



BEST MANAGEMENT PRACTICES IN
CANADIAN AGRICULTURE:

Analysis of Adoption and Barriers

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Executive Summary:

This comprehensive study of 509 Canadian agricultural producers reinforces and expands upon the findings from *Producer Perspectives on Barriers to the Adoption of Regenerative Agriculture on the Canadian Prairies (2024)*, revealing consistent patterns in adoption barriers. Both studies identify the lack of demonstrated Return on Investment (ROI) and unclear practice definitions as fundamental barriers preventing wider adoption of Best Management Practices (BMPs) in agriculture. The research shows that while producers express strong interest in BMPs and conservation practices, uncertainty about economic returns and confusion over practice definitions create compound barriers that affect all aspects of adoption. In many cases, the absence of standard definitions reflects a deeper lack of agronomic and technical clarity about how BMPs should be implemented across diverse production systems and ecological contexts.

Critical ROI and Definition Barriers:

- Return on Investment Challenges:
 - Primary barrier for 6 out of 9 studied BMPs
 - Major factor in practice discontinuation (61% for foliar fertilization)
 - Key concern even among current users (37% for variable rate fertilization)
 - Particularly impacts adoption of practices requiring significant investment
- Definition and Classification Issues:
 - Multiple interpretations of key practices (e.g., 5 distinct definitions for cover crops)
 - Overlap between practice categories creates measurement challenges
 - Inconsistent terminology between producers and technical advisors
 - Confusion affects ability to measure and communicate benefits

These fundamental barriers cascade into broader adoption challenges:

Economic Barriers:

- Infrastructure and implementation costs
- Uncertain payback periods
- Risk associated with practice changes
- Limited understanding of long-term financial benefits

Agronomic Barriers:

- Technical implementation challenges
- Integration with existing systems
- Regional variations in effectiveness
- Resource constraints (water, labor, equipment)

Socio-cultural Barriers:

- Insufficient demonstration of successful cases
- Limited access to implementation guidance
- Gap between research and on-farm application
- Lack of standardized measurement methods

Investment Priority Areas:

1. ROI Documentation and Communication:

- Fund long-term studies tracking economic returns
- Develop standardized ROI measurement methods
- Create region-specific economic case studies
- Support peer-to-peer ROI communication networks

2. Practice Definition Standardization:

- Establish clear, consistent BMP definitions
- Create standardized implementation guidelines
- Develop uniform measurement metrics
- Build common terminology frameworks

3. Supporting Infrastructure:

- Regional demonstration networks
- Technical support systems
- Producer-to-producer learning programs
- Implementation validation tools

Strategic Investment Considerations:

The research indicates that investment in ROI demonstration and practice definition clarity would provide the highest leverage for increasing BMP adoption. Recommended approach:

- Prioritize documentation and communication of economic returns
- Support development of standardized practice definitions
- Fund demonstration projects that clearly track and report ROI
- Enable regional adaptation while maintaining consistent metrics
- Create systems for long-term benefit documentation

While producers show strong commitment to sustainability and conservation (71% express strong support), the lack of clear ROI demonstration and practice definitions fundamentally undermines adoption efforts. Investment in these areas, supported by appropriate knowledge transfer and technical support systems, offers the highest potential for driving increased BMP adoption across Canadian agriculture.



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Introduction

Agricultural producers are under growing pressure to adopt sustainability practices aimed at reducing greenhouse gas emissions, building soil carbon, and protecting habitat. On-farm Best Management Practices (BMPs) are highly diverse and vary significantly by region, with adoption rates influenced by geographic, economic, and operational factors. However, Canadian producers face significant knowledge gaps regarding the barriers to adopting individual BMPs and regenerative agriculture as a whole.

Since 2013, Food Water Wellness Foundation (FWWF) has collaborated with Prairie producers, providing opportunities for them to share challenges encountered during their transition to regenerative practices. Understanding these barriers is essential for addressing them effectively and increasing adoption rates across the region. This study explores how Canadian producers are integrating various sustainable practices into their operations, including variable rate fertilization, foliar fertilizers, manure/compost usage, and cover cropping, among others.

Building on previous research, particularly the report *Producer Perspectives on Barriers to the Adoption of Regenerative Agriculture on the Canadian Prairies* (2024) this study sought to validate and expand existing insights by gathering data from a broader cross-section of agricultural producers. The survey was designed to identify key barriers to the adoption of regenerative agriculture and BMPs while highlighting knowledge gaps and providing actionable recommendations for stakeholders looking to support producers in their sustainability journey.

Understanding the extent to which producers have already implemented, are in the process of implementing, or plan to adopt sustainability practices is crucial for shaping effective agricultural policies and prioritizing efforts to remove barriers.

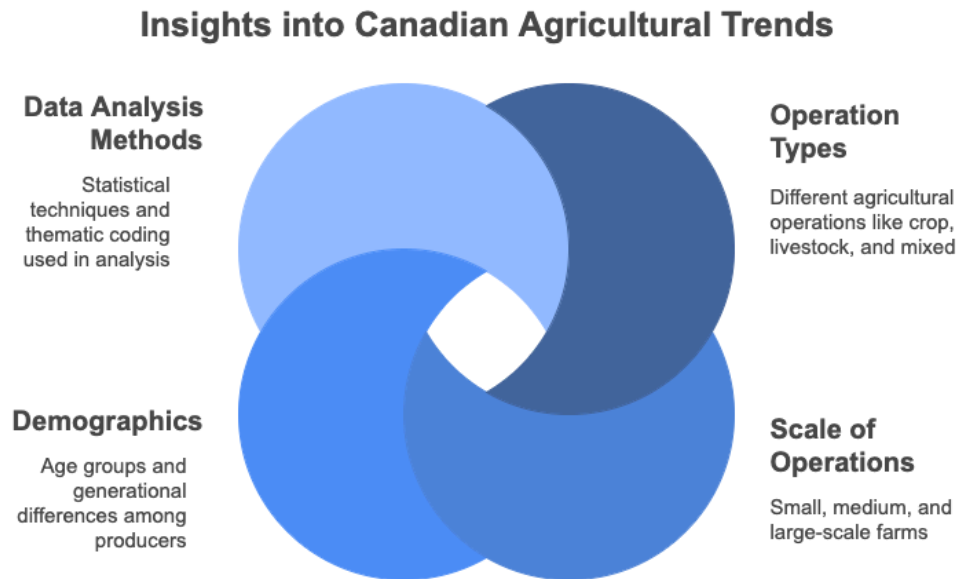
Survey Methodology

The survey was conducted in fall 2024, targeting Canadian agricultural producers across various regions and operation types to ensure a diverse and representative dataset. The methodology focused on both quantitative and qualitative data collection to capture a comprehensive understanding of the barriers to BMP adoption.

The survey utilized a structured questionnaire comprising multiple-choice, ranking, Likert scale and open-ended questions. This mixed-methods approach enabled researchers to gather quantitative data for statistical analysis while also capturing qualitative insights to explore nuanced producer experiences. Informed by Producer Perspectives on Barriers to the Adoption of Regenerative Agriculture on the Canadian Prairies (2024) some Best Management Practices (BMPs) were identified as having diverse definitions. To ensure clarity, respondents were asked to specify which definition best represented their understanding. The BMPs with the most diverse definitions in the literature were prioritized. Additionally, recognizing that cover cropping and intercropping presented multiple barriers to adoption, rather than asking producers to identify the single greatest barrier, they were instead asked to rank the barriers in order of significance resulting in weighted scores from percentages. Furthermore, many survey questions included an "Other" option, allowing respondents to provide written answers, ensuring a more comprehensive understanding of the challenges and perspectives surrounding BMP adoption. Key areas of inquiry included current BMP adoption rates, perceived benefits and challenges, regional and demographic variations in attitudes toward regenerative agriculture, and specific economic, agronomic, socio-cultural, and awareness-related barriers.

The survey received responses from a broad cross-section of 509 Canadian producers. The sample included a mix of crop, livestock, and mixed operations across small, medium, and large-scale operations, categorized by acreage and income. Participants spanned various age groups, reflecting generational differences in adoption trends.

Data analysis involved both statistical techniques and thematic coding. Survey responses were aggregated and analyzed to identify trends, adoption rates, and significant barriers by region, operation type, and demographic. Open-ended responses were coded to extract recurring themes and unique producer insights, highlighting individual stories and experiences that added depth to the findings.



Survey Demographics

The survey respondents represented a diverse range of agricultural operations, with the majority (61.0%) primarily engaged in crop production. A smaller proportion (9.0%) identified their operations as primarily focused on livestock, while 30.0% reported a mixed operation involving both crops and livestock. This distribution highlights the predominance of crop farming among Canadian producers surveyed, though a significant portion also integrate livestock into their operations, which may influence their approach to sustainability practices.

The age distribution of respondents reflects a broad generational representation in Canadian agriculture. The largest proportion of producers (30.0%) are 65 and over, followed closely by those aged 55 to 64, who make up 26.0% of respondents. The middle-aged group, 45 to 54, accounts for 17.0%, while younger producers are less represented, with 18.0% in the 35 to 44 category and only 9.0% under 35.

Operation income levels among respondents vary significantly. A quarter (25.0%) of operations report annual revenues between \$1 million and \$2.5 million, while 19.0% fall within the \$500,000 to \$1 million range. Smaller operations, earning under \$100,000, represent 9.0% of respondents, with another 15.0% reporting revenues between \$100,000 and \$250,000. Mid-sized operations making between \$250,000 and \$500,000 also constitute 15.0%, while larger-scale operations earning between \$2.5 million and \$5 million and those exceeding \$5 million account for 10.0% and 7.0%, respectively.

Regional distribution highlights a Western dominance in the survey, with 61.0% of respondents located in Western Canada, while the remaining 39.0% are from Eastern Canada. This regional difference is also evident in operation size, with Western operations averaging 4,259 acres, significantly larger than their Eastern counterparts, which average 1,087 acres. Overall, the total average operation size across respondents is 2,998 acres.

Operation size by acreage varies widely, with 27.0% of respondents operating between 1,000 and 2,499 acres, followed by 18.0% managing operations between 2,500 and 4,999 acres. Smaller operations under 500 acres represent 23.0% of respondents, while 12.0% fall in the 500 to 999-acre range. Larger operations between 5,000 and 9,999 acres make up 13.0%, and the most expansive operations, those 10,000 acres or more, constitute 7.0% of the surveyed population.



Survey Limitations

In designing the survey, a deliberate balance was struck between the depth of information sought and the ease of completion for participating producers. To encourage higher response rates, we streamlined the questionnaire by limiting the number of open-ended questions and detailed definitions for each conservation practice. As a result, broader categories—such as cover cropping, intercropping, 4R nutrient management, rotational grazing, and manure/compost application—may encapsulate a wide range of specific practices. For example, rotational grazing could refer to either a multi-paddock system with daily moves or a more seasonal approach. Additionally, in the interest of simplicity, the survey did not capture data on the acreage over which these practices are applied, meaning we cannot distinguish between large-scale nutrient management plans and smaller, localized applications (e.g., manure applied during a barn cleanout).



