2018 Environmentally Sustainable Agriculture Tracking Survey

FINAL Report

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SUMMARY OF KEY FINDINGS

As consumer expectations around the environment have evolved, Alberta Agriculture and Forestry (AF) has recognized the role that is can play by assisting the industry to manage risks and improve efficiencies through environmental beneficial management practices.

AF provides technical expertise and targeted programs to assist Alberta's producers in addressing a broad range of environmental issues relating to their own operations; including in the areas of soil conservation, water quality, wildlife habitat conservation, grazing management, manure management, agricultural waste management, energy and climate change, and planning approaches regarding sustainable agriculture.

The Environmentally Sustainable Agriculture Tracking Survey (ESATS) has been undertaken almost biannually since 1997. ESATS measures Alberta producers' awareness of, and adoption of environmentally sustainable agriculture (ESA) practices within eight agri-environmental risk areas.

The agri-environmental risk areas covered in the 2018 ESATS survey included:

- Water Quality and Quantity
- Wildlife Habitat Conservation
- Grazing Management
- Manure Management
- Agricultural Waste Management
- General Practices
- Soil Conservation
- Energy and Climate Change

In 2018, AF also wanted to measure awareness and readiness of Alberta producers to meet current and emerging sustainability initiatives which have expectations on agricultural production systems. Kynetec, along with AF reviewed and updated the 2018 ESATS questionnaire to ensure it is reflective of currently environmental conditions and includes the required performance measures, while at the same time shortening the previous questionnaire to include the new section. At the same time, wording changes and question changes were made to better gather the information AF requires – please see Appendix B where all changes from 2016 are noted in the questionnaire.

What follows is a summary of key research findings.

ESA Adoption Score (AF Performance Measure 3a)

AF Performance Measure 3a – which is used as a Ministry Performance Measure – is defined as *'the average percentage of improved environmentally sustainable agriculture practices adopted by producers'*. A total of 40 ESA practices are used to derive the result for this measure. **The 2018 adoption score is 53%**, though there is variation in the level of adoption of environmental practices both across and within the eight agri-environmental risks areas. Higher levels of adoption (80% or higher) of environmentally sustainable agriculture practices were seen for 11 specific practices. In contrast, adoption levels of less than 50% were seen for 13 specific practices. When averaging adoption levels of all 40 practices, these lower results tend to bring the overall result down.

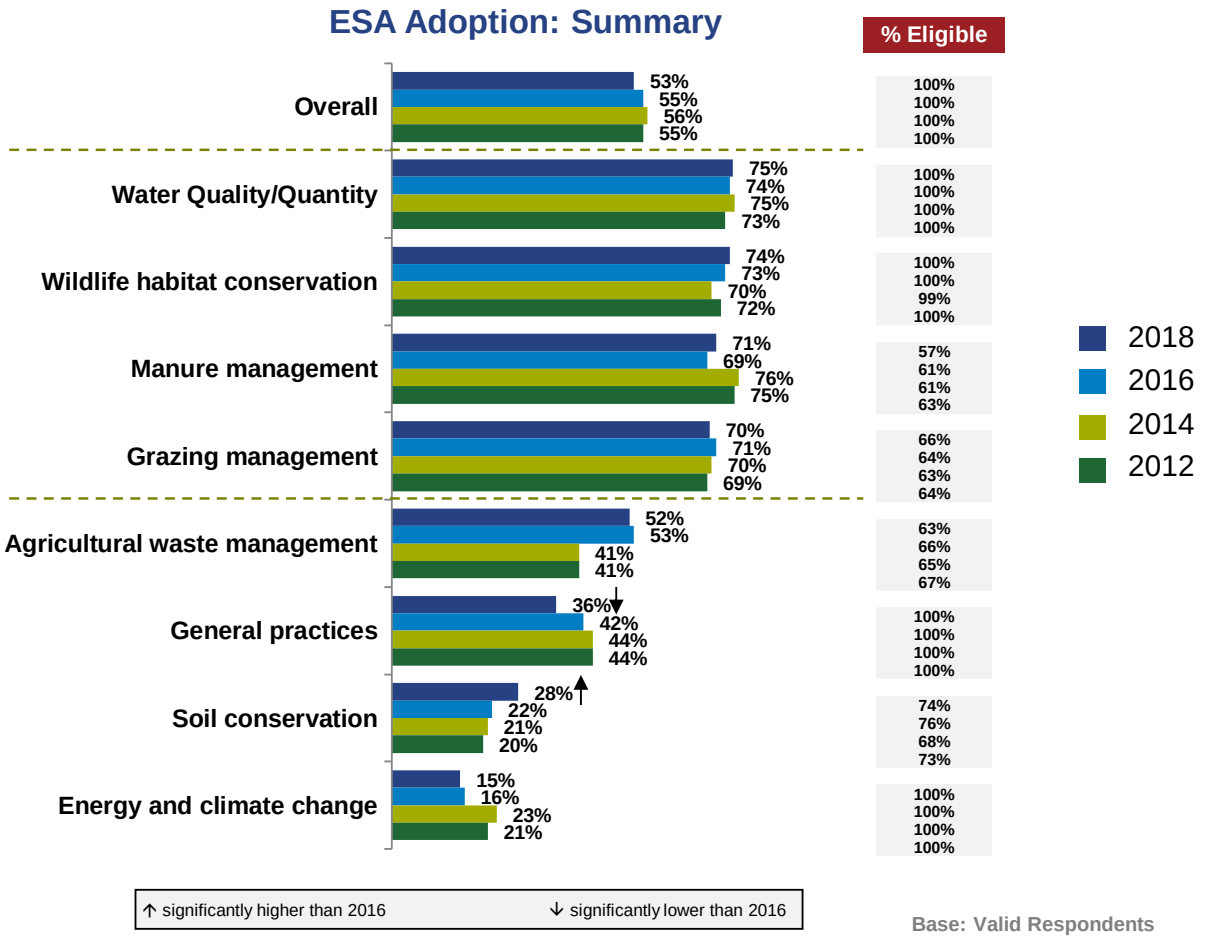
ESA Adoption Score by Agri-Environmental Risks Areas

The 2018 results show that there are two tiers of adoption rates of the agri-environmental risk areas.

The average ESA adoption scores are highest for Water Quality and Quantity (75%), Wildlife Habitat Conservation (74%) Manure Management (71%) and Grazing Management (70%).

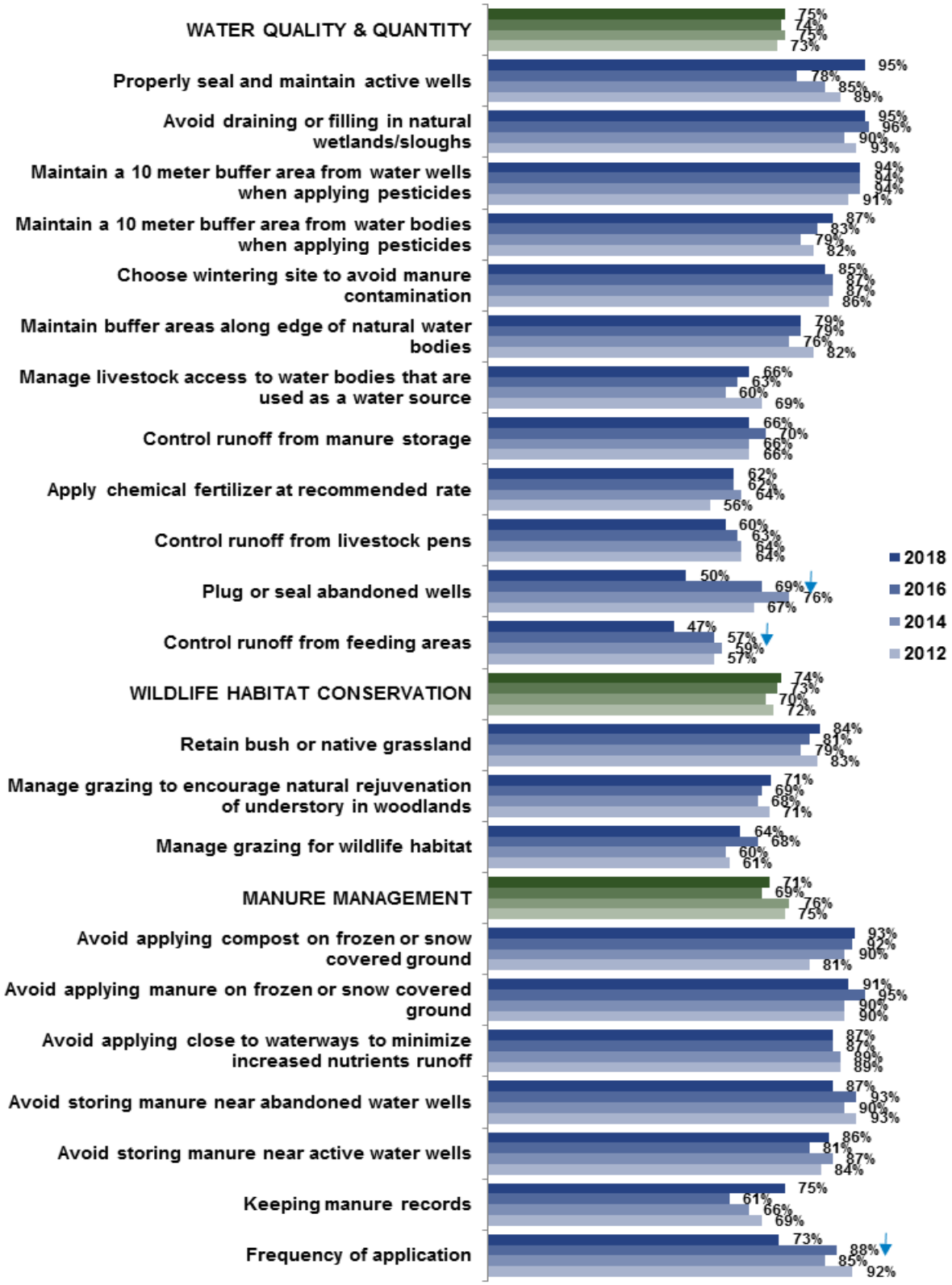
Notably lower are the average adoption scores for Agricultural Waste Management (52%) and General Practices (36%) – down 6 percentage points from 2016, however this is likely due to the fact that we asked specifically if trees were planted for agricultural purposes in 2018; rather than if trees were simply planted. The lowest average adoption scores are seen in the areas of and Soil Conservation (28% - which is significantly higher than in 2016) and Energy and Climate Change (15%, down from 2016, which had significantly declined from 2012 and 2014).

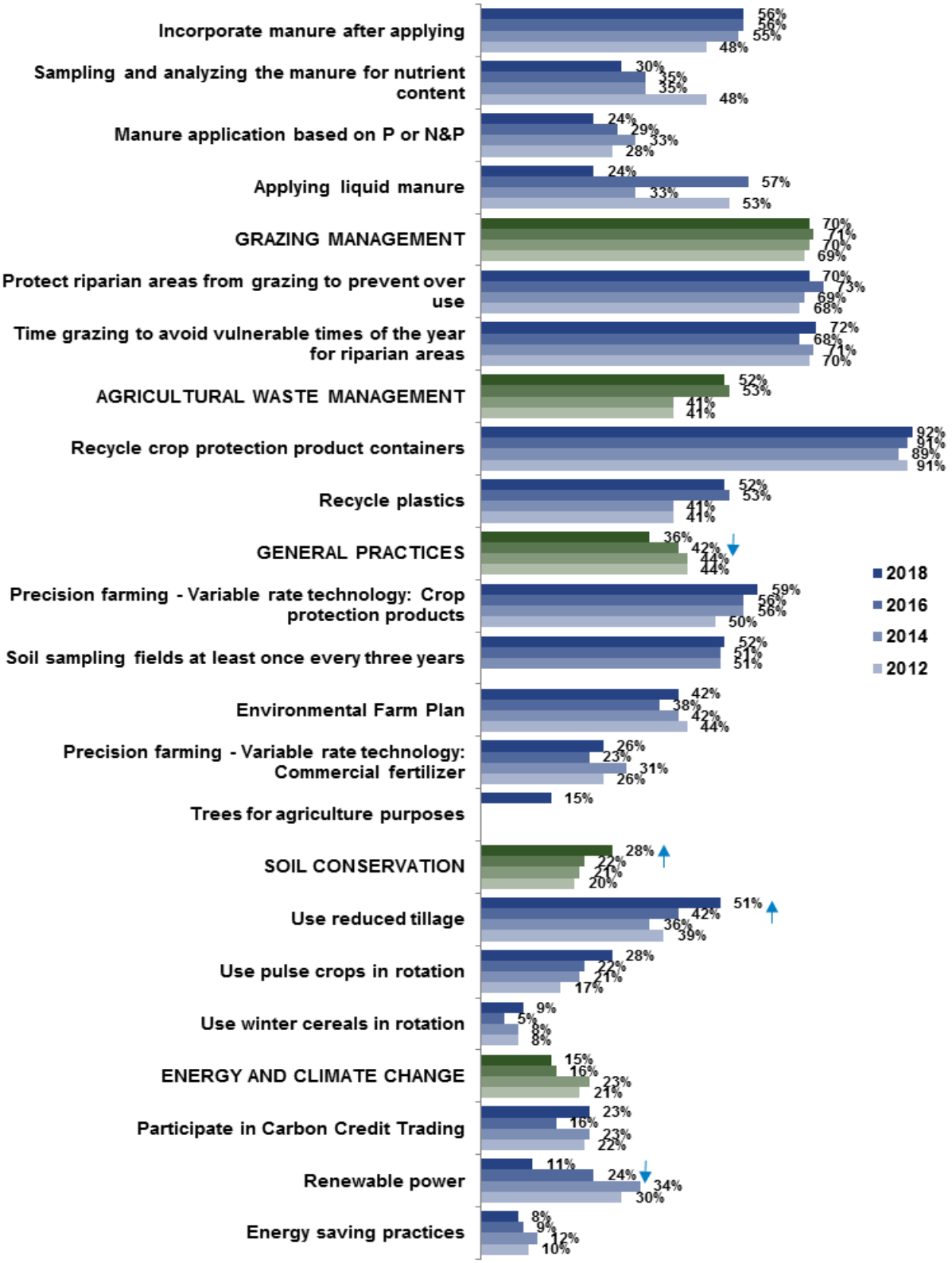
A detailed breakdown of adoption by specific practice within each agri-environmental risk area is provided in the next section.



ESA Adoption by Practice

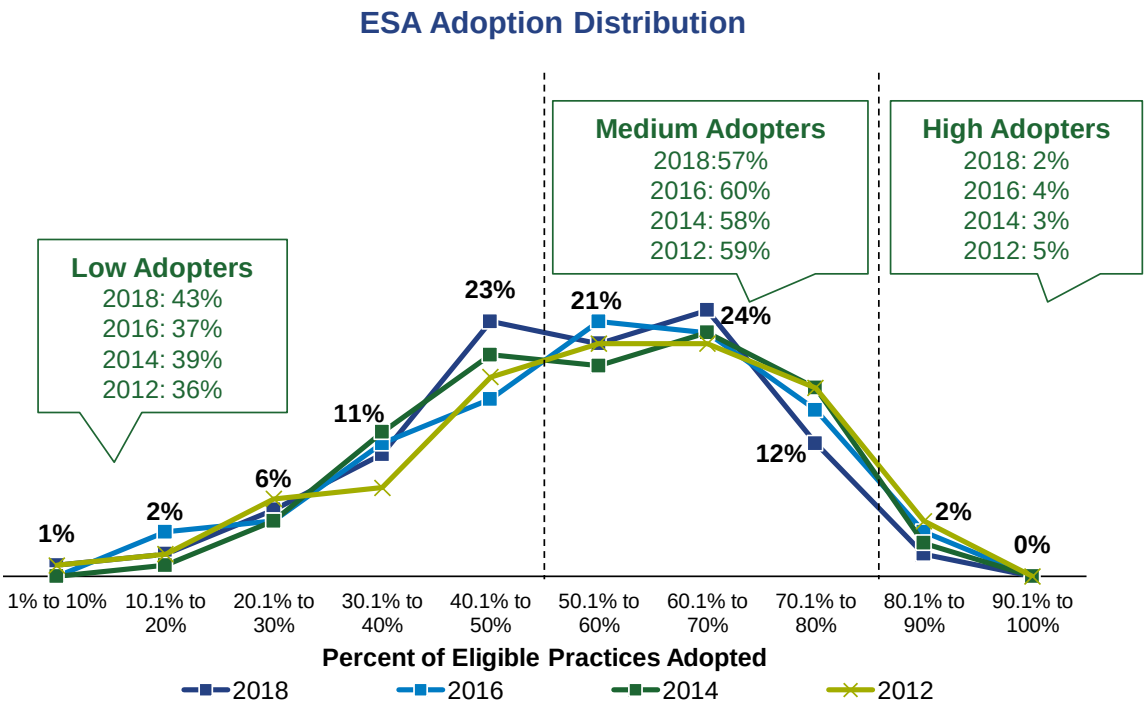
There are a number of significant changes in adoption from 2016: ‘plug and seal abandoned wells’ (water), controlling run-off from feeding areas (water), frequency of application (manure management), use of renewable power (energy and climate change) and overall adoption of general practices have all decreased, while overall adoption of soil conservation practices, including utilization of reduced tillage, have increased.


WATER QUALITY & QUANTITY
75%
74%
75%
73%
Properly seal and maintain active wells
95%
78%
85%
89%
Avoid draining or filling in natural wetlands/sloughs
95%
96%
90%
93%
Maintain a 10 meter buffer area from water wells when applying pesticides
94%
94%
94%
91%
Maintain a 10 meter buffer area from water bodies when applying pesticides
87%
83%
79%
82%
Choose wintering site to avoid manure contamination
85%
87%
87%
86%
Maintain buffer areas along edge of natural water bodies
79%
79%
76%
82%
Manage livestock access to water bodies that are used as a water source
66%
63%
60%
69%
Control runoff from manure storage
66%
70%
66%
66%
Apply chemical fertilizer at recommended rate
62%
62%
64%
56%
Control runoff from livestock pens
60%
63%
64%
64%
Plug or seal abandoned wells
50%
69%
76%
67%
Control runoff from feeding areas
47%
57%
59%
57%
WILDLIFE HABITAT CONSERVATION
74%
73%
70%
72%
Retain bush or native grassland
84%
81%
79%
83%
Manage grazing to encourage natural rejuvenation of understory in woodlands
71%
69%
68%
71%
Manage grazing for wildlife habitat
64%
68%
60%
61%
MANURE MANAGEMENT
71%
69%
76%
75%
Avoid applying compost on frozen or snow covered ground
93%
92%
90%
81%
Avoid applying manure on frozen or snow covered ground
91%
95%
90%
90%
Avoid applying close to waterways to minimize increased nutrients runoff
87%
87%
89%
89%
Avoid storing manure near abandoned water wells
87%
93%
90%
93%
Avoid storing manure near active water wells
86%
81%
87%
84%
Keeping manure records
75%
61%
66%
69%
Frequency of application
73%
88%
85%
92%
2018
2016
2014
2012


Incorporate manure after applying
56%
58%
56%
55%
48%
Sampling and analyzing the manure for nutrient content
30%
35%
35%
48%
Manure application based on P or N&P
24%
29%
33%
28%
Applying liquid manure
24%
57%
33%
53%
GRAZING MANAGEMENT
70%
71%
70%
69%
Protect riparian areas from grazing to prevent over use
70%
73%
69%
68%
Time grazing to avoid vulnerable times of the year for riparian areas
72%
68%
71%
70%
AGRICULTURAL WASTE MANAGEMENT
52%
53%
41%
41%
Recycle crop protection product containers
92%
91%
89%
91%
Recycle plastics
52%
53%
41%
41%
GENERAL PRACTICES
36%
42%
44%
44%
Precision farming - Variable rate technology: Crop protection products
59%
56%
56%
50%
Soil sampling fields at least once every three years
52%
51%
51%
Environmental Farm Plan
42%
38%
42%
44%
Precision farming - Variable rate technology: Commercial fertilizer
26%
23%
31%
26%
Trees for agriculture purposes
15%
SOIL CONSERVATION
28%
22%
21%
20%
Use reduced tillage
51%
42%
36%
39%
Use pulse crops in rotation
28%
22%
21%
17%
Use winter cereals in rotation
9%
5%
8%
8%
ENERGY AND CLIMATE CHANGE
15%
16%
23%
21%
Participate in Carbon Credit Trading
23%
16%
23%
22%
Renewable power
11%
24%
34%
30%
Energy saving practices
8%
9%
12%
10%
2018
2016
2014
2012

ESA Adoption: Distribution

Based on the 40 ESA practices used to calculate the adoption score, the majority (57%) of operations are classified as *medium* adopters – that is, they have adopted 50.1% to 80% of the practices for which they are eligible. Over four-in-ten (43%) *are low* adopters (have adopted 50% or less eligible practices), while only 2% are *high* adopters (have adopted more than 80% of eligible practices). The graph below illustrates the distribution of adoption which is consistent with the previous three years of tracking.



*Showing 2018 data labels.

ESA Adoption by Region, Gross Farm Sales, Farm Operations Characteristics and Farm Operator Characteristics

In general, one can see that adoption tends to be *higher* on larger operations (i.e. with gross farms sales of $250K or more). It is worth noting that while operations in the **$250K+ gross farm sales category** account for only 20% of total farms in Alberta, they likely manage some of the larger operations in the province.

ESA Adoption by Region and Gross Farm Sales

	Total	Region					Gross Farm Sales		
		South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	$250K+
2018 ESA Adoption	53%	**50%↓**	**55%↑**	54%	54%	50%	**47%↓**	**53%↑↓**	**59%↑↑**
Water Quality and Quantity	75%	**69%↓**	**78%↑**	75%	**77%↑**	**69%↓**	**68%↓**	**76%↑**	**80%↑**
Wildlife Habitat Conservation	74%	**56%↓**	**75%↑**	**80%↑**	**79%↑**	**74%↑**	71%	78%	72%
Manure Management	71%	73%	70%	71%	75%	64%	**65%↓**	**73%↑**	**75%↑**
Grazing Management	70%	63%	71%	69%	74%	68%	**61%↓**	73%	**75%↑**
Agricultural Waste Management	52%	44%	55%	47%	49%	67%	51%	53%	51%
General Practices	36%	**40%↑**	37%	**32%↓**	36%	34%	**24%↓**	**37%↑↓**	**48%↑↑**
Soil Conservation	28%	**31%↑**	27%	**30%↑**	**19%↓**	**36%↑**	**15%↓**	**20%↓**	**42%↑**
Energy and Climate Change	15%	**12%↓**	16%	16%	**11%↓**	**20%↑**	**13%↓**	**11%↓**	**22%↑**

**Within region and gross farm sales categories, ↑ indicates a number is significantly higher and ↓indicates the number that is significantly lower. For example, 2018 ESA Adoption is significantly higher on operations in Central Alberta (55%) compared to those in the South (50%), as well as those with gross farm sakes of $250K or more (59%) compared to smaller operations with gross farm sales of $50K to just under $250K (53%) and less than $50K (47%). ↑ Red arrows are included to distinguish an additional statistical difference in the same category. For example, 2018 ESA Adoption is significantly lower on farms with gross farm sales of $50K compared to the two larger categories (as indicated by the black arrows). It is also significantly higher on farms of $250K or more (59%) compared to operations with gross farm sales of $50K to just under $250K (53%).*

Adoption also tends to be *higher* on operations which are expanding.

ESA Adoption by Farm Operations Characteristics

	Total	Operation Type (main source of revenue)			Stage of Operation		
		Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
2018 ESA Adoption	53%	54%	55%	56%	**53%↓**	**59%↑**	**51%↓**
Water Quality and Quantity	75%	72%	71%	72%	74%	77%	75%
Wildlife Habitat Conservation	74%	67%	75%	75%	72%	71%	77%
Manure Management	71%	72%	70%	69%	72%	73%	68%
Grazing Management	70%	64%	72%	72%	68%	74%	69%
Agricultural Waste Management	52%	55%	46%	63%	**46%↓**	47%	**62%↑**
General Practices	36%	**45%↑**	**30%↓**	**41%↑**	**38%↑**	**45%↑**	**30%↓**
Soil Conservation	28%	**34%↑**	**18%↓**	24%	**27%↓**	**40%↑**	**21%↓**
Energy and Climate Change	15%	**19%↑**	**11%↓**	12%	**14%↓**	**22%↑**	**14%↓**

**Within operation type and stage of operation, ↑ indicates a number is significantly higher and ↓indicates a number is significantly lower. For example, 2018 ESA Adoption does not differ significantly by operation type but is significantly higher on expanding operations (59%) compared to those in the beginning or maintaining (53%) and reducing (51%) stages of operation.*

Overall ESA adoption is *higher* on operations where the producer has attended a degree or diploma program in an agriculturally related area, has attended an environmental agriculture training program, workshop or seminar in the past two years, or has accessed one or more of the AF programs. This also holds true for the Environmental Farm Plan (EFP) and Working Well program, as well as working directly with AF or Municipal staff.

ESA Adoption by Farm Operators Characteristics

	Total	Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
		Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
2018 ESA Adoption	53%	**59%↑**	**51%**	**61%↑**	**51%**	**58%↑**	**45%**	**60%↑**	**48%**	**61%↑**	**50%**	**62%↑**	**50%**
Water Quality and Quantity	75%	**81%↑**	**73%**	**82%↑**	**73%**	**79%↑**	**67%**	**80%↑**	**71%**	**83%↑**	**72%**	**83%↑**	**72%**
Wildlife Habitat Conservation	74%	73%	74%	80%	73%	76%	70%	75%	73%	**84%↑**	**71%**	79%	72%
Manure Management	71%	73%	71%	76%	70%	73%	68%	74%	69%	71%	71%	**76%↑**	**69%**
Grazing Management	70%	76%	68%	**81%↑**	**67%**	**78%↑**	**58%**	**78%↑**	**65%**	**82%↑**	**66%**	**87%↑**	**64%**
Agricultural Waste Management	52%	50%	52%	58%	50%	55%	46%	54%	50%	58%	49%	54%	51%
General Practices	36%	**46%↑**	**33%**	**50%↑**	**33%**	**44%↑**	**23%**	**54%↑**	**23%**	**44%↑**	**33%**	**46%↑**	**32%**
Soil Conservation	28%	33%	26%	**36%↑**	**26%**	**33%↑**	**17%**	**35%↑**	**21%**	33%	26%	33%	26%
Energy and Climate Change	15%	18%	14%	**20%↑**	**14%**	**18%↑**	**10%**	**19%↑**	**13%**	**19%↑**	**14%**	**20%↑**	**13%**

**Within all categories of training and program access, ↑ indicates a number is significantly higher. For example, adoption of water quality and quantity practices is significantly higher for those farmers who have attended a degree or diploma program related to agriculture, compared to those who have not.*

ESA Practice Areas

The graphs in each of the following sections summarize the adoption of each environmentally sustainable agriculture practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact.

