, which bring together farmers, scientists, and other participants to co-develop and test new practices and technologies. Members note that this innovative approach could be expanded across the province and may be an effective opportunity to meet the research interests and needs of Indigenous farmers and communities.

Committee Members agree that education and knowledge-sharing opportunities are an important part of supporting carbon sequestration. They are in favour of developing and improving educational and knowledge-sharing programs like field days and virtual seminars, to help producers make informed decisions about practices and technologies that can help them sequester carbon. The Committee discussed several specific practices, including agroforestry practices, cover cropping, rotational grazing, nutrient management, and composting and organic amendments, noting that educational programs should highlight their role in different production settings and benefits in addition to carbon sequestration. To support knowledge-sharing, Members recommend investing in extension services that provide context-specific information about practices and technologies. They emphasize that these services can be effectively delivered by different types of providers, and the most effective approach may vary across BC's diverse agriculture sector.

The Committee heard about barriers that make it challenging for farmers, ranchers, and producers to access supports and incentives related to carbon sequestration. To address challenges in navigating and applying for programs, the Committee supports creating a "one-stop-shop" where farmers and ranchers can access information about permitting requirements, programs, and supports. The Committee notes that FrontCounter BC as well as the Investment Agriculture Foundation can serve as a model for this service. The service should be both virtual and in-person, with locations across the province. The Committee also heard that there are barriers to accessing existing programs like the Beneficial Management Practices Program, and that creating dedicated programs for certain specific practices might address these challenges. Members emphasize that the Environmental Farm Plan and its Beneficial Management Practices Program, as well as programs offered by the Delta Farmland and Wildlife Trust are valuable supports. They recommend determining which practices are most effective at sequestering carbon and either increasing the accessibility and availability of existing programs or creating standalone programs with long-term, predictable funding.

Committee Members acknowledge the high cost of purchasing equipment, including equipment that farmers need for cover cropping. They agree that supporting the development and

expansion of regional programs that lend equipment to farmers to promote cover cropping and other practices that sequester carbon is a valuable opportunity. Members are also in favour of commissioning a study on the potential benefits and risks of a carbon offset program for on-farm practices for BC farmers, ranchers, and producers. They note that such a study should evaluate possible challenges, such as the potential for carbon sequestration to be reversed if the producer changes their practices.

The Work of the Committee

On February 15, 2023, the Legislative Assembly agreed that the Select Standing Committee on Agriculture, Fish and Food be empowered to examine carbon sequestration and related technology in BC's agricultural sector.

To begin its examination, the Committee received briefings from the Ministry of Agriculture and Food, the Ministry of Forests, agriculture sector organizations, and agritech innovators, on April 21 and June 12, 2023. These briefings provided background information and context on the importance of carbon sequestration, related agricultural practices and technology, and supports and incentives in this sector.

To gather additional input, the Committee accepted written submissions from the public between July 24 and November 17, 2023. The Committee also held public meetings to hear from stakeholders and members of the public on November 10 and 14, 2023. To encourage participation, the Committee issued a media release, shared information on Legislative Assembly social media accounts, and advertised in newspapers, in sector-specific publications, and online.

In total, the Committee received input from 32 participants. A list of the individuals and organizations that participated in the Committee's consultation is available in Appendix A.

Following the consultation period, the Committee met to consider the input received and develop recommendations.

MEETING SCHEDULE

4th Session, 42nd Parliament

February 21, 2023	Election of Chair and Deputy Chair, Planning
March 9, 2023	Planning
April 21, 2023	Briefings, Deliberations
June 12, 2023	Briefings
November 10, 2023	Public Hearings

November 14, 2023 Public Hearings

February 7, 2024 Deliberations

February 8, 2024 Deliberations

5th Session, 42nd Parliament

March 8, 2024 Election of Chair and Deputy Chair, Deliberations

April 2, 2024 Deliberations

April 5, 2024 Deliberations, Adoption of the Report

Background

In undertaking its inquiry into carbon sequestration and related technologies in BC's agricultural sector, the Select Standing Committee on Agriculture, Fish and Food considered the broader context of its work. This included background information on and input about climate change, carbon sequestration, and the agriculture sector. Subsequent chapters on practices to support soil carbon sequestration, supports for producers, and the role of data are informed by the information within this chapter.

CLIMATE CHANGE

According to research by the Intergovernmental Panel on Climate Change (IPCC), global temperatures between 2011 and 2020 were 1.1°C hotter than temperatures between 1850 and 1900. The IPCC emphasizes that this global warming is unequivocally caused by human activities, principally the emissions of greenhouse gases. The Paris Agreement, a legally binding international treaty adopted in 2015 by 196 parties, including Canada, set a goal to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels." More recently, world leaders have stressed the need to limit global warming to 1.5°C by the end of this century, noting that allowing temperatures to increase beyond that risks more severe climate change impacts, including more frequent and severe droughts, heatwaves, and rainfall. To limit global warming to 1.5°C, greenhouse gas emissions must peak before 2025 and decline 43 percent by 2030, according to the IPCC.

A farmer who spoke with the Committee referenced the 1.5°C target, stating that the world will likely reach this threshold in the next 20 years. The individual told the Committee that in 2021, there were 40 extremely hot days, bypassing the predicted 35 hot days per year expected in 2085. The First Nations Summit indicated that in summer 2023, some mountain creeks in BC reached an almost-unprecedented 18°C. Additionally, major rivers reached 22°C, which the

First Nations Summit noted can kill fish. Other individuals and organizations described the impact of climate change on agricultural producers. The Small-Scale Meat Producers Association emphasized that farmers and ranchers are on the front lines of climate change. The North Okanagan Livestock Association, a member of the BC Cattlemen's Association, said that two droughts have occurred in three years and that a lot of people have left the industry. One individual shared that there is increasing recognition among farmers of the role they need to play in climate change mitigation, both through carbon sequestration and reduced emissions.

Canada has committed to reducing its emissions by 40 to 45 percent below 2005 levels by 2030. BC's target for 2030 is to reduce emissions by 40 percent below 2007 levels. BC has also committed to a 16 percent reduction by 2025 and an 80 percent reduction by 2050, using the same baseline. BC's 2021 net emissions were four percent below 2007 levels, per BC's *2023 Climate Change Accountability Report*. Dr. Sean Smukler of the University of British Columbia (UBC) Faculty of Land and Food Systems noted that Canada's emissions reductions plan for 2030 is very ambitious, and the 2050 target, net zero, even more so. To meet these goals, according to Dr. Smukler, every sector will have to make significant reductions.

According to the Ministry of Agriculture and Food, emissions from agriculture compose about 5.4 percent of BC's total emissions, as of 2018. Greenhouse gases are emitted by a variety of agricultural activities, including:

- decomposition of plant matter stored in soil;
- fertilizer application;
- storage or decomposition of manure; and
- enteric fermentation (the digestive process of certain animals like cows).

These activities compose about 3.6 percent of BC's total emissions. Another 1.2 percent comes from energy use in the agriculture sector, like emissions from heating greenhouses and fueling tractors. An additional 0.6 percent comes from

land use, land use change, and forestry in the agriculture sector. The main greenhouse gases emitted by the agriculture sector are carbon dioxide, methane, and nitrous oxide. In recent years, agricultural emissions have increased. Regarding emissions reductions, the Ministry of Agriculture and Food noted that BC's climate targets are divided by sector and that agriculture has not been given a specific target.

Dr. Smukler indicated that while BC agriculture only composes around five percent of the province's emissions profile, the sector is a very small percentage of BC's total landscape, which means that in terms of area, agriculture is an intensive production system. Dr. Smukler also noted that if other sectors decrease their emissions and agriculture does not, it will compose nine percent of the province's emissions by 2030. Regarding the sources of agricultural emissions, Dr. Smukler attributed about 50 percent to animal production (enteric fermentation and manure management), 30 percent to crop production, and 20 percent to fuel use. FarmFolk CityFolk also discussed sources of emissions within the agriculture sector, stating that when energy use and the impacts of land use change are included, the largest sources of agricultural emissions are enteric fermentation from cattle, natural gas combustion, and changes in cropping from perennial to annual. The organization noted that together these categories make up 54.5 percent of BC's emissions from agriculture.

The Ministry of Forests stated that BC's land sector is currently a net source of greenhouse gas emissions, and that the efficacy of other mitigation efforts can be significantly undermined by wildfire activity. The Ministry elaborated that BC's total emissions across all sectors are approximately 64 million tonnes of carbon dioxide equivalent. In a high fire year, the emissions from wildfires alone are 210 million tonnes, though these are not counted towards BC's emissions totals. Additionally, the Ministry indicated that measuring emissions in the land sector is more challenging than in other sectors because net emissions must account for sequestration and because they are the result of both human-caused and natural factors. The Ministry added that emissions resulting from land management decisions may be counted in other sectors.

CARBON SEQUESTRATION

Carbon sequestration is "the process of capturing, securing, and storing carbon dioxide from the atmosphere," as described by the University of California Davis. The intent is to store carbon in solid and dissolved forms so that it does not cause the atmosphere to warm. Capturing and storing carbon dioxide is one option scientists have proposed for deferring the effects of warming in the atmosphere and is now viewed by many scientists as an essential component of addressing climate change. One method of naturally occurring carbon sequestration is the storage of carbon in soil by plants through photosynthesis. The output of this process is soil organic carbon.

The amount of carbon stored in soils can change based on various factors. Agriculture and Agri-Food Canada explained to the Committee some of the possible methods for increasing soil organic carbon, including increasing plant inputs and preventing decay of existing soil organic carbon. Plants generate biomass by using solar energy and converting carbon dioxide into leaves, roots, and fruit. This material is eventually deposited in the soil and becomes soil organic carbon. Agriculture and Agri-Food Canada indicated that it is not actually desirable to prevent decay, because when soil organic carbon decays it releases nutrients that support plant growth. Therefore, the best way to increase soil organic carbon in agricultural soils is to increase plant inputs. Agriculture and Agri-Food Canada added that soil inorganic carbon is usually stored deeper in the soil and, until recently, was believed to be unaffected by management practices; however, irrigation or application of fertilizers can actually affect this carbon pool.

The Ministry of Agriculture and Food explained that agricultural soils and crops are involved in a carbon cycle. The balance of carbon dioxide emitted or absorbed is dependent on farming practices, climate, soil, and crops. The Ministry indicated that soil-based agriculture has the unique potential to act as a carbon sink. Officials explained that it is only when specific practices adapted to the soil and climate are used over the long term that there will be a net increase in stable organic content in soils; however, understanding of soil carbon sequestration is still in its early stages and needs to be increased worldwide. In terms of soil carbon content in BC, the Ministry indicated that a study from UBC estimated that soil carbon in the Lower Mainland has decreased by about 0.4

percent per year since 1984. The Committee also heard that concentrations of soil organic carbon are higher in the north, due to topographical features, and that small plots of land can be effective in sequestering carbon.

The Ministry of Agriculture and Food identified that soil carbon sequestration has benefits beyond mitigating climate change, such as enhancing agricultural productivity, improving resilience to extreme weather, and supporting biodiversity. FarmFolk CityFolk and the BC Centre for Agritech Innovation identified benefits including: increased productivity; conservation of biodiversity; improved soil health, food security, and resilience; and opportunities for carbon markets, offset programs, and financial incentives.

A 2022 report by the Canadian Agri-Food Policy Institute cites that Canada has joined the 4x1000 initiative, which sets the goal of increasing soil carbon by 0.4 percent per year. This target is considered to be technically achievable in the actively managed agricultural soils in Canada. The report emphasizes that Canadian agriculture must simultaneously increase production, reduce emissions, and sequester carbon to achieve this goal.