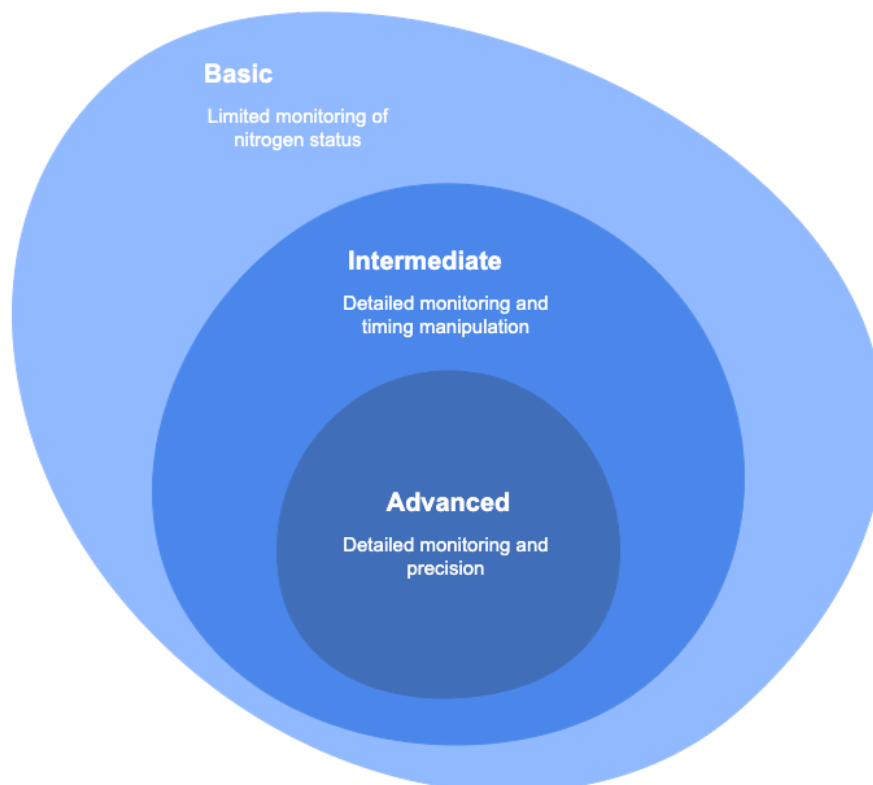
These methodological choices, while enhancing survey participation, also introduce limitations regarding the granularity of our findings. Consequently, the reported adoption rates should be interpreted with an awareness of these constraints; the broad definitions and unknown scale imply that the rates provide a general indication of practice uptake rather than precise measurements.

Best Management Practices Analysis

The 4Rs (Right Source, Rate, Time, Place)

The 4Rs refer to the application of fertilizer from the Right Source, using the Right Rate, to the Right Place at the Right Time. Building on insights from Producer Perspectives on Barriers to the Adoption of Regenerative Agriculture on the Canadian Prairies (2024), the 4R framework consists of three levels of implementation—basic, intermediate, and advanced—each of which is regionally adapted based on local conditions further defines these levels as:

1. Basic – Matching nutrient supply to crop needs based on limited monitoring of nitrogen status and field-level spatial resolution.
2. Intermediate – Matching nutrient supply through detailed monitoring of nutrient status, manipulation of the timing of nutrient supply, and sub-field spatial resolution.
3. Advanced – Matching nutrient supply through detailed monitoring of nutrient status and plant health, extensive manipulation of nutrient supply timing, and detailed sub-field spatial resolution.



In this survey, respondents were not asked to specify their level of 4R adoption but instead provided a general response regarding their use of 4R practices. This decision was made because Fertilizer Canada conducts detailed surveys focused specifically on 4R adoption.

The survey revealed that 80.0% of respondents practice the 4Rs, focusing on improving nutrient efficiency and reducing environmental impact. The study found consistent adoption across the country, with operation size showing some effect on 4R implementation. Economic barriers such as high upfront costs for equipment and perceived lack of demonstrated ROI discourage smaller operations from adopting these practices. Agronomic barriers include technical challenges in aligning 4R principles with diverse cropping systems. Socio-cultural resistance to adopting new systems is compounded by insufficient support for collaborative knowledge-sharing. Awareness barriers, including limited understanding of implementation methods and terminology confusion, further hinder adoption.

The survey data on 4R adoption indicates that the likelihood of adoption increases with operation size, though adoption remains high across all categories. The following visualization illustrates this relationship between operation size and 4R adoption rates:

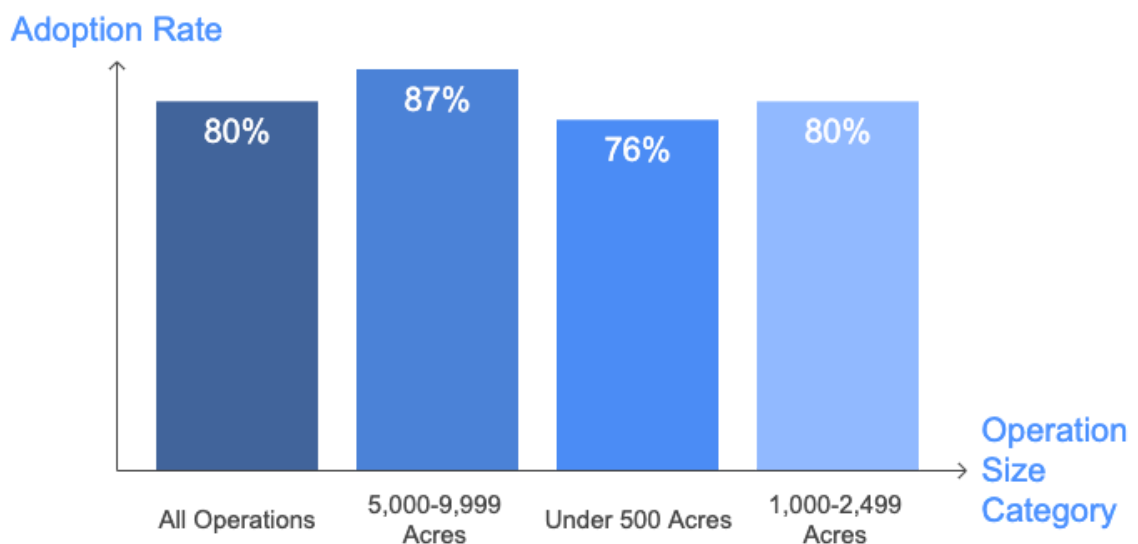
Among operations with under 500 acres, 76.0% reported practicing the 4Rs, while 15.0% said they were not, and 9.0% were unsure. Similarly, operations between 500 and 999 acres showed a slightly lower adoption rate at 74.0%, with 19.0% not adopting and 7.0% uncertain.

As operation size increases, so does adoption. For operations between 1,000 and 2,499 acres, 80.0% are practicing the 4Rs, while 10.0% are not, and 10.0% remain unsure. This trend continues with 85.0% adoption among operations between 2,500 and 4,999 acres, with only 11.0% not participating and 5.0% uncertain. The highest adoption rates were observed in operations between 5,000 and 9,999 acres, where 87.0% reported following 4R principles, 8.0% did not, and 5.0% were unsure.

Interestingly, adoption slightly decreases among the largest operations (10,000 acres and above), with 82.0% practicing the 4Rs, 15.0% not, and 3.0% uncertain. These results suggest that while 4R adoption is strong across the spectrum, smaller operations are slightly less likely to adopt the practice, and larger operations may face unique challenges that slightly impact uptake.

Key Insights:

- 80% adoption rate indicates strong industry acceptance of 4R principles and widespread recognition of nutrient management importance; however, the data does not distinguish between basic, intermediate, or advanced implementation levels.
- Operation size correlates positively with 4R adoption up to 9,999 acres, with peak adoption (87%) among operations between 5,000-9,999 acres, suggesting larger operations have greater capacity to implement these practices
- Smaller operations (under 500 acres) face distinct challenges, with lower adoption rates (76%) primarily due to economic barriers including high equipment costs and uncertain return on investment
- Mid-sized operations (1,000-2,499 acres) show solid adoption rates at 80%, representing a potential sweet spot where resources and implementation capability align effectively



**4R Principles Adoption Rates by
Operation Size**

Variable Rate Fertilization (VRF)

30% of respondents use VRF technology, with little difference between adoption rates in Western Canada (32.0%) and Eastern Canada (27.0%). The study reveals complex patterns in barriers to adoption across different user groups, providing insights into both implementation challenges and reasons for discontinuation.

The primary barrier to Variable Rate Fertilizer Application (VRFA) adoption across all groups is upfront costs, which was cited by 37.0% of current users, 45.0% of those considering adoption, and 36.0% of those who have not adopted the practice. However, only 5.0% of those who stopped using VRFA identified cost as a barrier, suggesting that other factors played a larger role in discontinuation.

Complexity of implementation was reported as a challenge by 16.0% of current users, 26.0% of those considering adoption, 9.0% of former users, and 13.0% of non-users. This indicates that those still evaluating VRFA perceive the learning curve to be steeper than those who have already implemented or discontinued the practice.

A lack of return on investment (ROI) was the most significant factor for those who stopped using VRFA, with 46.0% citing it as a barrier. In contrast, only 5.0% of current users, 9.0% of those considering adoption, and 19.0% of non-users viewed ROI as a concern.

The time required to implement VRFA correctly was an issue for 19.0% of current users, but it was not a major factor for others, with only 5.0% of those considering adoption, former users, and non-users indicating that time was a significant barrier.

Interestingly, 14.0% of current users reported facing no barriers when adopting VRFA, while only 5.0% of those considering the technology shared this perspective. A lack of educational support was reported as a challenge by 5.0% of current users, 6.0% of those considering adoption, 11.0% of those who stopped using VRFA, and 1.0% of non-users, suggesting that access to guidance and technical assistance may influence long-term adoption.

Lastly, other unspecified barriers were cited by 5.0% of current users, 4.0% of those considering adoption, 25.0% of former users, and 27.0% of those who have never used VRFA, highlighting that additional concerns—potentially operation-specific—may impact adoption decisions.

Key Insights:

- Moderate national adoption rate of 30% for VRF technology, with relatively consistent uptake between Western (32%) and Eastern Canada (27%), suggesting regional factors have minimal impact on adoption
- Economic considerations vary significantly by user group:
 - Upfront costs are the dominant barrier for current users (37%) and potential adopters (45%)
 - ROI concerns are most significant for those who discontinued use (46%), but minimal for current users (5%), indicating a notable perception gap in value realization
- Implementation challenges show distinct patterns:
 - Current evaluators perceive complexity (26%) as a much bigger barrier than actual users (16%) or former users (9%), suggesting potential overestimation of implementation difficulties
 - Time management is primarily a concern for current users (19%) but not for other groups (5%), indicating this becomes more apparent during actual implementation
- Support system gaps are evident:
 - Only 14% of current users report no barriers, dropping to 5% among potential adopters
 - Technical support challenges affect former users (11%) more than current users (5%), suggesting adequate support may be crucial for sustained adoption
- A significant percentage of former users (25%) and non-users (27%) cite unspecified barriers, indicating potential unique operational challenges that warrant further investigation
- The stark contrast between perceived and actual challenges across user groups suggests a need for better demonstration of real-world implementation experiences and return on investment related to this BMP.