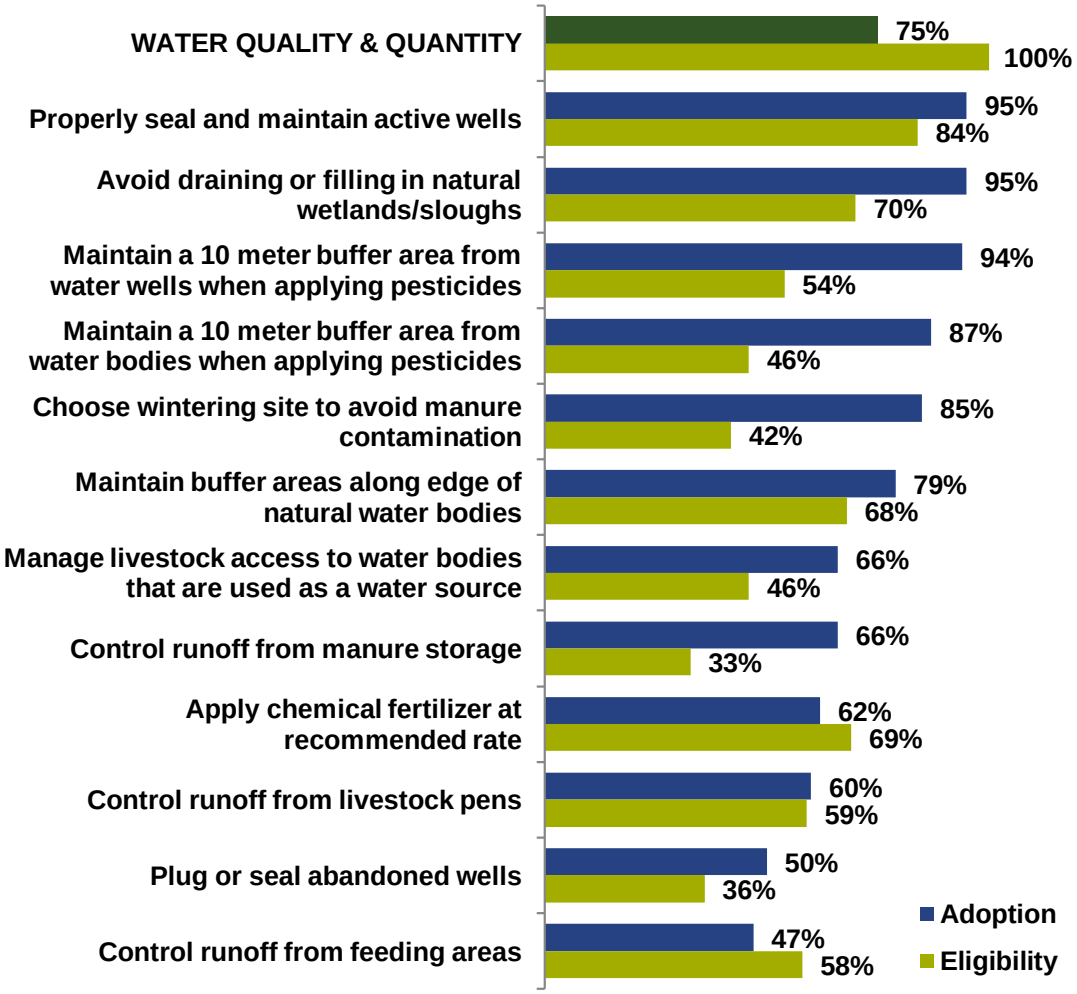
Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of AF on practice adoption, should also be considered in prioritizing areas for focus.

Practices that Impact Water Quality and/or Quantity

The ESA adoption score for water quality and quantity practices is very strong at 75% – the highest score among the eight practice areas assessed and essentially unchanged from previous years.

Adoption Rate			
2018	2016	2014	2012
75%	74%	75%	73%

Of the 12 specific practices, six have adoption levels higher than 75%, while adoption of the other six practices are comparatively lower but all top 50%, except 'controls runoff from feeding areas – which is slightly below 50%. Eligibility for the practices is also mixed – roughly six-in-ten or more operations are eligible for six of the practices, while half or fewer are eligible for the remaining six practices.

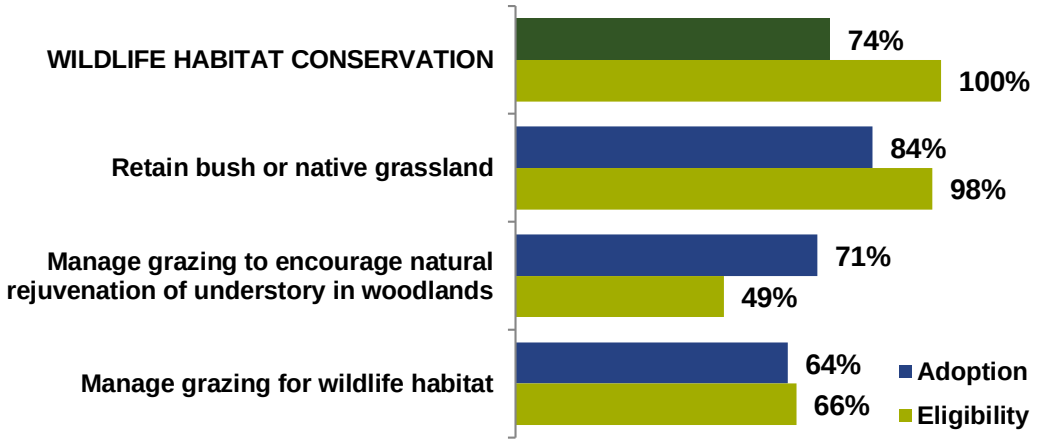


Wildlife Habitat Conservation Practices

The average ESA adoption score for wildlife habitat conservation practices is also very strong – at 74%, essentially tied with water quality and quantity for top spot. The adoption trend for this agri-environmental risk area is slowly increasing.

Adoption Rate			
2018	2016	2014	2012
74%	73%	70%	72%

Of the three specific practices, retaining bush or native grassland tops 80%. Managing grazing to encourage natural rejuvenation of understory in woodlands is more widely adopted than managing grazing for wildfire habitat. Eligibility ranges from near universal to moderate.



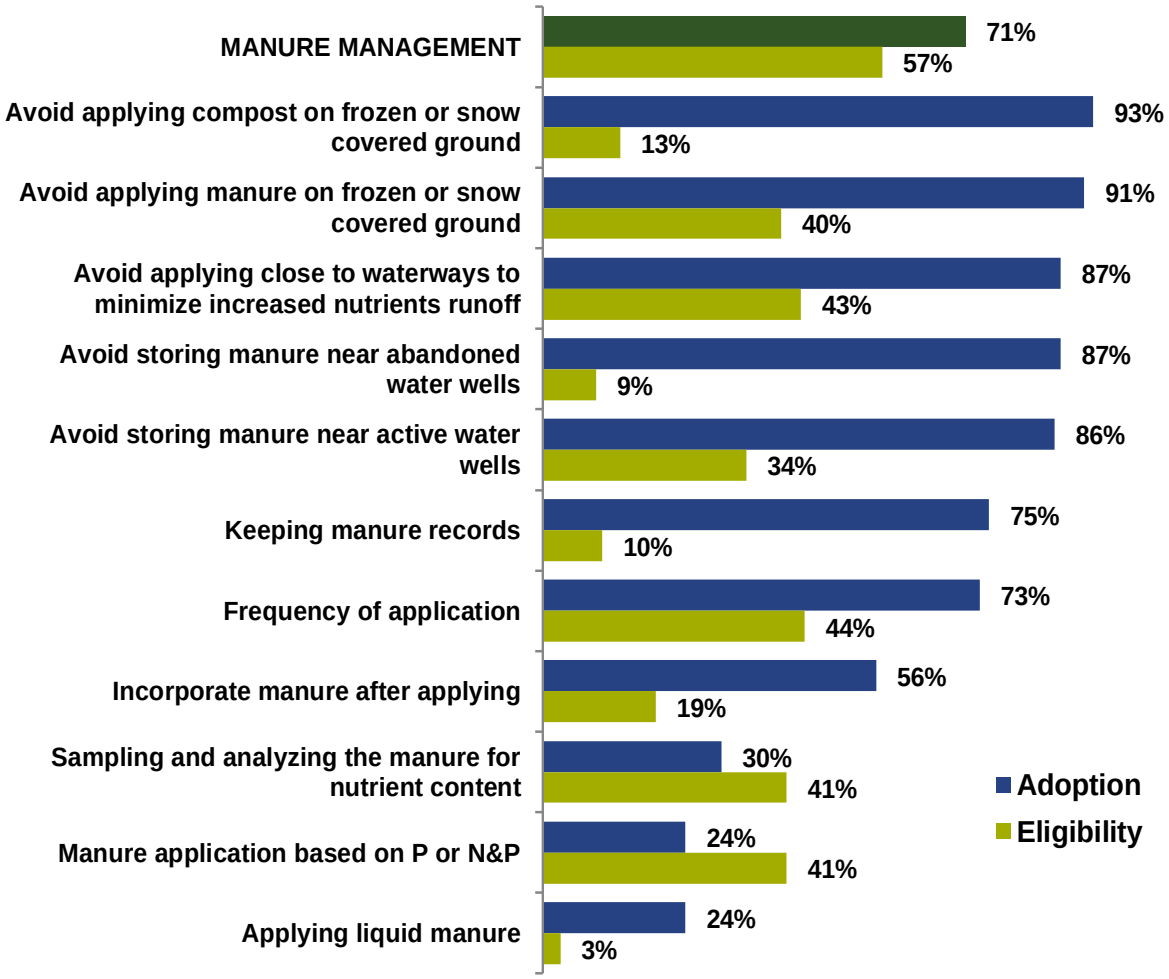
Manure Management Practices

The ESA adoption score for the 11 manure management performance measures is also in the top tier at 71%.

Adoption Rate			
2018	2016	2014	2012
71%	69%	76%	75%

Adoption in 2018 has recovered slightly from a significant decline in 2016. This is largely due to the removal of the practice 'extend the grazing season' which had the highest adoption (94%) and highest eligibility (54%) of the 12 manure management performance measures assessed in 2014. In this new measurement without 'extend the grazing season' the 2018 results track very well with the 2016 results.

Adoption levels of several manure management practices are extremely high while others lag. Five manure management practices have adoption levels between 86% and 93%. Conversely, *sampling and analyzing the manure for nutrient content* as well as *manure application based on P or N&P* have low levels of adoption.

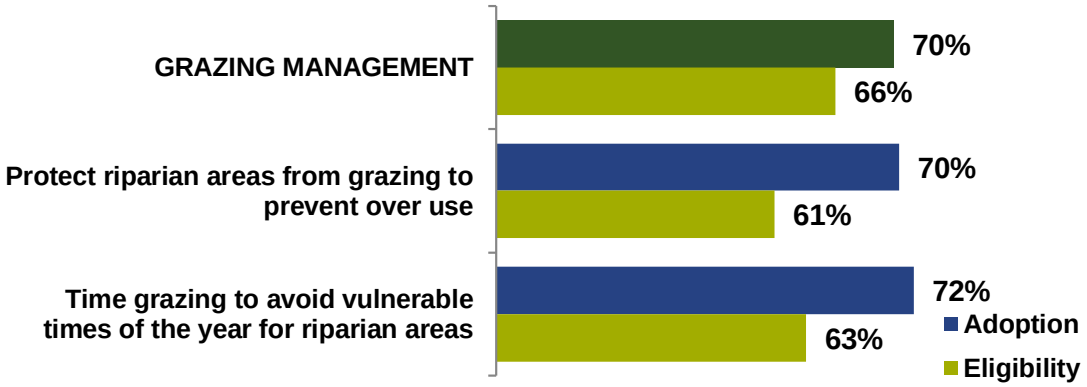


Grazing Management Practices

The grazing management average ESA adoption score just trails the top three practice areas 70% and is also consistent with past measures.

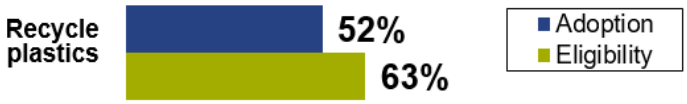
Adoption Rate			
2018	2016	2014	2012
70%	71%	70%	69%

Adoption levels for both grazing management practices are good – around the 70% mark – while eligibility levels are moderate.



Agricultural Waste Management Practices

Only one agricultural waste management practice is included in the ESA adoption score: *Recycle agricultural plastics* (*i.e. recycle plastics such as baler twine, feed bags, silage wraps and/or bale wraps)*. **Just over 50% of those eligible have adopted this practice; the same trend as in 2016 and up significantly from 2014 and 2012**, and eligibility is moderate at 63%.



Adoption Rate			
2018	2016	2014	2012
52%	53%	41%	41%

General Practices

The average ESA adoption score for general practices is low at 36% – a significant decline from 2016. The reason for this decline is the way in which we asked about planting trees for agricultural purposes. In 2018 we asked specifically if farmers had planted trees for agricultural purposes, giving examples. Those who said yes, were marked as having adopted this practice. In 2016 farmers were asked if they planted trees, and then if they answered yes, they were asked for what purpose and were provided a list to check off. If they checked any reason on the list, then they were considered to have adopted the practice. This change had a significant impact in the adoption rate.

Adoption Rate			
2018	2016	2014	2012
36%	42%	44%	44%

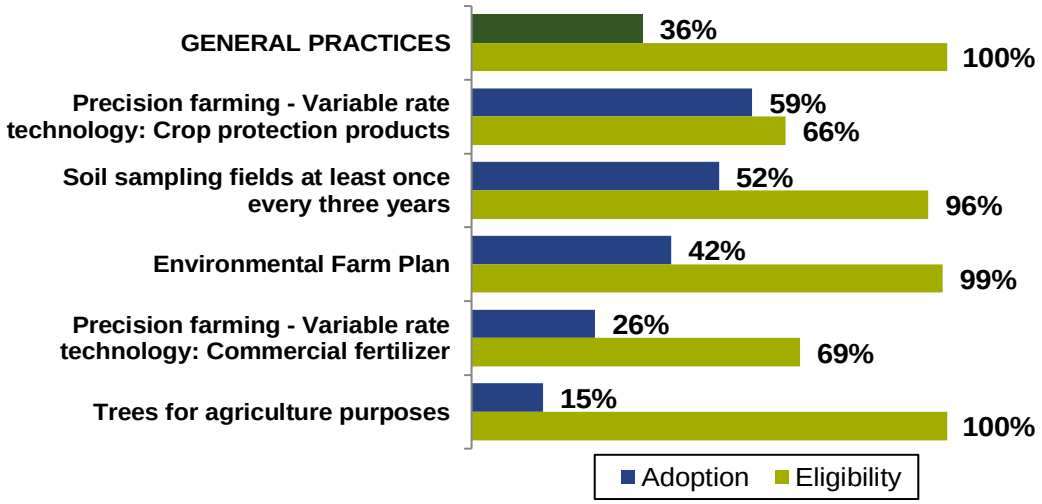
Adoption levels of the five practices included in 'general practices' are variable – ranging from just under 60% to 15%; while eligibility for many of the practices is nearly universal.

With adoption of environmental farm plans at 42%, there is an opportunity for AF to improve. In 2018, farmers were not asked why they have not completed an EFP, but previous results

suggest that there is a lack of understanding/information as to its purpose and the benefits it could provide farmers.

With regard to Precision Agriculture, in addition to helping farmers manage crop input costs while at the same time optimizing yields, the ag industry recognizes Precision Ag can play a key role in terms of environmental sustainability – in particular water quality management. The adoption of precision agriculture for the application of crop protection products is more than double that of using the technology to apply commercial fertilizer.

Planting trees for agricultural purposes was asked more specifically than in the past, having a significant impact on the adoption rate in 2018; albeit a more realistic one.



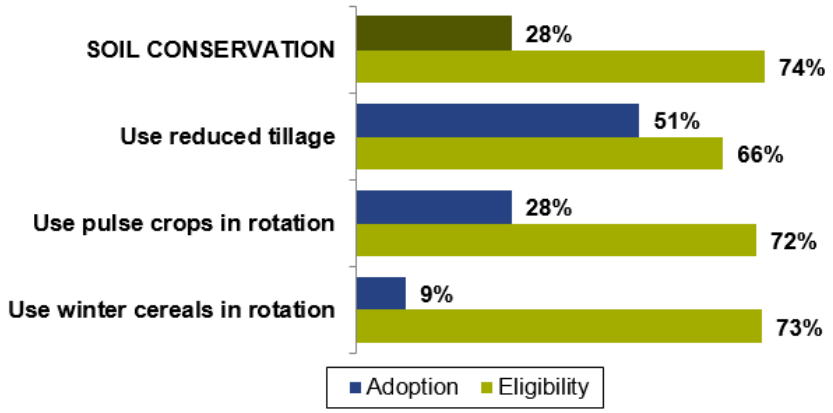
Soil Conservation Practices

Although, the average ESA adoption score for soil conservation practices is the second lowest of the eight practice areas – it has improved significantly over 2016; at 28% up from 22%.

Adoption Rate			
2018	2016	2014	2012
28%	22%	21%	20%

Further, adoption levels of all three specific practices are low – with use of winter cereals in the cropping rotation extremely low. Eligibility, however, is relatively high with 65% or more farms eligible for each practice.

Increasing adoption of reduced tillage is perhaps the strongest opportunity, particularly given the benefit of carbon sequestering (i.e. less disturbance of the soil acts as a carbon sink). AF may wish to explore and gain a stronger understanding of barriers to reduced tillage for Alberta farmers.



Energy and Climate Change Practices

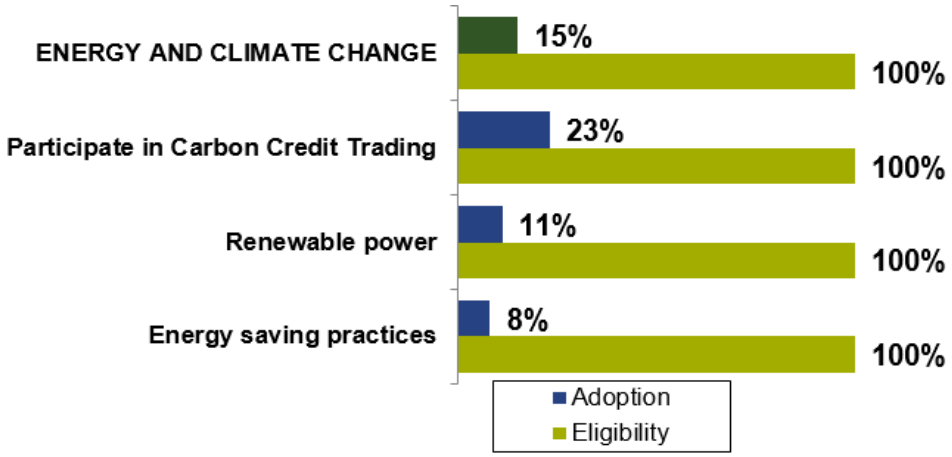
The average ESA adoption score for energy and climate change practices is 15% – on trend with 2016 but both years are down significantly from 2014 and 2012 - the lowest adoption rate of the eight practice areas assessed.

Adoption Rate			
2018	2016	2014	2012
15%	16%	23%	21%

Adoption levels of both energy saving practices as well as carbon credit trading are very low, with the utilization of sub-meters at only 9%. All farmers are eligible for every practice, therefore there is a high potential for adoption and impact.

Increasing adoption of energy saving practices perhaps has the **greatest potential** given the dual benefits of cost savings as well as a positive impact on the environment.

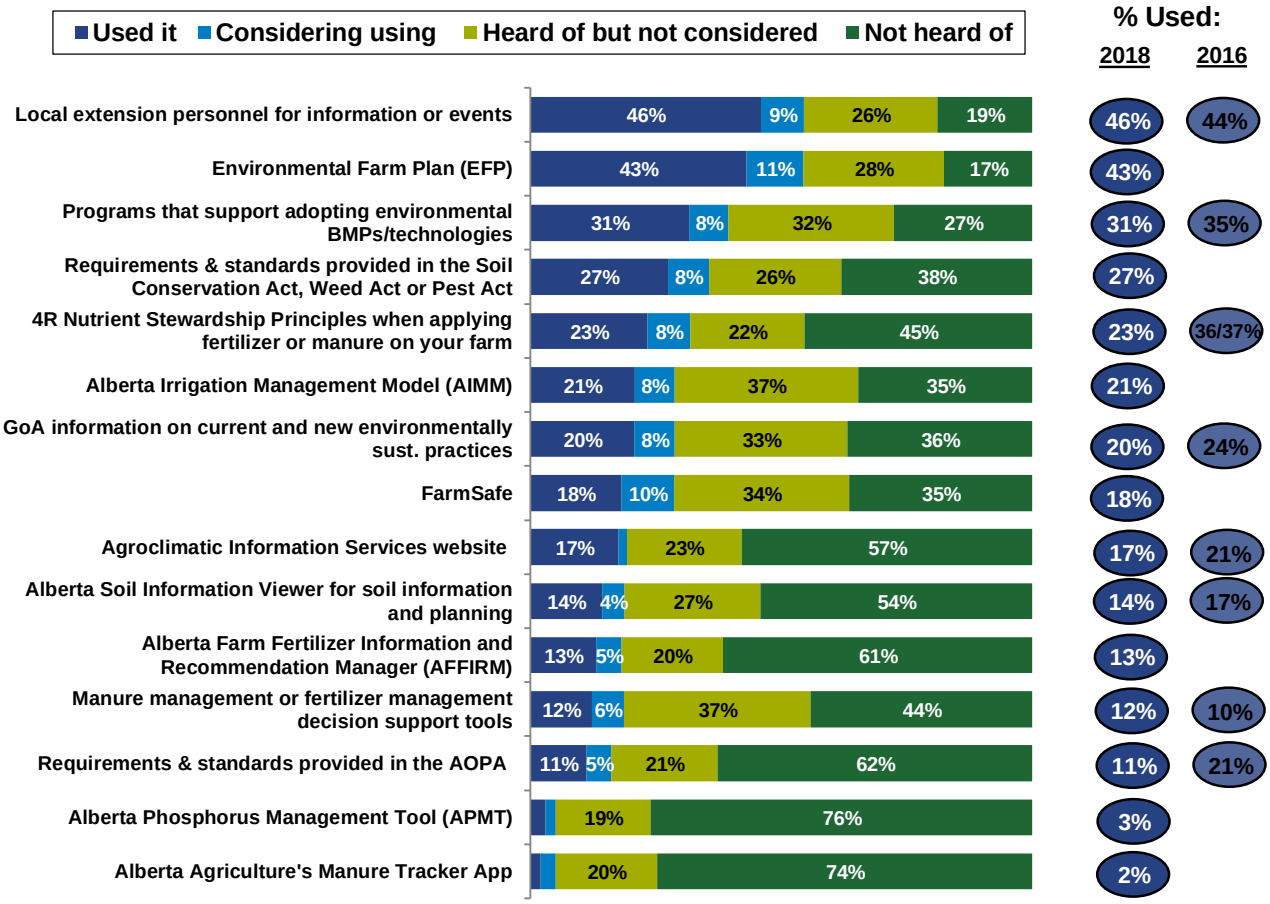
Increasing adoption of carbon credit training may be challenging. In 2016, awareness of the Alberta Carbon Offset market was high (74%), however for some operators, their farming practices may not allow them to meet some qualifying criteria (e.g. minimum till or zero till), while others may question the return on investment (i.e. does the reward offset the cost). In 2018, participation in carbon credit trading improved to previous years' rates at 23%.



Decision Making Support Resources and Tools

For the first time in 2016, operators were asked about their awareness and usage of 11 decision making support resources and tools that focus on projects, programs and services delivered by the Environmental Stewardship Branch (ESB). In 2018. 16 practices were studied (not all shown in the graphic below, as some had very low participation).

The most used resources and tools are local extension personnel and the Environmental Farm Plan.



Base: All respondents (n=500)

Q12_NEW. For each of the following, please tell me which statement best describes how familiar you are with it or if you've used it to help you make management decisions. Would you say, you have not heard of it, you have heard of it but haven't considered using it, you are considering using it, or you have used it?

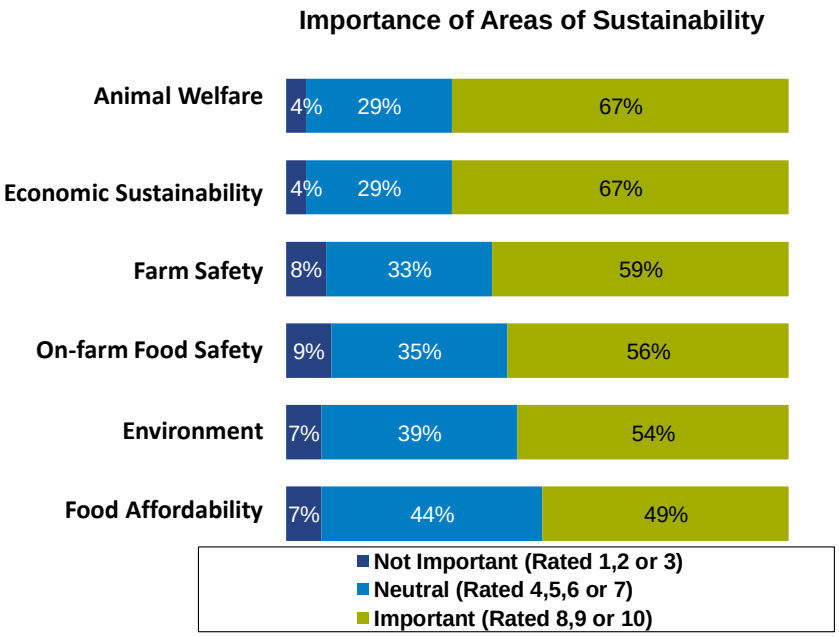
Sustainability Perspectives & Programs Summary

After cost of inputs, many areas of sustainability and how they are managed, rank as issues in which producers believe will have a significant impact on the way they farm in the next 3-5 years. These include:

- Animal care regulations / code of practice
- Restricted market access
- Environmental regulations
- Farm safety regulations
- Biosecurity / animal health and disease
- Food safety and health regulations

Therefore, if these issues are potentially impacting operator's farming practices, then, sustainability and/or sustainability programs could have a significant impact on the ways in which farming operations are managed.

Animal welfare has rated #1 for both the most important area of sustainability, as well as the area of sustainability in which farmers feel the most consumer pressure. Following animal welfare, the most important area of sustainability as perceived by operators is economic sustainability. The environment, which is the 'traditional' definition of sustainability rates lower on the list.