The Committee heard differing perspectives on the climate mitigation potential of carbon sequestration in agriculture. Some organizations and individuals suggested that this potential is significant. A study by UBC that assessed 12 agriculture practices associated with carbon sequestration and reduced emissions found that adoption of these practices by 25 percent of BC farmers could nearly offset the agricultural emissions increases observed since 2007 (including emissions from livestock and soil emissions, on-farm fuel emissions, and soil carbon sequestration). A farmer told the Committee that studies have shown that adopting appropriate land management practices can singlehandedly cancel out around one third of global annual greenhouse gas emissions. The Small-Scale Meat Producers Association cited research by Jaqueline McGlade, a former chief scientist of the United Nations Environment Program, which found that enriching half of the world's agricultural soils with one percent more carbon would limit global warming to the 1.5°C target. The Association indicated that marginal improvements to farming techniques could sequester 31 gigatonnes of carbon dioxide per year, close to the 32 gigatonnes necessary to keep global warming below the 1.5°C target. A farmer who

presented to the Committee suggested that one study found that sequestering one megagram of carbon per hectare on rangeland would offset the energy use of California's commercial and residential sectors. They further noted that BC is 2.3 times the size of California and has one seventh of its population.

In contrast, the Committee also heard that the climate mitigation potential of carbon sequestration in agriculture may be more limited. A 2022 report by the Organization for Economic Cooperation and Development (OECD) found that net soil carbon sequestration on agricultural lands could offset four percent of annual global greenhouse gas emissions over the rest of the century. The report indicates that this would be an important contribution to meeting the targets in the Paris Agreement, which will not be possible without significant carbon dioxide removals from the atmosphere. According to the OECD, studies have estimated that net soil carbon sequestration practices could sequester up to two gigatonnes of carbon per year in the short term; however, when the dynamics of adoption and the finite capacity of soil carbon sinks are considered, their sequestration potential is between 0.3 and 0.6 gigatonnes of carbon per year. This translates to the capacity to offset between two and four percent of global greenhouse gas emissions. Similarly, an individual cited a study from Wageningen University in the Netherlands that found that soil carbon sequestration could at most contribute four percent of the necessary reductions to limit warming to the 1.5°C target. Furthermore, the individual suggested that this number is likely lower in BC due to the province's small amount of farmland.

The Ministry of Agriculture and Food, FarmFolk CityFolk, and Dr. Thomas Forge of the UBC Faculty of Land and Food Systems emphasized that soil carbon levels will not increase forever. The Ministry noted that the period during which carbon can be effectively sequestered ranges from 20 to over 100 years, so practices that support sequestration are only buying time. The Ministry also noted that keeping the carbon in the soil requires the practice to be continued forever, or carbon levels will drop again. Dr. Smukler and the Ministry noted that considering emissions of other greenhouse gases is important, with Ministry officials indicating that adding organic material can sometimes increase emissions of nitrous gas, which has a 300-times-higher warming potential than

carbon dioxide. Several presenters emphasized that the overall goal is reducing emissions, and that avenues other than carbon sequestration should be considered. An individual also suggested that it may be more useful to focus on maintaining soil health to be able to feed current and future generations, and avoid over-promising on the climate mitigation potential of soil carbon sequestration.

AGRICULTURAL SECTOR IN BC

The Committee also heard general information about the agriculture sector in BC, in addition to its role in sequestering carbon. Many individuals and organizations emphasized the sector's diversity. An agricultural consultant who spoke with the Committee stated that BC agriculture's greatest strength and greatest challenge is its diversity, including in production categories, soils, climate, and topography. FarmFolk CityFolk indicated that, in addition to its small scale relative to the Prairie provinces, BC agriculture is distinct because of the range of ecosystems and geographic features that enable production of over 200 commodities. The BC Centre for Agritech Innovation noted that BC has the most diverse agricultural sector in Canada with more than 17,500 farms, 1,500 agribusinesses, 35,100 jobs, and eight agricultural regions with distinct growing conditions and resources.

The Committee also heard about the challenges facing the BC agriculture sector. The Food and Agriculture Institute shared that BC has lost 10 percent of its agricultural businesses in the last five years. The BC Centre for Agritech Innovation stated that the sector is facing critical challenges related to climate change adaptation, increasing competitiveness, food security, long-term sustainability, and unfilled labour gaps. A farmer emphasized that the cost of farming has risen dramatically. They shared that 94 percent of their farm's income goes to hay and feed, which does not include the costs of infrastructure, farm insurance, utilities, labour, or veterinarians. They noted other farmers face similar costs, spending 92 to 98 percent of their farms' incomes on outputs. A rancher told the Committee that the doubling of fertilizer, feed, and transportation costs, as well as access to water are challenges that the sector faces.

WHAT THE COMMITTEE HEARD: BENEFICIAL MANAGEMENT PRACTICES

BACKGROUND

According to the Canadian Agri-Food Policy Institute, a Beneficial Management Practice (BMP) is a production technique that is different from the conventional approach, and which confers certain benefits. Farmers, ranchers, and producers already adopt BMPs for a range of reasons, including for production and environmental benefits. One such environmental benefit is carbon sequestration and, in this area, some BMPs have greater potential than others. In its presentation to the Committee, the Ministry of Agriculture and Food described the following BMPs in order of highest to lowest potential for carbon sequestration:

- wetland and tree management;
- soil management, such as reduced tillage and cover cropping;
- grazing management;
- nitrogen and manure management and anaerobic digestion; and
- organic matter recycling or compost.

In a 2022 report, Farmers for Climate Solutions emphasized the importance of adopting a suite of BMPs rather than focusing on individual practices.

The Committee heard about various BMPs being used across the province to sequester carbon. While there are many new technologies that farmers can use to facilitate these efforts, the Committee also heard that there are traditional practices that sequester carbon. Dr. Jean-Thomas Cornelis of the University of British Columbia (UBC) Faculty of Land and Food Systems noted that research conducted with Indigenous peoples in Kitselas, Sts'ailes, and Hannamuwx communities affirmed that soil carbon can be increased, while producing food, through practices like recycling fish residues from rivers, using prescribed burns, and recycling forest-raised biomass. They stated that it is urgent to revitalize ancestral Indigenous practices in BC's agricultural sector.

While many farmers and ranchers use BMPs, there are opportunities to increase adoption of the practices that sequester carbon. To encourage the adoption of BMPs, Dr. Sean Smukler of the UBC Faculty of Land and Food Systems suggested using soil health as an entry point to illustrate benefits to farmers beyond climate benefits. According to the report from the Minister of Agriculture's Advisory Group on Regenerative Agriculture and Agritech, healthy soils "can continuously support or help provide multiple ecosystem services including food, fibre and fuel production, regulation of climate and water cycles and provide habitat that supports biodiversity to the benefit of plant, animal, and human health." Dr. Smukler explained that management practices that sequester carbon also create organic matter that builds the resilience of the system by improving soil health. Further, every farmer they work with appreciates the idea of soil health as an integral part of sustainability. Similarly, another individual with experience in potato and dairy production highlighted the importance of soil health and shared that many producers they have spoken to are concerned about declining soil health, especially in the Fraser Valley and Delta.

Some individuals and organizations highlighted other benefits associated with BMPs. Dr. Woo Soo Kim from the Simon Fraser University BC Centre for Agritech Innovation noted that certain practices, like agroforestry and conservation agriculture practices, foster and conserve biodiversity, provide habitat for wildlife, and improve water quality. The Isha Foundation, which launched the Save Soil Movement, stated that improving the organic matter in the soil increases resilience of crops to climate shocks, including flood and drought cycles, and improves the quality of food, including the nutrition density and yield. Both an individual and the Ministry of Agriculture and Food also made a connection between BMPs and responding to pest pressures.

In addition to BMPs, the Committee heard more broadly about regenerative agriculture, which the Ministry of Agriculture and Food described as a range of practices that seek to improve soil health and provide broader benefits to the ecosystem.

The Small-Scale Meat Producers Association noted several principles of regenerative agriculture including keeping the soil covered, minimizing soil disturbance, maintaining biodiversity, integrating animals, maintaining living roots year-round, restoring ecosystems, avoiding toxic inputs, and safeguarding the water cycle. The Association conducted a survey in 2021 which found that half of the 708 respondents were already practicing regenerative practices. Similarly, Dr. Lenore Newman of the University of the Fraser Valley Food and Agriculture Institute noted that BC is doing well in terms of regenerative agriculture, which is something Dr. Newman recommends in the rest of Canada. Regarding the potential of regenerative agriculture, Dr. Smukler cited research looking at a national level which found that regenerative practices and other natural climate solutions would offset almost all if not more than agriculture's annual emissions by 2030. The Committee received multiple suggestions to promote the adoption of regenerative agriculture.

Throughout the Committee's consultation, some participants referred to specific BMPs, while others referred to multiple practices, or regenerative agriculture. The following sections summarize what the Committee heard about BMPs, including benefits, barriers, and recommendations to increase their adoption. Suggestions related to existing or proposed programs and incentives are summarized in the chapter on Supports and Incentives.

AGROFORESTRY

According to the Ministry of Agriculture and Food, agroforestry is the integration of suitable woody perennials into an agricultural landscape. Examples include:

- windbreaks: one or more rows of closely spaced trees and/or shrubs planted at right angles to the prevailing winds;
- alley cropping: the practice of establishing parallel rows of trees on cropland;
- hedgerows: linear features of shrubs and trees; and
- silvopasture: the practice of planting trees on pastures and grazing lands.

Ministry officials noted that soils under perennials tend to have more carbon than under animals; therefore, increasing the areas of perennials, especially on marginal lands, has good

carbon sequestration potential and can make economic sense with the right incentives.

In terms of benefits associated with agroforestry, Dr. Kim noted that integrating trees and shrubs into agriculture can lead to improved soil health, biodiversity, and carbon sequestration. Dr. Stefania Pizzirani from the University of the Fraser Valley Food and Agriculture Institute also commented on the potential for carbon sequestration from planting hedgerows and noted other benefits, including providing a habitat for local wildlife as well as shielding crops from wind and frost. Further, FarmFolk CityFolk stated that bushes and trees provide shade, support biodiversity, and promote moisture retention. An agricultural consultant and professional agrologist told the Committee that agroforestry systems are designed to leverage the positive benefits of integration to enhance production, achieve conservation goals, or buffer and transition land use. They noted that agroforestry has tremendous potential to help protect the soil, build soil carbon, and enhance agricultural production in BC. As such, they recommended improving awareness and education materials to aid producers in understanding the potential for agroforestry in their individual production settings.

Individuals and organizations also linked agroforestry practices to climate change and extreme weather adaptation. The BC Agriculture Council stated that forestry management practices, like planting root rot-resistant trees that are less susceptible to fire and using them as a buffer between the forest and a watercourse, can limit runoff from wildfires and could be encouraged in areas of the province with significant agricultural production. The Council recommended investing in flood mitigation infrastructure and forestry management practices to limit the impacts of environmental disasters on soil health and carbon sequestration. Regarding silvopasture, an agricultural consultant referenced anecdotal evidence from BC and Washington state that the practice may reduce wildfire risk by acting as a landscape buffer. Similarly, a farmer noted that pasturing livestock in forested land reduces ground fuel for forest fires. They recommended encouraging silvopastoral systems, especially on marginal or underutilized lands.

There are also barriers associated with adopting agroforestry practices. Dr. Pizzirani explained that since planting hedgerows takes some of the land out of production, uptake has been limited without providing compensation. Similarly, FarmFolk

CityFolk noted that with tight margins, it is tempting for farmers to plow over riparian areas (areas surrounding wetlands, lakes, rivers, and streams) or to remove bushy areas. As such, they recommended compensating farmers for the ecosystem services they provide by retaining spaces, including bushy and riparian areas and trees. Dr. Kim stated that agroforestry may involve converting land that was previously used for other purposes, potentially leading to conflict with other stakeholders over land use. An individual also noted that resistance to recognizing trees as a farm crop can be a barrier to implementing these practices.