Foliar Fertilization

The adoption of foliar fertilizer varies by region, with noticeable differences between Western and Eastern Canada. In Western Canada, 26.0% of producers currently use foliar fertilizer, while 18.0% are considering its adoption. Additionally, 21.0% have tried using it in the past but have since stopped, and 35.0% do not use it and are unlikely to do so in the near future.

In Eastern Canada, the adoption rate is slightly higher, with 35.0% of producers currently using foliar fertilizer. Meanwhile, 17.0% are considering its use, and 12.0% have previously tried it but discontinued usage. Like in Western Canada, 35.0% of producers in Eastern Canada do not use foliar fertilizer and do not plan to adopt it in the future.

Those using foliar fertilizer report several key benefits. The most cited advantage is improved plant health, mentioned by 52.0% of current users and 27.0% of those considering adoption. Increased production (yield) is another major benefit, identified by 28.0% of users and 44.0% of those considering adoption. Other benefits include increased efficiency (7.0% of users, 13.0% of those considering), cost savings (5.0% of users, 9.0% of those considering), and environmental benefits (3.0% of users, 4.0% of those considering). These findings highlight that adoption is primarily driven by economic benefits, such as return on investment (ROI), while environmental benefits play a minimal role in decision-making.

Despite its benefits, several challenges hinder broader adoption of foliar fertilizer. Lack of return on investment (ROI) is the most significant concern for those who stopped using it (61.0%) and remains a barrier for 19.0% of those considering adoption and 5.0% of current users. Among non-users, 27.0% cite lack of ROI as a reason for non-adoption.

Multiple barriers to the adoption of the BMP include, equipment capabilities reported by 15.0% of current users, 33.0% of those considering adoption, and 27.0% of non-users. A lack of information or support affects 20.0% of current users, 13.0% of those considering adoption, and 18.0% of non-users. Product cost is a barrier for 18.0% of current users, 12.0% of those considering adoption, and 11.0% of those who stopped using foliar fertilizer. Interestingly, 22.0% of current users reported no significant barriers to adoption.

Other reported barriers include complexity (7.0% of users, 11.0% of those considering), product availability (7.0% of users, 4.0% of those considering), and other unspecified challenges (6.0% of users, 1.0% of those considering, 11.0% of former users, and 15.0% of non-users).

Key Insights:

- Significant regional variation in adoption rates:
 - Higher adoption rates in Eastern Canada (35%) compared to Western Canada (26%), likely influenced by differences in cropping systems and rotations.
 - Both regions show identical non-adoption rates (35%), suggesting similar core resistance factors
 - Western Canada has higher discontinuation rates (21%) compared to Eastern (12%), indicating potential region-specific challenges
- Benefits perception varies between current users and potential adopters:
 - Current users primarily value improved plant health (52%)
 - Those considering adoption are more focused on increased production/yield (44%)
 - Environmental benefits are minimally recognized across all groups (3-4%)
- Lack of ROI as a key barrier varies across user groups:
 - Major factor for those who discontinued use (61%)
 - Minimal concern for current users (5%)
 - Moderate concern for potential adopters (19%)
 - Significant barrier for non-users (27%)
- Implementation barriers are multifaceted:
 - Equipment capabilities are a primary concern for those considering adoption (33%)
 - Information and support gaps affect current users most significantly (20%)
 - Product cost impacts current users more (18%) than other groups
 - Notable portion of current users (22%) report no significant barriers
- The disconnect between perceived benefits and barriers suggests a need for better documentation and communication of successful implementation strategies

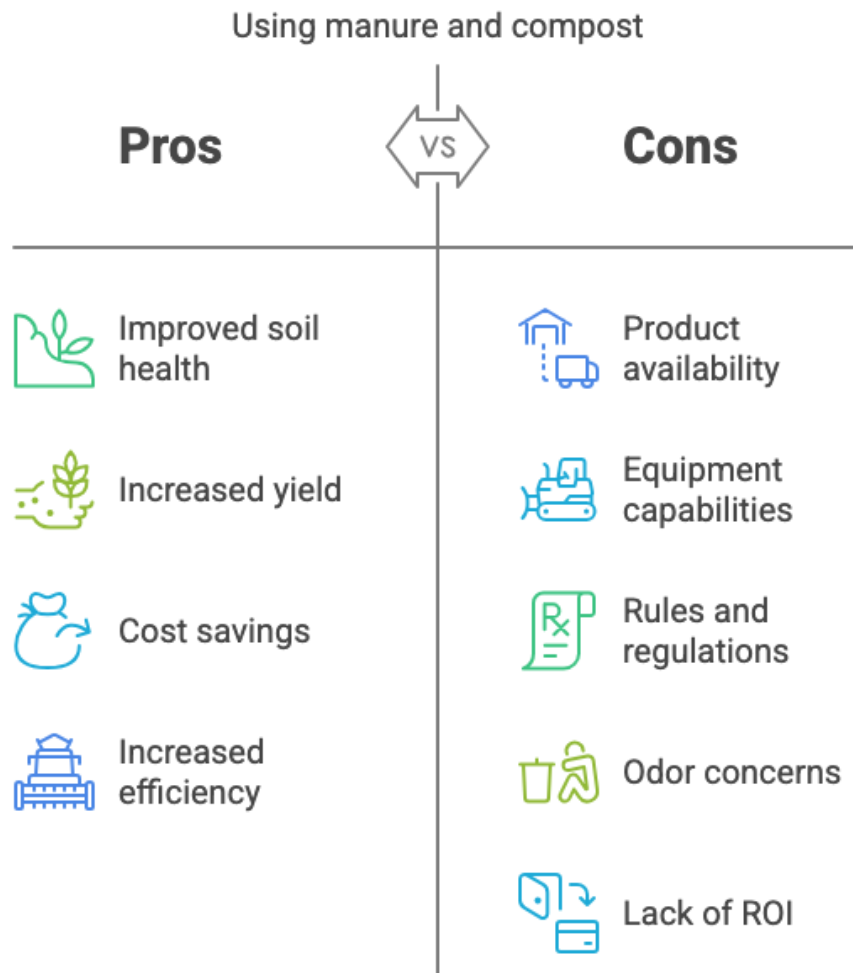
Manure and Compost Usage

The survey results indicate that a majority of producers (54.0%) currently use manure and/or compost as part of their agricultural practices. However, 6.0% are considering adoption, while 7.0% have tried using manure or compost but have since stopped. A significant portion (34.0%) do not use these materials and are unlikely to do so in the near future. It is important to note that we did not ask in the survey the scale of the use of manure and compost just if it was used.

Manure and compost usage varies significantly by region. In Western Canada, 46.0% of producers currently use manure or compost, while 5.0% are considering it, and 8.0% have stopped using it. A notable 41.0% do not use and are unlikely to adopt manure or compost practices. In contrast, Eastern Canada shows higher adoption rates, with 67.0% currently using manure or compost, 6.0% considering it, and only 4.0% having stopped using it. The percentage of producers not using manure or compost is lower in Eastern Canada (23.0% compared to 41.0% in Western Canada).

Among producers who use manure and compost, the primary perceived benefit is improved soil health, cited by 65.0% of respondents. Other advantages include increased production (yield) at 23.0%, cost savings at 10.0%, and increased efficiency at 2.0%. When broken down by user category, 58.0% of current users and 76.0% of those considering adoption highlight improved soil health as the top benefit. Yield increases are recognized by 23.0% of users, though only 7.0% of potential adopters see it as a key benefit. Cost savings are mentioned by 10.0% of users and 7.0% of those considering adoption, while increased efficiency is cited by 2.0% of users and 3.0% of potential adopters.

The biggest challenge to manure and compost use is product availability, with 49.0% of respondents citing this as a key issue. Other barriers include equipment capabilities (17.0%), rules and regulations (4.0%), odor concerns (3.0%), lack of return on investment (3.0%), and lack of information or support (2.0%). Notably, 23.0% of users reported no significant barriers to adoption.



When analyzed by user category, 35.0% of current users state they face no barriers, while only 11.0% of those considering adoption say the same. Product availability is a major obstacle for 24.0% of users, 57.0% of those considering adoption, 33.0% of those who stopped using it, and 68.0% of non-users.

Equipment limitations impact 21.0% of current users but only 6.0% of non-users. Other challenges vary by group, with 42.0% of those who stopped using manure or compost citing unspecified "other" barriers, compared to 7.0% of users and 11.0% of potential adopters. Regulations, odor, and lack of ROI are also minor concerns across different categories.

Key Insights:

- Strong regional adoption disparity:
 - Eastern Canada shows significantly higher adoption (67%) compared to Western Canada (46%)
 - Western Canada has nearly double the non-adoption rate (41%) compared to Eastern Canada (23%)
 - Regional differences suggest distinct operational contexts and accessibility challenges
- Benefits perception is highly aligned across user groups:
 - Soil health improvement is the dominant perceived benefit for both current users (58%) and potential adopters (76%)
 - Yield benefits are more recognized by current users (23%) than potential adopters (7%)
 - Cost savings and efficiency gains are considered minor benefits (<10%) across all groups
- Product availability emerges as the critical barrier:
 - Primary concern for non-users (68%) and potential adopters (57%)
 - Less problematic for current users (24%), suggesting successful users have established reliable supply chains
 - Regional supply chain differences may explain adoption rate variations
- Barrier perception varies significantly by user status:
 - Current users report much higher "no barriers" responses (35%) compared to potential adopters (11%)
 - Equipment limitations affect current users (21%) more than non-users (6%)
 - High percentage of discontinued users citing "other" barriers (42%) suggests complex, operation-specific challenges
- National adoption shows strong base:
 - Overall adoption rate of 54% indicates widespread acceptance
 - Low discontinuation rate (7%) suggests those who implement tend to maintain usage
 - Small percentage considering adoption (6%) may indicate market maturity

Soil Amendments

The survey results highlight varying levels of adoption and perception of soil amendments (such as humic, fulvic products, or biochar) within nutrient management programs. Currently, 15.0% of producers use soil amendments, while 28.0% are considering adoption. However, 9.0% have tried using soil amendments but have since discontinued their use. A significant portion (49.0%) do not use soil amendments and are unlikely to do so in the near future.

Adoption varies slightly by region. In Western Canada, 15.0% of producers currently use soil amendments, while 30.0% are considering adoption. A further 9.0% have tried and stopped using them, and 47.0% do not use and are unlikely to adopt them. In Eastern Canada, adoption is similar, with 14.0% currently using soil amendments, 26.0% considering them, 8.0% having discontinued their use, and 52.0% indicating they are unlikely to use them in the near future.

The most commonly cited benefit of using soil amendments is improved soil health, reported by 54.0% of respondents. Other perceived benefits include plant health improvements (21.0%), increased production and yield (19.0%), cost savings (4.0%), and increased efficiency (2.0%). When broken down by user category, 56.0% of current users and 50.0% of those considering adoption identified improved soil health as the primary benefit. Plant health benefits were cited by 19.0% of current users and 21.0% of potential adopters, while increased production (yield) was valued by 16.0% of current users and 20.0% of those considering adoption. Cost savings and efficiency improvements were noted by a smaller percentage of both groups.