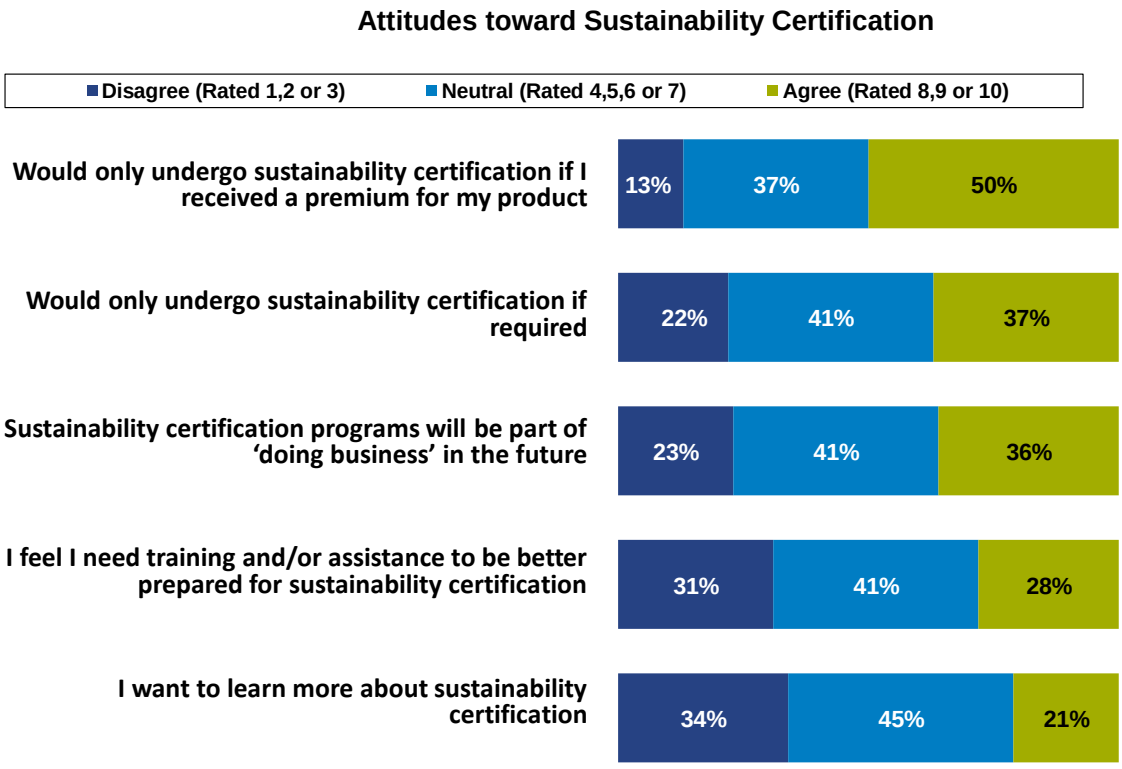


Q10B – 2: Please tell us how important you feel each area of sustainability is by using the following scale from 1 to 10, where 1 means not at all important and 10 means extremely important. Base: All Respondents (n=500)

From the consumers' perspective, farmers feel the most pressure with respect to animal welfare and on-farm food safety. Farm safety and economic sustainability, those areas that have more of an impact on the farm itself, are the areas with the least pressure from consumers.

Nearly 90% of farm operators know about the concept of sustainability standards, suggesting this is not an awareness issue but a familiarity issue.

Although sustainability standards and certification programs are no longer 'new', there still remains a large proportion of operators who have no strong opinions about them. For most producers, participation in a sustainability standard will require a financial reward or a requirement from the customer. Very few sustainability certification programs have been encountered in the marketplace, therefore familiarity with specific programs is very low. This result may also be the reason that less than half of operators feel they need training to be prepared for participation and only 1 in 5 producers want to learn more about sustainability. There is opportunity for AF to help in promoting many of the specific programs to eligible operators, as awareness will then lead to familiarity and eventual participation and advocacy of the programs.



Q10B – 7. Please indicate your agreement with the statements below using a scale from 1 to 10 where 1 is completely disagree and 10 is completely agree..
Base: All Respondents (n=500)

BACKGROUND AND METHODOLOGY

Background and Objectives

Alberta Agriculture and Forestry (AF) recognizes it has a role to enable the industry to innovate, create and capture value, and build competitive capacity by meeting consumer and public expectations around the environment. The agriculture, agri-food and agri-business industry will build on opportunities to realize the benefits associated with production systems that manage risks, address public concerns, and improve efficiencies while stewarding Alberta's air, water, and land for the well-being of current and future generations.

AF provides technical expertise and targeted programs to assist primary producers in addressing a broad range of environmental issues relating to the agricultural industry. Specifically, environmental issues encompass soil conservation, water quality and quantity, wildlife habitat conservation, grazing management, manure management, agricultural waste management, energy and climate change, and planning approaches regarding sustainable agriculture. The main outcome in providing resources to address environmental issues is to encourage producers to adopt environmentally sustainable agriculture (ESA) practices.

The Environmentally Sustainable Agriculture Tracking Survey (ESATS) has been undertaken in 1997, 2001, 2004, 2007, 2010, 2012, 2014, 2016 and again in 2018.

Over the years, the AF team has revised the survey as new objectives were introduced, new environmentally sustainable agriculture practices developed or to better align it with the Ministry's programs and initiatives.

In 2012, an 'Environmentally Sustainable Agriculture Tracking Survey team was created to better align the survey with current environmental conditions and AF's work in helping producers to address them. The survey sampling framework was also updated at this time.

In 2014 and 2016, minor revisions were made to the questionnaire but the performance measure questions remained intact.

In 2018, the overall objective to measure farm-level change in sustainable agriculture that has occurred since 2016 remains. However, a new research objective was also included – to measure awareness and readiness of Alberta producers to meet current and emerging sustainability schemes which have expectations on agricultural production systems.

As a result of the inclusion of the new research objective, the goal was to remove 15% of the 2016 survey questions to make room for the new 'sustainability' questions. In October 2017, Kynetec and the ESAT Project team met in Edmonton for a working session with two objectives:

1. Review the 2016 ESAT survey to determine which questions could be removed without jeopardizing any performance measure analysis
2. Discuss the vision of the 'sustainability' section of the survey and exactly what the team was looking to accomplish

For objective one and the tracking part of the survey, eight key agri-environmental risk areas were examined in 2018. Within these eight agri-environmental risk areas, a total of 40 practices serve as ESA performance measures – and are used to derive the biennial result for AF

Measure 3a. The remaining measures are not classified as performance measures. Non-performance measures are practices that are emerging as future practices to measure and could potentially be tracked as a performance measure for AF in the future. Currently there are limited direct resources allocated to these practices, however, tracking of adoption is important to inform future policy and program decisions.

The breakdown of the 51 practices by agri-environmental risk area is as follows:

- Soil conservation – 3 performance measures;
- Management practices that impact Water quality and/or quantity – 12 performance measures and 1 non-performance measure;
- Wildlife habitat conservation – 3 performance measures and 1 non-performance measure;
- Grazing management – 2 performance measures and 4 non-performance measures;
- Manure management – 11 performance measures and 3 non-performance measures;
- Agricultural waste management – 1 performance measure and 1 non-performance measures;
- Energy and climate change – 3 performance measures; and 1 non-measure
- General practices – 5 performance measures.

In addition to environmentally sustainable agricultural practices, the 2018 survey fully explored the awareness, familiarity and perceptions of the different areas of sustainability as well as standards and certification programs.

Methodology

A telephone survey with a random and representative sample of 500 Alberta agricultural producers was conducted between January 2nd and 21st, 2018. A telephone methodology was selected to be consistent with previous ESA tracking surveys. The average interview length was 34 minutes (this is slightly longer than we were expecting due to the number of questions that were cut in the tracking section of the survey to make room for the new sustainability section).

The target population for this survey was primary agricultural operators in Alberta who had gross farm sales of at least $10,000 in 2017, and were most involved in making decisions about the practices and operations used on their farm.

The sample was drawn from Kynetec's proprietary provincially representative database of over 30,000 unique Alberta agricultural producers. The same sample source was used for the 2012, 2014 and 2016 surveys.

Interviews were stratified by five Alberta regions and quotas were established to ensure a reliable sample size within each region for regional analysis. The final data were weighted to ensure the overall sample's regional and gross farm sales composition reflects that of the actual distribution of farms in Alberta based on the 2016 Census of Agriculture.

With a sample of 500, results are considered accurate to within ±4.4 percentage points, 19 times out of 20, of what they would have been had the entire population of Alberta farms been surveyed. The margin of error is larger within regions and for other sub-groupings of the survey population.

Sample Stratification

The table below summarizes the number of interviews conducted by region as well as the corresponding margins of error.

Region	% of 2016 Census Farms in Alberta with $10K+ in gross farm sales (34,859)	Number of Interviews	Maximum margin of error
South	**14.8%**	**105**	**±9.6%**
CD1	3.5%	25	
CD 2	7.1%	50	
CD 3	4.2%	30	
Central	**37%**	**100**	**±9.8%**
CD 4	3.2%	9	
CD 5	6.4%	17	
CD 6	9.0%	24	
CD 7	7.1%	19	
CD 8	8.8%	24	
CD 9	2.2%	6	
CD 15	0.3%	1	
North East	**16.2%**	**105**	**±9.6%**
CD 10	11.4%	74	
CD 12	4.8%	31	
North West	**20.0%**	**112**	**±9.3%**
CD 11	10.3%	58	
CD 13	8.4%	47	
CD 14	1.3%	7	
Peace	**12.0%**	**78**	**±11.1%**
CD 17	4.8%	31	
CD 18	1.2%	8	
CD 19	6.0%	39	
Total	**100%**	**500**	**±4.4%**

Data Analysis

Survey results are presented for the overall weighted sample of primary agricultural operators in Alberta with gross farm sales of $10,000 or more. Further, significant differences – by region as well as farm and operator characteristics – are highlighted throughout the report.

Additionally, findings are tracked against 2012, 2014 and 2016 measures and significant year-to-year changes are highlighted in the graphs.

A two-sample t-test of proportions at a 5% risk level is used for significance testing.

Please note, throughout the report, graphs show responses for all operators asked the question. The ESA adoption score, however, is calculated excluding 'don't know' and 'not applicable' responses. Therefore, for ESA performance measures, the ESA adoption score is provided below the graph and may not correspond to the data shown. Also, throughout the report, numbers in some graphs may not sum to 100% due to rounding.

ESA Adoption Score Calculation (AF Performance Measure 3a)

As in 2016, a total of 40 ESA practices, that could be used to address soil conservation, water quality, grazing management, wildlife habitat conservation, energy and climate change (adaptation) manure management, agricultural waste management, as well as planning approaches regarding sustainable agriculture, were used to derive the result for this measure. An eligible ESA practice (or group) for the base calculation is based on farm type, farm site characteristics and operation practices.

For each respondent, the total number of eligible practices (i.e. appropriate to their operation) is determined, and then the percentage of these eligible practices currently adopted is calculated. For example, if an operator is eligible to adopt 20 of the 40 ESA practices, and has adopted 10 of the 20 practices, the producer's individual adoption score would be 50%.

The percentage of eligible environmentally sustainable agricultural practices adopted by each respondent is multiplied by a weighting factor to generate a weighted adoption score for each respondent. The result of Performance Measure 2a is the average weighted adoption score of all respondents expressed as a percentage.

The adoption score for each of the 40 eligible practices, as well as the average adoption score within each focus area, was also calculated and results are presented throughout the report.

All data, including the ESA Adoption Score calculation, has been verified by AF.

Further details of the 2018 methodology can be found in Appendix A of this report.

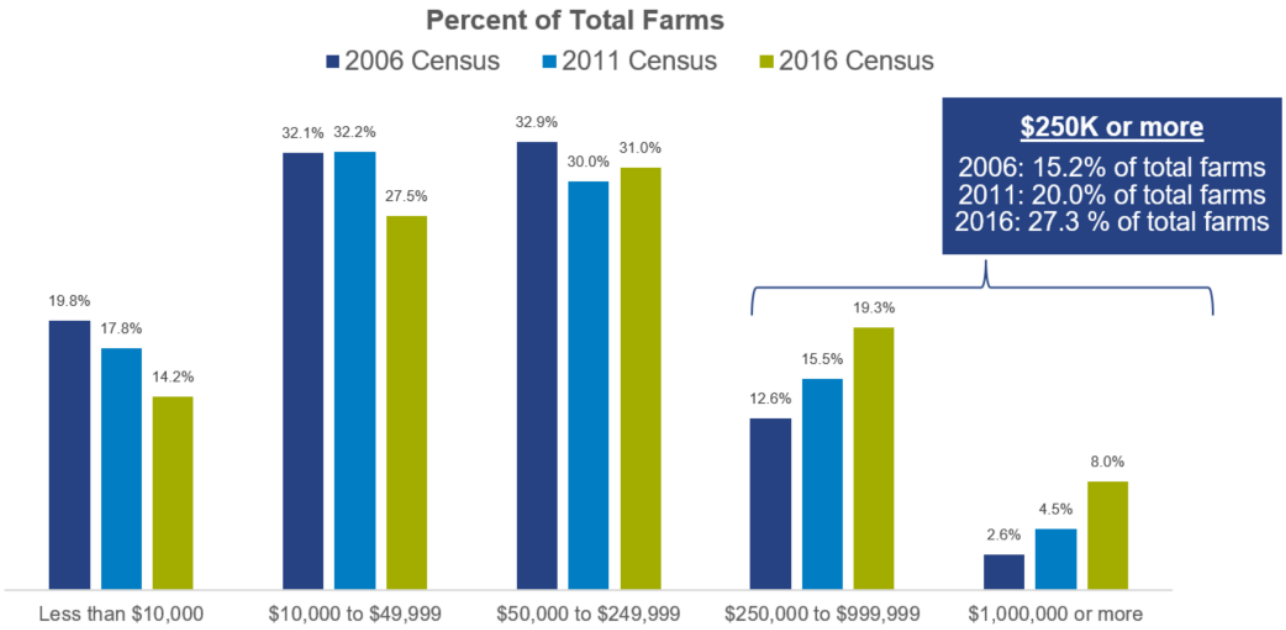
Profile of Alberta Farms

Provincial Trends

Statistics Canada identified a number of provincial trends from 2016 Census of Agriculture, all of which follow the same trend as was seen between the 2006 and 2011 Census periods.

- **Gross farm receipts increased:** Alberta's gross farm receipts in 2015, the year prior to the 2016 Census, increased 36%, to $17.7 billion, from 2010.
- **Farm numbers decreased:** The 2016 Census of Agriculture counted 40,638 census farms in Alberta, down 6.0% from 2011.
- **More larger farms**: According to the 2016 Census of Agriculture, the percentage of total farms with gross farm sales of $250K or more increased from 20% to 27%, an increase of nearly one-third.

Percentage of Farms by Gross Farm Sales in Alberta



Farm Operations and Operators Profile

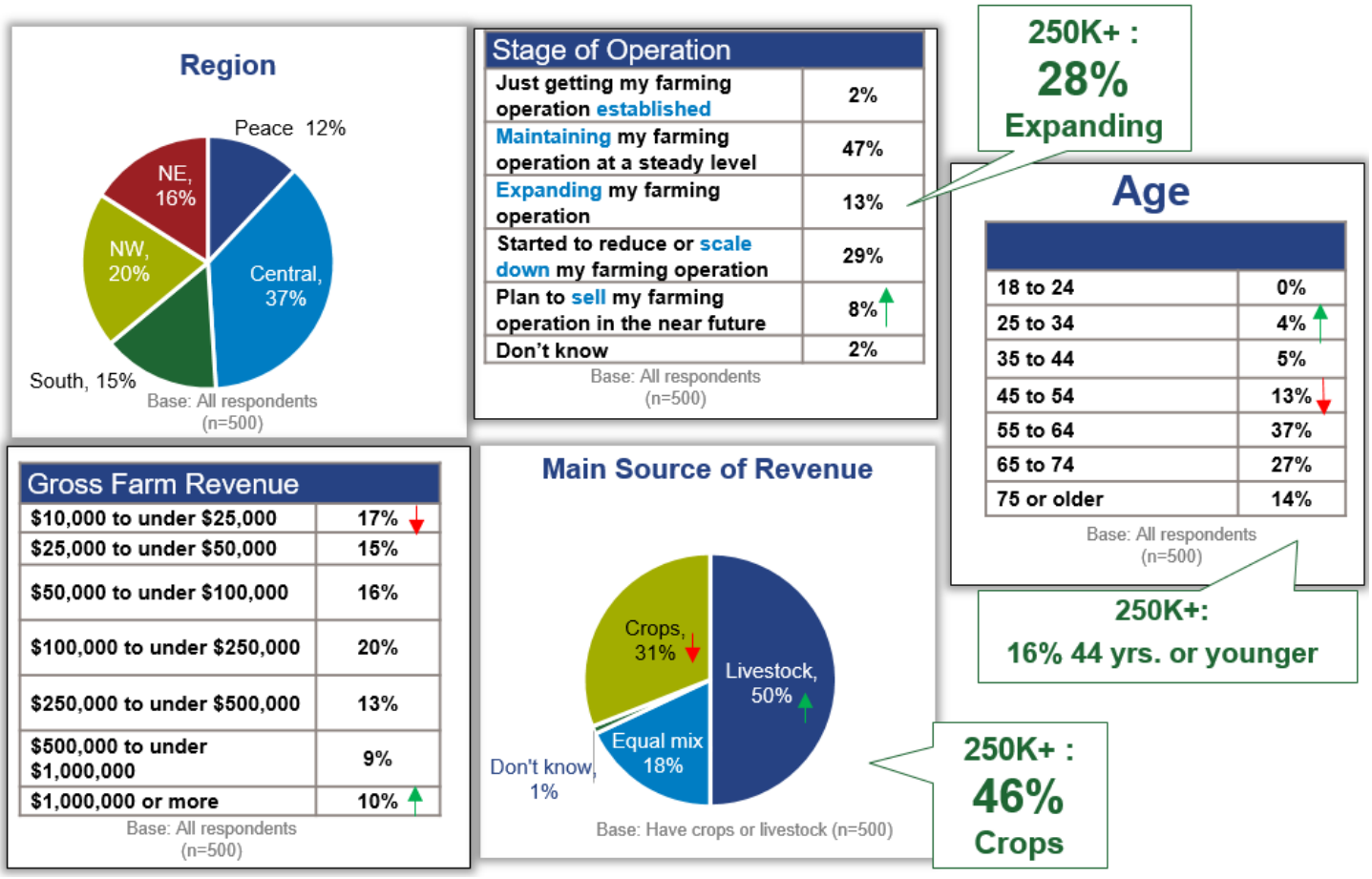
The following charts show **key variables by which the data were analyzed**[1].

As one can see, with regard to stage of operation, overall, close to half (47%) are in the maintenance stage, while 37% are scaling down or plan to sell; just 13% are expanding. Among **larger** operations ($250K+ gross farm sales), however, just over **half (53%) are in the maintenance stage** and **28% are expanding** (just 15% are winding down).

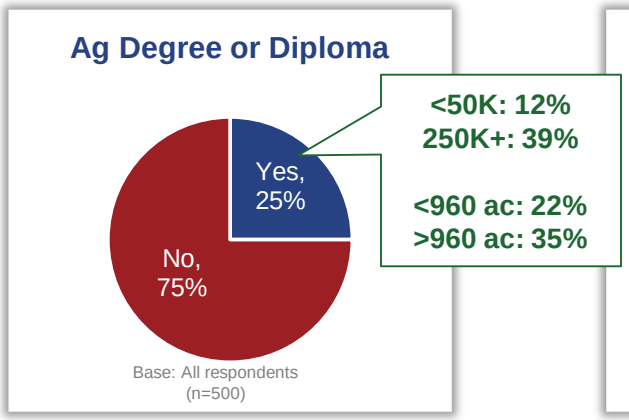
Further, respondents in the sample frame have significantly larger farms, by gross farm sales, than in 2016. The proportion of farms surveyed with less than $25,000 in GFS is significantly less, while farms surveyed with greater than $1 million in GFS has increased significantly.

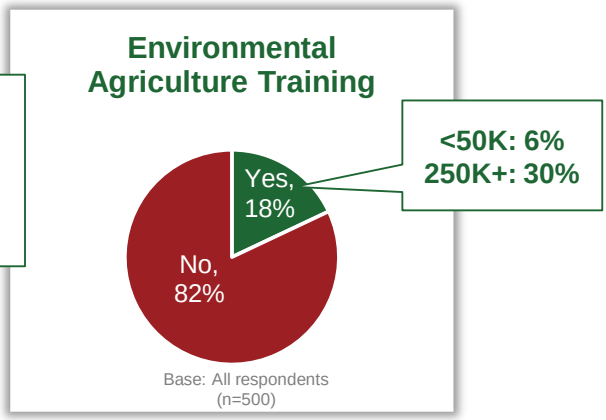
Overall, 41% of operators are aged 65 years or older, with only 22% under the age of 55. Respondents from **larger operations, however, are significantly younger**, with 16% under the age of 45.

[1] Throughout the report and in the charts in this section; a green arrow pointing up indicates a significant increase from 2016, whereas a red arrow pointing down indicates a significant decrease from 2016. On larger tables black arrows are also used to compare results.



The other farm operator profiling questions asked regarded education and training, and use of AF programs aimed at assisting producers to make environmental improvements to their farms. Overall, one-quarter of farmers say they have an agriculture-related degree or diploma, 18% say they have taken environmental agriculture training in the past two years, and 62% indicate they have taken part in or accessed at least one of five specific AF programs assessed in the past five years. It is notable, that a significantly higher percentage of operators in large operations ($250K+) have an **agriculture-related degree or diploma (39%)** and **environmental agriculture training (30%)**. Further, past five years access of one or more **AF programs** climbs to **87% for larger farms**. Likely related to the 'financial' size of the operation, these findings are similar on operations with >960 cropped acres compared to fewer acres: having participated in **agriculture-related degree or diploma (35%)** and **participation in one or more AF programs (83%).**





AF Programs Taken Part in or Accessed in Past 5 Years

% Yes	
Taken part in any program [NET]	62%
Worked with AF staff or Municipal Staff to help make environmental improvements on your farm	25%
Growing Forward Stewardship Program	21%
Growing Forward Water Management Program	20%
Used any information resources or tools of the Working Well Program	26%
Growing Forward Energy Management Program	14%

Base: All respondents (n=500)

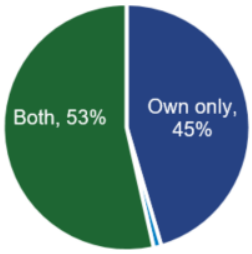
Have taken part in a program:

250K+: 87%

>960 cropped acres: 83%

The following farm characteristics were used to determine eligible practices for each respondent.

Own or rent farmland



Base: All respondents (n=500)

Type of Farmland

Acres in…?	
Crop production	74%
Summerfallow	19%
Forages or hay	72%
Improved land used for pasture or grazing	66%
Undisturbed wetlands	54%
Unimproved land in bush, native grasses, etc.	78%

Base: All respondents (n=500)

Cropland Seeded to Annual Crops

1 to 79 acres	8%
80 – 159 acres	13%
160 – 319 acres	18%
319 – 639 acres	16%
640 – 959 acres	8%
960 – 1,599 acres	12%
1,600 – 3,199 acres	13%
3,200 + acres	6%
Don't know	6%
Mean (Median)	1,102 (430)

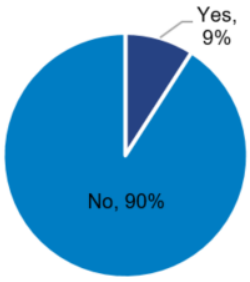
Base: Farmland includes acres in crop production or summerfallow (n=410)

Acres of Perennial Cover

1 to 79 acres	16%
80 – 159 acres	13%
160 – 319 acres	19%
319 – 639 acres	14%
640 – 959 acres	6%
960 – 1,599 acres	5%
1,600 – 3,199 acres	3%
3,200 + acres	2%
Don't know	22%
Mean (Median)	564 (250)

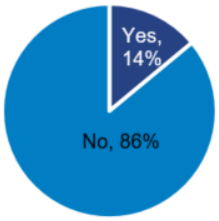
Base: Farmland includes acres in forages or hay, or improved or unimproved land (n=466)