CONSERVATION TILLAGE PRACTICES

Another set of BMPs highlighted by the Ministry of Agriculture and Food are conservation tillage practices, which limit tillage during seed planting and crop cultivation. These practices include reduced tillage, no-till, and strip tillage. Ministry officials explained that much of the carbon loss in agricultural soil has been attributed to the destruction of the soil structure by repeated tillage. As such, soil management practices that minimize soil disturbance help to restore soil health and carbon content. The Ministry noted other benefits associated with these practices, including cost savings (which have the potential to offset yield losses), increased water use efficiency, and improved soil structure, leading to potential carbon sequestration and improved soil health and biodiversity. A rancher echoed these benefits, noting that enhanced water-holding capacity can stop desertification and make land more drought-resistant.

A common theme emphasized by individuals and organizations is that the effectiveness of conservation tillage practices with respect to carbon sequestration is dependent on region and climate. The Committee heard from an individual who worked in climate-smart agriculture policy evaluation who cited national research demonstrating that in terms of soil carbon sequestration, no-till works in the Prairies under dry conditions but not under wetter climates in Eastern Canada. As such, they noted that it is reasonable to expect the effectiveness of no-till would also be limited in the Lower Mainland. Similarly, the Ministry of Agriculture and Food cautioned that the expectation for carbon gains from no-till practices may need to be tempered as the increase in soil carbon content has only been consistently reported for dry,

rain-fed areas. In a 2022 report, the Canadian Agri-Food Policy Institute noted that since reduced tillage is already widely adopted where soil characteristics and cropping systems permit, its potential to address climate goals is limited. Ministry of Agriculture and Food officials also stated that, in the past, researchers often only examined the top layer of a soil profile for carbon measurements; however, some studies that looked at the entire soil profile found no difference or even carbon losses in deeper layers under no-till compared to a conventional tillage system. Regarding strip tillage, which alternates undisturbed strips of land with tilled strips, the Ministry noted that this practice combines the best of both worlds and demonstrates that the most appropriate solution is always site-specific.

COVER CROPPING

A 2022 report by Farmers for Climate Solutions defines a cover crop as any crop that is grown to provide fertility or increase soil health, rather than for harvest. These crops are usually grown when cash crops are not being produced, such as after harvest or during a fallow period; however, FarmFolk CityFolk noted that some cover crops can be grown at the same time as the cash crop. Related to cover cropping, intercropping is the practice of growing more than one crop in the same field at the same time, and usually involves growing a legume or pulse with a cereal. Dr. DeLisa Lewis of the UBC Faculty of Land and Food Systems explained that cover crops promote soil health by keeping the soil covered during winter when there is more precipitation and by keeping a living root in the ground for as long as possible. In terms of climate benefits, the Ministry of Agriculture and Food stated that there is consistent evidence that soils under cover crops have generally higher soil carbon compared to non-cover cropped systems. Ministry officials added that cover cropping generally also decreases nitrous oxide emissions. Regarding the use of cover crops in BC, one individual who has been involved in potato and dairy production in the Lower Mainland shared that BC farmers have been leaders in normalizing cover cropping and that farmers on the Sumas Prairie have been using this practice for years.

The Committee heard about many other benefits associated with cover crops beyond carbon sequestration. The Ministry of Agriculture and Food stated that cover crops can support weed

suppression, increase water infiltration, attract pollinators and beneficial insects, and reduce erosion. Further, Ministry officials noted that while BC data is insufficient, studies from other jurisdictions show that yield is generally higher compared to fields without cover cropping, though these effects vary depending on environment, climate, cropping system, and operational goals. A rancher noted additional benefits associated with cover cropping including increased capacity to hold nitrogen and reduced need for fertilizing and spraying. FarmFolk CityFolk explained that intercropping and cover cropping ensure there is no bare soil, which reduces stresses on soil health from extreme heat, wind, rain, or flooding. The organization recommended expanding the use of cover cropping across all relevant sectors to build soil health, provide protection from temperature and precipitation extremes, enhance nutrient availability, and reduce soil erosion.

Regarding barriers to cover cropping, the Committee heard about upfront costs associated with implementing the practice. FarmFolk CityFolk noted that shifting land from a cash crop to a cover crop can be a hard trade-off, particularly in BC, where farms are relatively small due to the province's topography. They added that farmers will have seed planting and management costs to absorb, and potentially a reduced harvest of cash crops if land must be taken out of production for the cover crop. Similarly, the 2022 report by Farmers for Climate Solutions cited costs of seeding and planting that can make cover-cropping expensive during the first few years of adoption. The report notes that cover crops can provide economic benefits, but these usually take several years of continuous practice to materialize. Dr. Lewis noted that while there are programs related to cover cropping seeds and seeding equipment, these programs have barriers related to eligibility and paperwork that should be addressed. Some organizations highlighted a lack of specific knowledge and understanding related to cover cropping as a barrier. Agriculture and Agri-Food Canada pointed to a need for guidance to help growers select appropriate seeds and monitor the effects of cover cropping. Similarly, FarmFolk CityFolk stated that more needs to be done to understand the optimal species selection based on the needs of the soil, cash crops, water availability, and demand and function.

ROTATIONAL GRAZING

Per the 2022 report by Farmers for Climate Solutions, rotational grazing is "a range of practices that include increasing stocking densities, decreasing the amount of time animals are allowed to graze in a given paddock, and increasing the interval between grazing events." According to the Ministry of Agriculture and Food, rotational grazing has been shown to stimulate positive plant growth response which can result in an increase in soil carbon. In contrast, continuous grazing allows animals to graze at low densities in the same paddock for months, or the entire grazing season. The Small-Scale Meat Producers Association explained that continuous grazing leads to overgrazing which does not give the roots time to recover and allows the plants that the livestock do not want to eat, largely invasive weed species, to start taking over the pasture.

In terms of the benefits associated with rotational grazing, many organizations and individuals noted its potential for carbon sequestration and referenced various studies in this area. Dr. Lewis cited a 2023 study on the impacts of multi-paddock grazing which found that the potential for soil organic carbon increased from 2.7 percent to 7.5 percent, when compared with heavy continuous grazing. In addition, the Small-Scale Meat Producers Association referenced a study conducted at White Oak Pastures in the United States which found that regenerative grazing has the potential to have a net positive impact on climate and that using this practice led to a lower carbon footprint when compared with a conventional US beef system. FarmFolk CityFolk explained that rotational grazing sequesters carbon by deepening the root mass in the soil. The organization recommended increasing the use of rotational grazing, adding that it is already widely practiced and promoted by organizations such as the BC Cattlemen's Association.

The Committee also heard that rotational grazing could help to prevent wildfires. A farmer told the Committee that grazing animals remove potential forest fire fuel and rotational grazing prevents erosion, supports water quality, and aids the hydrologic cycle. Further, the Ministry of Forests referenced a recent pilot study partially funded by the provincial government to examine "targeted grazing," using cattle to control wildfire fuel levels across forest landscapes.

Additionally, the Small-Scale Meat Producers Association noted other benefits associated with rotational grazing including improved wildlife habitats, increased microbial diversity, and increased rainfall absorption. The 2022 report by Farmers for Climate Solutions referenced benefits including increased stocking rates, improved animal health, reduced parasite loads, and increased biodiversity. These benefits can lead to net economic gains for most producers; however, the report notes that high up-front infrastructure costs and increased labour requirements can be a barrier to adoption.

One way to practice rotational grazing is by using electric or virtual fences to create small paddocks. A rancher stated that strip grazing involves using a moveable electric fence to allow livestock to graze on enough grass or other forage for a short period of time. Then, the rancher moves the fence, supplying a new strip of forage while the rest of the pasture is resting. They noted that strip grazing can lead to better-producing pastures, reduced input costs, higher weaning weights on livestock, and carbon sequestration through healthier plants and soil organisms. The North Okanagan Livestock Association, a member of the BC Cattlemen's Association, noted that virtual fencing may have a good return on investment. Virtual fences can also be an option to address the loss of physical fences due to wildfires. The Small-Scale Meat Producers Association noted several technologies that could be used for rotational grazing and recommended increasing and specifically allocating agritech funding for innovations such as electric fencing, robotic pasture barns, and e-collars.

There are some barriers associated with rotational grazing in general and with the use of these fences in particular. The Ministry of Agriculture and Food explained that almost all Crown land with livestock tenure is subject to range management plans with ecological and preservation goals, which limits the extent to which rotational grazing and other BMPs can be implemented. A rancher shared that it is also time-consuming to move the cattle three times a day rather than putting them on larger pastures where they are moved once a week or rangeland where they can stay for a whole season. Regarding fences, they noted that it is time-consuming to set up the fencing needed for strip grazing, and the supplies cost money. The North Okanagan Livestock Association noted that electric fences are very expensive and facilitating access to these fences would support ranchers to practice rotational

grazing. The Association suggested getting larger operations to start using innovations first could be one effective method to increase adoption of this technology.

Related to rotational grazing, the Committee also heard differing views on the impact of methane emissions from cattle. Enteric methane is expelled by cattle through burping; it is a by-product of enteric fermentation that takes place in the digestive systems of ruminant animals (cattle, buffalo, sheep, goats, and camels). Both the Small-Scale Meat Producers Association and a farmer noted that the enteric methane produced by cattle is part of the natural carbon cycle and has a half-life of 10 to 12 years. The Food and Agriculture Organization of the United Nations also references a 12-year half-life for enteric methane; however, the Organization notes that methane traps 84 times more heat than carbon dioxide over the first two decades after it is released. In addition, the Ministry of Agriculture and Food stated that enteric fermentation accounts for 60 percent of BC's agricultural greenhouse gas emissions.

NUTRIENT MANAGEMENT

Agriculture and Agri-Food Canada explained that increasing soil organic carbon requires effectively and efficiently managing nutrients. Related to this, Dr. Kim explained that "4R nutrient management" optimizes nutrient use, boosting plant biomass and soil organic carbon levels by using the right source of nutrients at the right rate, right time, and right place. While plants need nitrogen to grow, it is also a significant source of greenhouse gas emissions. The 2022 report by Farmers for Climate Solutions states that direct greenhouse gas emissions from the use of nitrogen fertilizer are the fastest growing source of emissions, representing approximately 14 percent of all emissions from Canadian agriculture.

Soil sampling and testing is often a first step in nutrient management. Miraterra highlighted the importance of measuring soil and using the results to help farmers reduce the costs from expensive inputs like fertilizer while also increasing carbon sequestration. In its 2023 White Paper, FarmFolk CityFolk notes that fewer than 20 percent of Canadian farms use soil tests to guide decisions on the application of extra nitrogen fertilizer and if the levels of organic and chemical nitrogen were measured and understood relative to the needs of the crops, this could reduce the use of these fertilizers. As

such, the organization recommended matching crop and soil needs with application rates and timing to reduce the use of nitrogen fertilizer. Noting that it would help farmers make better decisions focused on building soil carbon and soil nutrient management, Dr. Lewis recommended providing free soil nutrient testing and interpretations. Further information about soil testing in general is in the Data chapter.

Regarding the benefits of nutrient management, Dr. Thomas Forge of the UBC Faculty of Land and Food Systems noted that animal production releases more emissions than crop production; however, using animal manure in horticultural crop production could "even out" some of these impacts and reduce overall agricultural emissions, particularly if it is used to offset fertilizer usage. Similarly, the Ministry of Agriculture and Food shared that, if done well, nitrogen and manure management reduce the release of methane and nitrous oxide into the atmosphere. Ministry officials also stated that good nutrient management and careful pest and disease control produce healthy plants, which produce more biomass and thereby increase soil carbon. Additionally, Agriculture and Agri-Food Canada noted that effective nutrient management promotes plant growth, protects water quality, and saves money for farmers.

In terms of fertilizer technology, FarmFolk CityFolk explained that controlled-release technology creates a physical barrier that slows down the release of coated chemical ingredients. In the case of plastic coatings, this results in increased levels of microplastics in the soil, which causes environmental harm, compromises soil health, and accumulates in the food chain. As such, the organization recommended using only biodegradable coatings on delayed-release fertilizers to reduce emissions. The Committee also heard from a forester who recommended adopting technical solutions to use manure to improve soil organic matter and nutrient levels on farmlands and adjacent forest lands.