Despite the benefits, several barriers prevent broader adoption. The most significant challenge is lack of information or support, cited by 35.0% of respondents. Additionally, 30.0% of respondents identified lack of return on investment (ROI) as a barrier, followed by equipment capabilities (11.0%), product availability (9.0%), and complexity (8.0%). Notably, only 7.0% reported facing no barriers to adoption.

Among different user groups, 31.0% of current users and 25.0% of those considering adoption struggle with lack of information or support, while this barrier is even higher for 41.0% of non-users. Lack of ROI is the most critical issue for 65.0% of those who stopped using soil amendments, compared to 12.0% of current users, 23.0% of potential adopters, and 26.0% of non-users. Equipment capabilities are a challenge for 15.0% of users and 18.0% of those considering adoption, but only 5.0% of non-users. Product availability impacts 8.0% of users, 10.0% of those considering adoption, and 7.0% of non-users. Complexity is a concern for 7.0% of users and 9.0% of potential adopters. Interestingly, 24.0% of current users reported no significant barriers to adoption.

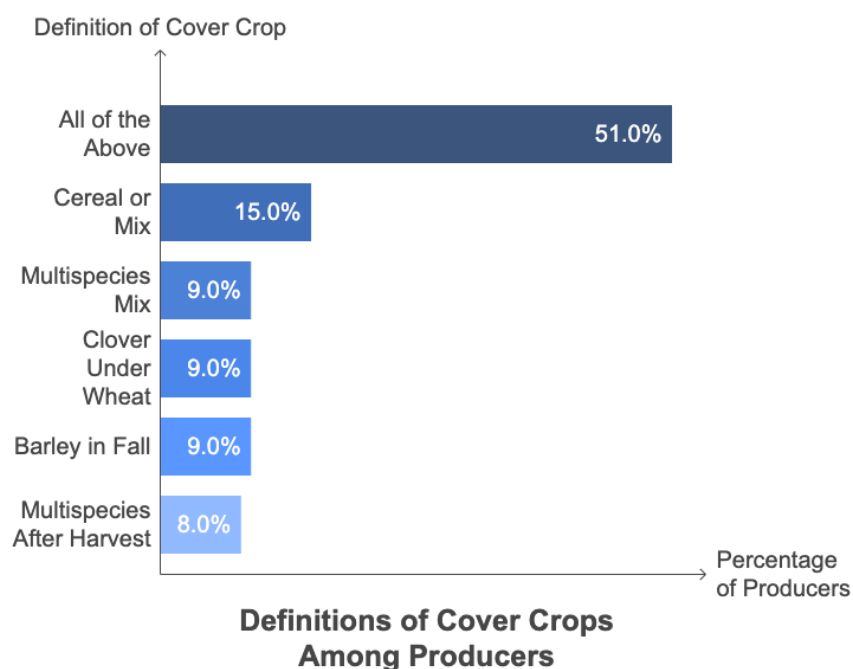
Key Insights:

- Low current adoption rate (15%) but significant interest:
 - Notable portion (28%) considering adoption indicates growth potential
 - High non-adoption rate (49%) suggests significant market resistance
 - Similar adoption patterns across Eastern and Western Canada suggests universal rather than regional challenges
- Information and ROI emerge as critical barriers:
 - Lack of information/support is the primary barrier across all groups (35% overall)
 - ROI concerns show dramatic variation between groups:
 - Major factor for those who discontinued (65%)
 - Much lower concern for current users (12%)
 - Moderate concern for potential adopters (23%)
- Benefits perception shows alignment around soil health:
 - Soil health is primary benefit for both current users (56%) and potential adopters (50%)
 - Secondary benefits are relatively balanced:
 - Plant health (19-21% across groups)
 - Yield improvements (16-20% across groups)
 - Limited recognition of cost savings and efficiency benefits (<5%)

- Barrier perceptions vary significantly by user status:
 - Current users report much higher "no barriers" responses (24%)
 - Equipment capabilities concern potential adopters (18%) more than non-users (5%)
 - Information gaps affect non-users (41%) more than current users (31%), suggesting knowledge transfer challenges
- The high percentage of those considering adoption (28%) coupled with significant information barriers suggests an opportunity for targeted education and demonstration programs

Cover Cropping

Because of the high number of definitions identified in the literature review and retrospective of producer engagement captured in the Producer Perspectives on Barriers to the Adoption of Regenerative Agriculture on the Canadian Prairies (2024) related to cover crops, we asked producers to specifically indicate what they were referring to when using the term "cover crops." The survey assessed producers' understanding by offering various definitions drawn from both academic and practical agricultural sources. The majority of respondents (51.0%) selected "All of the Above," indicating that many distinct practices are being grouped under the umbrella term "cover crop," which suggests potential communication challenges when discussing adoption strategies.



Among individual definitions, 15.0% of producers defined cover crops as a cereal or mix of species seeded into or after a cash crop and terminated in the fall before winter dormancy. Equal proportions of respondents (9.0% each) selected: (1) a multispecies mix seeding left to grow throughout the entire growing season; (2) clover underseeded in winter wheat, left to grow after wheat harvest, then terminated in the fall; and (3) barley or another single species seeded in the fall and terminated in spring before seeding the next cash crop. Additionally, 8.0% of producers preferred to define cover crops as a multispecies mix seeded after a primary crop harvest and terminated in the spring prior to planting.

This diversity in definitions highlights the need for more precise terminology when discussing cover crop adoption strategies and barriers across the Canadian Prairies, as producers may be conceptualizing fundamentally different agricultural practices despite using the same terminology.

Regional analysis showed variations in how cover crops are understood. In Western Canada, 53.0% chose "All of the Above," while individual category choices were more evenly distributed. In Eastern Canada, 48.0% selected "All of the Above," with a slightly higher preference for cereals or mixes seeded into/after a crop and terminated in the fall (17.0%). These differences suggest that producers in Eastern Canada may associate cover crops more with traditional rotations, while Western producers embrace a slightly broader understanding. The responses indicate that there are at least five distinct practices with potentially different environmental outcomes all being referred to as cover crops by most producers. This underscores the need for clear definitions when seeking to study the effect of and drive adoption of cover crops.

When asked about cover crop adoption, 44.0% of respondents currently grow cover crops, 12.0% are considering using them, 11.0% have tried them but discontinued, and 34.0% do not use cover crops and are unlikely to adopt them. Regional variations are significant, with 51.0% of Western Canada producers reporting not using cover crops and being unlikely to start, while in Eastern Canada, 74.0% of respondents currently grow cover crops, showing a significantly higher adoption rate.

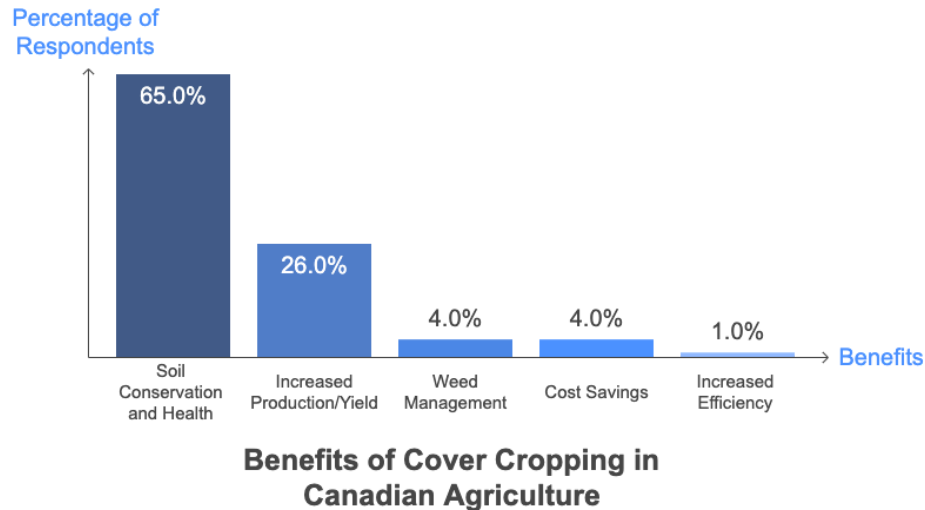
Adoption patterns vary notably by operation type. Among crop-only operations, 35.0% grow cover crops, while 43.0% do not and are unlikely to adopt. Livestock-only operations show higher adoption rates, with 56.0% growing cover crops and only 9.0% rejecting them. Mixed crop-livestock operations demonstrate strong adoption as well, with 58.0% growing cover crops and 25.0% not adopting.



Operation income appears to influence cover crop adoption, with usage declining as operation income increases. Small operations (under \$100,000) show 57.0% adoption rates, while large operations (over \$5 million) report only 44.0% adoption. Higher-income operations may find adoption more complex due to operational constraints, competing land uses, or higher opportunity costs. Similar trends appear in adoption by operation size. Small operations (under 500 acres) report 64.0% cover crop use, while large operations (over 10,000 acres) show 43.0% adoption. Similar to income trends, smaller operations are more likely to adopt cover crops, possibly due to greater flexibility in management practices.

Age also influences adoption patterns, with younger producers (under 35) showing higher adoption rates (49.0%) compared to older producers (40.0% for ages 55-64). This suggests younger generations may be more open to cover cropping.

Respondents ranked the primary benefit of cover cropping, with soil conservation and health leading at 65.0%, followed by increased production/yield (26.0%), weed management (4.0%), cost savings (4.0%), and increased efficiency (1.0%). There was no significant difference in how benefits were ranked across demographics, regions, or operation types. This consensus reinforces that soil health is the primary driver behind cover crop adoption.



Regarding barriers to adoption, respondents ranked lack of return on investment (ROI) as the biggest barrier (53.0%), followed by complexity in management (30.0%), product availability (4.0%), social acceptability (2.0%), and lack of information or support (11.0%). The perception of barriers varies by adoption status. Current users rank complexity and management concerns higher, while those considering adoption cite lack of ROI as their top concern. Producers who stopped using cover crops had the highest concern for ROI (64.0%), while those unlikely to adopt cover crops had the strongest perception of social unacceptability (56.0%). Among producers currently implementing cover cropping practices, a significant portion (45%) expressed concerns specifically related to insufficient return on investment (ROI). This finding is particularly noteworthy because it represents feedback from practitioners with firsthand experience, rather than theoretical concerns from non-adopters. These results suggest that the actual implementation of cover cropping is empirically demonstrating inadequate financial returns for many farmers, as opposed to merely reflecting a perception gap or lack of available economic data. In other words, these producers aren't primarily concerned about missing evidence or research gaps regarding potential ROI—they're reporting that their own direct experience with cover cropping has revealed actual economic shortfalls that challenge the financial viability of the practice under current market conditions and within existing agricultural support systems in the Canadian Prairies.

Additional barriers identified by respondents include cost-related issues such as high equipment costs (including interseeding tools and fuel), expensive seed and availability challenges, and short-term financial constraints. Agronomic challenges were also noted, including difficulty sourcing appropriate seeds, managing weed competition and pests, risk of reduced yields in low-rainfall areas, and conflicts between grazing needs and cover cropping strategies. Operational and timing constraints present further challenges, such as integrating cover crops within existing crop rotations, timing of termination to avoid competition with cash crops, and additional labor requirements. Attitudes and perceptions also play a role, with some producers expressing skepticism about the financial payoff and concerns over additional labor or management burden.