Irrigated Cropland

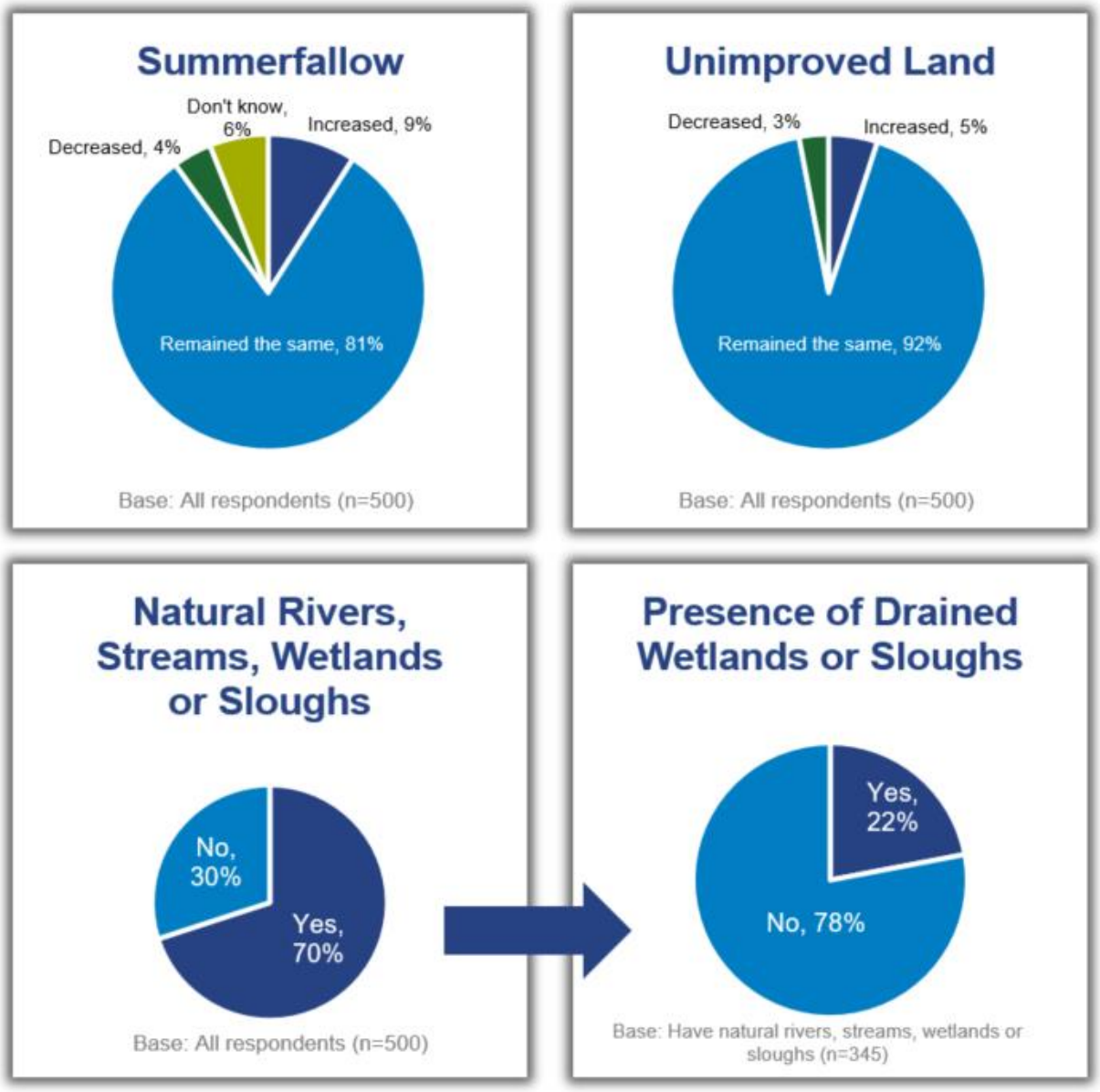


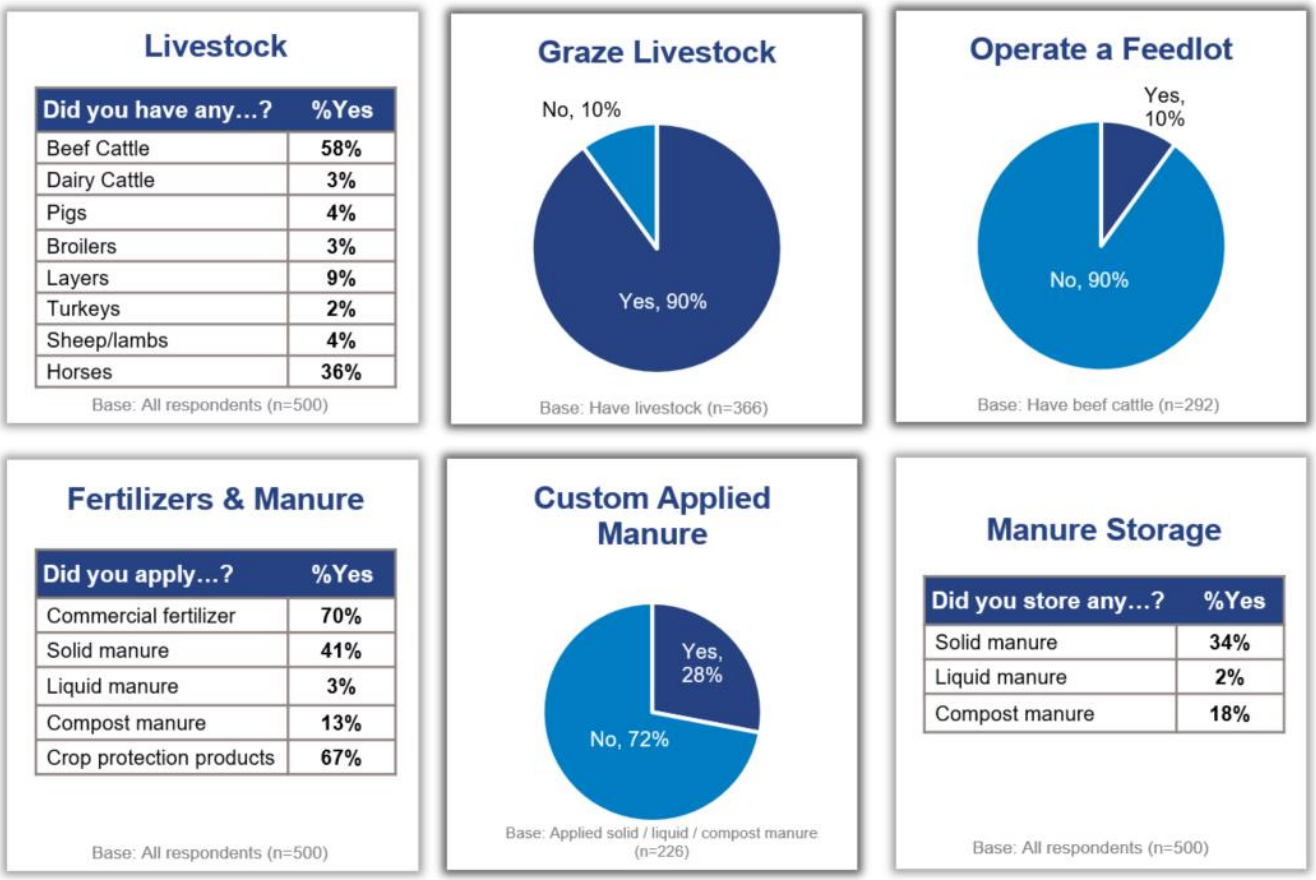
Base: Farmland includes acres in crop production (n=393)

Irrigated Pasture or Forages or Hay



Base: Farmland includes acres in forages or hay, or improved land for pasture or grazing (n=399)


Summerfallow
Don't know, 6%
Increased, 9%
Decreased, 4%
Remained the same, 81%
Base: All respondents (n=500)
Unimproved Land
Decreased, 3%
Increased, 5%
Remained the same, 92%
Base: All respondents (n=500)
Natural Rivers, Streams, Wetlands or Sloughs
No, 30%
Yes, 70%
Base: All respondents (n=500)
Presence of Drained Wetlands or Sloughs
Yes, 22%
No, 78%
Base: Have natural rivers, streams, wetlands or sloughs (n=345)



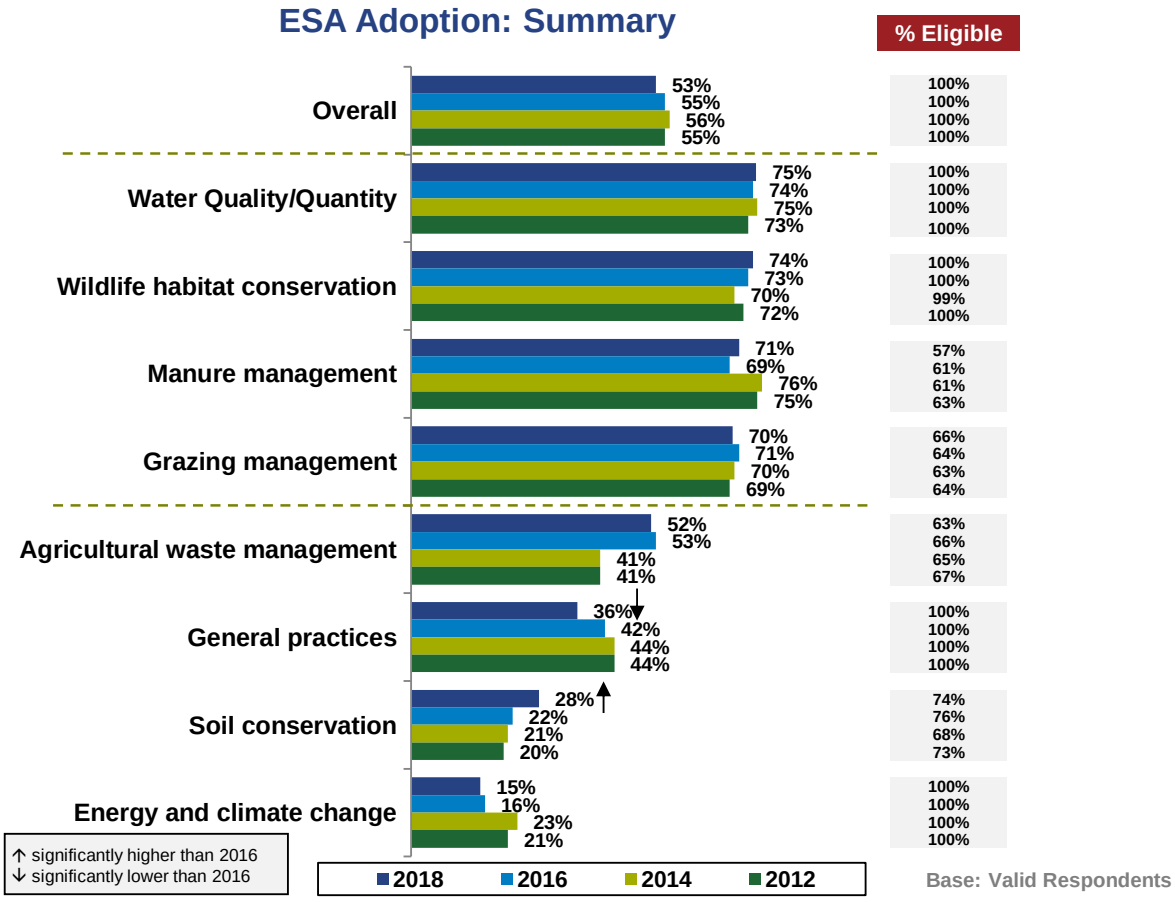
ESA Adoption Score (AF Performance Measure 3a)

AF Performance Measure 3a is defined as ***'the average percentage of improved environmentally sustainable agriculture practices adopted by producers'***.

A total of 40 ESA practices, that could be used to address soil conservation, water quality, grazing management, wildlife habitat conservation, energy and climate change (adaptation) manure management, agricultural waste management, as well as planning approaches regarding sustainable agriculture, were used to derive the result for this measure. An eligible ESA practice (or group) for the base calculation is based on farm type, farm site characteristics and operation practices.

The percentage of all eligible environmentally sustainable agricultural practices adopted by each respondent is multiplied by a weighting factor to generate a weighted adoption score for each respondent. The result of Performance Measure 3a is the average weighted adoption score of all respondents expressed as a percentage.

The 2018 adoption score – i.e. AF Performance Measure 3a – is 53%.



Across key areas of focus, the strongest adoption is seen for Water Quality and Quantity and Wildlife Habitat Conservation practices, while the lowest average adoption is seen for Energy and Climate Change practices.

Adoption of General Practices are down significantly from 2016 (due to the improved 'agricultural trees' question, while adoption of Soil Conservation practices has increased significantly to 28% in 2018.

A number of significant differences in ESA adoption are seen when the data are analyzed by farm operations/operator characteristics. The overall ESA Adoption score is significantly *higher* on operations:

- In the Central region (55%) compared to those in the South region (50%);
- With gross farm sales of $250K or more in 2017 (59%);
- Which are expanding (59%); and,
- Where the producer has attended any of the programs listed below compared to those who have not

- Where the producer has worked directly with AF or Municipal staff (62%)
- With more than 960 cropped acres (59%) compared to fewer cropped acres (51%)

Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
50%↓	55%↑	54%	54%	50%	47%↓	53%↑↓	59%↑↑

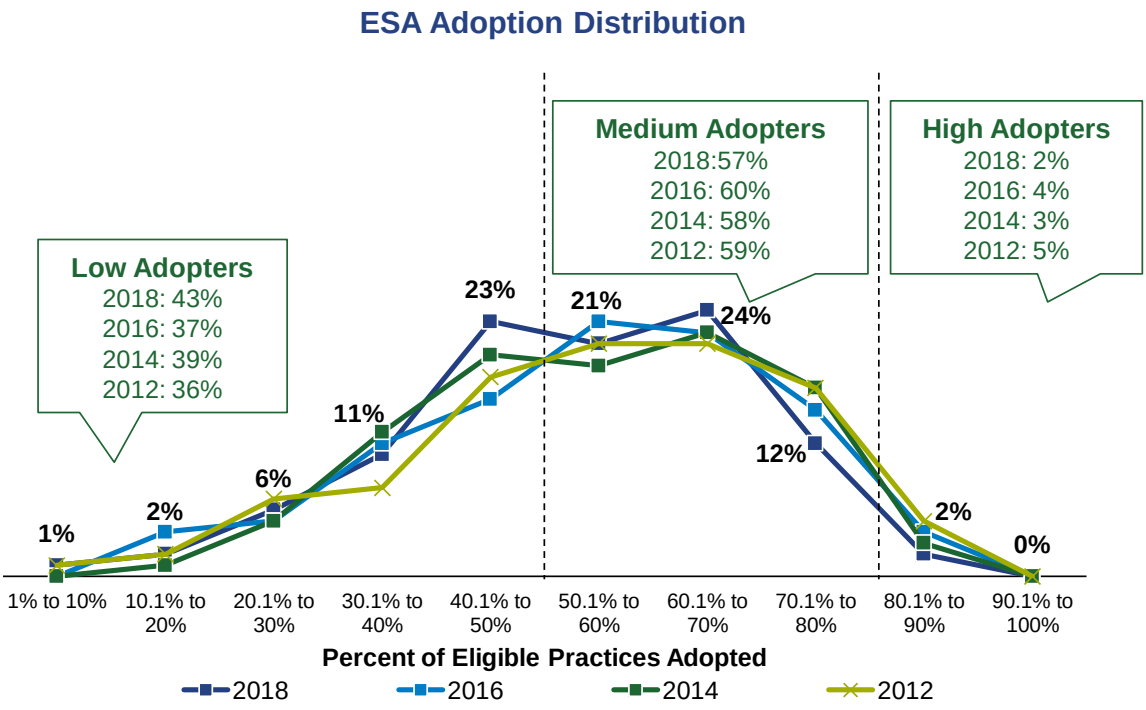
Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
54%	55%	56%	53%↓	59%↑	51%↓

Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
59%↑	51%	61%↑	51%	58%↑	45%	60%↑	48%	61%↑	50%	62%↑	50%

**Within each category (i.e. region, gross farm sales, operation type, operation stage and operator training), ↑ indicates a number is significantly higher and ↓indicates a number is significantly lower. ↑ Red arrows are included to distinguish an additional statistical difference in the same category.*

ESA Adoption: Distribution

Based on the 40 ESA practices used to calculate the adoption score, the majority (57%) of operations are classified as *medium* adopters – that is, they have adopted 50.1% to 80% of the practices for which they are eligible. Over four-in-ten (43%) *are low* adopters (have adopted 50% or less eligible practices), while only 2% are *high* adopters (have adopted more than 80% of eligible practices). The graph below illustrates the distribution of adoption which is consistent with the previous three years of tracking.



*Showing 2018 data labels.

Soil Conservation Practices

Soil conservation is a set of management strategies and practices for prevention of soil being eroded or fertility changed due to nutrient depletion. Practices can include reduced tillage and/or the use of perennial forages, pulse crops and winter cereals in rotation.

Soil Conservation Practices ESA Adoption Score

Although, the average ESA adoption score for soil conservation practices is the second lowest of the eight practice areas – it has improved significantly over 2016; at 28% up from 22%.

Adoption Rate			
2018	2016	2014	2012
28%	22%	21%	20%

Adoption of soil conservation practices is significantly *higher* in:

- The Peace region (36%), Southern (37%) and Northeast (30%) Alberta versus the Northwest region;
- Operations where gross farm sales were $250K or more in 2017 (42%);
- Operations where the primary source of revenue is crops (34%) versus livestock;
- Expanding operations (40%); and,
- Operations where the producer has: attended an environmental agriculture training program, workshop or seminar in the past two years (36%), taken part in AF program in the past five years (33%), or completed the environmental farm plan process (35%).

Soil Conservation Practices Adoption Score by Farm Operations Characteristics

Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
31%↑	27%	30%↑	19%↓	36%↑	15%↓	20%↓	42%↑

Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
34%↑	18%↓	24%	27%↓	40%↑	21%↓

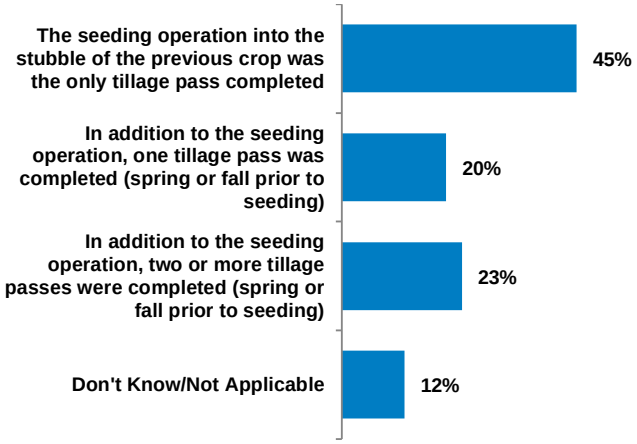
Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
33%	26%	36%↑	26%	33%↑	17%	35%↑	21%	33%	26%	33%	26%

Use Reduced Tillage

Less than half (43%) of operators with crop acres report completing one or more tillage passes in addition to the seeding operation – this is a significant decline from 2016 (53%). Respondents that say the seeding operation into the stubble of the previous crop was the only tillage pass completed has increased from 39% in 2016 to 45% in 2018. Among those who completed two or more tillage passes, the most frequent reason given was "to manage weed populations" (25%), followed by "seeding equipment required a tillage pass for seed bed preparation" (14%) and "to manage excess moisture" (13%).

Reduced Tillage

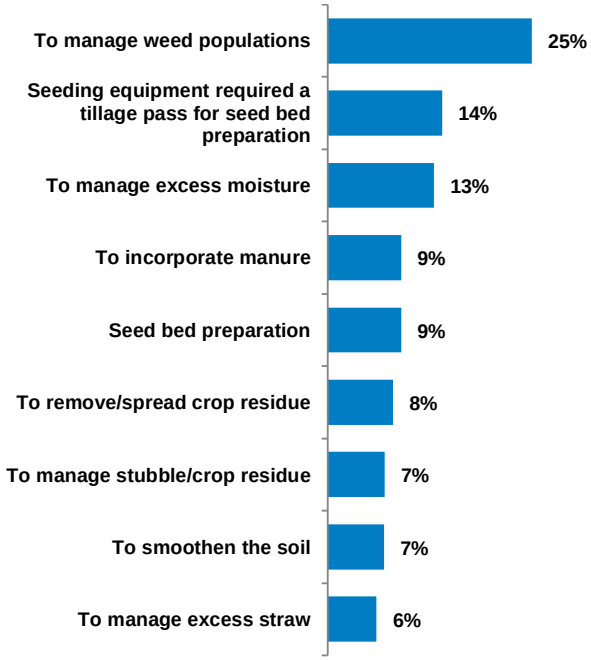
Means of Seeding Majority of Crop Acres



Base: Farmland includes acres in crop production (n=393)
Q13. Please indicate which of the following best describes how you seeded the majority of your crop acres in 2017.

Reduced Tillage Adoption Rate			
2018	2016	2014	2012
51%	42%	36%	39%

Reasons for Completing Two or More Tillage Passes



Base: Completed 2 or more tillage passes in Q13 (n=92)
Q14. What are the main reasons why you completed two or more tillage passes prior to seeding?

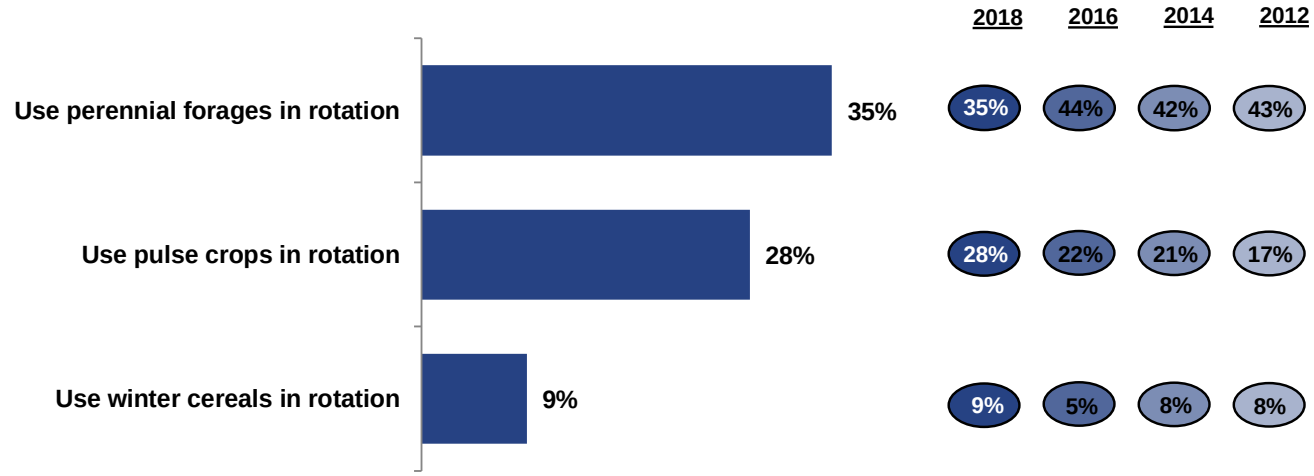
Excluding 'don't know' and 'not applicable' responses, **the adoption score for this practice is 51% - a significant increase over 2016**. Adoption is significantly *higher* on operations:

- In the Peace (66%), Central (56%) and Northeast (58%) regions of Alberta versus the Northwest (34%);
- With gross farm sales of $250K or more (66%) versus those with sales in the $50K to <$250K range (40%) and less than $50K (41%);
- Where the primary source of revenue is crops (56%) or a mixed operation (56%) versus livestock only (31%); and,
- Where the producer has completed the Environmental Farm Plan process (59%), participated in Growing Forward Stewardship program (61%), in the Growing Forward Energy Management program (65%), or taken part in any AF program (58%).

Use of Perennial Forages, Pulse Crops and Winter Cereals in Rotation

Just over one-third (35%) of operators with crops report using perennial forages in their cropping rotation in 2017, a significant decline from 2016 (44%). The decline in using perennial forages seems to have been made up for by the increased use of pulse crops (28%) and winter cereals (9%) in rotation.

% of Producers who use Perennial Forages, Pulse Crops and Winter Cereals in Rotation



Base: Farmland acres in crop production (n=393)
Q15. Did you use [XXX} in your cropping rotation in 2017?

Adoption scores for using pulse crops and winter cereals in rotation are both lower at 28% and 9% respectively – an increase from 2016. Using perennial forages is not an ESA performance measure. When the data are analyzed further, a number of significant differences emerge.

In the case of **pulse crops**, adoption is significantly *higher* on operations:

- In Southern Alberta (39%) compared to the Northwest (19%) region;
- With gross farm sales of $250K or more (48%) versus those with sales of $50K to <$250K (15%) and less than $50K (13%); and,
- Where the primary source of revenue is crops (38%) versus livestock (13%) or a mixed operation (17%);
- That are expanding (51% vs. 16% reducing); and,
- Where the producer has: attended an environmental agriculture training program, workshop or seminar in the past two years (41%), taken part in the Growing Forward Stewardship Program (38%) or completed the Environmental Farm Plan process (36%); or worked with AF/Municipal staff (37%).

Adoption of using **winter cereals** is significantly *higher* in Southern Alberta (20%); on operations with gross farm sales of $250K or more (13%); and, has completed the Environmental Farm Plan process (13%) or has taken part in the Growing Forward Stewardship Program (16%).

Use of **perennial forages** is significantly *higher* in Southern (42%) or Northwest (46%) Alberta compared to the Northeast region and on operations where the primary source of revenue is livestock (53%) versus crops only (33%), and, where the producer has an agriculture-related degree or diploma (45% vs 32%), participated in any one of the AF programs (41% vs 25% if not) or worked with AF/Municipal staff (46% vs 31% if not).

Soil Conservation Practices Summary

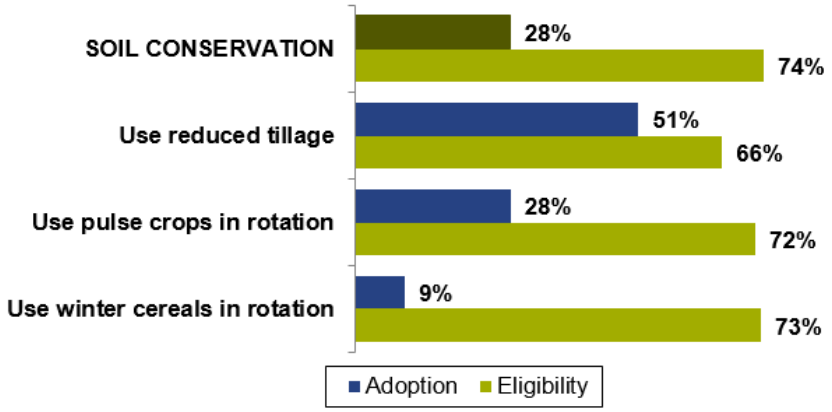
The graph below summarizes the adoption of each practice that soil conservation as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices could have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, understanding barriers to use, potential for increased adoption, ease of adoption and influence of AF on practice adoption, should also be considered in prioritizing areas for focus.

Although, the average ESA adoption score for soil conservation practices is the second lowest of the eight practice areas – it has improved significantly over 2016; at 28% up from 22%.

Adoption Rate			
2018	2016	2014	2012
28%	22%	21%	20%

Further, adoption levels of all three specific practices are low – with use of winter cereals in the cropping rotation extremely low. Eligibility, however, is relatively high with 65% or more farms eligible for each practice.

Increasing adoption of reduced tillage is perhaps the strongest opportunity, particularly given the benefit of carbon sequestering (i.e. less disturbance of the soil acts as a carbon sink). AF may wish to explore and gain a stronger understanding of barriers to reduced tillage for Alberta farmers.



PRACTICES THAT IMPACT WATER QUALITY AND/OR QUANTITY

Practices that impact water quality and/or quantity are individual practices or a combination of practices that are an effective and practicable means of improving water *quality* by preventing pollutants (which may be fertilizer, manure or pesticides) from entering wells, waterways, lakes, wetlands or ground water, and *quantity* by preventing runoff from irrigated fields.

Water Quality and/or Quantity Practices ESA Adoption Score

The ESA adoption score for water quality and quantity practices is very strong at 75% – the highest score among the eight practice areas assessed and essentially unchanged from previous years.

Adoption Rate			
2018	2016	2014	2012
75%	74%	75%	73%

Adoption of water quality and quantity practices is significantly *higher* on operations where:

- Gross farm sales were $50K - <$250K (76%) and $250K or more in 2017 (80%);
- The producer has: an agriculture-related degree or diploma (81%), attended an environmental agriculture training program, workshop or seminar in the past two years (82%), taken part in an AF program in the past five years (79%) – this holds true for the Working Well Program (83%), interacting with AF or Municipal staff (83%), the Growing Forward Stewardship Program (82%) and the Growing Forward Water Management Program (82%) – or, completed the Environmental Farm Plan process (80%).