To promote adoption of nitrogen management, the BC Agriculture Council recommended creating a dedicated program like the Prairie Watershed Climate Program which provides stackable supports to enhance nitrogen management on farms in Saskatchewan and Manitoba. Funding from the program covers portions of the cost of soil testing, soil mapping, developing a nitrogen management plan, and

purchasing urease inhibitors or other enhanced efficiency fertilizers.

Lucent BioSciences told the Committee about Soileos, a micronutrient fertilizer they developed that uses upcycled food processing residues to deliver nutrition to growing crops. When the soil is warm and moist, the soil microbiome eats the carbon in Soileos and releases the nutrients, allowing for on-time delivery. The company stated that for every tonne of Soileos used, three to four tonnes of carbon dioxide equivalent is sequestered. They explained that while other fertilizers can also increase soil carbon by increasing yield, they believe their product works more effectively than other micronutrient fertilizers and has a much lower carbon footprint. As such, they recommended using products like Soileos that improve yields and sequester carbon while increasing soil health.

COMPOSTING AND ORGANIC AMENDMENTS

According to the US Department of Agriculture, soil amendments are products, like compost and biochar, that are added to soils to improve qualities like soil fertility. The Committee heard about various benefits associated with composting and organic amendments, including that their application leads to higher soil carbon content. Dr. Forge explained that using organic amendments increases the activity and diversity of the biological communities in soil, which is fundamental to soil health. As such it is a relatively low-cost approach to increasing soil organic matter. Further, it leads to: improved soil structure and water-holding capacity; increased retention and cycling of plant nutrients within the soil biota; increased populations of microbes that help plants take up scarce nutrients, reducing reliance on fertilizer; and increased biological activity in the soil, which can suppress pests and pathogens. These benefits increase productivity and the resilience of the food system.

The Committee also heard about some factors that limit the effectiveness of composting and organic amendments. The Ministry of Agriculture and Food noted that applying recycled organic material can increase soil carbon, but the effects depend on the environment, soil properties, and the organic matter. As examples, Ministry officials shared that fresh manure makes a relatively small contribution to the long-term carbon pool, compared with amendments like well-matured compost from yard waste. In addition, applying biosolids often

increases stable carbon in the soil, but some biosolids may add high concentrations of metals and/or organic components, which have negative effects. The Ministry further noted that while organic amendments often increase yield, they can pose risks to water quality without a good nutrient management plan.

To increase adoption of composting and organic amendments, Agriculture and Agri-Food Canada noted that many smaller farmers could use expertise and equipment for applying manure effectively, and infrastructure for effectively composting it or using it as a feedstock for biodigestion. They also suggested considering opportunities to divert carbon and nutrients from the waste stream and use them as sources of organic matter or nutrients to sustain plant growth. Similarly, Dr. Forge recommended improving understanding of the value of composts and treated manures as well as providing incentives to use more waste-derived organic amendments instead of synthetic nitrogen fertilizers.

Regarding specific amendments, ONT Holdings Inc. told the Committee about its product, ONT bio-enhancer, a liquid soil amendment that uses algae to reinvigorate the soil microbiome, helping beneficial bacteria and fungi. This promotes soil health and plant growth. The company stated that over time, the product will help reduce the need for chemical-based fertilizers and help lower greenhouse gas emissions by farms.

The Ministry of Agriculture and Food stated that the term biochar is used to refer to a wide range of different charcoal-like products that result from burning organic material at high temperatures and low oxygen content. The Committee heard conflicting views on the benefits of biochar. Dr. Kim stated that biochar increases soil carbon content and improves the soil health by adding charcoal produced from organic materials. In addition, Lucent BioSciences recommended investing in options like biochar and seaweed. While Dr. Forge also noted that biochar can help improve the physical and chemical properties of soil, they added that it has almost no benefits for soil biology and the components of soil health that are related to biological activity, at least in the short term. Similarly, the Ministry stated that some studies have shown an increase in yield associated with biochar, while others have shown an alarming decrease. Ministry officials cautioned that the carbon

footprint of biochar needs to be considered, including its transportation.

Other organizations and individuals also referenced the transportation of organic amendments generally as an area of concern. The Minister's Advisory Group on Regenerative Agriculture and Agritech stated that inefficient use of transportation is a barrier in the industry. Further, the BC Association of Farmers' Markets flagged the need to determine how to move resources from the Lower Mainland to other parts of the province and recommended supporting circular economy initiatives to reuse and redirect resources for new uses as healthy soil amendments. An individual noted that previously BC lost a lot of nutrients, like poultry manure, by shipping them to the United States.

CONSERVING GRASSLANDS

While not necessarily an agricultural BMP, the Committee also heard about conserving grasslands to increase carbon sequestration. A 2019 paper prepared by Dr. Smukler for the Canadian Agri-Food Policy Institute notes that there have been soil organic carbon losses due to the conversion of native grassland to cropland. The paper also states that preventing further conversion of forest and grasslands is essential to increase croplands' role as a net sink. The Grasslands Conservation Council of BC stated that healthy grasslands capture, store, and safely release water and also store vast amounts of carbon. The Council noted threats to grassland including conversion to other land uses, degradation from overgrazing and recreation, invasive species, climate change, and wildfires. Both the Council and a farmer recommended preserving grasslands and preventing them from being converted to other forms of land use.

BARRIERS TO ADOPTION

In addition to difficulties associated with the adoption of specific BMPs, many organizations and individuals referenced general barriers such as the province's diversity of climate and production systems. The Ministry of Agriculture and Food stated that the different climates across BC make it difficult to replicate programs, practices, and recommendations across regions. Ministry officials explained that BMPs need to be adapted to specific climates, noting that those that have been developed in the Prairies may not work in BC. Similarly,

FarmFolk CityFolk noted that national proposals and costing need to be adapted to apply to the unique and diverse agricultural sector in BC. On production, Dr. Forge noted that the most effective practices for increasing soil organic matter will be different for different production systems, and there is a wide variety of production systems in BC.

Another barrier is access to land. Harold Steves, a former Member of the Legislative Assembly who was involved with drafting agricultural policy, noted that it is difficult for young farmers to find land to lease and when they do find it, the owners often only provide one-year leases. They added that more land needs to be put into production in addition to sequestering carbon on land that is already being farmed. As such, they recommended returning farmland to production and reinstating the land bank program of 1973 with a requirement to rebuild the soil with organics, compost, and manures, and to sequester carbon. Jacob Beaton with the Minister's Advisory Group on Regenerative Agriculture and Agritech referenced surveys which found that the number one barrier for Indigenous people to be involved in food production is access to land.

The 2022 Organization for Economic Cooperation and Development (OECD) Food, Agriculture and Fisheries report states that social and behavioural factors can also discourage adoption as farmers may be reluctant to alter habitual practices, especially on small farms and those owned by older farmers where farming practices have been long established. The Isha Foundation expressed a similar view, sharing that the greatest challenge it has experienced in terms of carbon sequestration is getting farmers to change their behaviour. Further, the organization noted that farmers do not trust people who are not farmers, and that building trust takes time since farming is a risky business. Dr. Lewis shared that as a researcher it can be challenging to gain the cooperation of independent landowners and suggested that it might be easier to implement BMPs on lands that are provincially owned or managed.

In terms of policy and regulation, Jacob Beaton noted that past government policy, as well as the *Indian Act*, still influences today's institutions and creates barriers for Indigenous people, including with respect to financing. Despite this, the number of Indigenous farmers is increasing while the number of non-Indigenous farmers is declining. This relates

to a recommendation from the Minister's Advisory Group on Regenerative Agriculture and Agritech to support the growth and revitalization of Indigenous food systems and agriculture by investigating and addressing inequitable policy, funding, institutional, and structural barriers that impact Indigenous food systems and agriculture. The Ministry of Agriculture and Food explained that regulations put in place to protect the environment can make it challenging for farmers to access inputs to apply them on their land to increase soil carbon levels. Similarly, a farmer stated that it is difficult to practice regenerative agriculture when other ministries do not understand the critical role of soil in healthy food and a healthy environment.

Given the thin margins in the agricultural sector, the cost associated with adopting BMPs is another significant barrier. Discussion about addressing input costs is in the Supports and Incentives chapter. The Committee also heard about a lack of data to measure the impact of BMPs. The Data chapter has more information about this theme.

WHAT THE COMMITTEE HEARD: SUPPORTS AND INCENTIVES

BACKGROUND

One way to encourage the adoption of BMPs that contribute to carbon sequestration is through government supports and incentives. These may be intended to increase producers' knowledge of specific techniques, provide funding or financial incentives to adopt certain practices, or enhance research and development related to sustainable practices and technologies.

The Ministry of Agriculture and Food delivers many supports and incentives to encourage the adoption of BMPs and technologies to improve the agriculture sector's economic, social, and environmental performance, though there are not any programs that explicitly target soil carbon sequestration. Two overarching sources of funding are CleanBC and the federal Sustainable Canadian Agricultural Partnership. Through CleanBC, the Ministry has received funding for cost-share programs for on-farm projects, regional extension, and innovation. The Sustainable Canadian Agricultural Partnership is a five-year agreement between BC and Canada, which has funded many programs related to soil carbon sequestration.

Regarding the need for supports, Ministry officials explained that some agricultural practices benefit the environment or society more than they do individual producers; in these cases, it is most effective to give producers financial incentives. The BC Association of Farmers' Markets recommended compensating farmers for good land stewardship and expanding existing farmer-led solutions. A rancher told the Committee there is currently no incentive for farmers and ranchers to sequester carbon, and providing incentives could leverage the significant climate mitigation potential of certain land management practices. The Minister's Advisory Group on Regenerative Agriculture and Agritech recommended pursuing sustainable agriculture policy and program innovation, innovative business models, and agritech solutions for BC-specific farming challenges.

Many organizations and individuals emphasized that cost is a significant barrier to implementing practices that sequester carbon and that government supports can help overcome this

barrier. Dr. Woo Soo Kim from the Simon Fraser University BC Centre for Agritech Innovation explained that many BMPs and technologies require a significant upfront investment and ongoing maintenance costs, such as acquiring new equipment or modifying existing equipment. In addition, adoption of new practices may temporarily decrease yields and farmers may encounter challenges finding markets for products produced through these practices, particularly if consumer demand is limited or not yet established. Both the Minister's Advisory Group on Regenerative Agriculture and Agritech and Dr. Sean Smukler of the University of British Columbia (UBC) Faculty of Land and Food Systems expressed concern about these costs being passed on to the consumer, stating that regenerative agriculture efforts cannot be so expensive that people cannot afford the food produced. The Ministry of Agriculture and Food also noted input costs as a barrier, especially for small and medium-sized producers who have less capacity to absorb capital costs or risks. The Ministry added that many farmers are already stretched; therefore, it is crucial to provide incentives to ensure farmers are not sacrificing their business' viability to become more sustainable. Another challenge identified by an individual was the time it takes to achieve a balanced soil system, which they suggested could be addressed through financial supports. In terms of the cost of supports, the Small-Scale Meat Producers Association noted that farms experience \$2 billion in damages annually from severe climate impacts, which the organization suggested should be redirected to climate adaptation and mitigation programs for farmers. The Association emphasized that for producers to reach the industry's potential for carbon sequestration, they need to be profitable.

In addition to the need for supports and incentives, many presenters highlighted the need for collaboration to promote carbon sequestration. The Ministry of Agriculture and Food identified fostering more collaboration between entrepreneurs, farmers, and researchers to be an opportunity. The BC Agriculture Council described some achievements resulting from collaboration between government and

industry, such as the Council's participation in the Minister's Advisory Group on Regenerative Agriculture and Agritech. The Advisory Group itself recommended supporting collaborative relationships between farmers, producers, agritech industry, Indigenous peoples, and academia. Dr. Jean-Thomas Cornelis of the UBC Faculty of Land and Food Systems supported improving integration between different ministries, as well as Indigenous and non-Indigenous land users. A professional forester noted that opportunities to improve soil health will involve landowners, industry, and all four levels of government (federal, Indigenous, provincial, and local).