Key Insights:

- Complex understanding of cover crop definitions:
 - Majority (51%) recognize multiple valid approaches to cover cropping
 - Five distinct practices are commonly identified as cover crops
 - Regional variations show Eastern Canada favoring traditional rotational approaches
 - Definitional diversity suggests need for standardized terminology in research and policy
- Strong regional and operational type variations in adoption:
 - Significant East-West divide:
 - Eastern Canada shows high adoption (74%)
 - Western Canada has high non-adoption (51%)
 - Operation type impacts:
 - Livestock-only (56%) and mixed operations (58%) show higher adoption
 - Crop-only operations have lower adoption (35%)
- Operation size and demographics reveal clear patterns:
 - Inverse relationship between operation size and adoption:
 - Small operations (<500 acres) lead adoption (64%)
 - Large operations (>10,000 acres) show lower rates (43%)
 - Age correlation shows younger farmers (<35) more likely to adopt (49%) compared to older producers (40% for 55-64)

- Benefits perception shows strong consensus:
 - Soil conservation and health dominates (65%)
 - Production/yield benefits secondary (26%)
 - Remarkable consistency in benefit perception across all demographics
- Barrier hierarchy reveals complex adoption challenges:
 - ROI concerns dominate (53% overall, 64% among those who discontinued)
 - Management complexity significant (30%)
 - Social acceptability particularly concerns non-adopters (56%)
 - Practical challenges include equipment costs, seed availability, and timing constraints
- **Producers who stopped using cover crops emphasize economic challenges.** Those still using them struggle with management and product availability.

Intercropping

21.0% of respondents who have adopted intercropping indicate that the practice provides benefits like pest management and resource optimization. Economic barriers, including limited financial incentives and perceived profitability challenges, affect adoption. Agronomic issues, such as equipment limitations and complexities in managing intercropped fields, pose additional hurdles. Socio-cultural resistance to integrating non-traditional systems into existing practices is prevalent. Awareness barriers arise from a lack of Prairie-specific evidence supporting intercropping benefits. The survey indicated the biggest barrier is the perceived lack of financial incentives.

The survey revealed consistent patterns across four distinct producer groups - those currently practicing intercropping, those considering it, former practitioners, and those who have never practiced intercropping. 57% of respondents answered that time and complexity were the dominant barrier across all groups. Lack of ROI (Return on Investment) was identified as the most significant challenge for 31%. Current practitioners and those considering adopting rated lack of information and support as a more substantial concern at 13% those to do not intercrop 2%.

Also, those who have never practiced intercropping rated social acceptability higher than other respondents 9% said it was the most significant barrier while only 2% of those who were considering intercropping thought it to be the most significant concern. Product availability was the primary for only 2% of respondents but 49% saw it as the third most significant barrier. Interestingly, former practitioners' rankings closely aligned with those who never practiced, suggesting similar perspectives and experiences might influence their decision to discontinue or avoid intercropping practices.

Key Insights:

- Moderate national adoption rate (21%) suggests intercropping remains a niche practice despite its potential benefits
- Time and complexity emerge as universal challenges:
 - Consistently rated as top barrier across all user groups. (57%)
 - Challenge level remains high regardless of experience level
 - Suggests fundamental operational complexities that experience doesn't fully mitigate
- ROI concerns significant
 - Highest concern for 31%
 - Second highest ranked barrier for 46%
- Lack of Information & Support more pressing for engaged in the practice:
 - 13% of current practitioners and those considering intercropping see this as a major barrier
 - 2% of non-practitioners
- Social perceptions may discourage initial consideration of the practice:
 - 9% of those who have never practiced intercropping cite social resistance as the most significant barrier
 - 2% of those considering adoption share this concern
- Multiple barrier categories create compound challenges:
 - Economic: Limited financial incentives
 - Operational: Equipment limitations
 - Technical: Management complexities
 - Social-cultural: Hesitancy toward adopting unconventional farming practices

Cropland Grazing

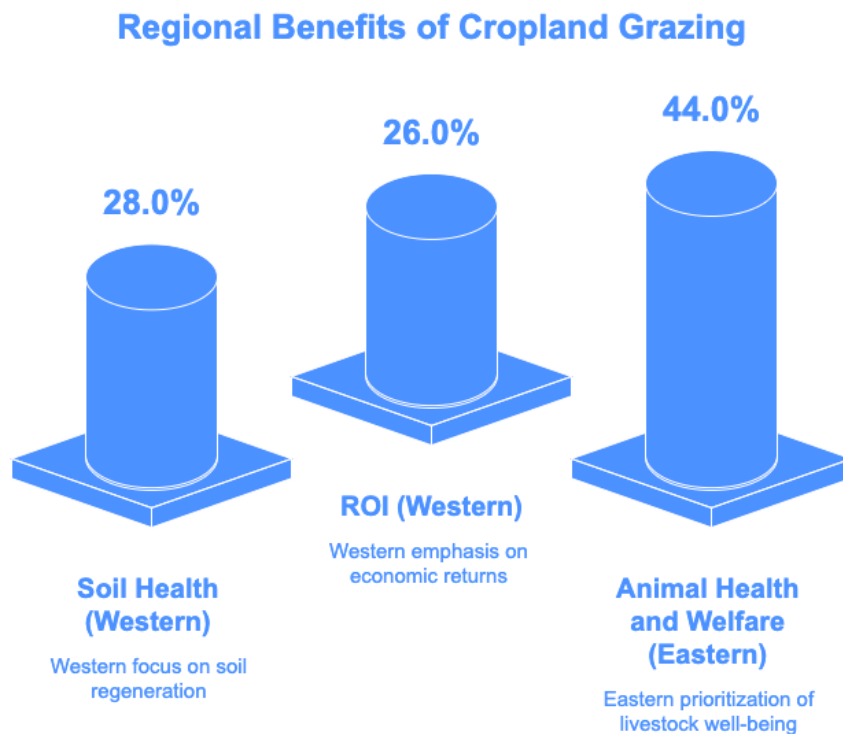
The survey gathered responses on cropland grazing adoption and its perceived benefits and challenges. A majority of respondents (50.0%) currently allow livestock to graze on cropland, while 8.0% are considering implementing it. A small portion (5.0%) previously allowed grazing but have since discontinued the practice. Meanwhile, 24.0% do not permit grazing on cropland and have no plans to do so, and 13.0% have livestock that typically do not graze outdoors (e.g., poultry). When assessing the overall experience of those currently practicing cropland grazing, 59.0% reported that it is going great, 37.0% rated it as "alright," while only 4.0% stated it was not as good as they had hoped. This suggests that, for most, cropland grazing meets or exceeds expectations.

Regional trends show significant variations in adoption. Western producers are significantly more likely to practice cropland grazing (64.0%) compared to their Eastern counterparts (28.0%). More Eastern producers (33.0%) do not allow grazing and are unlikely to start, compared to only 18.0% in Western Canada. A higher percentage of Eastern producers (21.0%) raise poultry or other livestock that do not typically graze outdoors, compared to 9.0% in Western Canada. This regional variation suggests that cropland grazing is more widely adopted in Western Canada, possibly due to larger land availability, different climatic conditions, or regional grazing traditions.

Among operations that do not have their own livestock, only 15.0% allow other producers to graze their livestock on their cropland, while 85.0% do not. This indicates that while some landowners recognize the value of managed grazing, a significant majority are not engaging in this practice, possibly due to concerns over land use agreements, soil health impact, or liability.

The top three reported benefits of cropland grazing are improvements in soil health (26.0%) – where grazing supports soil regeneration by integrating organic matter and reducing compaction; increased return on investment (ROI) (25.0%) – through improved forage utilization and better land use; and animal health and welfare (23.0%) – where livestock benefit from diversified diets and natural grazing behavior.

Regional differences show that Western producers indicate soil health (28.0%) and increased ROI (26.0%), with more balanced interest in other benefits. Eastern producers rank animal health and welfare highest (44.0%), suggesting a greater focus on livestock well-being rather than direct land productivity. Interestingly, those currently allowing grazing emphasize ROI (24.0%) and soil health (22.0%), while those considering grazing focus more on soil health (29.0%) and animal health (36.0%). This suggests that economic benefits become clearer after implementation, while potential adopters are primarily motivated by environmental and animal welfare considerations.



The biggest challenges identified were availability of water (33.0%) – critical for rotational grazing systems; labor/time requirements (19.0%) – related to additional management and fencing needs; and amount of available land (15.0%) – where land constraints impact the feasibility of grazing. Those considering grazing were more concerned with labor/time (36.0%) than those already practicing it (19.0%), indicating that concerns about workload may deter adoption.

Those who stopped grazing cited labor/time constraints (22.0%), lack of ROI (11.0%), and feed/nutritional quality concerns (11.0%). This suggests that economic viability and operational feasibility are key factors influencing whether producers continue or abandon cropland grazing.

Barriers vary significantly by region. Western producers face the biggest hurdle with water availability (42.0%), likely due to drier conditions. Eastern producers struggle more with labor/time (39.0%) and equipment costs (15.0%), possibly due to smaller operations requiring more intensive management. By operation type, primarily crop operations cite labor/time (46.0%) as their biggest challenge, showing a lack of integration of livestock into existing operations. Livestock-focused operations struggle with water access (39.0%), indicating an infrastructure challenge. Mixed crop-livestock operations report more balanced barriers, suggesting they have greater adaptability.

Operation size also influences barrier perception. Smaller operations (under 500 acres) struggle with multiple factors, including labor (18.0%) and water (21.0%). Larger operations (5,000+ acres) report water (40.0%) as their biggest issue, reinforcing the trend that larger land bases require better water management for successful grazing. Income level impacts challenges as well, with smaller operations (under \$100,000 annual revenue) reporting water as their biggest challenge (67.0%), likely due to limited investment in infrastructure. Higher-income operations (\$500,000 - \$1M) report time/labor (33.0%) and water (29.0%) as their primary barriers, indicating that even financially stable operations face resource constraints.

Key Insights:

- High adoption rate with strong satisfaction levels:
 - 50% current adoption with overwhelmingly positive experience (59% "great", 37% "alright")
 - Only 5% discontinuation rate suggests strong practice sustainability
 - Additional 8% considering implementation indicates growth potential
- Significant regional adoption disparity:
 - Western Canada shows much higher adoption (64%) compared to Eastern Canada (28%)
 - Eastern Canada has higher non-adoption rate (33% vs 18%)
 - Regional differences likely influenced by land availability, climate, and traditional practices

- Benefits perception varies by user status and region:
 - Western producers prioritize soil health (28%) and ROI (26%)
 - Eastern producers strongly favor animal health benefits (44%)
 - Current users emphasize ROI (24%), while potential adopters focus on soil health (29%) and animal welfare (36%)
- Water availability emerges as critical barrier:
 - Primary challenge overall (33%)
 - Particularly significant in Western Canada (42%)
 - More severe for larger operations (40% for 5,000+ acres)
 - Major concern for low-income operations (67% for under \$100,000 annual revenue)
- Operation characteristics influence barrier patterns with labour and management concerns deterring potential adopters more than current users:
 - Crop operations struggle with labor/time management (46%)
 - Livestock operations focus on water access challenges (39%)
 - Mixed operations show more balanced barrier distribution
 - Size and income level significantly impact barrier perception
- Limited cross-operation collaboration:
 - Only 15% of non-livestock operations allow external grazing
 - Suggests untapped potential for resource sharing and integration

Rotational Pasture Grazing

Rotational grazing is a widely adopted practice among livestock producers. Overall, 72.0% of respondents indicated that they practice rotational grazing on their pastures, while 28.0% do not. However, adoption rates vary significantly by region, with 81.0% of Western producers implementing rotational grazing, compared to only 54.0% in Eastern Canada. The study explores the motivations and barriers associated with rotational grazing, highlighting both its advantages and the challenges faced by those who have not yet implemented it.