Water Quality and/or Quantity Practices Adoption Score by Farm Operations Characteristics

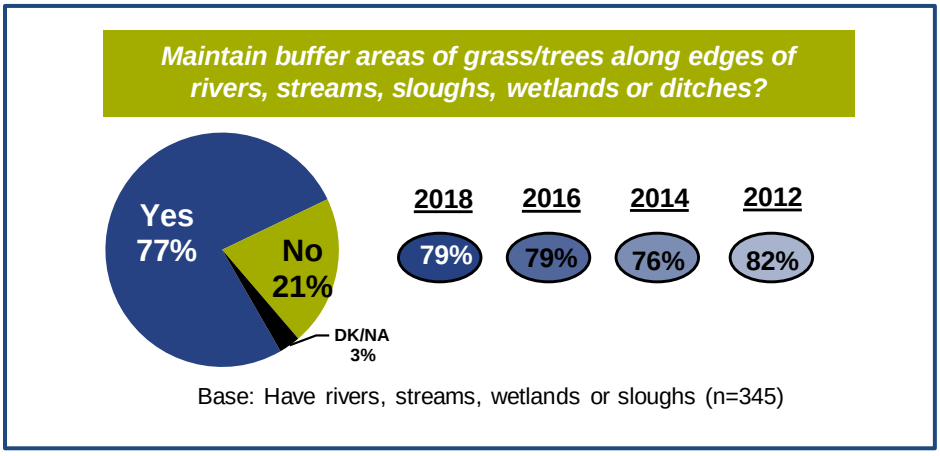
Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
69%↓	78%↑	75%	77%↑	69%↓	68%↓	76%↑	80%↑

Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
72%	71%	72%	74%	77%	75%

Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
81%↑	73%	82%↑	73%	79%↑	67%	80%↑	71%	83%↑	72%	83%↑	72%

Maintain Buffer Areas along Edge of Natural Water Bodies

Roughly three-quarters (77%) of operators with water bodies on their land said they maintained buffer areas of grass or trees along the edge of rivers, streams, sloughs wetlands or ditches. **The adoption score for this practice is high at 79%.**

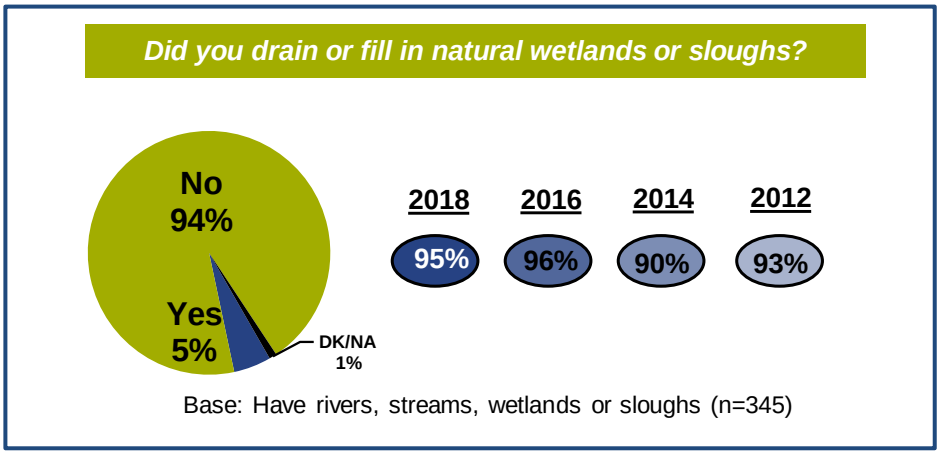


It is noteworthy that adoption is significantly *higher* in Northeast (86%) and Northwest (84%) Alberta compared to Southern (63%) Alberta; and on operations with gross farm sales of $250K or more (85%) and $50K to < $250K (83%) compared to farms with fewer GFS; and where the producer has completed the environmental farm plan process (87%), has an agriculture-related degree or diploma (89%) or taken part in an AF program – specifically, worked with AF/Municipal staff (93%), or the Growing Forward Stewardship (93%) or taken an environmental agriculture training program or workshop in the past two years (91%).

Avoid Draining or Filling in Natural Wetlands or Sloughs

The vast majority (95%) of operators with water bodies on their land said they had not drained or filled in natural wetlands or sloughs.

At 95%, the adoption score for this practice is extremely high.

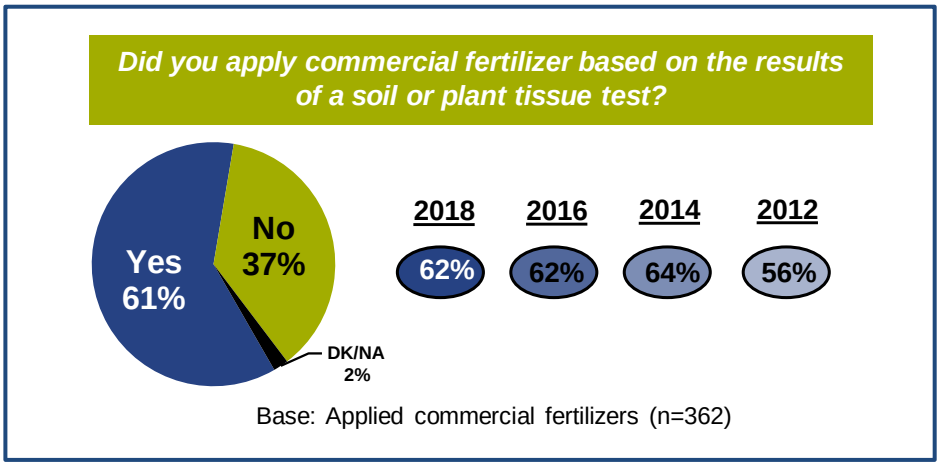


Adoption is not significantly different when analyzed by farm operations/operator characteristics

Apply Chemical Fertilizer at Recommended Rate Based on Soil or Tissue Test

Roughly six-in-ten (61%) operators who applied commercial fertilizer said they did so based on the results of a soil or plant tissue test. **The adoption score of 62% is comparatively lower than other water related practices.**

Adoption is significantly *higher* on operations in the Central region (68%) versus the Northeast (50%); with gross farms sales of $250K or more (76%); that primarily derive revenue from crops (70%); and, where the key operator has completed the Environmental Farm Plan (73%); has an agriculture-related degree or diploma (71%) or taken part in an AF program – specifically, the Growing Forward Stewardship (77%).



Base: Applied commercial fertilizers (n=362)

Commercial Fertilizer – Time of Application, Placement and Product

These questions regarding commercial fertilizer were asked for the first time in 2016, with a new question added in 2018.

Nearly eight-in-ten (77%) producers who applied commercial fertilizer said they applied all of it (100%) in the spring. Very few producers are applying any amount of fertilizer in the fall or any other time of year.

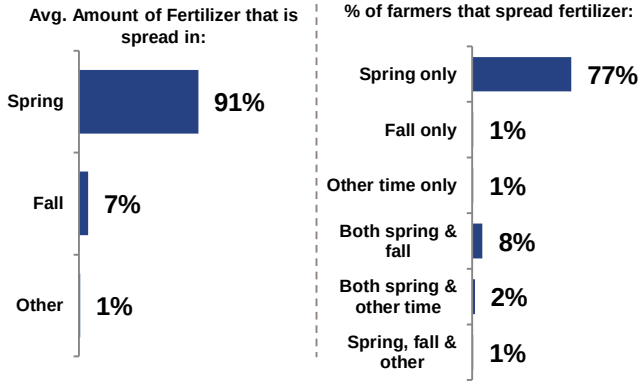
The two most frequently used application methods were *seedplaced* (i.e. *in furrow with the seed)* (51%) and *banded* (41%), followed by *broadcast* – with (29%) and without (18%) incorporation.

Overall, 27% of producers reported using Enhanced Efficiency Fertilizers (referred to in the survey as nitrogen use efficiency products) – a significant increase from 14% in 2016. Use of these fertilizers also increases in the South region (36%), and on crop (31%) and mixed (37%) operations compared to livestock operations (12%).

Of those producers who are using Enhanced Efficiency Fertilizers, on average, they are using them on 65% of their productive acres.

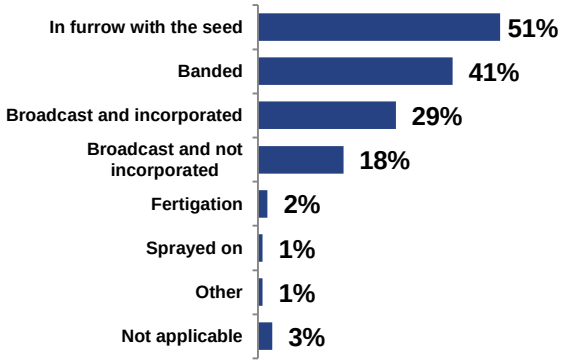
Fertilizer Nitrogen: Time and Placement

Time of Application



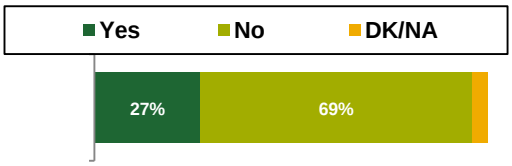
Q19A. Thinking about the total amount of commercial fertilizer you applied or had applied in 2017, about what percentage was applied in?

Application Method



Q19B. Which of the following application methods were used for the fertilizer you applied or had applied in 2017?

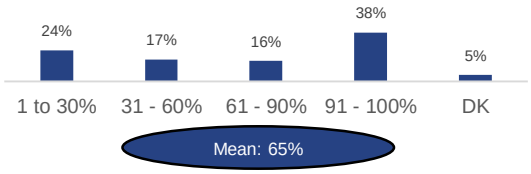
Enhanced Efficiency Fertilizers



Q19C. Did you use any Nitrogen Use Efficiency products in 2017 – e.g. ESN, Super U, Urea with Agrotain, Anhydrous Ammonia with N-Serve, etc…?

Q19A, Q19B, Q19C Base: Applied Commercial Fertilizers (n=362)

Enhanced Efficiency Fertilizer Acres

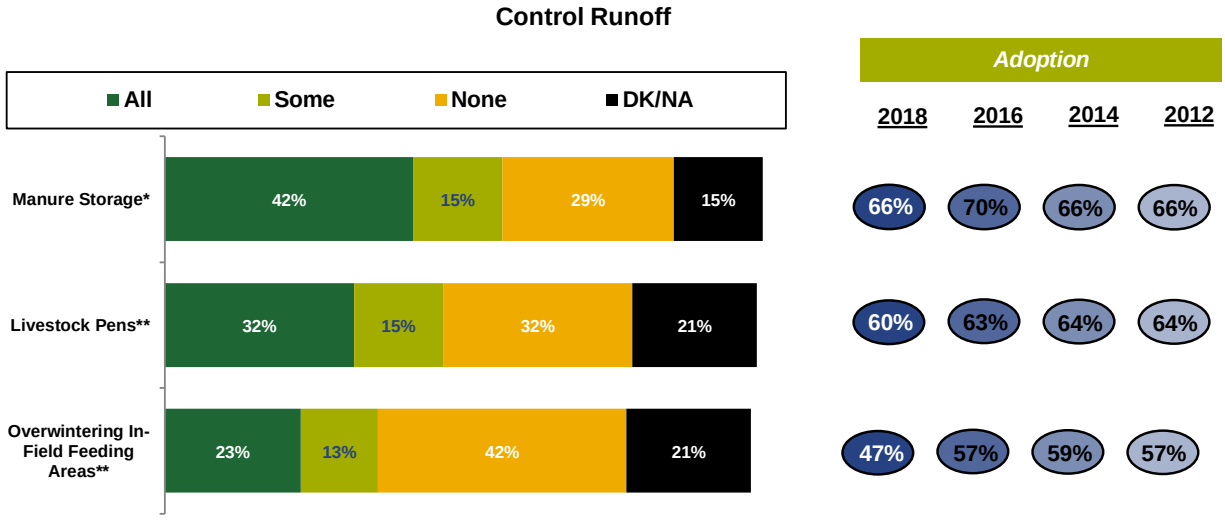


NEW: Q19D. Of all the acres that you could use Nitrogen Use Efficiency products on, on your operation, what % of your acres are you using them on? Base: Respondents who said Yes in Q19C (n=106)

Control Runoff from Manure Storage, Livestock Pens and Feeding Areas

Operators who have livestock and store manure were asked if they control runoff. 57% say they controlled *all* or *some* runoff from manure storage (down from 2016), while this drops to 47% regarding livestock pens and 36% for feeding areas.

In 2018, we slightly modified the question for feeding areas, and added a bit more specificity to it by asking about *overwintering in-field* feeding areas, rather than simply feeding areas. This change is likely why we see a significant decline in the adoption score.



*Base: Store Manure (n=185) / **Base: Have Livestock (n=364)
Q20. Did you control runoff from all, some or none of your…?

The adoption scores for controlling runoff are 66% in the case of manure storage, 60% in the case of livestock pens and 47% in the case of feeding areas – all moderate but lower than many water-related practices. All adoption rates have declined since 2016; in feeding areas it is a significant decline (likely due to the question modification).

Controlling runoff is significantly *higher* on operation where the producer has:

- Attended a farm conservation training program, workshop or seminar in the past two years (for all areas); and
- Worked with AF or Municipal Staff (for all areas).

Plug or Seal Abandoned Wells / Properly Seal and Maintain Active Wells

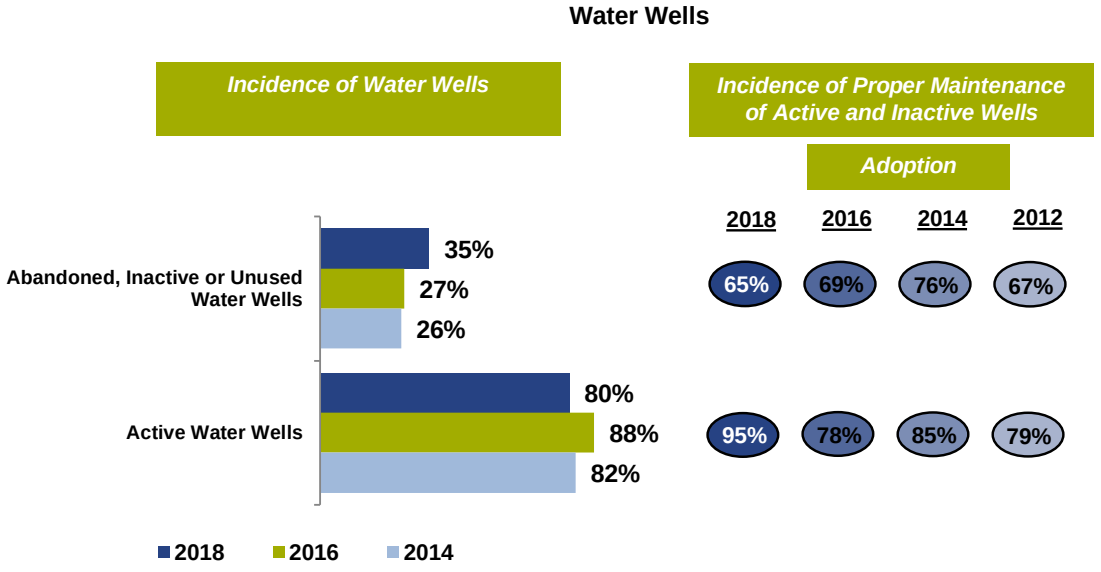
Note that in 2018, the questions regarding water wells were restructured to provide some definition regarding active vs. abandoned water wells, as well as to identify the number of wells on respondents' properties. Therefore, although tracking is shown in the graphic below, these are essentially new questions.

Definitions of wells and maintenance of wells:

- Active well – no definition provided
- Inactive, abandoned or unused well: a well that is no longer being used or maintained for future use
- Proper maintenance of active well: examples of well maintenance include shock chlorination, collection of water samples, visual inspection, etc..
- Proper maintenance of inactive, abandoned or unused well: properly sealed or plugged using bentonite or other approved material.

Of the 80% of farmers who have active wells on their properties, 95% say they properly maintained all or some of the wells. Whereas 35% of farmers stated they have abandoned, inactive or unused wells on their properties, and only 65% say they have properly sealed or capped all or some of these wells.

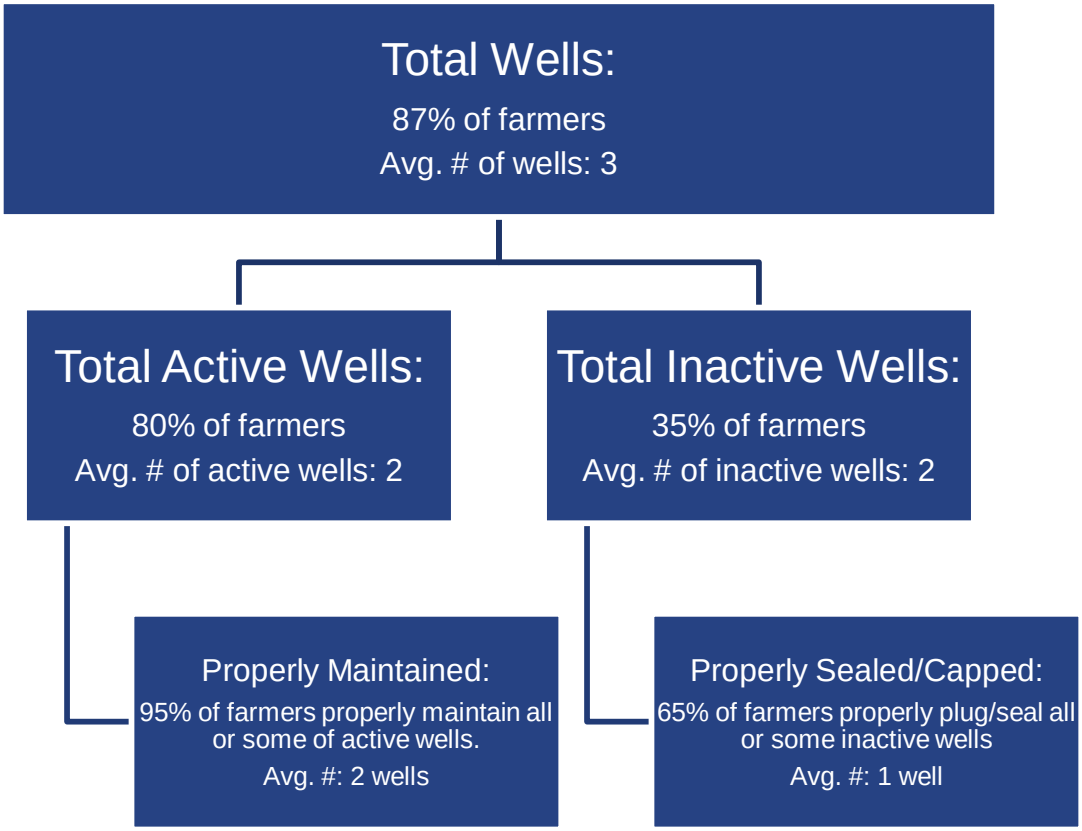
The adoption score for plug or seal abandoned wells is 65%, while the score for properly seal and maintain active wells is 95%. Respondents are more likely to have properly maintained their active water wells if they have participated in a Growing Forward Stewardship, Water Management or Energy Management program, or have worked with AF/Municipal staff.



Base: All Respondents (n=500)
Q20B-2. Number of total active wells / Q20B-3 Number of total inactive, abandoned or unused wells (a well that is no longer being used or maintained for future use).

Base: Have abandoned, inactive or unused wells (n=173) / Have active wells (n=400)
Q20B-4. Total # of active wells that are properly maintained (examples included) / Q20B-5. Total # of abandoned wells properly sealed or plugged

Average # of Water Wells



Base: All Respondents (n=500)
Q20B-2. Number of total active wells / Q20B-3 Number of total inactive, abandoned or unused wells (a well that is no longer being used or maintained for future use).

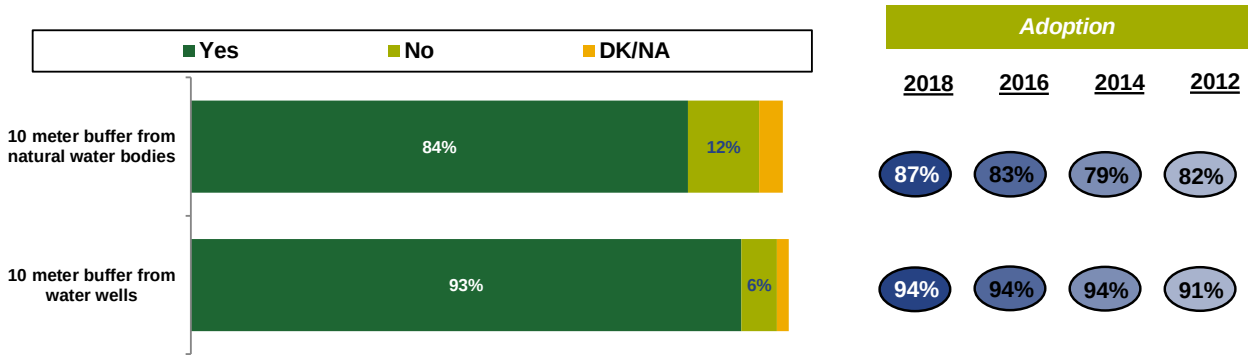
Base: Have abandoned, inactive or unused wells (n=173) / Have active wells (n=400)
Q20B-4. Total # of active wells that are properly maintained (examples included) / Q20B-5. Total # of abandoned wells properly sealed or plugged

Maintain a 10 Meter Buffer Area from Water Bodies / Water Wells when Applying Pesticides

Most operators protect water sources when applying crop protection products.

Nearly nine-in-ten (84%) operators with natural water bodies on their farm report maintaining a 10-meter buffer area when applying crop protection products – this goes up to 93% for water wells.

Buffer Areas when Applying Crop Protection Products



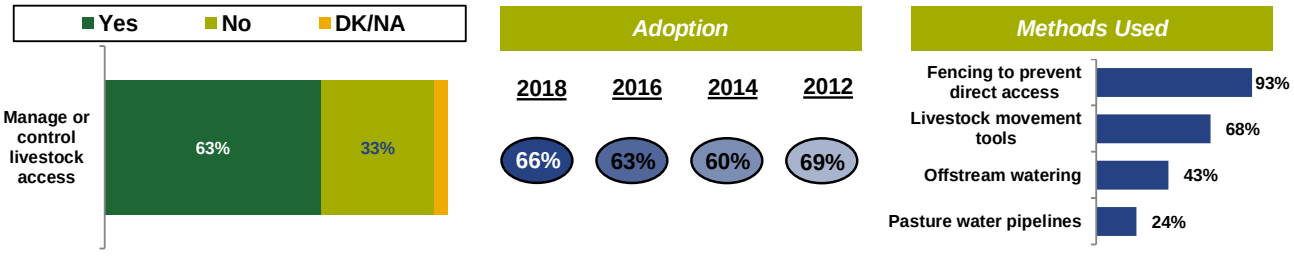
[1]Base: Applied crop protection products and have natural water bodies on farm property (n=243) / [2] Base: Applied crop protection products and have active and/or inactive water wells on property (n=275)
Q25. In 2017, did you maintain at least a 10 meter buffer area from XXX when applying crop protection products?

Adoption scores for both practices are very high – 87% for maintaining a 10-meter buffer from water bodies when applying pesticides and 94% for maintaining a 10-meter buffer from water wells. 2018 results are consistent with 2016 responses.

Manage Livestock Access to Water Bodies that are used as a Water Source

More than six-in-ten (63%) operators who both graze livestock and have water bodies on their farm say they managed or controlled livestock access to water bodes that are used as water sources, while 33% did not. By far the most common means of managing livestock access was fencing to prevent direct access (93%), followed by livestock movement tools (68%) – use of pasture water pipelines increased from 13% of respondents in 2016 to 24% in 2018.

Managing Livestock Access



Base: Graze livestock and have natural water bodies (n=233).
Q28. In 2017, did you manage or control livestock access to water bodies that are used as a source of water?

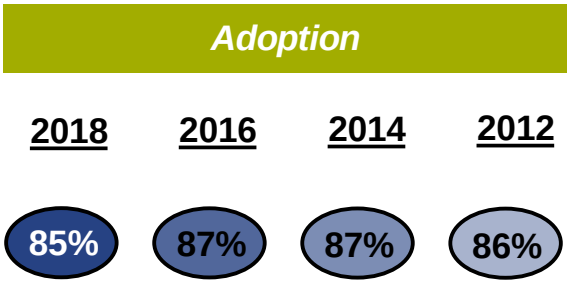
Base: Manage or control livestock access to natural water bodies (n=145).
Q29. Which of the following methods did you use?

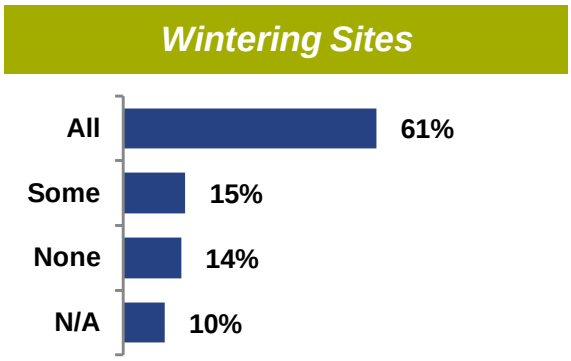
The adoption score for managing livestock access to water bodies used as a water source is moderate at 66%.

Choose Wintering Site to Avoid Manure Contamination

Three-quarters of operators who both graze livestock and have water bodies on their farm say they locate *all* (61%) or *some* (15%) of their winter feeding and bedding sites to prevent runoff from manure entering natural water bodies.

The adoption score for this practice is high at 85%.





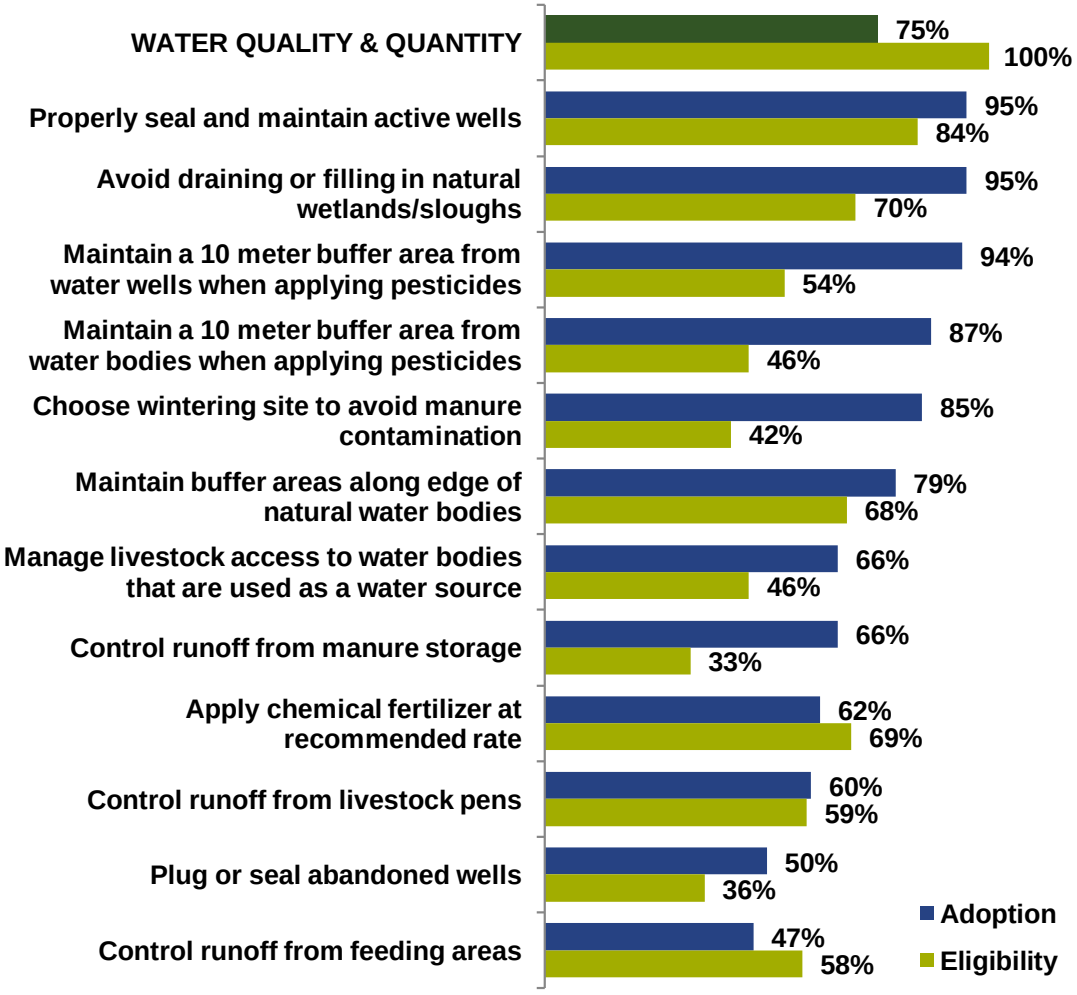
Base: Graze livestock and have natural water bodies (n=233).
Q30. Did you locate all, some or none of your in-field winter feeding and bedding sites to prevent runoff from manure entering natural water bodies?