EDUCATION AND KNOWLEDGE-SHARING

The Committee heard about programs that provide education and promote knowledge-sharing. The Ministry of Agriculture and Food described two existing programs: the Knowledge and Technology Transfer Program and the Regional Environment and Climate Extension Program. The Knowledge and Technology Transfer Program provides cost-share funding focused on knowledge development, hands-on learning, and regenerative agriculture. The Regional Environment and Climate Extension Program, piloted for the first time in 2023, is a climate adaptation and mitigation program that includes activities like on-farm demonstrations, field days, development of decision-aid tools, and communications such as newsletters and podcasts.

A theme that came out of the Committee's consultation was that education and knowledge-sharing programs are an important way to show producers the benefits of practices that sequester carbon. Presenters, including FarmFolk CityFolk and Dr. Thomas Forge of the UBC Faculty of Land and Food Systems, highlighted that programs that show farmers the effectiveness of carbon sequestration practices are one of the most effective ways to support adoption. Dr. Forge specified that it would be helpful to show producers how to apply these practices most effectively in BC production systems, and also noted that demonstrations should focus on benefits to the producers, and not exclusively benefits related to carbon sequestration. Similarly, the Minister's Advisory Group on Regenerative Agriculture and Agritech recommended developing more demonstration projects that showcase the benefits and feasibility of adopting sustainable agricultural practices and technologies in different regions and

commodities in BC. Further, the Ministry of Agriculture and Food identified an opportunity to increase education on the long-term benefits of using BMPs.

Individuals and organizations also supported expanding education and awareness programs. One rancher who spoke with the Committee stated that farmers and ranchers need more education about carbon sequestration, including what it is, how to implement it, and its benefits. The BC Association of Farmers' Markets noted that producing food requires healthy soil and supported increasing public awareness of farmers' role in land stewardship, soil regeneration, healthy soil building, and the critical role of soil in food systems. The Association also suggested that farmers' markets are an opportunity to educate the public and connect with farmers and vendors about carbon sequestration and regenerative agriculture. An individual recommended that agricultural education programs teach farmers the principles of regenerative organic agriculture, provide them with resources, and show them how to apply it.

Extension services connect farmers with expert input, tools, and knowledge to help implement sustainable farming practices. Dr. DeLisa Lewis of the UBC Faculty of Land and Food Systems suggested supporting regionally focused field days and knowledge transfer. A rancher recommended increasing the amount of extension services and workshops, stating that there should be at least two regionalized workshops per year where Ministry of Agriculture and Food staff and regional agrologists meet with farmers to share information and resources on issues affecting their regions. The Minister's Advisory Group on Regenerative Agriculture and Agritech recommended developing extension and support services to help producers assess sustainability indicators on their farms and make it easier to identify best practices that they can apply in their local context. Additionally, the Advisory Group supported working with Indigenous peoples to develop Indigenous-led extension, advisory, and training services.

The Committee also heard generally about the role of knowledge-sharing in supporting carbon sequestration. The Minister's Advisory Group on Regenerative Agriculture and Agritech emphasized that knowledge-sharing is important because farmers have limited time to experiment with different practices. The Advisory Group recommended identifying and sharing best practices on sustainable

agriculture, regenerative agriculture, soil health, and agritech to support producers in identifying opportunities and sharing their successes. The Isha Foundation, which launched the Save Soil Movement, stated that there are multiple pillars to managing soil sustainably and the one that Canada is missing is supports for farmers to adopt knowledge systems. The BC Association of Farmers' Markets emphasized that part of knowledge-sharing means taking advantage of existing knowledge. For example, Farmers for Climate Solutions has a farm mentorship program that provides tools, resources, networking, and mentorship around healthy soil practices for farmers. The Association recommended relying on existing knowledge and healthy soil practices of farmers and Indigenous peoples. A rancher recommended increasing knowledge-sharing and cooperation between the Ministry of Agriculture and Food and other ministries to support more soil-based farming.

ON-FARM SUPPORTS AND INCENTIVES

Another type of program to encourage carbon sequestration practices are those that directly support or providing funding for on-farm activities. The Committee heard about several programs related to on-farm supports, including: the Environmental Farm Plan (EFP), the Beneficial Management Practices Program (BMP Program), the Resilient Agricultural Landscapes Program, and the Extreme Weather Preparedness for Agriculture Program.

Through the EFP, independent planning advisors work with farmers to assess on-farm environmental issues and develop an action plan to address them. The assessment includes all aspects of the farming system, including energy efficiency, biodiversity, water protection, manure management, and soil conservation. According to the Ministry of Agriculture and Food, 16.2 percent of BC farms have an active EFP, and these farms account for 22.5 percent of farmed land in the province.

FarmFolk CityFolk stated that BC is a leader in delivering the EFP, in part because the advisors visit the farms. The organization suggested that recent provincial-federal funding agreements provide an opportunity to build a robust EFP that can deliver a range of services. FarmFolk CityFolk also noted that, while farmers are aware of the EFP, it would be beneficial to demonstrate its benefits more effectively. One individual shared that they have a plan through the EFP and it works

well, adding that programs must recognize that farmers are the experts on their land.

The EFP is closely related to the BMP Program, which provides cost-share funding to farmers who have completed an EFP to address the environmental issues identified in their plan. Over 70 categories of practices and actions are eligible for cost-share funding through the program, ranging from planning and design to investments in farm infrastructure and equipment. According to the Ministry of Agriculture and Food, over 20 BMPs funded through the program contribute to soil carbon sequestration and regenerative agriculture. Previously there was a lifetime \$70,000 funding cap for participants; this has been raised to \$100,000 and all participants were reset to zero. For individual projects, the cost-share percentage ranges from 30 percent to 60 percent and funding caps range from \$3,000 to \$70,000.

The Minister's Advisory Group on Regenerative Agriculture and Agritech recommended strengthening existing programs like the EFP and BMP Program to increase adoption of sustainable agriculture practices. The Small-Scale Meat Producers Association and a farmer both recommended increasing the percentage of cost-share funding offered through the program to up to 90 percent, noting a lot of farmers are struggling financially. One individual who applied for funding through the programs spoke positively of them but suggested that some of the requirements are confusing. The BC Agriculture Council noted that receiving cost-share funding for carbon sequestration practices may be difficult for producers because of challenges in some regions accessing an EFP planning advisor, as well as tight application windows and extensive paperwork. As a result, the Council recommended identifying the practices that would impact sustainability the most and creating standalone programs for them with long-term, predictable funding.

Some organizations and individuals also discussed crop insurance as a way to support producers. Agriculture and Agri-Food Canada suggested that crop insurance and compensation may incentivize farmers who are interested in trying new practices to help mitigate climate change but who are worried about yield losses. Harold Steves, a former MLA with experience in agricultural policy, recommended supporting BC farmers with a new agricultural insurance program.

Additionally, the Committee heard about supports and incentives related to water use and storage. Agriculture and Agri-Food Canada described the importance of water for soil carbon sequestration. Water availability affects plant growth and therefore affects levels of soil organic carbon. Existing irrigation infrastructure was not designed with hotter temperatures in mind, so investing in this infrastructure is an opportunity to maintain plant productivity and, as a result, soil carbon. Agriculture and Agri-Food Canada officials also noted that investing in irrigation infrastructure may support agriculture on new areas of land as the climate warms. They suggested considering long-term agricultural water use and infrastructure needs.

The BC Agriculture Council stated that there are five separate practice codes under the BMP Program for on-farm water storage, each for a different volume and size and each with a different cap and cost-share. The organization suggested that developing a standalone program, such as Saskatchewan's Farm and Ranch Water Infrastructure Program, would address water management issues, funding pressures, and confusion among producers. Dr. Lewis supported providing irrigation system planning and expanding funding for on-farm water storage and farm water drainage projects. More generally, the Small-Scale Meat Producers Association and a farmer recommended prioritizing water access for producers practicing BMPs.

BARRIERS

The Committee also heard about barriers to accessing supports and incentives related to sustainable agriculture practices. The BC Agriculture Council discussed challenges with the administrative work involved in applying for government programs, including: complicated and time-consuming applications; limited internet connectivity in rural areas and a lack of paper applications; and short application windows that overlap with seeding and harvesting schedules. The Council noted that, given these barriers, the cost-share amounts for certain programs are not worth it for some producers to complete long application processes. The organization also raised that FrontCounter BC needs more support to help producers with these applications. The Minister's Advisory Group on Regenerative Agriculture and Agritech emphasized that it is important to reduce the friction for farmers so that

they can access programs without doing a lot of paperwork. The Advisory Group recommended reducing program administrative barriers, especially those that disproportionately impact Indigenous peoples.

The BC Agriculture Council also raised that, between the federal and provincial governments, there are many programs and navigating them can be difficult. The organization recommended developing a single window that would have all the information on federal and provincial funding opportunities. Applications could be submitted through this window and staff could determine which programs are suitable. The Ministry of Agriculture and Food acknowledged that it has heard that a one-window process for regulatory and program applications would be helpful. An individual raised that the Ministry's website is challenging to navigate and said that there should be an app to share information and resources.

The BC Agriculture Council noted that federal and provincial bodies often pursue overlapping initiatives that may not be coordinated with each other, and suggested increasing communication between different levels of government. The organization highlighted that the Standing Senate Committee on Agriculture and Forestry is conducting its own study on soil health.

Individuals and organizations described barriers related to a lack of program staff. The Minister's Advisory Group on Regenerative Agriculture and Agritech noted that staffing of government programs is a barrier in the north. One individual who participated in the Advisory Group stated that there are only two staff in the region where they farm; some staff are part-time and can only visit farms in the evening. The BC Agriculture Council identified that some programs are contingent on completing an Environmental Farm Plan, and in some areas of the province accessing a planning advisor can be challenging.

RESEARCH AND DEVELOPMENT

Another way to promote carbon sequestration is through research and development. The Committee heard about existing programs, including Agricultural Climate Solutions Living Labs, the Delta Farmland and Wildlife Trust, and Farmland Advantage. The Ministry of Agriculture and Food

emphasized that applied on-farm research and demonstrations may share, improve, and validate sustainable practices.

Many organizations and individuals identified a need for increased supports related to research and development. Dr. Stefania Pizzirani of the University of the Fraser Valley Food and Agriculture Institute stated that there is a lack of financial supports and incentives for the agriculture sector for research and improved data, and recommended increasing financial support to farmers and to applied research. An individual recommended funding research on the long-term benefits of healthy soil on crop yields and carbon storage through the Canada-BC Agri-Innovation Program or another targeted program. Another individual recommended supporting academic institutions to provide both research and extension services.

One specific research project that the Committee heard about was Agricultural Climate Solutions Living Labs. The Living Labs bring together farmers, scientists, and other stakeholders to co-develop and test new practices and technologies in a real-life context, so that they can be adopted more quickly by Canadian farmers. There are two Living Labs in BC. The first is led by the Investment Agriculture Foundation and the BC Agriculture Council and aims to explore new BMPs in six general areas to support climate change mitigation. The other is administered by the Peace Region Forage Seed Association and focuses on carbon sequestration, greenhouse gas mitigation, and enhancing agroecosystem services in the Peace Region.

Agriculture and Agri-Food Canada stated that the goal of these Living Labs is to work closely with farmers to help them adopt practices that not only increase soil organic carbon, but also help reduce greenhouse gas emissions and promote other co-benefits. Farmers participating in these Living Labs identified interest in cover cropping, nutrient management, and extended grazing. The department noted there may be opportunities for the provincial government to be involved with these Living Labs, such as by working with commodity groups that are not already participating or supporting the existing work through extension or other support to fund more sites. The Small-Scale Meat Producers Association recommended funding a second round of the existing BC Living Lab projects and supporting new ones in other areas of BC.