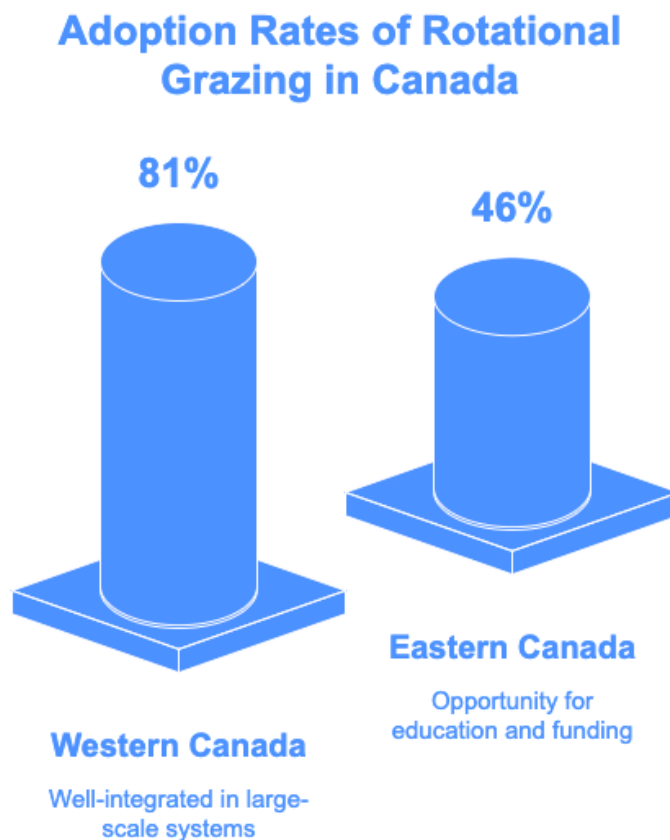
The data reveals a substantial gap between Western and Eastern Canada in the adoption of rotational grazing. In Western Canada, a clear majority (81.0%) have implemented this practice, while in Eastern Canada, adoption lags behind at 54.0%, with 46.0% of producers not using rotational grazing. This suggests that while rotational grazing is well established in Western Canada, significant room for growth remains in Eastern Canada.

Several key trends influence the state of adoption for rotational grazing. In Western Canada, larger land bases and extensive grazing operations support rotational systems, with more emphasis on drought resilience and soil regeneration as key drivers. The region benefits from greater access to pasture-based livestock systems, particularly in Alberta and Saskatchewan, and shows a long-standing industry push for regenerative grazing practices. In Eastern Canada, higher land costs and smaller operations make rotational grazing implementation more challenging. More prevalent intensive livestock operations, particularly in dairy, may limit rotation feasibility. Wetter conditions and higher forage productivity could reduce the perceived urgency of pasture rotation, while the need for more infrastructure investment, such as fencing and water systems, creates additional barriers to facilitate rotational practices.

Infrastructure costs present a significant barrier, particularly in Eastern Canada, where operations are smaller and more fragmented, making fencing and water infrastructure investments more challenging. Knowledge and training gaps affect adoption, with many producers, particularly in Eastern Canada, lacking access to extension programs or peer-to-peer learning opportunities that support rotational grazing adoption. Land suitability concerns also play a role, as certain soil types and terrain in Eastern Canada may not be as conducive to rotational systems as in the expansive rangelands of Western Canada. Time and management demands remain significant constraints, with some producers citing labor and planning as barriers preventing them from transitioning to rotational grazing.

Looking ahead, opportunities for expansion vary by region. In Western Canada, with high adoption rates, further improvements may focus on refining rotational strategies, optimizing stocking densities, and integrating additional regenerative practices such as adaptive multi-paddock grazing. In Eastern Canada, increasing adoption may require financial incentives, technical training, and infrastructure investment to make rotational grazing a more accessible and attractive option.

The strong 81.0% adoption rate in Western Canada indicates that rotational grazing is already a well-integrated practice in large-scale grazing systems. However, the 46.0% non-adoption rate in Eastern Canada presents an opportunity for further education, funding, and research to support expansion. As climate variability and soil health concerns grow, encouraging broader adoption of rotational grazing will be critical to maintaining sustainable livestock production and resilient pasture systems.



Key Insights:

- High overall adoption with significant regional disparity:
 - Strong national adoption rate (72%)
 - Western Canada leads with exceptional adoption (81%)
 - Eastern Canada lags significantly (54%)
 - Regional gap suggests different operational contexts and challenges
- Regional characteristics shape adoption patterns:
 - Western advantages:
 - Larger land bases support implementation
 - Established industry focus on regenerative practices
 - Greater access to pasture-based systems
 - Eastern challenges:
 - Higher land costs
 - Smaller, fragmented operations
 - More intensive livestock operations (especially dairy)
 - Infrastructure investment barriers
- Multiple core benefits drive adoption:
 - Enhanced grass management through rest-recovery cycles
 - Improved soil health
- Barriers show regional variation:
 - Eastern Canada faces:
 - Higher infrastructure costs due to fragmented operations
 - Limited access to training and peer learning
 - Land suitability challenges
 - Common challenges across regions:
 - Time management demands
 - Labor requirements
 - Planning complexity
- Future opportunities differ by region:
 - Western focus on optimization and advanced techniques
 - Eastern potential for significant adoption growth through targeted support and incentives
 - Climate resilience concerns may drive further adoption

Conservation Practices on Non-Farmed Land

Overall, 49.0% of producers actively practice conservation of wetlands, riparian areas, grasslands, and treed areas, while an additional 9.0% are considering adoption. However, 16.0% do not engage in conservation and are unlikely to do so, while 23.0% report having no opportunity for conservation on their operations. These figures reflect a significant level of engagement with conservation practices, though considerable room for expansion remains.

The overall conservation practice rate is identical in both Western and Eastern Canada at 49.0%, but regional variations appear in other adoption categories. Western Canada has a higher percentage of producers considering conservation (11.0%), compared to 7.0% in Eastern Canada. Eastern producers are slightly more likely (3.0%) to have tried conservation but discontinued it, compared to 2.0% in Western Canada. A larger proportion of Eastern producers (27.0%) report no opportunity to practice conservation, compared to 21.0% in Western Canada. These differences suggest that Western producers may have more favorable conditions for expanding conservation efforts, while Eastern producers face more constraints, possibly due to smaller operation sizes, more intensive cropping systems, or limited access to non-cropped land.

The likelihood of engaging in conservation differs significantly based on operation type. Livestock-focused operations have the highest conservation adoption rate at 58.0%, with only 9.0% stating they are unlikely to adopt conservation. Crop-only operations have a lower adoption rate at 53.0%, with 17.0% not planning to engage in conservation. Mixed operations (crops and livestock) show the lowest adoption rate at 39.0%, with a relatively high 27.0% reporting no opportunity for conservation. This trend suggests that livestock operations naturally integrate conservation into pasture and rangeland management, whereas crop-focused operations may perceive fewer direct benefits or face challenges in implementing conservation practices.

Operation income levels influence conservation participation, with higher adoption rates among lower-income operations. Operations earning under \$100,000 have the highest conservation adoption (68.0%) and the lowest rate of non-participation (3.0%). Operations earning \$100,000 to \$250,000 show a lower conservation rate (46.0%), with 23.0% not planning to adopt conservation. Larger operations (\$2.5M - \$5M) have only a 45.0% adoption rate, with 24.0% not planning to engage. The lowest adoption is in operations over \$5M (38.0%), with 21.0% unlikely to adopt conservation. This suggests that smaller operations may see conservation as a cost-effective way to maintain land health, while larger operations may face operational challenges or competing financial priorities.

Operation size in acreage also plays a role in conservation efforts. Smaller operations (under 500 acres) have a 51.0% conservation rate, but 29.0% report no opportunity for conservation. Mid-sized operations (500-2,499 acres) have the highest adoption rates (51.0%-54.0%) and the lowest non-participation rates (10.0%-17.0%). Large-scale operations (5,000+ acres) show lower conservation adoption (40.0%), with a higher 23.0%-27.0% reporting no opportunity. These findings indicate that mid-sized operations may be best positioned to integrate conservation into their management, while both small and large operations face land-use limitations.

The likelihood of conservation engagement varies by age. More mature producers (45-54 and 65+) have the highest adoption rates (54.0%-59.0%), with relatively low non-participation rates. Younger producers (under 35) have the lowest adoption rate (39.0%), with a higher 22.0% non-participation rate. Producers age 35-44 show higher consideration for conservation (14.0%), indicating potential for future adoption. This suggests that older producers may have established conservation practices over time, while younger producers may be less familiar with conservation programs or lack the resources to implement them.

The findings indicate that while nearly half of producers practice conservation, significant barriers remain, particularly for crop-focused operations, large-scale operations, and younger producers. Regional differences suggest that Western producers may have more infrastructure or land availability for conservation, whereas Eastern producers often cite limited opportunities. Livestock operations and smaller-scale producers are leading conservation efforts, while financial and land-use constraints influence adoption at higher income and acreage levels.

Key Insights:

- Moderate national adoption with regional nuances:
 - Identical base adoption rate (49%) in both Eastern and Western Canada
 - Western Canada shows higher potential growth (11% considering adoption vs 7% in East)
 - Eastern Canada reports more "no opportunity" situations (27% vs 21% West)
 - Suggests different regional constraints and opportunities
- Operation type significantly influences adoption:
 - Livestock operations lead adoption (58%)
 - Crop-only operations show moderate adoption (53%)
 - Mixed operations unexpectedly lag (39%)
 - Higher "no opportunity" reports from mixed operations (27%) suggests potential misalignment of conservation opportunities
- Clear inverse relationship with operation size and income:
 - Small operations (<\$100,000) show highest adoption (68%)
 - Large operations (>\$5M) show lowest adoption (38%)
 - Mid-sized operations (500-2,499 acres) demonstrate moderate adoption rates (51-54%)
 - Suggests different cost-benefit calculations at different operational scales
- Age-related adoption patterns emerge:
 - More mature producers (45-54 and 65+) lead adoption (54-59%)
 - Younger producers (<35) show lowest adoption (39%)
 - Producer age 35-44 show highest consideration rates (14%)
 - Indicates potential knowledge transfer and resource access gaps
- Multiple barrier categories identified:
 - Land availability constraints
 - Financial and operational priorities
 - Infrastructure limitations
 - Knowledge and experience gaps
 - Regional differences in implementation opportunities
- The findings suggest need for targeted support programs considering operation type, size, and operator age to optimize conservation practice adoption

Additional Practices Identified

As part of the survey, respondents were invited to share additional stewardship and management practices they are currently implementing. Through open-ended responses, producers identified several key fertilization and diagnostic methods that contribute to their sustainability and conservation efforts.