Water Quality and Quantity Practices Summary

The graph below summarizes the adoption of each practice that impacts water quality and/or quantity as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, understanding barriers to use, potential for increased adoption, ease of adoption and influence of AF on practice adoption, should also be considered in prioritizing areas for focus.

The ESA adoption score for water quality and quantity practices is very strong at 75% – the highest score among the eight practice areas assessed and essentially unchanged from previous years.

Of the 12 specific practices, six have adoption levels higher than 75%, while adoption of the other six practices are comparatively lower but all top 50%, except 'controls runoff from feeding areas – which is slightly below 50%. Eligibility for the practices is also mixed – roughly six-in-ten or more operations are eligible for six of the practices, while half or fewer are eligible for the remaining six practices.


WATER QUALITY & QUANTITY
75%
100%
Properly seal and maintain active wells
95%
84%
Avoid draining or filling in natural wetlands/sloughs
95%
70%
Maintain a 10 meter buffer area from water wells when applying pesticides
94%
54%
Maintain a 10 meter buffer area from water bodies when applying pesticides
87%
46%
Choose wintering site to avoid manure contamination
85%
42%
Maintain buffer areas along edge of natural water bodies
79%
68%
Manage livestock access to water bodies that are used as a water source
66%
46%
Control runoff from manure storage
66%
33%
Apply chemical fertilizer at recommended rate
62%
69%
Control runoff from livestock pens
60%
59%
Plug or seal abandoned wells
50%
36%
Control runoff from feeding areas
47%
58%
Adoption
Eligibility

WILDLIFE HABITAT CONSERVATION PRACTICES

Wildlife habitat restoration management preserves natural habitat and wetland ecosystem and the plants and animals that thrive there. Wildlife habitat conservation practices include retention of bush and native grassland, managing grazing to encourage natural rejuvenation of understory in woodlands, manage grazing for wildlife habitat, and avoiding bringing land into production that has not been previously cropped (new in the 2018 survey).

Wildlife Habitat Conservation Practices ESA Adoption Score

The average ESA adoption score for wildlife habitat conservation practices is also very strong – at 74%, essentially tied with water quality and quantity for top spot. The adoption trend for this agri-environmental risk area is slowly increasing.

Adoption Rate			
2018	2016	2014	2012
74%	73%	70%	72%

Adoption of wildlife habitat conservation practices is significantly *lower* in the South (56%) compared with all other regions. Conversely, adoption is significantly *higher* on operations where the producer has taken part in the Working Well program (84%) in the past five years.

Wildlife Habitat Conservation Practices Adoption Score by Farm Operations Characteristics

Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
56%↓	75%↑	80%↑	79%↑	74%↑	71%	78%	72%

Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
67%	75%	75%	72%	71%	77%

Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
73%	74%	80%	73%	76%	70%	75%	73%	84%↑	71%	79%	72%

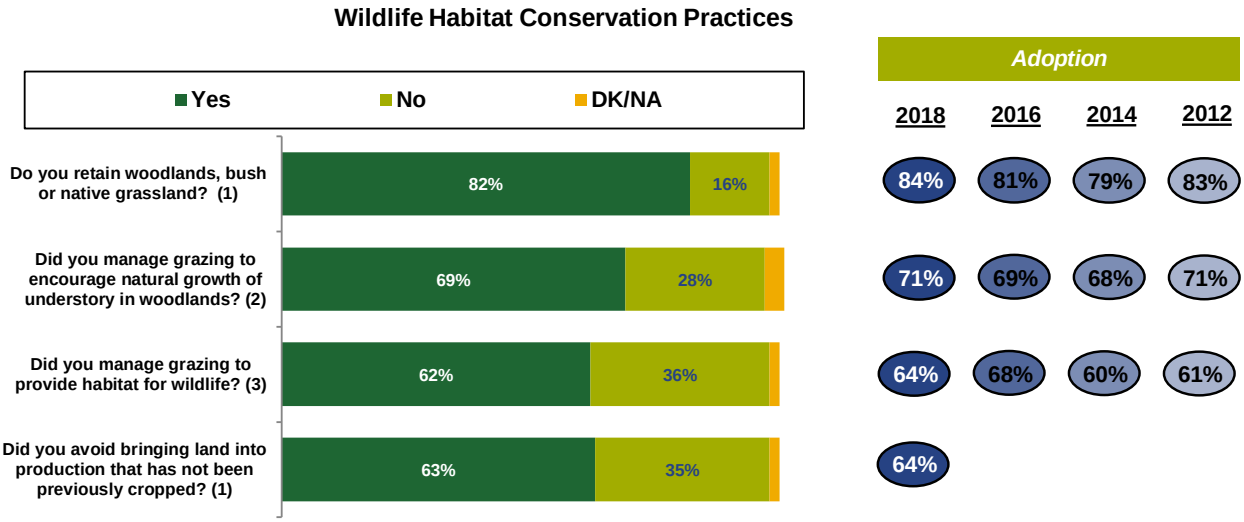
Wildlife Habitat Conservation Practices

The four wildlife habitat conservation practices are:

- ***Retain woodlands, bush or native grassland***;
- ***Manage grazing to encourage natural rejuvenation of understory in woodlands***;
- ***Manage grazing for wildlife habitat***; and,
- ***Avoid bringing land into production that has not been previously cropped*** (not a performance measure and new in 2018).

Adoption scores for all three performance measures are moderate to strong, with a high of 84% for *retain bush or native grassland* and moderate scores of 71% for *manage grazing to encourage natural rejuvenation of understory in woodlands* and 64% for *manage grazing for wildlife habitat*.

Though **not a performance measure and new in 2018**, adoption is moderate for *avoiding bringing land into production* at 64%.



[1]Base: All Respondents (n=500) / [2]Base: Graze livestock (n=329) / [3]Base: Graze livestock and have woodlands/bush (n=258)

When the data are analyzed further, several significant differences emerge.

- *Retain bush or native grassland*: Adoption is significantly *lower* in the South (62%) compared to all other regions (83% to 94%) as well as on operations where the primary source of revenue is crops (79%). It is *higher* on operations where the producer has participated in the Working Well program (93%).
- *Manage grazing to encourage natural rejuvenation of understory in woodlands:* Adoption is significantly *higher* on operations where the producer has taken part in the Working Well program (81%).
- *Manage grazing to provide habitat for wildlife:* Adoption is significantly *higher* on operations where the producer has taken an environmental agriculture training program, seminar or workshop in the past 2 years (76% vs. 61% if not).
- *Avoid bringing land into production:* Adoption is significantly lower for operations that are

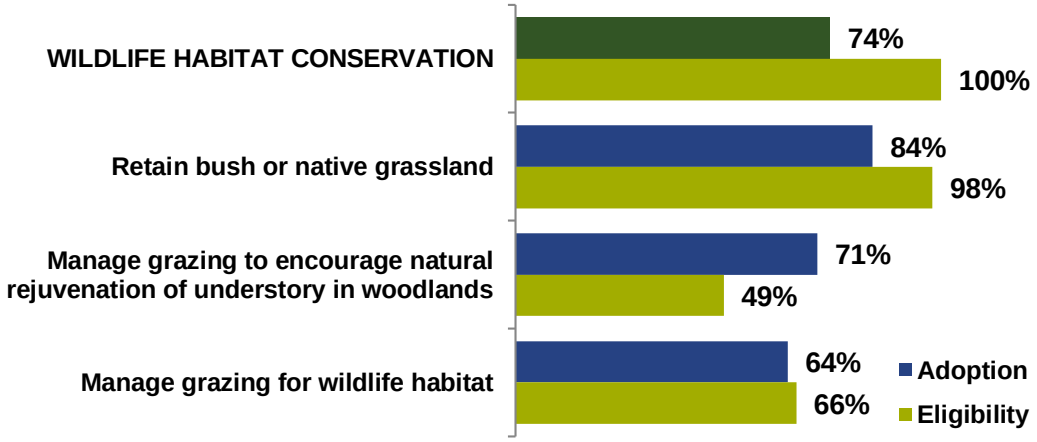
just beginning or maintaining their size (54% vs. 70%).

Wildlife Habitat Conservation Practices Summary

The graph below summarizes the adoption of each wildlife habitat conservation practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of AF on practice adoption, should also be considered in prioritizing areas for focus.

Adoption of wildlife habitat conservation practices is high overall – at 74%, essentially tied with water quality and quantity for top spot. The adoption trend for this agri-environmental risk area is slowly increasing.

Of the three specific practices, retaining bush or native grassland tops 80%. Managing grazing to encourage natural rejuvenation of understory in woodlands is more widely adopted than managing grazing for wildfire habitat. Eligibility ranges from near universal to moderate.



GRAZING MANAGEMENT PRACTICES

The environmental benefits of well managed pasture and riparian areas (green vegetated areas adjacent to a creek, stream, or river), include reduced soil erosion; improved air and water quality; better plant diversity, vigor and production; and, improved fish and wildlife habitat.

Grazing Management Practices ESA Adoption Score

The grazing management average ESA adoption score just trails the top three practice areas 70% and is also consistent with past measures.

Adoption Rate			
2018	2016	2014	2012
70%	71%	70%	69%

Adoption levels for both grazing management practices are good – around the 70% mark – while eligibility levels are moderate.

Adoption of grazing management practices is significantly *higher* on operations where:

- Gross farm sales are greater than $250K compared to less than $50K; and
- The producer has completed the Environmental Farm Plan process (88%), taken part in in the Working Well program (82%), participated in an environmental agriculture training program, workshop or seminar (81%) or worked with AF/Municipal staff (87%).

Grazing Management Practices Adoption Score by Farm Operations Characteristics

Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
63%	71%	69%	74%	68%	61%↓	73%	75%↑

Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
64%	72%	72%	68%	74%	69%

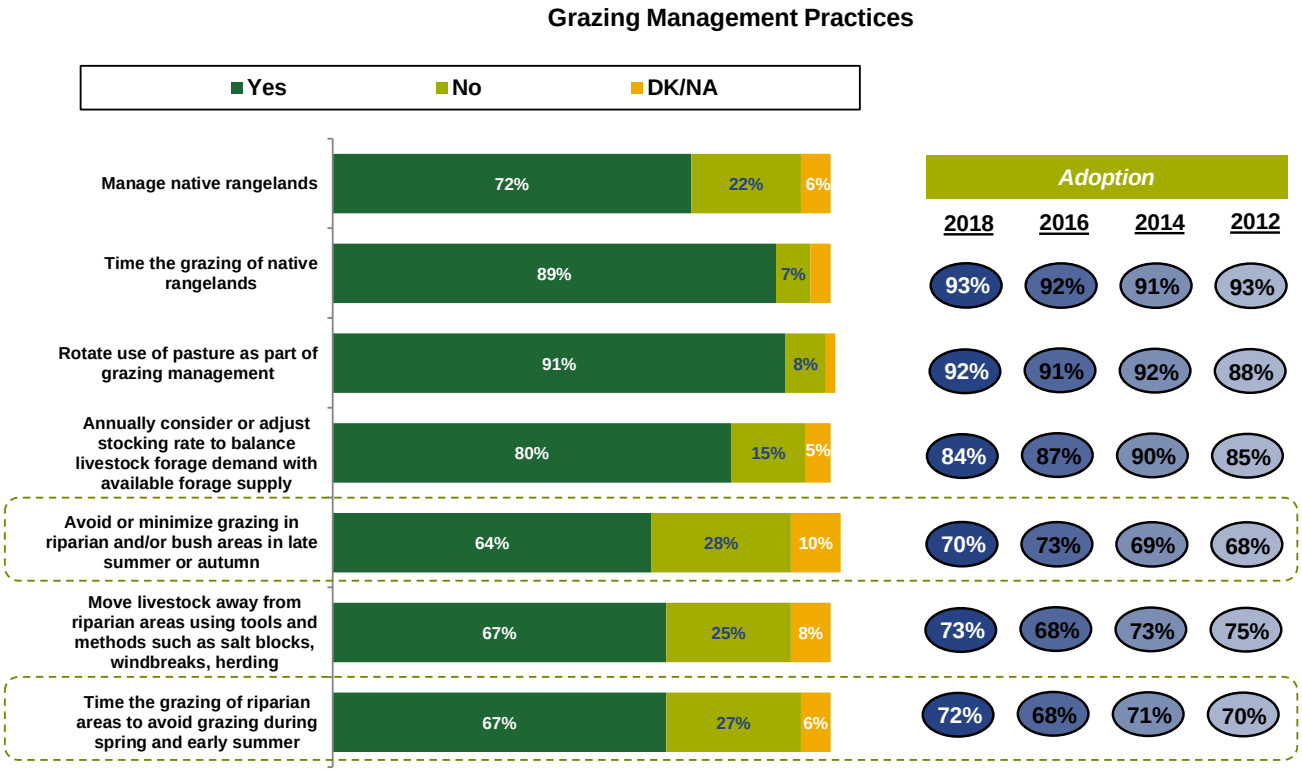
Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
76%	68%	81%↑	67%	78%↑	58%	78%↑	65%	82%↑	66%	87%↑	64%

Grazing Management Practices

The six grazing management practices are:

- ***Rotation of pastures to prevent over use*** (not a performance measure);
- ***Adequate forage based on actual requirements*** (not a performance measure);
- ***Grazing native rangeland during vulnerable periods*** (not a performance measure);
- ***Protect riparian areas from grazing to prevent over use***: *Move livestock away from riparian areas using tools and methods such as salt blocks, windbreaks and herding* (not a performance measure) and *Avoid or minimize grazing in riparian and/or bush areas in the late summer or autumn*; and,
- ***Time grazing to avoid vulnerable times of year for riparian areas (during spring and early summer)***.

Adoption of several grazing management practices is quite high – 89% of those that manage native rangelands say they time the grazing of native rangelands (i.e. *grazing native rangeland during vulnerable periods adoption is 93%*), 91% of operations that graze livestock indicate they rotate use of their pastures as part of their grazing management (i.e. *rotation of pastures to prevent over use adoption is 92%*) and 80% annually consider or adjust their stocking rate to balance livestock forage demand with the available forage supply (i.e. *adequate forage based on actual requirements adoption is 84%*).



Base: Graze livestock (n=329) (Other than time the grazing of native rangelands (n=237))
Q31. Which of the following do you typically do on your farm?

Adoption of practices related to the protection of riparian areas is good but comparatively lower. Roughly two-thirds (67%) say they move livestock away from riparian areas using tools and methods such as salt blocks, windbreaks and herding (adoption is 73%).

Adoption scores for the two performance measures related to riparian areas are good at 70% for *protect riparian areas from grazing to prevent over use* (i.e. avoid or minimize grazing in riparian and/or bush areas in the late summer or autumn) and **72% for *time grazing to avoid spring and early summer***.

Adoption of *avoiding grazing in riparian and/or bush areas in the late summer or autumn* is significantly higher in the Central (75%) and Northwest (74%) regions compared to the South (55%); on livestock operations (75%) vs. mainly crop production (60%); and where the producer has taken one of the many AF programs.

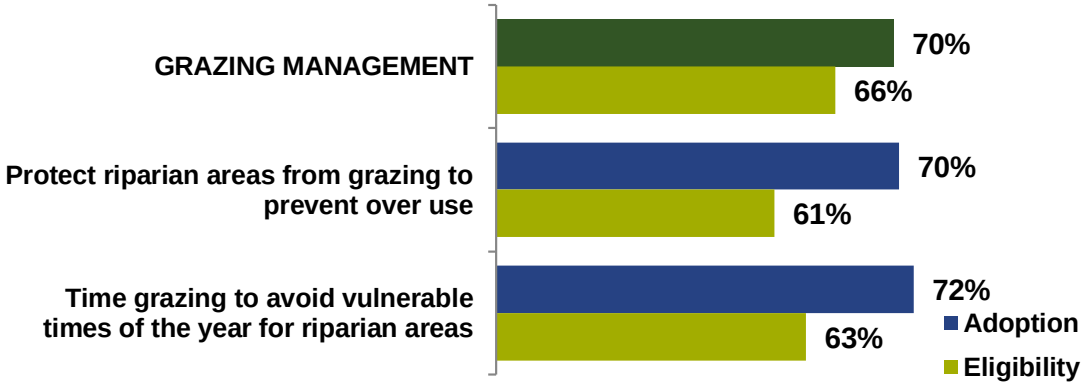
Adoption of *time grazing to avoid spring and early summer* is significantly *higher* among operations where the producer has used the Working Well program (85%) or worked with AF/Municipal staff (85%).

Grazing Management Practices Summary

The graph below summarizes the adoption of each grazing management practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of AF on practice adoption, should also be considered in prioritizing areas for focus.

The grazing management average ESA adoption score just trails the top three practice areas 70% and is also consistent with past measures.

Adoption levels for both grazing management practices are good – around the 70% mark – while eligibility levels are moderate.



MANURE MANAGEMENT PRACTICES

Manure management practices involve handling manure in the most efficient and environmentally sound means possible. Most of these practices involve managing manure from the source to the end use – typically utilization by crops.

Manure Management Practices ESA Adoption Score

The ESA adoption score for the 11 manure management performance measures is also in the top tier at 71%.

Adoption Rate			
2018	2016	2014	2012
71%	69%	76%	75%

Adoption in 2018 has recovered slightly from a significant decline in 2016. This is largely due to the removal of the practice 'extend the grazing season' which had the highest adoption (94%) and highest eligibility (54%) of the 12 manure management performance measures assessed in 2014. In this new measurement without 'extend the grazing season' the 2018 results track very well with the 2016 results.

Adoption of manure management practices is significantly *higher* on operations:

- With more than $50K in Gross Farm Sales (73% or 75% compared to 65%); and
- Where the producer has worked with AF or Municipal staff (76%)

Manure Management Practices Adoption Score by Farm Operations Characteristics

Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
73%	70%	71%	75%	64%	65%↓	73%↑	75%↑

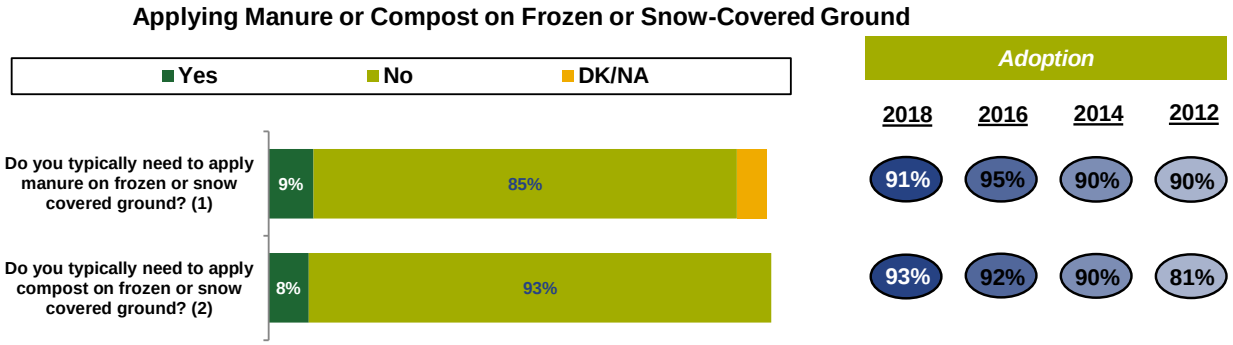
Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
72%	70%	69%	72%	73%	68%

Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
73%	71%	76%	70%	73%	68%	74%	69%	71%	71%	76%↑	69%

Avoid Applying Manure or Compost on Frozen or Snow-Covered Ground

Incidence of applying manure or compost on snow covered ground is low.

Among those who applied liquid or solid manure or compost in 2017, just 10% said they typically need to apply manure on frozen or snow-covered ground.



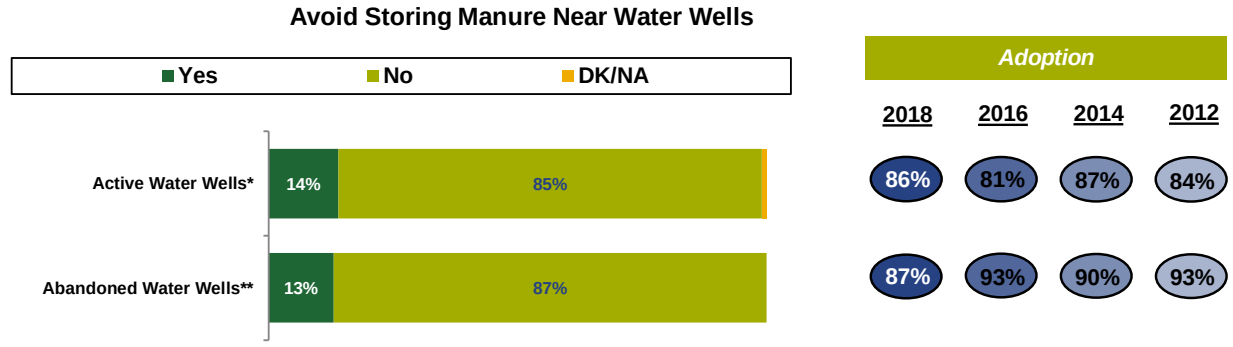
[1]Base: Applied liquid or solid manure to land in 2017 (n=214) /
[2]Base: Applied compost to land in 2017 (n=57*) *Caution: Small base size

Adoption scores are very high – 91% for *avoid applying manure on frozen or snow-covered ground* and 93% for *avoid applying compost on frozen or snow covered ground*.

Avoid Storing Manure near Water Wells

Few operators report storing manure near water wells.

On operations with active water wells, 14% of respondents said they stored manure within 100 meters the wells and on operations with abandoned water wells that have not been plugged, capped or sealed, 13% said they stored manure within 100 meters of the wells.

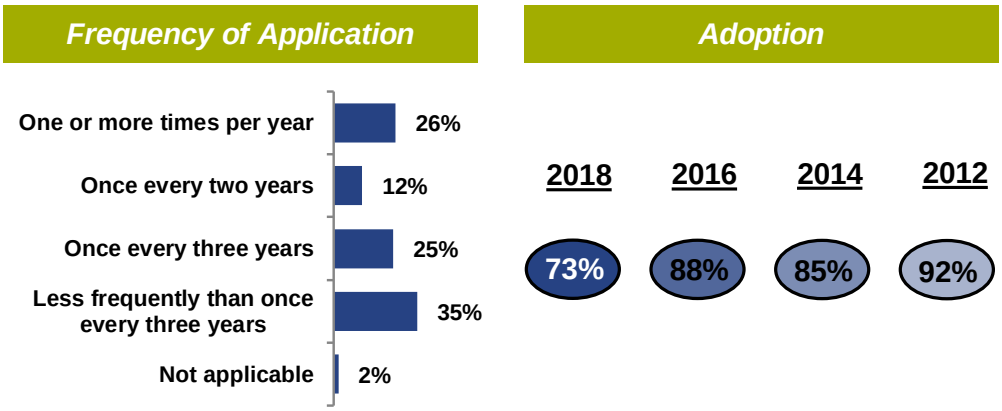


*Base: Store manure and have active water wells (n=160) /
**Base: Store manure and have abandoned, inactive or unused water wells (n=41*) *Caution: Small base size
Q39. Did you store manure (liquid, solid or compost) within 100 m of…?

Adoption of the practice '*avoid storing manure near abandoned water wells'* has declined since 2016 to 87% from 93%; while adoption of the practice '*avoid storing manure near active water wells'* has increased from 2016 to 86% from 81%.

Frequency of Application

The practice of applying manure more frequently than once every two years has increased significantly since 2016, up from 12% to 26% of producers. **This increase in application frequency has affected the adoption score for this practice and it has declined significantly to 73%.**



Base: Applied manure to land in 2017 (n=226).
Q40. On the fields that you have applied manure, how frequently do these fields typically receive manure?

Incorporate Manure after Applying

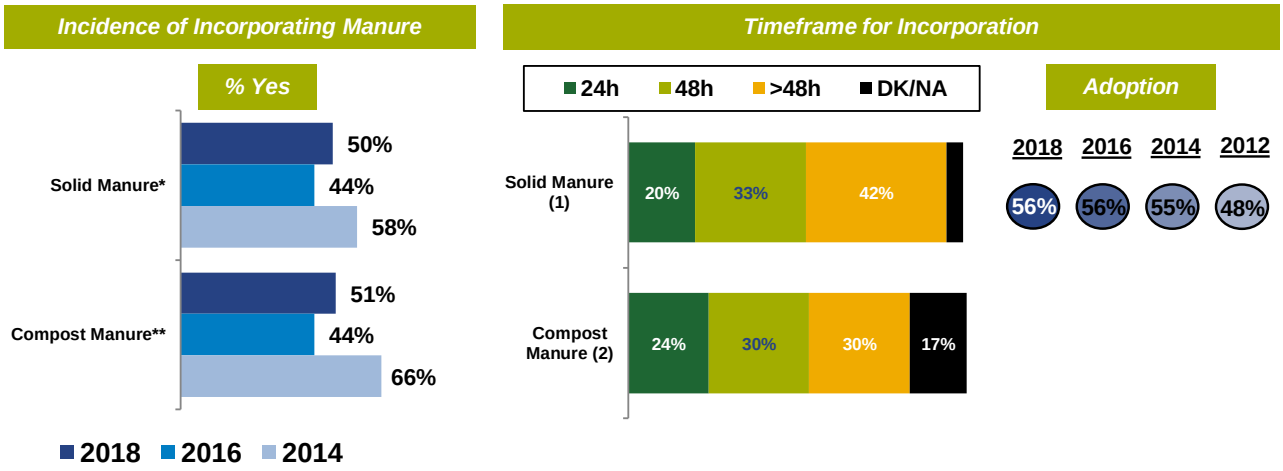
Many operators do not incorporate manure within the optimal timeframe.