The Committee also heard about opportunities to expand other existing programs. The Delta Farmland and Wildlife Trust offers stewardship programs that provide funding to farmers and conducts research projects that examine the effectiveness of current programs. Farmland Advantage is a research and development program created by the Investment Agriculture Foundation to ensure farmers contribute to and are compensated for stewardship actions and regenerative agricultural practices that support ecosystem services. Two individuals recommended supporting these programs, such as with increased funding and better evaluation tools.

In addition to existing research programs, the Committee received suggestions for other research projects and programs. The First Nations Summit sought assurance that carbon sequestration will not negatively affect fish, especially salmon, and recommended conducting research on carbon sequestration and fish habitats with the involvement of First Nations. Harold Steves told the Committee about Colony Farm, a 600-acre farm given to Metro Vancouver by the provincial government that was supposed to be used for farming and research, and recommended it be made operational. The individual noted that a 2016 report by Metro Vancouver recommended that one third of Colony Farm be used to demonstrate farming methods that sequester carbon.

AGRITECH

Another significant area of focus for the Committee was how to support and incentivize the use of technologies that contribute to carbon sequestration. The Ministry of Agriculture and Food stated that a significant amount of global research and development money is going into agritech right now. Some agritech innovations that contribute to carbon sequestration include tractor implements, compost or biochar production systems, fertilizer technologies, and crop varieties. Ministry officials noted that significant effort is being made to ensure made-in-BC technologies are being used in BC, while also contributing to other jurisdictions.

In terms of programs that help fund agritech, Ministry officials mentioned the Innovative Clean Energy Fund and the Canada-BC Agri-Innovation Program. Dr. Kim stated that the provincial government offers several funding programs to support agritech development, in addition to technical support, education, and collaborative networks for knowledge-sharing.

In terms of other existing programs, Lucent BioSciences, an agritech company, referenced the BC Agritech Fund, funds from Agriculture and Agri-Food Canada, and supercluster funds.

Multiple organizations and individuals identified opportunities to enhance collaboration around agritech. Wesco Food Society recommended working with local agrifood industry to encourage and support using made-in-BC innovations to increase carbon sequestration. Both Dr. Kim and Lucent BioSciences supported increased collaboration related to agritech development, including with industry and other provinces.

Some organizations suggested increasing funding and incentives to spur the development of BC agritech and encourage the use of made-in-BC technology. Miraterra, a soil-testing agritech company, supported establishing tax credits, rebates, or funding programs that incentivize growers to use BC-specific technology. In terms of development, both Miraterra and Dr. Kim supported providing funding for development and pre-commercialization of made-in-BC agritech. Lucent BioSciences specified that a portion of PacifiCan funds should be directed to projects focused on soil carbon.

The Committee also heard about the need to increase education and awareness regarding agritech. The Ministry of Agriculture and Food indicated that there may be an opportunity to share knowledge and set up communities of practice to help overcome adoption barriers regarding emergent technologies. Dr. Kim suggested fostering cutting-edge tech education and innovation, such as upskilling programs for agritech communities. Lucent BioSciences recommended ensuring broad awareness of funding programs for agritech.

Agritech innovators told the Committee about barriers they experience developing technologies. Miraterra shared that getting funding and investors in BC has been extremely challenging. The company stated that InBC is a good start, but does not support companies until they are in the sales phase. Lucent BioSciences identified government approvals as a barrier. The company submitted its product registrations to the Canadian Food Inspection Agency over two years ago, and stated that at the time of its presentation it has not been

granted its registrations yet. Lucent BioSciences indicated that California has stricter regulations than Canada but allowed the company to register and sell its product within two months. The company recommended providing strategic regulatory support to agritech companies, such as by addressing wait times for registration with the Canadian Food Inspection Agency.

The Committee also heard about the role of farmers regarding agritech. The BC Association of Farmers' Markets recommended ensuring that any carbon sequestration opportunity, including the use of agritech, is farmer-centric. The Association suggested that one way to make technologies work for farmers is to provide financial incentives and support for farmers to test technologies, particularly in the pilot and demonstration phase, to provide technical knowledge and reduce barriers to using them. The Association emphasized it is important for farmers to share in the profits, because making farming financially viable is a challenge.

Researchers from the University of the Fraser Valley Food and Agriculture Institute, Dr. Stefania Pizzirani and Dr. Lenore Newman, identified several specific agritech practices that they view as promising for BC. Dr. Pizzirani suggested vertical agriculture, the growth of food in shelving units, as an opportunity to increase the resilience of the food system and offset productivity losses from implementing BMPs like planting hedgerows. Dr. Newman recommended increasing indoor production and investing heavily in the production of alternative proteins.

One individual opposed use of agritech, suggesting that technology is a good resource but is infrastructure-intensive and can be out of reach for most farmers.

CARBON OFFSET PROGRAMS

One specific type of program that the Committee heard about was carbon offset programs. A carbon offset system is a set of rules and processes for trading carbon offset credits. Carbon offset credits represent a set amount of greenhouse gas emissions either not emitted or removed from the atmosphere. These credits are used to counterbalance emissions. Carbon offset programs are closely related to carbon markets, in which carbon credits are bought and sold.

BC has a carbon offset program that recognizes projects including carbon sequestration in forestry, fuel switching, and energy efficiency. The emissions removals or reductions are validated and verified by an independent, accredited third party to ensure they are real, permanent, and additional. While BC's carbon offset program does not currently include carbon sequestration through agriculture, the Committee heard about programs in other jurisdictions that do. Australia and Japan both have programs that include some sequestration methods related to agriculture. Alberta previously allowed farmers to earn carbon offsets by increasing soil carbon levels through no-till management and by reducing emissions from fuel use, but the program was ended in 2021. While Dr. Kim stated that the carbon market is not very active in BC or Canada, the Isha Foundation shared that it has worked with carbon credit project development organizations that are very active in other jurisdictions.

According to the federal government, the benefits of carbon offset programs include economic development, climate change mitigation, and environmental co-benefits like improved habitats and soil quality. Social benefits of these projects may include improved wildlife and plant populations for cultural use, reduced pollutants, and increased community capacity through new skills and knowledge.

The Committee also heard about the benefits of carbon offset programs from organizations and individuals. The BC Agriculture Council and a rancher recommended using eligibility to sell carbon offset credits to incentivize producers to adopt carbon sequestration practices or technologies. The Council specified this should be done by expanding BC's existing carbon offset program. The BC Association of Farmers' Markets suggested that existing carbon markets related to tree planting could be extended to farmers who use BMPs, but noted that this would be easier with better data. Dr. Newman highlighted that revenue from carbon offsets may enable farmers using BMPs to lower their prices and better compete with conventional farmers. Dr. Newman recommended working the federal government to develop such a program. Lucent BioSciences stated that carbon markets are a growing area and recommended providing certainty to agritech developers that verified carbon will be a recognized commodity in BC.

One of the limitations of carbon offset programs based on sequestration, including soil carbon sequestration, is ensuring that the carbon removed from the atmosphere remains stored. A 2022 report by the Organization for Economic Cooperation and Development (OECD) notes that even after an offset credit has been created, sequestered carbon can be released into the atmosphere at any time, undermining the program. The main reason, according to the OECD, is the ease with which farmers and ranchers can return to traditional agriculture practices. Furthermore, the capacity of certain practices to add new carbon to the soil will decline. Climate events like droughts, which are expected to occur more frequently due to climate change, may also impact soil carbon stocks. According to the OECD report, when the practices to maintain soil carbon are expensive, it is likely that carbon sequestration will be reversed. In a 2022 report, the Canadian Agri-Food Policy Institute wrote that carbon offset protocols based on sequestration have not seen significant uptake in Canada because of issues with permanence and the associated cost to verify emissions removals.

The Committee also heard from organizations and individuals about these challenges with permanence. A rancher told the Committee that farmers worry about what will happen if they decide to till their land and release the carbon back into the air from a previously sold offset. Lucent BioSciences indicated that a lack of a permanence, resulting from farmers changing their crops or from drought, should be addressed by buffer pools or carbon insurance. The company noted that government supports are necessary to ensure the extra work is worthwhile for farmers. Additionally, Lucent BioSciences emphasized that timelines should be realistic: some offset protocols have 100-year crediting periods and farms work on an annual basis.

Dr. Newman and an individual who has been involved in potato and dairy production in the Lower Mainland noted that there is interest federally in starting a carbon market, but measurement of sequestration in agriculture is a significant barrier. The individual stated that carbon offset programs for agriculture make sense on the Prairies but not in BC, because of the diversity of the climate and crops. Choosing a commodity and determining the emissions for it and what practices would reduce those emissions is very complicated. Additionally, BC has some of the lowest amounts of long-term trials in Canada. The Minister's Advisory Group on

Regenerative Agriculture and Agritech identified a need for data on soil health to include Crown land so it could be included in a carbon market.

Lastly, the BC Agriculture Council noted that productive agricultural land in BC is limited and food production should be prioritized. The Council emphasized that land should not be left out of production to earn offset credits; to address this, the organization recommended excluding offset revenue from revenue for farm classification.

LOCAL FOOD PRODUCTION

In addition to the supports and incentives already discussed in this chapter, the Committee heard about how supports for local food production are related to carbon sequestration. Several presenters highlighted how importing food contributes to BC's carbon footprint. Harold Steves noted that a 2021 report found that BC's food supply is 39.6 percent from other countries, 21.7 percent from other provinces, and 34.4 percent from BC. Dr. Pizzirani and another individual both noted that importing food releases significant emissions. Also in reference to the high carbon footprint of imported food, the Ministry of Agriculture and Food noted that it is important to take a broad view of climate mitigation efforts instead of only focusing on soil carbon sequestration. An individual who has been involved with potato and dairy production in the Lower Mainland emphasized that bolstering local food supplies to rely less on imports would reduce BC's emissions in a more sustainable way rather than only trying to sequester carbon in the soil. Three individuals, including Dr. Pizzirani and a farmer, recommended strengthening the local food supply. Similarly, Small-Scale Meat Producers Association highlighted the importance of local processing and recommended support for small-scale regional meat-processing capacity. Wesco Food Society recommended collaborating with non-profit bodies around BC that work towards local agrifood development, food accessibility, and ecologically valued land to sustainably create a better local economy that serves marginalized communities.

WHAT THE COMMITTEE HEARD: DATA

BACKGROUND

A consistent theme that emerged from the Committee's consultation was the importance of data to understand soil health and the effects of different practices or government programs to increase carbon sequestration. As such, the Ministry of Agriculture and Food is working to: identify soil health indicators to form a soil health baseline; create a data-sharing protocol; develop soil health extension tools; and establish a provincial soil health working group. The Ministry also plans to establish a performance metric for programs, and include that data in a monitoring and reporting verification system. The Ministry identified that it is important that data is not only collected but also cleaned, analyzed, and turned into recommendations. The Ministry of Forests shared that the provincial government has recently announced investments in LiDAR coverage, which is very high-resolution data on the structure of a forest or any part of the land base.

In particular, the Committee heard about the importance of baseline data on the current state of soil health and carbon content and how BC lacks this information. Both Dr. Sean Smukler of the University of British Columbia (UBC) Faculty of Land and Food Systems and the BC Agriculture Council stated that very little soil data has been collected in the past 40 years, though Dr. Smukler suggested that soil carbon is projected to have increased in that time. The BC Agriculture Council suggested that this could be addressed by including soil mapping in the work on land use inventories that the provincial government described in its announcements on food security. The Minister's Advisory Group on Regenerative Agriculture and Agritech recommended defining, measuring, and communicating the baselines of soil health at farm, regional, and provincial levels, and determining realistic improvement goals. Dr. DeLisa Lewis of the UBC Faculty of Land and Food Systems supported establishing baseline measurements and understanding of soil health indicators and soil carbon status across various agriculture sectors and farming types. One farmer from the Peace region, affiliated with the Minister's Advisory Group on Regenerative

Agriculture and Agritech, shared that farmers need baseline data so they can understand how their farm's soil health compares to farms in the same area.