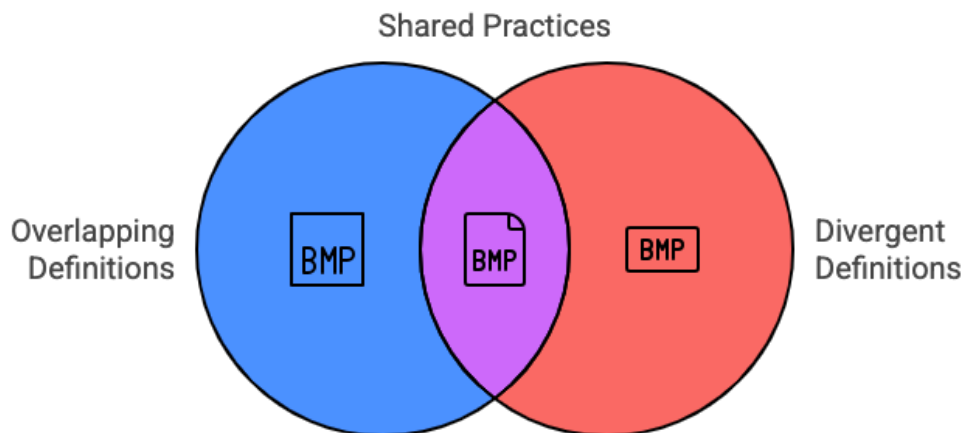
In terms of fertilization practices, producers reported implementing nitrogen fixation crop rotation, incorporating nitrogen-fixing crops into rotations to enhance soil fertility. Grid fertilizer application was also mentioned, with producers applying fertilizers based on grid-mapped soil test results to optimize nutrient distribution. Many respondents indicated using manure application guided by soil tests, determining appropriate application rates through scientific analysis. Staged and multiple fertilizer applications were reported as common practice, with producers splitting fertilizer applications throughout the growing season to improve nutrient availability and uptake. The use of nitrogen stabilizers was also noted, with producers employing additives to slow nitrogen loss and improve efficiency.

Diagnostic practices emerged as another significant area of innovation. Grid soil testing was frequently mentioned, with producers conducting detailed soil assessments across field grids to tailor fertilization strategies. Fertilizer application by zone showed strong adoption, as producers apply fertilizers based on specific soil and crop needs within field management zones. Similarly, manure application by zone was reported, with producers targeting manure applications to areas most in need of organic amendments. Tissue testing during the growing season was also cited as an important practice, allowing producers to adjust fertilization in real time based on plant needs.

A key challenge highlighted in both this study and the *Producer Perspectives on Barriers to the Adoption of Regenerative Agriculture on the Canadian Prairies* (2024) is the lack of universal definitions for regenerative agriculture and best management practices (BMPs) in Canada. Some of the fertilization methods reported, such as fertilization by soil test or zone, are often categorized under variable rate fertilization or 4R, demonstrating how terminology varies between producers and agronomists. This inconsistency in classification extends beyond fertilization. For example, cover cropping encompasses a diverse range of approaches, yet the term is often used broadly without distinguishing between different applications. This inconsistency creates a two-fold problem: instances where people use a single term (like "cover cropping") to describe a diverse suite of distinct practices, and conversely, cases where different stakeholders use various terms to describe essentially the same agricultural practice. This terminological confusion complicates not only research efforts but also the development and communication of effective policy incentives, educational resources, and practical implementation strategies across the agricultural sector.

These findings suggest that climate mitigation efforts focused on increasing adoption of individual BMPs must account for both overlapping and divergent definitions in practice. Without clear standardization, relying on individual BMP adoption to drive climate outcomes may be as unstable as building a foundation on shifting ground.

Navigating BMP Adoption for Climate Stability



Key Insights:

- Producers are implementing a diverse range of advanced fertilization and diagnostic practices beyond standard BMPs, including:
 - Sophisticated nutrient management through nitrogen fixation rotation, grid-based applications, and staged fertilizer timing
 - Data-driven diagnostic approaches like grid soil testing, zone-based applications, and in-season tissue testing
- Terminology and classification inconsistency emerges as a critical industry challenge:
 - Lack of standardized definitions for BMPs and regenerative agriculture practices creates confusion
 - Overlap between practice categories (e.g., VRF vs. zone-based fertilization) complicates measurement and assessment of adoption rates
 - This definitional ambiguity potentially undermines efforts to effectively promote and track climate mitigation practices

Attitudinal Analysis

Producers were asked to indicate their level of agreement or disagreement with key statements related to land stewardship, conservation, and government support for sustainable agricultural practices, using a 5-point scale (5 = Completely agree, 4 = Somewhat agree, 3 = May or may not agree, 2 = Somewhat disagree, 1 = Completely disagree). The findings reveal strong commitment to stewardship, concern about long-term sustainability, and a mixed perception of the effectiveness of government programs.

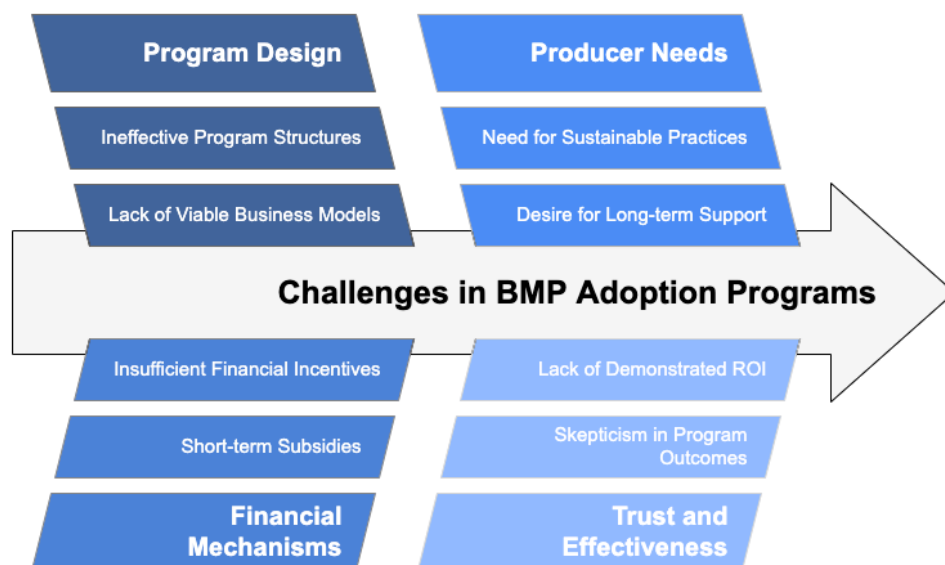
Across all operations, producers overwhelmingly prioritize land stewardship and soil health, with 71.0% completely agreeing and average score of 4.62 out of 5. Additionally, 59.0% completely agree that they are concerned about the long-term sustainability of their operation, resulting in a mean score of 4.27. While many producers engage in conservation, only 25.0% see themselves as early adopters of new stewardship practices, reflected in a mean score of 3.65. This suggests that while stewardship is a priority, many prefer proven methods over early-stage adoption.

The perceived difficulty of overcoming barriers to conservation had a moderate mean score of 3.39, with 42.0% somewhat agreeing that these challenges are significant. A strong 42.0% somewhat agree and 24.0% completely agree that they could be doing more on their operation in terms of conservation efforts, resulting in a mean score of 3.75. This suggests that while many are engaged in stewardship, they recognize opportunities for further action.

Government program effectiveness receives mixed reviews, with only 6.0% completely agreeing that these programs drive lasting change, while 22.0% completely disagree, resulting in a mean score of 2.70. This indicates significant skepticism regarding the effectiveness of policy-driven incentives. However, financial support remains influential, with 32.0% completely agreeing and 30.0% somewhat agreeing that they are more likely to participate in BMPs and conservation if financial support is available, leading to a mean score of 3.66. A moderate mean score of 3.43 reflects that producers feel there is not enough assistance available to help them identify and adopt conservation practices.

This data reveals a telling paradox: while producers strongly value financial support for BMP adoption (62% agreeing it would increase their participation), they simultaneously doubt government programs' ability to drive meaningful change (only 6% believing these programs are truly effective). This disconnect suggests a fundamental misalignment between producer needs and program design. The issue isn't simply a lack of funding, but rather that government initiatives often fail to demonstrate how BMPs integrate into viable business models.

Bridging the Gap in BMP Adoption



Producers seek financial mechanisms that enhance their operational sustainability, not merely short-term subsidies disconnected from economic realities. For programs to gain producer trust and drive lasting adoption, they must directly address the business case for implementation, demonstrating tangible ROI beyond the subsidy period itself.

Regional differences emerge between Western and Eastern Canada. Western producers are slightly less concerned about long-term sustainability (4.22 vs. 4.35 in the East), but both regions prioritize land stewardship at similar levels. Eastern producers are more likely to see a lack of support for conservation efforts (3.58) and have a stronger preference for financial incentives (3.89) compared to Western producers (3.52). Western producers are more inclined to be early adopters of stewardship practices (3.71) than Eastern producers (3.54).

Operation type influences attitudes significantly. Livestock-focused operations show the highest concern for operation sustainability (4.47), suggesting they see stewardship as vital to long-term viability. Crop-focused operations report the least concern (4.24) and the lowest belief that government programs create lasting change (2.58). Mixed crop-livestock operations have the highest belief that more can be done in conservation (3.84), indicating strong engagement but recognition of further opportunities.

Operation income and size also play important roles in shaping attitudes. Smaller operations (under \$100,000 income) express the highest concern for sustainability (4.56) and feel the strongest about increasing conservation efforts (3.91). Larger operations (over \$5M) are the least concerned about sustainability (4.04) and show the lowest agreement that government programs create lasting change (2.29). Smaller operations (under 500 acres) perceive greater difficulty in adopting conservation practices (3.55), while larger operations (over 10,000 acres) report lower levels of support and incentives for conservation (2.96 and 3.32 respectively).

Age differences reveal varying perspectives on conservation. Younger producers (under 35) most strongly felt that they could be doing more for conservation on their farm (3.89) and are more open to incentives (3.86). Producers age 55-64 are the group that most agreed that land stewardship and soil health are a commitment (4.72). Mid-career producers (35-44) report the highest levels of innovation in stewardship adoption (3.77).

Key Insights

- Stewardship Priority
 - Strong industry-wide commitment to land stewardship (71% completely agree)
 - Most producers recognize they could be doing more for conservation
- Government Program Skepticism
 - Low confidence in government programs' effectiveness to drive lasting change (only 6% completely agree)
 - Financial incentives still motivate participation (62% somewhat/completely agree)
- Size & Type Differences
 - Smaller operations show higher sustainability concern
 - Livestock operations most concerned about sustainability
 - Larger operations most skeptical of government programs
- Generational Patterns
 - Younger producers most open to new conservation efforts
 - Older producers show strongest stewardship commitment
 - Mid-career farmers lead in innovation adoption
- Regional Variations
 - Eastern producers prefer financial incentives
 - Western producers more likely to adopt new practices early
 - Both regions similarly prioritize land stewardship

Barrier Analysis

This survey focused on a smaller set of BMPs compared to *Producer Perspectives on Barriers to the Adoption of Regenerative Agriculture on the Canadian Prairies* (2024). The survey's goal was to identify the most significant barriers preventing BMP adoption across multiple practices, whereas the previous report aimed to capture all potential barriers. **Notably, the survey results largely align with the findings of the earlier report.**

Based on the analysis of the data, the most common barriers to adoption that run through multiple BMPs are economic concerns and knowledge gaps. Economic concerns, particularly lack of return on investment, appears in six of the nine practices, manifesting as direct "lack of ROI" concerns in variable rate fertilization, foliar fertilization, soil amendments, and intercropping, as well as economic barriers in 4Rs and cover cropping. Cost-related concerns consistently emerge across multiple practices, indicating a fundamental challenge in demonstrating and achieving financial viability for BMPs.