Operators who applied solid manure or compost manure in 2017 – on annually cropped fields that are not direct seeded –and said they typically incorporate manure after applying increased in 2018 from the 2016 results; likely a move back to more normal trends after a decline in 2016.

Among those who incorporate manure, just over half report incorporating solid manure (53%) or compost manure (54%) within 24 or 48 hours.

The adoption score for *incorporate manure after applying* (i.e. solid manure) is moderate at 56%. Although more producers are incorporating manure, the timeframe for incorporation has not improved.

Incorporate Manure After Applying

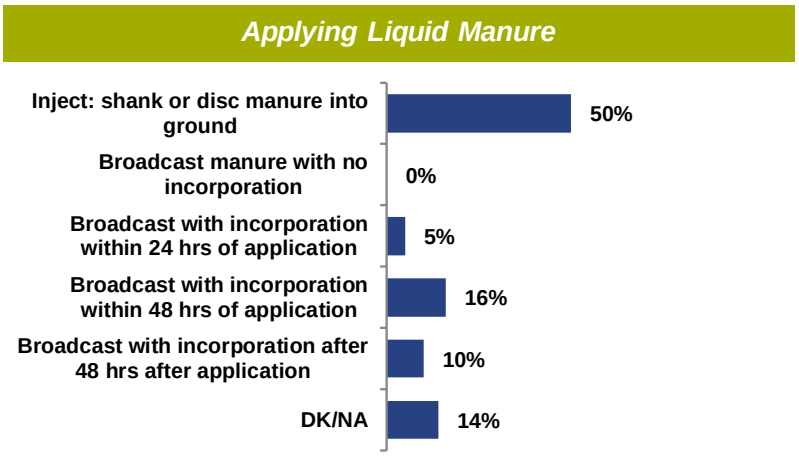


*Base: Applied solid manure in 2017 (n=208) /
**Base: Applied compost manure in 2017 (n=57*) *Small Base Size
Q41. On annually cropped fields that are not direct seeded, do you typically incorporate…?

[1]Base: Typically incorporate solid manure (n=103) /
[2]Base: Typically incorporate compost manure (n=32*) *Small Base Size
Q42. Do you typically incorporate solid/compost manure within 24 hours, 48 hours or greater?

Applying Liquid Manure

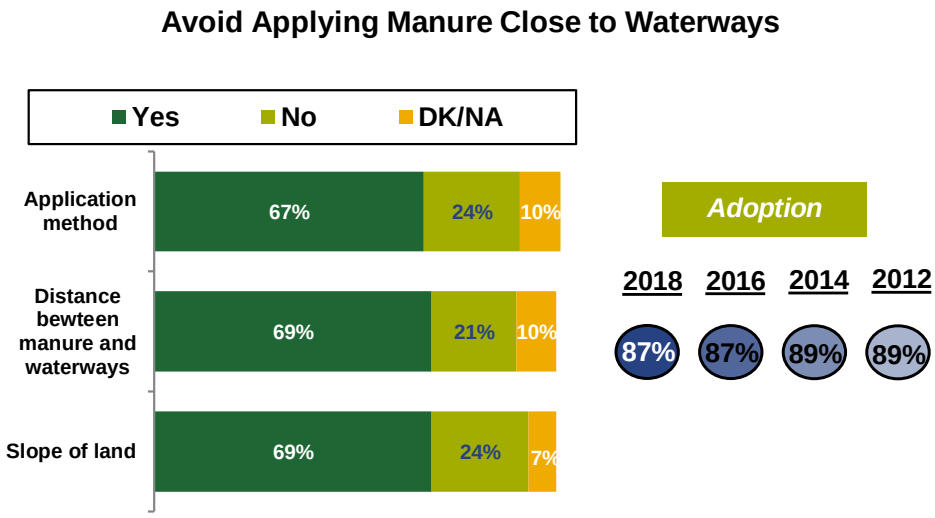
Just 3% of operations applied liquid manure to their land in 2017, down from 4% in 2015. Among them exactly half indicated that they typically inject the manure into the ground, and only 10% broadcast with incorporation after 48 hours.



Base: Applied liquid manure in 2017 (n=16*). *Small Basse Size
Q43. Thinking of liquid manure do you typically…?

Avoid Applying Manure Close to Waterways to Minimize Increased Nutrients Runoff

Among operators who applied manure to their land in 2017, 67% indicated they typically consider the application method, 69% the distance between manure and waterways and 69% the slope of land when applying either solid or liquid manure.



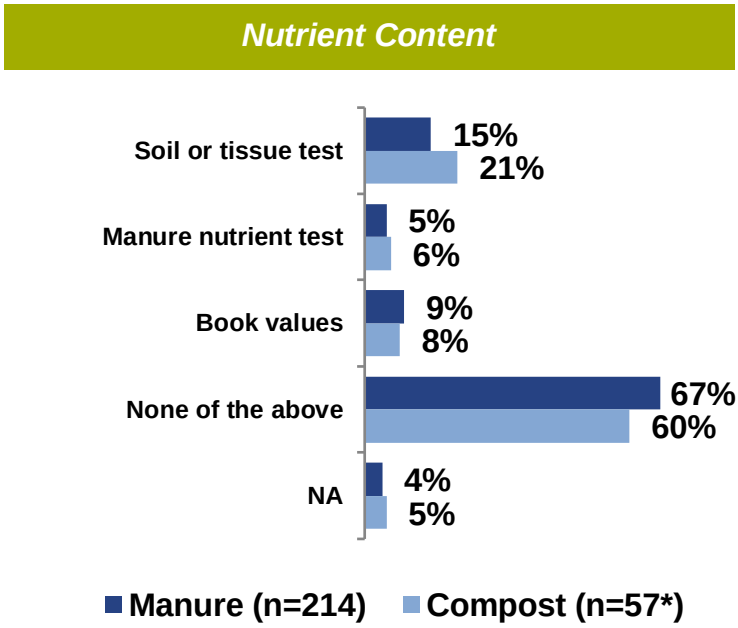
Base: Applied manure to land in 2015 (n=226)
Q44. Do you typically take into account any of the following factors when applying either solid or liquid manure?

The adoption score for *avoid applying manure close to waterways to minimize increased nutrients runoff* (i.e. considering at least one of the three factors when applying manure) is strong at 87%.

Sampling and Analyzing the Manure for Nutrient Content

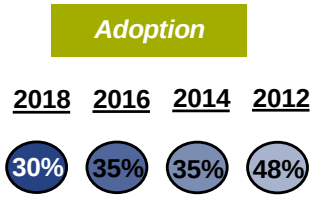
Sampling and analyzing manure for nutrient content lags other manure management practices in adoption.

Roughly one-third of operators who applied liquid or solid manure in 2017 said they typically apply manure based on a soil or tissue test (17%), manure nutrient test (3%) or book values (15%). Similar findings are observed for sampling and analyzing compost for nutrient content.



Base: Applied liquid or solid manure or compost to land in 2017.
Q45. Do you typically apply manure/compost based on the following?

The adoption score for sampling and analyzing manure for nutrient content is 30% - down from 2016 (this is not a performance measure).

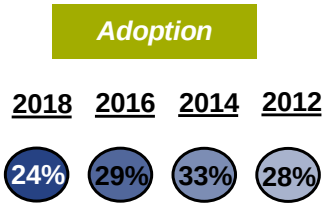


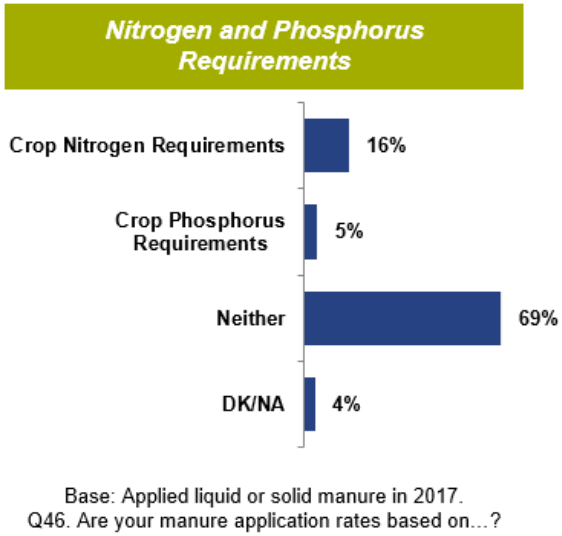
Adoption is significantly *higher* when the producer has environmental agriculture training or has taken part in the Environmental Farm Plan process (31%), the Growing Forward Water Management program (34%) or the Working Well program (36%) compared to those who have not take part in these programs.

Manure Application Based on P or N&P

Incidence of applying manure based on crop phosphorus or crop nitrogen requirements is extremely low and trending downward.

Among operators who applied liquid, solid or compost manure in 2017, only 20% say they typically base their manure application rates on crop nitrogen (16%) or crop phosphorus (5%) requirements.



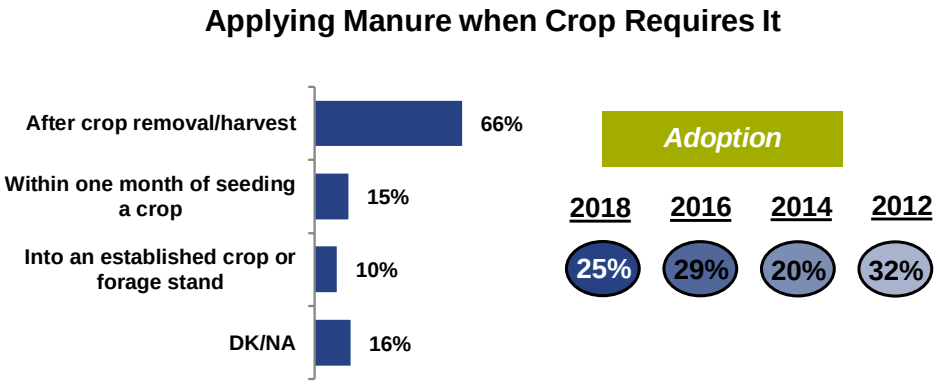


Base: Applied liquid or solid manure in 2017.
Q46. Are your manure application rates based on…?

The adoption score for manure application based on P or N&P is 24%. Adoption is significantly *higher* on operations where the operator has completed the Environmental Farm Plan process (33%), taken part in the Growing Forward Stewardship program (39%), a degree (40%) or has worked with AF/Municipal staff (43%). Adoption is also significantly higher on operations that are expanding (44%).

Applying Manure when Crop Requires It

Most operators do not apply manure at the optimal time.



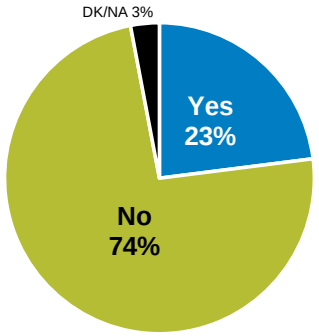
Base: Applied liquid or solid manure or compost to land in 2017. (n=226)
Q47. Do you typically time manure application within one month of seeding a crop, into an established crop or forage stand or after crop removal or harvest?

When asked when they typically time manure application, two-thirds (66%) say 'after crop removal/harvest', while very few use the preferred practices of within one month of seeding a crop' (15%) or 'into an established crop or forage stand' (10%). **The adoption score for applying manure when the crop requires it is low at 25%.** This practice is **not an ESA performance measure**.

Keeping Manure Records

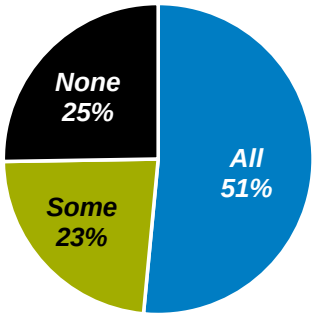
23% of operators who applied manure in 2017 indicated they typically manage more than 500 tonnes of manure per year. Among them, three-quarters say they typically keep records detailing the amount and field location where the manure I spread for *all* (51%) or *some* (23%) of their fields. **The adoption score for keeping manure records is moderate at 75% - but has significantly increased from 2016.**

Manage >500 Tonnes of Manure/Year



Base: Applied liquid, solid or compost manure to land in 2017 (n=226)
Q48. Do you typically manage – that is, receive or produce – more than 500 tonnes of manure per year?

Keeping Manure Records



Adoption

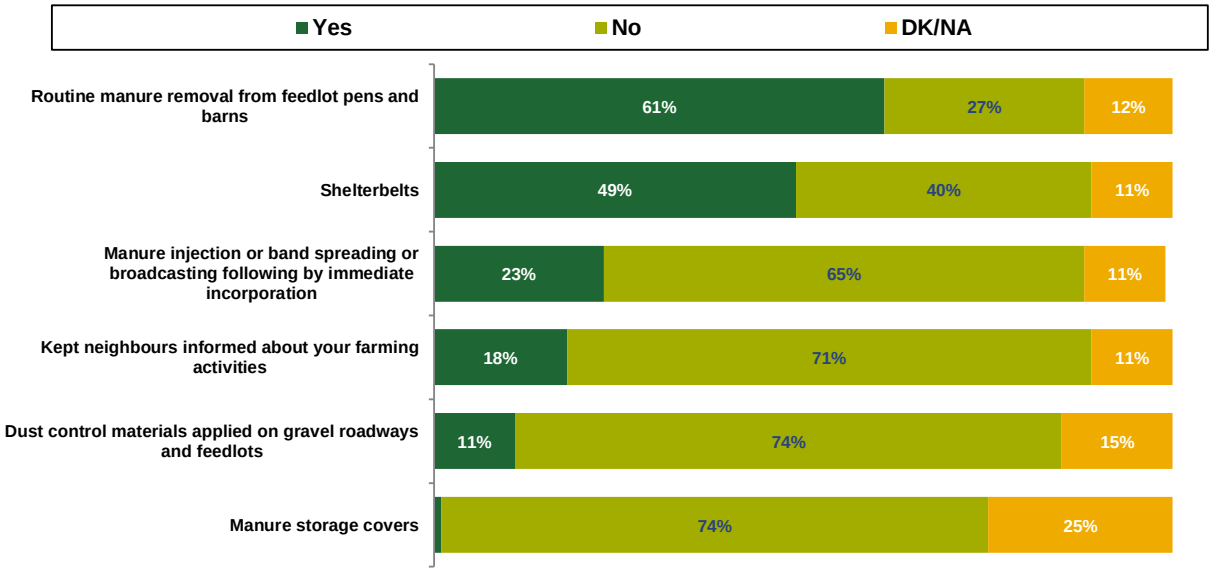
2018	2016	2014	2012
75%	61%	66%	69%

Base: Typically manage more than 500 tonnes of manure per year (n=50*) *Small base size
Q49. Do you typically keep records detailing the amount and field location where the manure is spread for all, some or none of your fields?

Managing Odour and Dust

Operators who stored manure on their farm in 2017 were asked if they used any of eight specific practices to manage odour or dust. The most common practices adopted were the routine removal of manure from feedlot pens or barns (61%) and use of shelterbelts (49%).

Managing Odour and Dust



Base: Stored manure on-farm in 2017 (n=185)
Q50. In 2017, did you use any of the following practices to manage odour or dust from your farm?

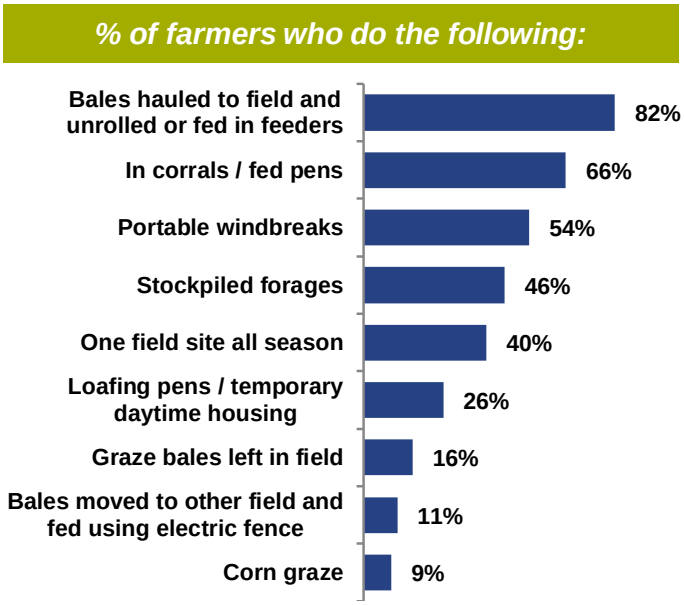
In the 2018 survey we changed the wording from “frequent manure removal” to “routine manure removal”. As a result, this practice climbed 13% suggesting that farmers do conduct this practice on a routine basis, but they may not be conducting this practice frequently or that ‘frequently’ is a subjective term with different definitions. This increase in the practice of routinely removing manure has surpassed the use of shelterbelts.

This practice is **not an ESA performance measure**.

Winter Livestock Housing & Feeding

93% of producers who house livestock, typically house livestock outside during the winter. The most common practice of managing livestock throughout the winter is to haul bales to the field or feed in feeders, in corrals or pens and with the use of portable windbreaks.

Management of Livestock Outside in Winter



Base: Typically house livestock outside during winter (n=250).
Q51B. Thinking about livestock that are housed outside during the winter, how do you typically manage them?

Manure Management Practices Summary

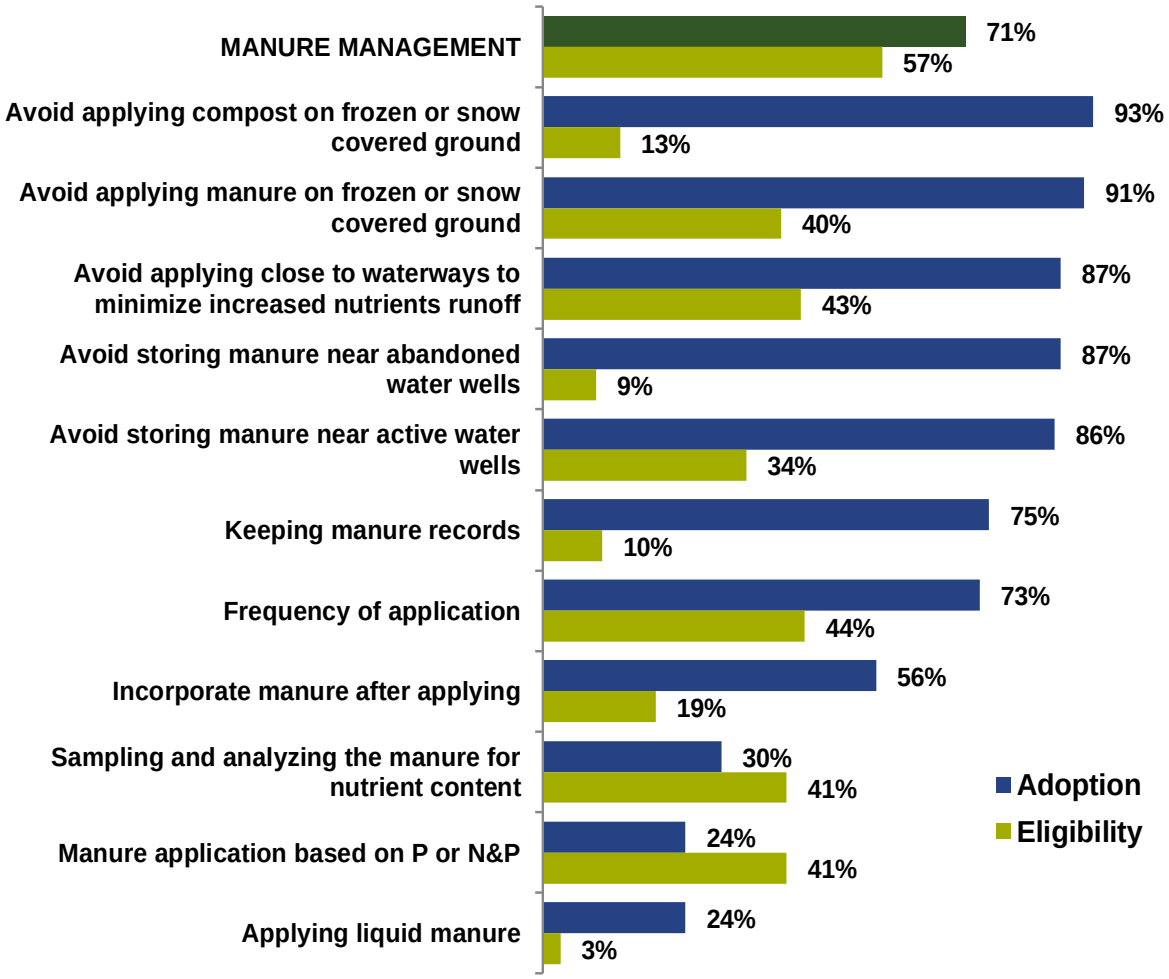
The graph below summarizes the adoption of each manure management practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use,

ease of adoption and influence of AF on practice adoption, should also be considered in prioritizing areas for focus.

The ESA adoption score for the 11 manure management performance measures is also in the top tier at 71%.

Adoption in 2018 has recovered slightly from a significant decline in 2016. This is largely due to the removal of the practice 'extend the grazing season' which had the highest adoption (94%) and highest eligibility (54%) of the 12 manure management performance measures assessed in 2014. In this new measurement without 'extend the grazing season' the 2018 results track very well with the 2016 results.

Adoption levels of several manure management practices are extremely high while others lag. Five manure management practices have adoption levels between 86% and 93%. Conversely, *sampling and analyzing the manure for nutrient content* as well as *manure application based on P or N&P* have low levels of adoption.


MANURE MANAGEMENT
71%
57%
Avoid applying compost on frozen or snow covered ground
93%
13%
Avoid applying manure on frozen or snow covered ground
91%
40%
Avoid applying close to waterways to minimize increased nutrients runoff
87%
43%
Avoid storing manure near abandoned water wells
87%
9%
Avoid storing manure near active water wells
86%
34%
Keeping manure records
75%
10%
Frequency of application
73%
44%
Incorporate manure after applying
56%
19%
Sampling and analyzing the manure for nutrient content
30%
41%
Manure application based on P or N&P
24%
41%
Applying liquid manure
24%
3%
Adoption
Eligibility

AGRICULTURAL WASTE MANAGEMENT PRACTICES

Agricultural waste in this study is defined as agricultural plastics (baler twine, feed bags, silage wraps and/or bale wraps) and crop protection product containers. Waste management practices involve recycling these materials.

The two agricultural waste management practices are:

- ***Recycle agricultural plastics*** *– i.e. recycle plastics such as baler twine, feed bags, silage wraps and/or bale wraps; and,*
- ***Recycle crop protection product containers*** (not a performance measure).

The adoption score for *recycle agricultural plastics* is solid at 52% (keeping on trend with 2016 and up from 41% in 2014).

Adoption Rate			
2018	2016	2014	2012
52%	53%	41%	41%

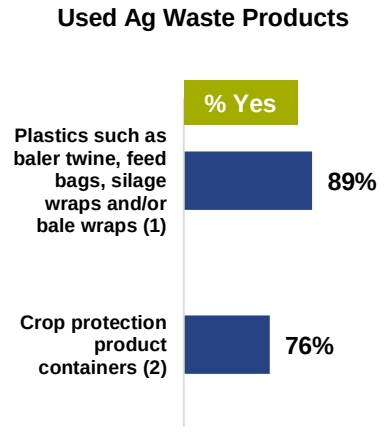
Adoption is significantly *higher* on operations that are in reduction mode compared to operations that are just beginning or maintaining their level of operations.

Agricultural Waste Management Adoption Score by Farm Operations Characteristics

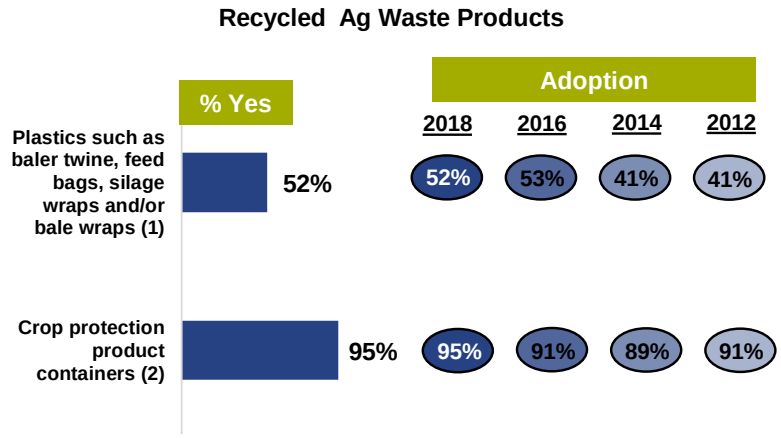
Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
44%	55%	47%	49%	67%	51%	53%	51%

Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
55%	46%	63%	46%↓	47%	62%↑

Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
50%	52%	58%	50%	55%	46%	54%	50%	58%	49%	54%	51%



[1]Base: Have livestock (n=370) /
[2]Base: Apply crop protection products (n=327)
Q52A. Please indicate if you used each of the following on your farm in 2017.



[1]Base: Have livestock & used item in 2017 (n=314) /
[2]Base: Apply crop protection products & used item in 2017 (n=242)
Q52. Please indicate if you did each of the following on your farm in 2017.

Adoption of the other agricultural waste management practice is quite high. Ninety-five percent of operators who used crop protection product containers and applied crop protection products in 2017 said they *recycled crop protection product containers*.

ENERGY AND CLIMATE CHANGE PRACTICES

For this study, energy and climate change practices involved looking at the production and use of renewable energy (solar, wind, biogas, wood, biomass), energy management practices such as the usage of sub-meters and participation in the Alberta Carbon offset market.

Energy and Climate Change Practices ESA Adoption Score

The average ESA adoption score for energy and climate change practices is 15% – on trend with 2016 but both years are down significantly from 2014 and 2012 - the lowest adoption rate of the eight practice areas assessed.

Adoption Rate			
2018	2016	2014	2012
15%	16%	23%	21%

Adoption of energy and climate change practices is low across the board, though significantly *higher* in:

- Operations in the Peace (20%) region compared to in the Northwest or South regions of the province
- Operations where gross farm sales were $250K or more in 2017 (22%);
- Expanding (22%) operations; and,
- Operations where the producer has taken part in any of the following:
  - Environmental Farm Plan process (19%)
  - Growing Forward Stewardship program (21%)
  - Growing Forward Water Management program (22%)

  - The Energy Management program (27%)
  - Working Well Program (19%)
  - Environmental agriculture training, workshop or seminar is past 2 years (20%)
- Operations where the producer has worked with AF/Municipal staff (22%)

Energy and Climate Change Practices Adoption Score by Farm Operations Characteristics

Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
12%↓	16%	16%	11%↓	20%↑	13%↓	11%↓	22%↑

Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
19%↑	11%↓	12%	14%↓	22%↑	14%↓

Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
18%	14%	20%↑	14%	18%↑	10%	19%↑	13%	19%↑	14%	20%↑	13%

Energy Saving Practices and Renewable Power

Adoption of *energy saving practices* has now been divided into two questions, specifically asking about separate electricity meters and separate gas meters. **Adoption of *energy saving practices* is extremely low at between 8 and 10% - on trend with 2016**

The adoption of separate electricity meters is significantly *higher* in operations that are expanding (18%), that grow mainly crops (16%) and that have participated in either the Growing Forward Stewardship program (19%) or Energy Management program (19%).