Once baseline data has been collected, it can be used to measure the effectiveness of different farming practices for sequestering carbon. The Ministry of Agriculture and Food stated that there is limited BC-specific data on how different soil management practices affect soil carbon content. Ministry officials stated that they need to be able to track emissions reductions from the programming the Ministry launches in the future. This extends to farmers as well, who need site- and crop-specific data to ensure adopting new practices gets results. Agriculture and Agri-Food Canada, the BC Agriculture Council, and Dr. Smukler stated that better data is essential to analyzing and understanding the effectiveness of different practices in different contexts. The Ministry of Agriculture and Food highlighted how a lack of data is a barrier to this type of analysis by referencing UBC's *Opportunity Assessment of British Columbia's Agricultural Greenhouse Gas Reductions and Carbon Sinks* which includes large margins of error due to a lack of BC-specific data. Regarding the impact of this lack of data, the Peace Region Forage Seed Association shared that farmers' inability to demonstrate a change in soil carbon means they do not have access to rewards; quantification will create more opportunities. Agriculture and Agri-Food Canada noted that collaboration with the federal government to collect baseline data may be useful.

The Isha Foundation, which launched the Save Soil Movement, discussed opportunities to include soil health targets in legislation. The Foundation stated that having a target is a necessary step to achieve goals and proposed that BC set a target in legislation for the percentage of soil organic matter in soils.

SOIL TESTING

In addition to general input about data collection, the Committee heard specifically about soil testing. A 2022

report by the Canadian Agri-Food Policy Institute noted that, while carbon sequestration is considered an essential part of the climate change strategy, the ability to measure soil organic carbon at a field level is a key element that is often overlooked. Soil sampling could help identify where adopting BMPs would be most helpful and could validate positive changes over time.

The Ministry of Agriculture and Food stated that soil testing technologies help producers make better management decisions by providing real-time and cost-effective measurement of the impact of different farming practices. For example, FarmFolk CityFolk stated that organic farmers routinely test soil and make decisions based on that, including the addition of amendments. Ministry officials indicated that possible data points include changes in soil carbon, soil water content, and crop development. Examples of soil testing technologies include sensors and ground-penetrating radar technology on tractors or drones that can be used for rapid farm scale measurements and remote sensors on satellites for regional mapping of soil properties and land use patterns. Both of these technologies, noted Ministry officials, can capture carbon content and are complementary to each other. They suggested an opportunity would be to consider the value of sensing, sampling, and analysis technologies, as well as decision aid and farm management tools.

Miraterra, a soil testing company, also told the Committee about the technology it has developed, which combines a molecular fingerprint sensor with a computational model. Miraterra representatives stated that the company's goal is to make soil-testing more accessible through digitization. They claimed that the resulting data can improve soil health, crop quality, and profit margins, in addition to kickstarting carbon sequestration and establishing trust in carbon markets. The company also suggested working with leaders like Dr. Smukler to deploy more affordable soil measurements in BC. Miraterra further noted that soil testing and monitoring could be part of disaster recovery by putting data in the hands of growers to learn more about their soil and how to increase climate resilience.

The Peace Region Forage Seed Association described how it is using digital soil mapping to quantify whether farmers are becoming a carbon source or sink based on their management practices. The Association stated that this method of soil sampling will be the most practical option for

farmers, particularly if a reward system or carbon credits are implemented. The Association begins with Google Earth data to determine covariates and predict soil attributes; after this, its computer model suggests where to collect soil samples. Association representatives stated that this technology would likely be more affordable than a conventional carbon analysis, but BC's topography will increase costs compared to the Prairies. They recommended continuing to expand and diversify in-field testing of pilot soil sampling technology.

BARRIERS

In addition to emphasizing the importance of data, many individuals and organizations described barriers to data collection. The Ministry of Agriculture and Food and Dr. Smukler both mentioned the diversity of commodities, climates, and soil types across the province. Ministry officials also discussed the reversibility of carbon capture and the capacity of soil to become saturated. Additionally, they noted that many farmers may not trust data collection by the government, out of concern that such collection may inhibit their ability to manage their land as they see fit. This may be partially addressed through increased transparency about how data is used and by aggregating data to protect privacy. Wesco Food Society identified cost as a barrier, stating that land auditing should be more accessible and affordable for farmers.

In terms of barriers to soil testing, Ministry officials stated that sampling correctly is time-consuming and producers may require support. They also noted that labs may be using different methodologies and offering different services, which makes it difficult to compare results. Miraterra stated that most existing soil testing methods are slow, expensive, and often stored without digital technology, all of which hinders efforts to enhance carbon sequestration and soil health. Dr. Thomas Forge of the UBC Faculty of Land and Food Systems noted that there used to be a set of soil analyses that farmers could have done at commercial labs regularly and at a low cost; however, these analyses were focused on nutrients and have become less useful as the focus has shifted to soil health. FarmFolk CityFolk stated that, outside of organic farming, regular soil tests are not common practice, and that one option to increase access to soil testing would be to provide a mobile test service supported by specialists. Several organizations, including Miraterra, FarmFolk CityFolk, and the UBC researchers, suggested making soil tests free for farmers.

Committee Discussion

IMPORTANCE AND POTENTIAL OF BENEFICIAL MANAGEMENT PRACTICES

During their deliberations, Members reflected on the many benefits that BMPs provide, both to farmers and the environment. For example, they noted that nutrient management benefits farmers financially by reducing their use of nitrogen fertilizer, which is expensive. They also discussed benefits related to production and soil health, noting that cover cropping decreases soil erosion, improves soil structure and rainfall absorption, and provides migrating waterfowl an alternative food to cash crops. Regarding rotational grazing, Committee Members highlighted that livestock contribute to soil enrichment, land maintenance, and carbon sequestration; however, they also expressed concerns about the release of enteric methane.

In terms of the climate mitigation potential of BMPs, Members discussed research that found, at a national level, regenerative agriculture practices and other protection, management, and restoration actions have the potential to offset almost all of, if not more than, agriculture's annual emissions by 2030. Committee Members emphasized that not only do BMPs have potential to mitigate climate change by sequestering carbon, they also can help producers and ecosystems adapt to the effects of climate change. For example, Members noted that rotational grazing can remove potential wildfire fuel and cover cropping can help with drought and flooding. Additionally, agroforestry practices can reduce erosion and silvopastures specifically can be used as landscape buffers to reduce wildfire risks.

On the other hand, Members noted that the effectiveness of BMPs is place-based and context-dependent, varying according to region and climate. For example, the Committee heard that conservation tillage practices are unlikely to work in the Fraser Valley, where soils are wet, and farmers need to work the land before planting. The usefulness of cover cropping also depends on the climate; in the north, seeds must be planted by mid-August otherwise the crops will freeze.

Additionally, access to manure and other organic amendments may be cost-prohibitive in some parts of BC.

The Committee emphasized that a crucial piece of farmers' and ranchers' ability to adopt BMPs is access to agricultural land. Committee Members explained that farmers need to have certainty through long-term leases to be incentivized to spend money on any improvements. They also noted that access to land can offset some of the costs of adopting certain BMPs, such as cover cropping. In particular, Members were concerned about the level of competition to access Crown Land, community pastures, and range tenures. The Committee noted that responsibility for agricultural land is shared between multiple ministries, and that a lack of coordination between ministries can make it more difficult for ranchers to access leases and tenures. Another barrier raised by Members was that the applications required for grazing leases are very involved and there is limited support for producers trying to complete these applications due to backlogs at FrontCounter BC.

Members also acknowledged that the effect of increased access to land on carbon sequestration is complex. They discussed how converting more land to farmland might be counterproductive in terms of carbon sequestration, but also recognized that increasing local food production helps lower BC's emissions from importing food. Members also observed that there is unused land in the ALR that could be used to sequester carbon, suggesting that land usage could be examined by a future committee.

IMPROVING EDUCATION, SUPPORTS, AND INCENTIVES

Regarding supports and incentives for the agriculture sector, the Committee emphasized the importance of collaboration in contributing to innovation and technology adoption, particularly in the agritech sector. Members agreed that agritech innovators can play a critical role in advancing carbon sequestration and supported reducing barriers to research

and development. Further, they emphasized that technology development and deployment must be farmer-centric, recognizing how farmers play a key role in piloting and using technologies.

Members reflected on the central role of education and knowledge-sharing. They indicated that encouraging adoption of BMPs and technologies requires more than providing financial incentives; education and knowledge-sharing programs are also critically important. Members emphasized the importance of providing opportunities for farmers to share what is working for them, through opportunities like field days. They also supported relying on best practices and inviting experts to share their knowledge with producers. The Committee recognized that different types of education programs will be valuable in different regions. Members indicated that one such model is using Farmers' Institute meetings as a venue for education initiatives.

To further support education and knowledge-sharing, Members emphasized that extension services should be revitalized. They noted that extension services can be effectively provided by many different bodies and that there is a need for in-person, local services. The Committee also discussed how extension services could support enhanced data collection and help farmers interpret the results of soil tests, which may have complex, technical interpretations, to make informed decisions about different practices and technologies.

During the consultation, the Committee heard about various challenges that farmers and ranchers face accessing supports that are related to carbon sequestration. For example, individuals and organizations highlighted issues with navigating government programs and managing the administrative work of applying for them. The Committee discussed how establishing a single window for funding opportunities would address some of these barriers and added that it should also include information about permitting requirements. Members agreed that having this "one-stop-shop" would support carbon sequestration by providing another opportunity to learn about supports and practices. In terms of the structure of this service, Members indicated that FrontCounter BC is having challenges with capacity but is a valuable model. They also specified that the service should cover the portfolios of multiple ministries and must

be accessible in areas of the province with limited phone and internet connectivity. Additionally, Committee Members supported taking an inventory of existing programs to improve navigation and ensure that efforts to improve programs do not add administrative complexity.

Committee Members also discussed the effectiveness of existing programs. They emphasized that the Environmental Farm Plan and its Beneficial Management Practices Program are very important, but there may be an opportunity to consider if specific practices may be better suited to standalone programs. Members also discussed the supports provided by Delta Farmland and Wildlife Trust, particularly with respect to cover cropping, and considered additional opportunities to promote this practice, including per-acre payments, education, and establishing an equipment sharing program. They noted that the climate-dependent nature of cover cropping could make a per-acre payment program difficult to implement.

Another important topic of discussion was the needs of Indigenous farmers and communities. The Committee reflected on the presentation from the First Nations Summit regarding the need for research on the effect of carbon sequestration on fish habitats. Committee Members highlighted the importance of fish for many First Nations and agreed that Indigenous farmers and communities should be involved in conducting research related to carbon sequestration. They noted that supporting research through programs like Living Labs is one effective way to do so. Committee Members appreciated the value of Living Labs in general and agreed that there should be more support for these initiatives to meet the needs of different regions across the province.

The Committee identified an opportunity for further examination of carbon offset programs in agriculture. During the consultation, individuals and organizations noted that BC has an existing carbon offset program and that it does not include carbon sequestration projects in the agriculture sector. Members indicated that carbon offset programs may be a valuable tool; however, there are associated risks and challenges that should be studied. They noted that carbon sequestration in agriculture generally relies on the farmer continuing to use certain practices, and that sequestration can be reversed if farm practices change, even if a carbon credit has been granted. Members also expressed concern that a

carbon offset program could incentivize using agricultural land for tree planting rather than food production. They noted that, in some cases, multinational companies have purchased farmland from BC producers and have taken it out of food production to earn carbon credits by planting trees. Members emphasized that any carbon offset program should not result in farmland being taken out of production to earn carbon credits and suggested that implementing a carbon offset program could be beneficial for productive capacity in the longer term due to increased resilience of the growing area.