Knowledge and support gaps also appear in six of the nine practices, emerging as lack of information or support, awareness barriers, knowledge gaps, and limited understanding of implementation methods. These two barriers consistently emerge as the most significant challenges across different BMPs and conservation practices, with economic concerns and knowledge gaps often interacting with each other - producers may struggle to see the ROI partly because they lack sufficient information about proper implementation and potential benefits.

Analysis of the explicitly stated top barriers for each BMP reveals compelling patterns. For the 4Rs, the survey indicated the biggest barrier is the economic challenge of high upfront costs. Similarly, the primary barrier to Variable Rate Fertilizer Application (VRFA) adoption across all groups is upfront costs, cited by 37.0% of current users. For foliar fertilization, lack of return on investment (ROI) is the most significant concern for those who stopped using it (61.0%).

Manure and compost usage faces different primary challenges, with product availability being the biggest challenge, cited by 49.0% of respondents. For soil amendments, the most significant challenge is lack of information or support, cited by 35.0% of respondents. Cover cropping faces economic barriers, with the survey indicating the biggest barrier is the high cost of seeds. Intercropping shows similar economic concerns, with the perceived lack of financial incentives emerging as the biggest barrier.

Cropland grazing presents unique challenges, with availability of water (33.0%) being the primary barrier. Rotational pasture grazing lists infrastructure costs as the primary barrier, again highlighting the economic theme running through most practices. When consolidating these top barriers, we can see that economic/cost-related barriers are the most frequently cited as the primary barrier across BMPs, being explicitly identified as the primary barrier in five out of the nine practices.

The economic/cost barriers specifically affect the 4Rs (high upfront costs), VRF (upfront costs), cover cropping (high seed costs), intercropping (lack of financial incentives), and rotational pasture grazing (infrastructure costs). The remaining top barriers were ROI concerns (foliar fertilization), product availability (manure and compost), lack of information/support (soil amendments), and water availability (cropland grazing).

Other notable recurring barriers include time and labor requirements, appearing as significant challenges in three practices, equipment capabilities, also cited in three practices, and product availability, emerging as a concern in three practices. This analysis suggests that addressing economic viability and knowledge gaps would be the most effective way to increase adoption across multiple conservation practices, as these barriers consistently appear regardless of the specific practice being considered.

The complexity of these barriers is further illustrated by their interconnected nature. For example, the economic barriers often relate to both initial implementation costs and ongoing operational expenses, while knowledge gaps can affect both the understanding of potential benefits and the ability to implement practices effectively. This suggests that successful interventions to increase BMP adoption may need to address multiple barrier categories simultaneously, providing both financial support and educational resources while considering regional and operation-specific contexts.

Top barrier for each BMP indicated by the survey:

1. Variable Rate Fertilization (VRF): upfront costs.
2. Foliar Fertilization: lack of return on investment (ROI).
3. Manure and Compost - product availability.
4. Soil Amendments: lack of information or support.
5. Cover Cropping: lack of return on investment (ROI).
6. Intercropping: time and complexity.
7. Cropland Grazing: availability of water.
8. Rotational Pasture Grazing: labour/time.

Barriers Across BMPs

Based on this analysis, economic and cost-related barriers emerge as the most consistently cited top barrier across the BMPs, being explicitly identified as the primary barrier in 5 out of the 9 practices.

Based on the analysis of the data, the most common barriers to adoption that run through multiple BMPs are:

1. Economic Concerns (ROI): Lack of return on investment appears in 6 of the 9 practices, manifesting as:
 - Direct "lack of ROI" concerns in VRF, foliar fertilization, soil amendments, and intercropping and cover cropping.
 - Cost-related concerns in multiple practices
2. Knowledge and Support Gaps: Also appearing in 6 of the 9 practices as:
 - Lack of information or support
 - Awareness barriers
 - Knowledge gaps
 - Limited understanding of implementation methods

These two barriers consistently emerge as the most significant challenges across different BMPs and conservation practices, with economic concerns and knowledge gaps often interacting with each other - farmers may struggle to see the ROI partly because they lack sufficient information about proper implementation and potential benefits.

Consistent with the Producer Perspectives on Barriers to the Adoption of Regenerative Agriculture on the Canadian Prairies (2024), these two barriers consistently emerge as the most significant challenges across different BMPs and conservation practices, with economic concerns and knowledge gaps often interacting with each other - farmers may struggle to see the ROI partly because they lack sufficient information about proper implementation and potential benefits.

The survey also echoed the report's findings on recurring socio-cultural barriers, such as:

- Time and labor requirements (3 practices)
- Equipment capabilities (3 practices)
- Product availability (3 practices)

This analysis suggests that addressing economic viability and knowledge gaps would be the most effective way to increase adoption across multiple BMPs and conservation practices, as these barriers consistently appear regardless of the specific practice being considered.

Conclusions

This survey of 509 Canadian agricultural producers builds upon and validates the findings of *Producer Perspectives on Barriers to the Adoption of Regenerative Agriculture on the Canadian Prairies (2024)*, a 10-year retrospective report on producer experiences in the Prairies. Both studies highlight complex adoption patterns of Best Management Practices (BMPs), demonstrating strong interest in sustainable practices while revealing persistent, interconnected barriers that hinder implementation and long-term success.

The strong alignment between the findings of the report and the survey underscores a key issue: ***barriers to BMP adoption have persisted over the past decade, despite increasing awareness and interest.***

Economic concerns remain the most significant barrier in both the report and the survey, with the report emphasizing overall profitability challenges and the survey specifically quantifying concerns about ROI. Economic barriers consistently emerge as the primary challenge across multiple practices. The lack of demonstrated ROI and high upfront costs are particularly significant for practices requiring substantial infrastructure or equipment investments, such as variable rate fertilization and rotational grazing. These economic concerns are often compounded by knowledge gaps and implementation challenges, creating a complex barrier to adoption.

Knowledge gaps are the second most significant barrier, with the report highlighting the role of peer-to-peer learning and local demonstration sites, and the survey providing additional insights into regional variations and operation types. The research reveals that producers often lack access to reliable information, technical support, and practical guidance for implementing new practices. These socio-cultural barriers outstrip awareness barriers related to the BMPs in this study. Lack of access to information or support is particularly evident in the adoption of soil amendments, where 35.0% of producers cite lack of information or support as their primary barrier.

Regional variations emerge as a crucial factor in adoption patterns. Western Canada generally shows higher adoption rates for practices such as rotational grazing (81.0% compared to 54.0% in Eastern Canada) and cropland grazing (64.0% compared to 28.0% in Eastern Canada). However, Eastern Canada leads in other areas, such as manure and compost usage (67.0% compared to 46.0% in Western Canada). These regional differences reflect varying operational contexts, including land base size, climate conditions, and traditional farming practices specific to each region.

Operation type significantly influences BMP adoption. Livestock-focused operations demonstrate higher adoption rates for several practices, particularly those related to grazing and soil health management. These operations show the highest adoption rate (58.0%) on non-farmed land, compared to crop-only operations (53.0%) and mixed operations (39.0%). This suggests that livestock integration may provide natural pathways to BMP adoption.

Operation size and income levels reveal interesting adoption patterns, often counter to initial expectations. Smaller operations (under 500 acres) and those with lower income levels frequently show higher adoption rates for certain practices, such as cover cropping, where operations under \$100,000 in annual revenue show 57.0% adoption compared to 44.0% for operations over \$5 million. This pattern suggests that larger operations may face unique challenges in implementing BMPs.

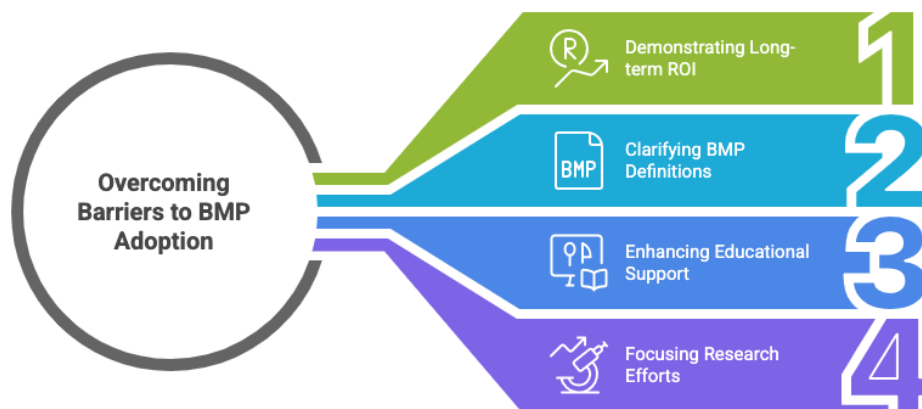
Age demographics play a notable role in adoption patterns. Younger producers (under 35) show higher adoption rates for some innovative practices but face greater challenges in implementing others, particularly those requiring significant capital investment. Meanwhile, older producers (55-64) demonstrate the strongest commitment to land stewardship (4.72 out of 5 mean score) but may be more hesitant to adopt new technologies or practices.

Government programs and support mechanisms receive mixed reviews from producers. Only 6.0% completely agree that government programs drive lasting change, while 22.0% completely disagree. However, financial support remains influential, with 62.0% of producers indicating they are more likely to implement BMPs and conservation efforts when financial support is available. This suggests a need for more effective and producer-focused program design.

Looking forward, several key recommendations emerge from this analysis, which notably reinforce and expand upon the findings from the Prairie-focused research:

1. Demonstration of long-term ROI must be addressed to enable the adoption of these practices. Economic support mechanisms need to be redesigned to address both upfront costs and long-term ROI concerns, particularly for practices requiring significant initial investment.
2. BMP definitions need to be clarified at all stages of research and extension, addressing a definitional challenge identified in both studies.
3. Educational and technical support systems should be enhanced, with particular focus on providing region-specific, practical implementation guidance with a view to communicating long-term ROI of adoption.
4. Research efforts should focus on documenting and communicating the long-term benefits of BMPs and conservation practices, particularly in terms of soil health and operation sustainability.

Breaking Barriers to Regenerative Agriculture



Economic concerns, agronomic challenges, and knowledge gaps remain the most significant hurdles. Until ROI is effectively demonstrated and support systems are strengthened, these barriers will likely continue to impede progress in regenerative agriculture across Canada. However, producers' strong commitment to land stewardship (71% completely agree on its importance) indicates a clear willingness to adopt BMPs if the right support structures are in place. Future efforts should focus on breaking down these long-standing barriers while leveraging producers' dedication to sustainable agriculture.