DATA AND SOIL TESTING

The Committee recognized that data is important for both farmers and policymakers to make informed decisions and noted that BC has a lack of soil health data. Members reflected on input they received on work being done on land use inventories, which may provide an opportunity for updated soil mapping. Committee Members agreed that data collection requires collaboration between a wide range of partners, including ministries, universities, other levels of government, and the private sector. Members noted that data will vary between different regions and climates and that different types of data are relevant in different production systems. To measure the efficacy of practices and technologies, Members highlighted the need to collect data to establish a starting point from which to compare.

Regarding soil testing, Committee Members suggested it would be helpful to have some consistency in what is being measured, but emphasized that producers should not be required to do specific tests. Instead, the Committee proposed developing a system that makes soil testing easy for farmers and provides consistent support and interpretation. Members also discussed opportunities to reward farmers and producers for sequestering carbon in the soil and noted that testing for carbon would be crucial to any such reward program. They noted some challenges in this area including that soil tests generally do not measure carbon content, and measuring carbon levels in soil is done through a different process than is used to measure other components of soil. Committee Members also noted that soil testing can be expensive, and emphasized that collecting these measurements should not be a burden on farmers. The Committee suggested that one way to improve the ease and affordability of testing

for carbon would be to invest in improving the technology. Further, Members emphasized that this work must involve collaborating with partners and effectively communicating to producers the value of increasing soil carbon.

Members also discussed other opportunities to enhance data collection, including revitalizing extension services to support farmers and producers with collecting and understanding data. They also spoke positively about experimental farms, noting that there is such a farm near Ottawa that has produced interesting and valuable data. Members observed that there was previously an experimental farm in the Lower Mainland.

OTHER OPPORTUNITIES

During their deliberations, Committee Members reflected on other opportunities to reduce emissions in the agriculture sector. They discussed how greenhouse gases are emitted by a range of agricultural activities, beyond food production. For example, Members highlighted upstream emissions from fertilizer production and downstream emissions from importing crops like lettuce. While the Committee's examination was focused on carbon sequestration and related technology, these broader climate impacts of the agriculture sector were often raised during the consultation. Committee Members highlighted some of the other opportunities they heard about to reduce emissions and make the sector more resilient. They recognized that supporting local food production and processing helps sustain farmers and can have a lower carbon footprint than relying on imports, particularly in terms of transportation emissions. They additionally emphasized that food waste is a significant source of emissions.

During the consultation, the Committee also heard about the importance of access to water. Members emphasized that access to water is especially important given the droughts BC experienced during summer 2023. They agreed that water storage is important to ensure access during droughts and suggested that during water restrictions, the needs of agriculture must be considered alongside other competing priorities. They recognized that government is investing \$83 million in the Agriculture Water Infrastructure Program to support the effective management, collection, transportation, and storage of water for agriculture and irrigation purposes as part of Budget 2024.

Conclusions and Recommendations

The aim of the Committee's recommendations is to support opportunities for carbon sequestration to meet BC's climate goals and emissions reductions targets that also benefit farmers, producers, and ranchers. The Committee sought to take a farmer-centric approach to these recommendations and ensure that none of its proposals place an undue burden on producers. The order of recommendations does not indicate priority.

The Committee recommends to the Legislative Assembly that the provincial government:

1. Partner with other levels of government, academia, non-profit organizations, agritech innovators, and farmers to:
 - a. develop a suite of indicators of soil health, including carbon content, across the province and develop a system to share these data provincially,
 - b. conduct long-term monitoring on the effects of BMPs and technologies in different soil and climate conditions, and
 - c. develop more effective ways to measure carbon sequestration on BC farmland.

During the consultation, Committee Members heard about a significant lack of soil health data across the province. Members agreed it should be easier for producers to collect data, but that this should not involve introducing requirements that might be challenging to implement across BC's diverse agriculture sector. Further, they emphasized that the purpose of collecting indicators on soil health is to be able to identify changes in soil content over time, not to set targets for producers. Members discussed how farmers need data to make informed management decisions and how data is also necessary for government to make good policy decisions and investments over time. The Committee notes that data collection and measurement involves a wide range of partners, including ministries, universities, other levels of government, and the private sector.

The Committee recommends to the Legislative Assembly that the provincial government:

2. Support BC's agritech industry to develop innovations that increase carbon sequestration in the agriculture sector by:
 - a. making investments to improve the affordability of soil testing, including testing for carbon,
 - b. reducing barriers to research and development,
 - c. encouraging collaboration and knowledge-sharing between agritech innovators, farmers, non-profit organizations, Indigenous peoples, and different levels of government,
 - d. examining opportunities for innovation through farming pilot projects, and
 - e. ensuring broad awareness of funding programs for agritech.

Members recognized and supported the potential of BC agritech to help advance carbon sequestration in agriculture. The Committee supported investing in innovation and technology to lower the cost of soil testing. Members discussed how carbon is not a standard measurement in soil tests, which makes it challenging to measure or reward changes in soil carbon levels. They emphasized that the goal of promoting soil testing is not to tell producers what they should test for but rather to streamline testing and provide producers with more tools for interpretation. They agreed that reducing barriers for agritech research and development would be helpful. The Committee emphasized that technologies need to work for farmers and discussed how farmers play a central role in piloting, refining, and adopting agritech.

The Committee recommends to the Legislative Assembly that the provincial government:

3. Facilitate collaboration between farmers, ranchers, producers, non-profit organizations, agritech innovators, Indigenous peoples, and post-secondary institutions and researchers to increase the adoption and knowledge of practices that sequester carbon in BC's agriculture sector.

The Committee emphasized that encouraging collaboration is an important part of improving education, supports, and incentives that encourage the adoption of practices and technologies. Throughout their discussions, Committee Members highlighted areas where they believe improved collaboration is necessary, including data collection, management of agricultural land, and efforts to reduce program barriers. Members also emphasized that collaboration has an important role in lowering adoption barriers and increasing cost-effectiveness, which are discussed in recommendations 7 and 8.

The Committee recommends to the Legislative Assembly that the provincial government:

4. Improve existing and develop new educational and knowledge-sharing programs, including field days and virtual seminars, to support farmers to make informed decisions about BMPs and technologies that will benefit them and sequester carbon, including but not limited to:
 - a. agroforestry practices,
 - b. cover cropping,
 - d. rotational grazing,
 - e. nutrient management, and
 - f. composting and organic amendments.

Committee Members emphasized that education is an important part of efforts to increase carbon sequestration in BC's agriculture sector. They noted that encouraging adoption of BMPs requires more than financial incentives; it requires knowledge-sharing through opportunities like field days and seminars. Members recognized that the practices highlighted in this recommendation are already used by many producers, and agreed that there are many advantages to sharing knowledge about their effectiveness in different production settings, role in disaster resilience, and economic benefits. The Committee also indicated that education and knowledge-sharing programs should include agritech, such as by setting up communities of practice to promote innovation and the adoption of technologies that help sequester carbon.

The Committee recommends to the Legislative Assembly that the provincial government:

5. Invest in extension services led by government bodies, regional agrologists, and/or non-government organizations to help farmers and producers determine which BMPs and technologies would be most impactful in their production settings.

Members concluded that extension services should be revitalized across the province. They discussed how extension services can be provided effectively by different ministries or non-government bodies, and the best approach may vary between regions. The Committee acknowledged that extension services may be delivered in a different manner than they were previously. Committee Members also agreed that an important role for extension services is to help producers determine which practices or technologies are most beneficial in their specific region or context.

The Committee recommends to the Legislative Assembly that the provincial government:

6. Create a “one-stop-shop,” similar to FrontCounter BC, where farmers and ranchers can access information about permitting requirements, programs, and supports related to the adoption and use of practices and technologies that sequester carbon.

Throughout the consultation, the Committee heard about challenges navigating and applying for government programs and supports. Committee Members supported creating a virtual and in-person service with locations around the province to make it easier for farmers and ranchers to access programs and incentives as well as information about permitting requirements. The Committee emphasized that the service must involve collaboration between multiple ministries and be accessible for regions with limited phone and internet connectivity. Members also noted that the Investment Agriculture Foundation offers a similar service, which could serve as a possible model or platform to build upon in addition to FrontCounter BC.

The Committee recommends to the Legislative Assembly that the provincial government:

7. Determine which practices are most effective at sequestering carbon and either:
 - a. increase the accessibility and availability of existing programs, such as the Environmental Farm Plan and its Beneficial Management Practices Program, as well as Delta Farmland and Wildlife Trust’s set-aside program, or
 - b. create standalone programs with long-term, predictable funding commitments from government and relevant partners.

During the consultation, Committee Members heard about barriers to accessing existing government programs, including challenges with eligibility, as well as application processes and timelines. The Committee emphasized that the Environmental Farm Plan, Beneficial Management Practices Program, and Delta Farmland and Wildlife Trust’s financial incentives for cover cropping are valuable supports. Members identified that, in addition to the valuable role played by programs that support multiple practices, there may be opportunities to assess whether certain impactful practices are better suited to a standalone program. They agreed that changes to program structures or funding should include an assessment of what will be most effective to meet the province’s goals.

The Committee recommends to the Legislative Assembly that the provincial government:

8. Support the development and expansion of regional programs that lend equipment to farmers to promote the adoption of cover cropping and other BMPs that sequester carbon.

Committee Members acknowledged that they heard that purchasing equipment, including equipment that farmers need for cover cropping, can be cost-prohibitive. They discussed existing programs that provide access to shared equipment and agreed that these are a valuable tool to support adoption and continued use of cover cropping and potentially other practices.

The Committee recommends to the Legislative Assembly that the provincial government:

9. Develop policy incentives for farmers to adopt regenerative agriculture practices.

The Committee heard about the potential of regenerative agriculture, which refers to practices that aim to improve soil health and benefit the ecosystem, including but not limited to sequestering carbon. Members suggested that efforts to increase adoption of practices should focus on adding incentives rather than introducing prescriptive requirements. One example of a possible incentive discussed by Members was providing a per-acre payment to encourage the adoption and continued use of cover cropping.

The Committee recommends to the Legislative Assembly that the provincial government:

10. Support the creation of Living Lab initiatives across the province, including one that meets the research interests and needs of Indigenous farmers and communities.

Committee Members highlighted the valuable contributions of the two existing Living Labs in BC, and suggested that more of these programs should be developed around the province. The Committee recognized that meeting the needs of Indigenous farmers and communities is important, and one way to do this is through supporting research. Members reflected that they heard interest in researching the effect of carbon sequestration on fish habitats. They discussed how good soil management can be beneficial for fish, noting that some farmers have found that adopting regenerative practices has significantly benefited nearby fish populations.

The Committee recommends to the Legislative Assembly that the provincial government:

11. Increase farmers' and ranchers' access to agricultural land, including Crown Land, range tenures, and grazing leases, to support the adoption of BMPs that sequester carbon.

Members emphasized that access to land is important, especially for young farmers and smaller operations. They acknowledged that reliable, long-term access to agricultural land is necessary for farmers to implement BMPs and make other investments. The Committee noted that multiple ministries have responsibility over access to agricultural land and that silos between ministries can make it more challenging for farmers and ranchers to access leases and tenures. Members emphasized that collaboration between ministries is a crucial step to increase farmers' and ranchers' access to agricultural land.

The Committee recommends to the Legislative Assembly that the provincial government:

12. Commission a study on the potential benefits and risks of a carbon offset program for on-farm practices for BC farmers, ranchers, and producers.

The Committee heard that BC has an existing carbon offset program, but that carbon sequestration projects in the agriculture sector are not eligible. Committee Members concluded that carbon offset programs for agriculture are a tool that should be studied. They emphasized that such a study should include an examination of the potential challenges and risks, such as the possibility that carbon sequestration may be reversed even after it has been counted towards a credit if the producer changes their practices.

Appendix A: Participants

Agriculture and Agri-Food Canada

B.C. Agriculture Council

BC Association of Farmers' Markets

BC Cattlemen's Association, North Okanagan Livestock Association

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Minister's Advisory Group on Regenerative Agriculture and Agritech

Ministry of Agriculture and Food

Ministry of Forests

Miraterra

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Peace Region Forage Seed Association

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