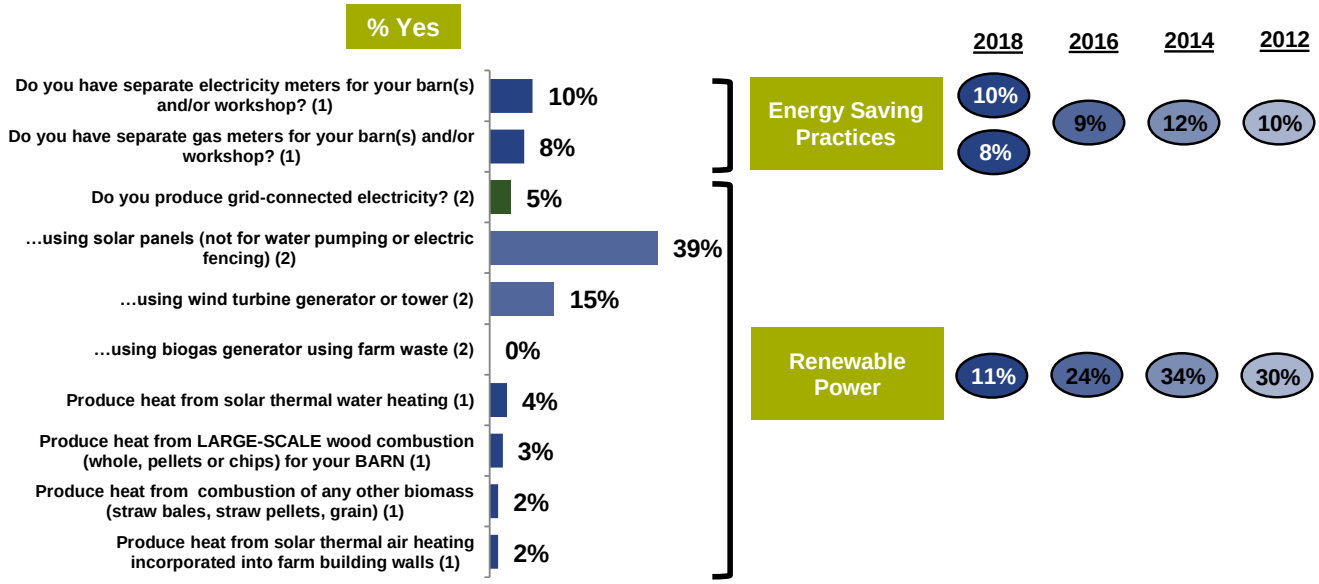
The adoption of separate gas meters is significantly lower in the Northeast, where virtually no operations have separate gas meters compared to other regions in the province. Whereas, adoption is significantly higher on operations with greater than $250K in gross farm sales (15%), on operations that are just being established or are maintaining their current production (11%), that grow mainly crops (10%) and that have participated in the Energy Management program (18%), have participated in the EFP process (12%) or on operations where the producers have a degree/diploma (13%).

Adoption of the *renewable power* practice is also low at 11% – further adoption is down significantly from 24% in 2016. Adoption is based on using one of seven renewable energy methods to produce grid-connected electricity or heat.

In 2018, the question about wood combustion to specifically state "large-scale wood combustion for the barn" compared to simply "wood-combustion" in 2016. This change is reflected in the results, as likely in 2016 and previously respondents would have included smaller scale wood combustion for their homes or workshops, and in 2018 this dropped significantly from 21% in 2016.

Using solar panels (39%) is by far the most adopted practice and jumped 30% since 2016, from 9% to 39% this year. This growth in adoption rate may be a direct result of AF's funding of farm solar panels (total of $500,000 in funding) that was announced in 2016.

Energy Saving Practices and Renewable Power



[1]Base: All Respondents (n=500) /
[2]Base: Produce grid – connected electricity (n=26) *small base

Participate in Carbon Credit Trading

23% of all respondents are currently participating in the Alberta Carbon Offset Program, an increase from 2016.

There are, however, numerous significant differences by farm operations/operator characteristics. Participation is significantly *higher* on operations:

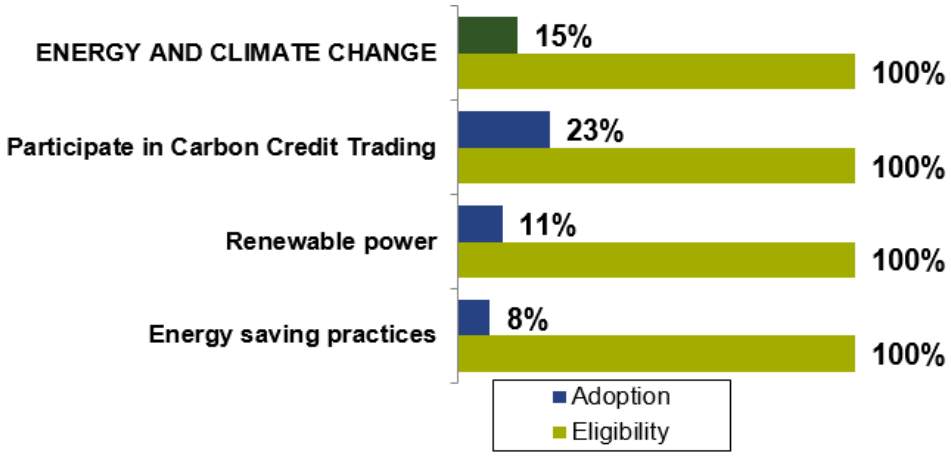
- In the Central (29%), Northeast (26%) and Peace (34%) regions compared to the South and Northwest regions of the province
- With gross farm sales of $250K or more (37%);
- Where the main source of revenue is crops (32%) compared to livestock;

- Where the producer has environmental agriculture training (32%) or has taken part in an AF program in the past five years – specifically, completed the Environmental Farm Plan process (28%).

Energy and Climate Change Practices Summary

The graph below summarizes the adoption of each energy and climate change practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of AF on practice adoption, should also be considered in prioritizing areas for focus.

Adoption levels of both energy saving practices as well as carbon credit trading are very low, with the utilization of sub-meters at only 10% (electricity) and 8% (gas). Eligibility for all three practices is universal so there is plenty of room for improvement.



Increasing adoption of energy saving practices perhaps has the **greatest potential** given the dual benefits of cost savings as well as a positive impact on the environment. Growth in the adoption of solar panels for the farm has shown that AF's initiatives have encouraged adoption of these practices, but there is more opportunity to improve.

Increasing adoption of carbon credit trading has also occurred over the past two years, in absolute terms nearly double the number of operators are participating in 2018.

GENERAL PRACTICES

For this study, general environmentally sustainable practices involved the use of variable rate technology, completing the Environment Farm Plan process, soil sampling, and, planting and removing trees.

General Practices ESA Adoption Score

The average ESA adoption score for general practices is low at 36% – a significant decline from 2016. The reason for this decline is the way in which we asked about planting trees for agricultural purposes.

Adoption Rate			
2018	2016	2014	2012
36%	42%	44%	44%

In 2018 we asked specifically if farmers had planted trees for agricultural purposes, giving examples. Those who said yes, were marked as having adopted this practice. In 2016 farmers were asked if they planted trees, and then if they answered yes, they were asked for what purpose and were provided a list to check off. If they checked any reason on the list, then they were considered to have adopted the practice, whether they believed it was for agricultural purposes or not. This change has had a significant impact in the adoption rate because the 2018 results are based on the total respondent population and not a subset.

Overall adoption of general practices is significantly *higher* in:

- The South (40%) versus the Northwest region of Alberta (32%);
- Larger operations where gross farm sales were $250K or more (48%) versus smaller operations;
- Expanding (45%) and beginning or maintaining (38%) operations;
- Operations where the producer has an agriculture degree or diploma (46%) or has attended an environmental agriculture training program, workshop or seminar in the past two years (50%); and,
- Operations where the producer has taken part in an AF program in the past five years (44%) – this holds true for both the Working Well Program (44%), Growing Forward Stewardship (50%), Growing Forward Water Management (46%) or the Energy Management (52%) programs and working with AF or Municipal staff (56%) – or, has completed the Environmental Farm Plan process (54%).

General Practices Adoption Score by Farm Operations Characteristics

Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
40%↑	37%	32%↓	36%	34%	24%↓	37%↑↓	48%↑↑

Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
45%↑	30%↓	41%↑	38%↑	45%↑	30%↓

Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
46%↑	33%	50%↑	33%	44%↑	23%	54%↑	23%	44%↑	33%	46%↑	32%

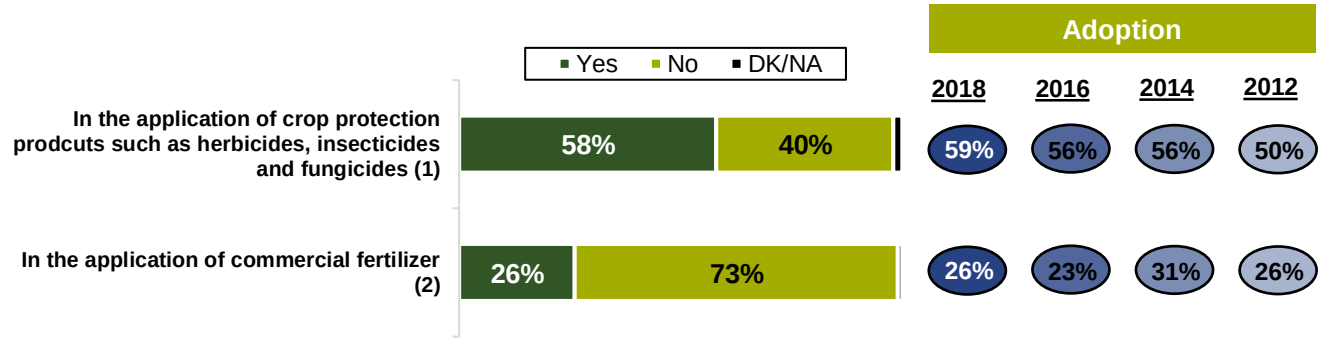
↑ indicates a number is significantly higher and ↓indicates the number that is significantly lower. ↑ Red arrows are included to distinguish an additional statistical difference in the same category.

Precision Farming: Variable Rate Technology

Use of variable rate technology is low, particularly in the application of commercial fertilizer.

Among those who applied crop protection products just under 60% say they utilized variable rate technology – this drops to 26% for the application of commercial fertilizer.

Precision Farming: VRT



[1]Base: Applied crop production products (n=329) / [2]Base: Applied commercial fertilizer (n=347)
Q59. Last year, did you utilize Variable Rate Technology in the application of… ?

The adoption score for *precision farming – variable rate technology: crop protection products* is 59% while the score for *precision farming – variable rate technology: commercial fertilizer* is less than half that at 26%.

Adoption of the use of variable rate technology in the application of *commercial fertilizer* is significantly *higher* on operations where the main income source is crops (33%) as well as where the producer has taken part in the Water Well program in the past five years (33%) or an environmental agriculture program, training or workshop (37%).

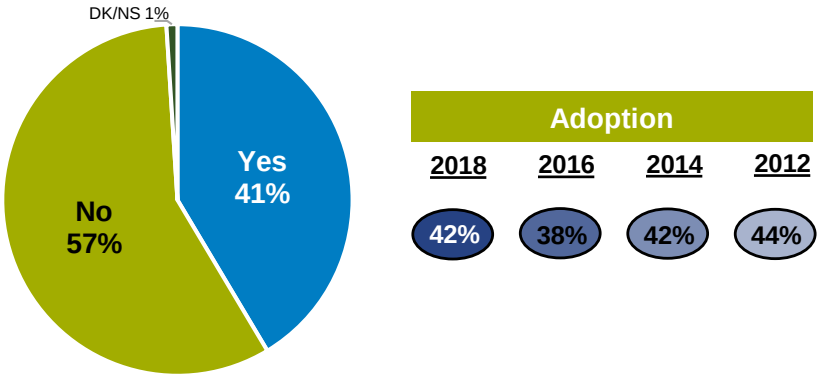
No significant differences exist regarding the adoption of the use of variable rate technology in the application of crop protection products by operation type/characteristic.

Environmental Farm Plan

Completion of the Environmental Farm Plan process is less than half.

The adoption score for this practice is 42%.

Completed the Environmental Farm Plan Process



Base: All Respondents (n=494) /
Q60. Have you completed the Environmental Farm Plan process?

Adoption varies significantly by a number of farm operations / operator characteristics, with *higher* adoption in:

- Operations where most of income comes from crops (52%);
- Larger operations – in fact, adoption increases significantly with gross farm sales, from 18% for sales of less than $50K to 40% for sales of $50K to less than $250K to 68% among operations with sales of $250K or more;
- Expanding (62%) and beginning or maintaining (44%) operations versus reducing (31%);
- Operations where the producer has an agriculture related degree or diploma (60%) or has attended an environmental agriculture training program, workshop or seminar in the past two years (62%); and,
- Where the producer has participated in an AF program in the past five years (67%) – specifically, the Growing Forward Stewardship (72%), Water (63%) or Energy (75%) Management programs, the Working Well program (58%), or has worked with AF or Municipal staff (66%).

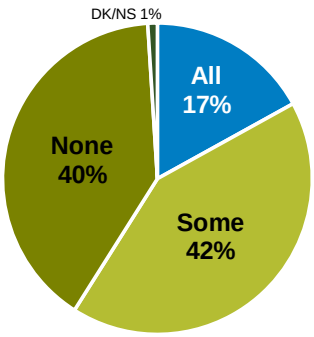
Soil Sampling Fields at Least Once Every Three Years

On operations with land used for crops, forages or hay, or improved land for pasture or grazing, over half soil sample their fields at least once every three years.

Among operators with land used for crops, forages or hay, or improved land for pasture or grazing, six-in-ten say they typically soil sample *all* (17%) or *some* (42%) of their fields, while 40% say they sample *none*. Further, over half (51%) report doing so yearly (17%) or at least once every three years (34%).

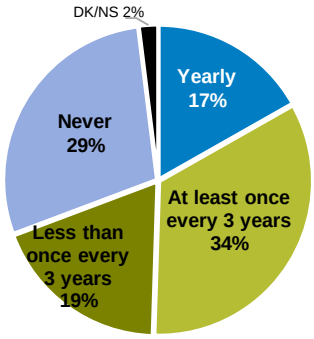
Soil Sampling Fields

Proportion of Fields Soil Sampled



Base: Land used for crops, forages or hay, or improved land for pasture or grazing (n=494) / Q62. Do you typically soil sample all, some or none of your fields?

Frequency of Soil Sampling Fields



Base: Typically soil sample all, some of none of their fields (n=482) / Q63. Do you typically soil sample your fields yearly, at least once every three years, less than once every three years or never?

Adoption

2018	2016	2014
52%	51%	51%

The adoption score for *soil sampling fields at least once every three years* is 52% - this is consistent with previous years tracked.

Adoption is significantly *higher* among operations:

- In the South (64%);
- With gross farm sales of $250K or more (76%);
- With crops as the primary source of revenue (67%);
- Those with expanding operations (75%); and,
- With a producer who has farm environmental agriculture training (75%) or has taken part in an AF program in the past five years (59%) – specifically, completed the Environmental Farm Plan process (66%), taken part in the Growing Forward Stewardship (71%), Water (70%) or Energy (73%) Management programs, or has worked with AF or Municipal staff (63%).

Trees for Agriculture Purposes

In 2018 we asked specifically if farmers had planted trees for agricultural purposes, giving examples. Those who said yes, were marked as having adopted this practice. In 2016 farmers were asked if they planted trees, and then if they answered yes, they were asked for what purpose and were provided a list to check off. If they checked any reason on the list, then they were considered to have adopted the practice, whether they believed it was for agricultural

purposes or not. This change has had a significant impact in the adoption rate because the 2018 results are based on the total respondent population and not a subset.

15% of operator's report having planted trees on their farm in the past two years specifically for agriculture purposes.

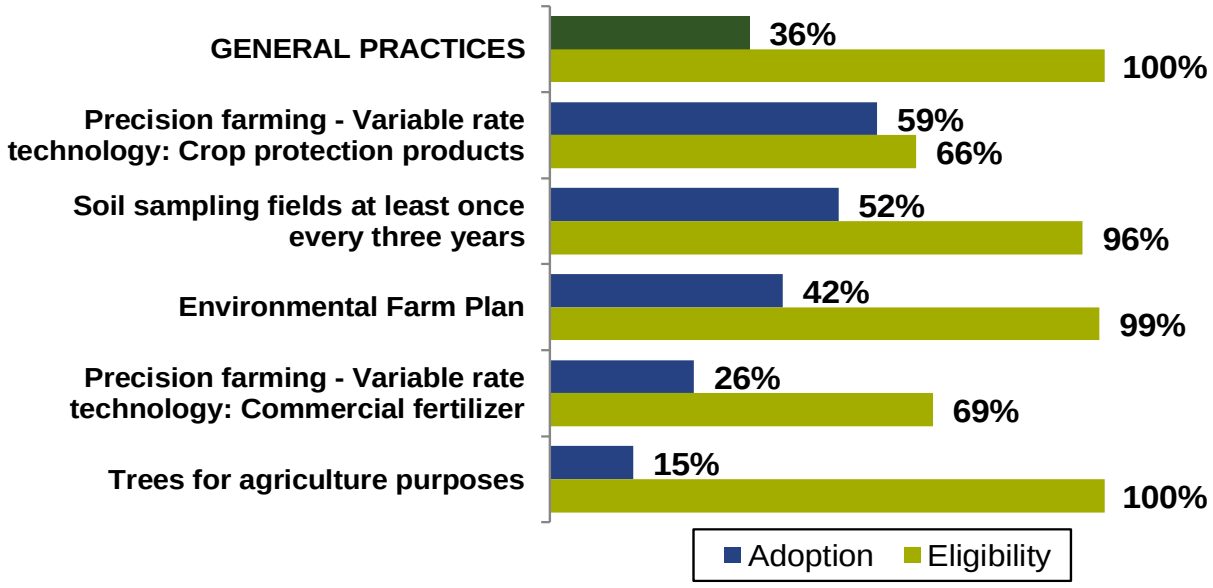
General Practices Summary

The graph below summarizes the adoption of each general practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of AF on practice adoption, should also be considered in prioritizing areas for focus.

Adoption levels of the five practices included in 'general practices' are variable – ranging from just under 60% to 15%; while eligibility for many of the practices is nearly universal. With adoption of EFPs at 42%, there is an opportunity for AF to improve. In 2018, farmers were not asked why they have not completed an EFP, but previous results suggest that there is a lack of understanding/information as to its purpose and the benefits it could provide farmers.

With regard to Precision Agriculture, in addition to helping farmers manage crop input costs while at the same time optimizing yields, the ag industry recognizes Precision Ag can play a key role in terms of environmental sustainability – in particular water quality management. The adoption of precision agriculture for the application of crop protection products is more than double that of using the technology to apply commercial fertilizer.

Planting trees for agricultural purposes was asked more specifically than in the past, having a significant impact on the adoption rate in 2018; albeit a more realistic one.



DECISION MAKING SUPPORT RESOURCES AND TOOLS

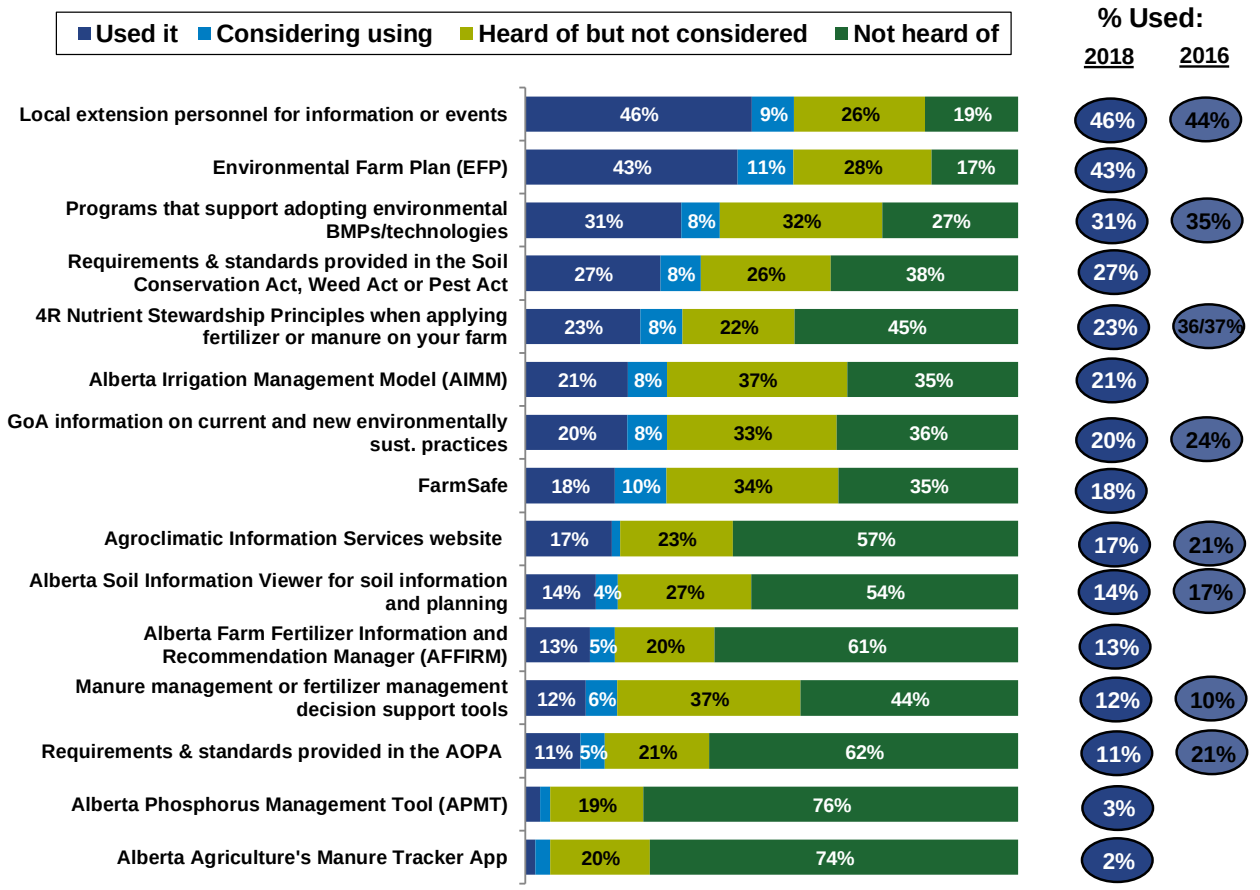
For the first time in 2016, operators were asked about their awareness and usage of 11 decision making support resources and tools that focus on projects, programs and services delivered by the Environmental Stewardship Branch (ESB) – this question was asked again in 2018 and includes some new resources and tools.

The most used resources and tools are local extension personnel and the Environmental Farm Plan. In 2016 local extension personnel were also the most used resource by operators.

The least used are the Alberta Phosphorus Management Tool (APMT) and Alberta Agriculture's Manure Tracker App[2] with less than 5% participation and the weakest awareness levels.

Overall, use of these resources and tools to make management decisions has trended steadily since 2016.

[2] Alberta Agriculture's Manure Tracker App is a new tool that was released only to a small number of operators at the end of 2017.



Base: All respondents (n=500)

Q12_NEW. For each of the following, please tell me which statement best describes how familiar you are with it or if you've used it to help you make management decisions. Would you say, you have not heard of it, you have heard of it but haven't considered using it, you are considering using it, or you have used it?

It is notable that use of almost all resources and tools evaluated is significantly higher on operations where the producer has an agriculture degree or diploma or has attended a farm conservation training program, workshop or seminar in the past two years. There are also interesting differences by region and gross farm sales.

Use of Decision Making Support Resources and Tools by Farm Operations Characteristics

	Region					Gross Farm Sales			Degree or Diploma		AF Program	
% Have Used It	South	Central	NE	NW	Peace	<$50K	$50K to <$250K	$250K+	Yes	No	Yes	No
Local extension personnel for information or events	43%	43%	42%	49%	57%	**32%↓**	**44%↓**	**60%↑**	**59%↑**	41%	**59%↑**	24%
Environmental Farm Plan	45%	44%	34%	46%	42%	**21%↓**	**42%↑↓**	**66%↑↑**	**64%↑**	36%	**65%↑**	7%
Programs that support adopting environmentally BMPs/technologies	29%	34%	28%	33%	26%	**21%↓**	**29%↓**	**44%↑**	**40%↑**	28%	**45%↑**	8%
Requirements & standards provided in the Soil Conservation Act, Weed Act or Pest Act	25%	28%	26%	26%	29%	**18%↓**	**29%**	**34%↑**	**43%↑**	21%	**36%↑**	13%
4R Nutrient Stewardship Principles when applying fertilizer or manure	16%	27%	22%	20%	26%	**10%↓**	**16%↓**	**41%↑**	**39%↑**	17%	**31%↑**	9%
AIMM tool when irrigating	22%	0%	0%	0%	0%	0%	22%	26%	34%	11%	28%	6%
GoA information on current and new environmentally sust. practices	22%	21%	17%	**15%↓**	**30%↑**	**10%↓**	**24%↑**	**27%↑**	**30%↑**	17%	**29%↑**	6%
FarmSafe	15%	20%	**21%↑**	**11%↓**	20%	13%	17%	23%	**29%↑**	14%	**22%↑**	11%
Agroclimatic Information Services website	15%	18%	14%	18%	25%	**11%↓**	17%	**24%↑**	**26%↑**	14%	20%	13%
Alberta Soil Information Viewer	10%	13%	14%	16%	20%	**10%↓**	**11%↓**	**21%↑**	**25%↑**	11%	**20%↑**	6%
AFFIRM	9%	12%	16%	14%	17%	11%	**8%↓**	**19%↑**	18%	11%	16%	8%
Manure & fertilizer management decision support tools	9%	10%	20%	9%	19%	8%	12%	17%	**20%↑**	9%	16%	6%
Requirements & standards provided in AOPA or the Soil Conservation Act	7%	13%	12%	8%	15%	**4%↓**	**12%↑**	**17%↑**	**22%↑**	8%	**15%↑**	4%
Alberta Phosphorus Management Tool	5%	2%	2%	3%	4%	1%	3%	5%	**6%↑**	2%	**4%↑**	0%
Alberta Agriculture's Manure Tracker App	2%	1%	2%	4%	1%	2%	2%	2%	4%	1%	**3%↑**	0%

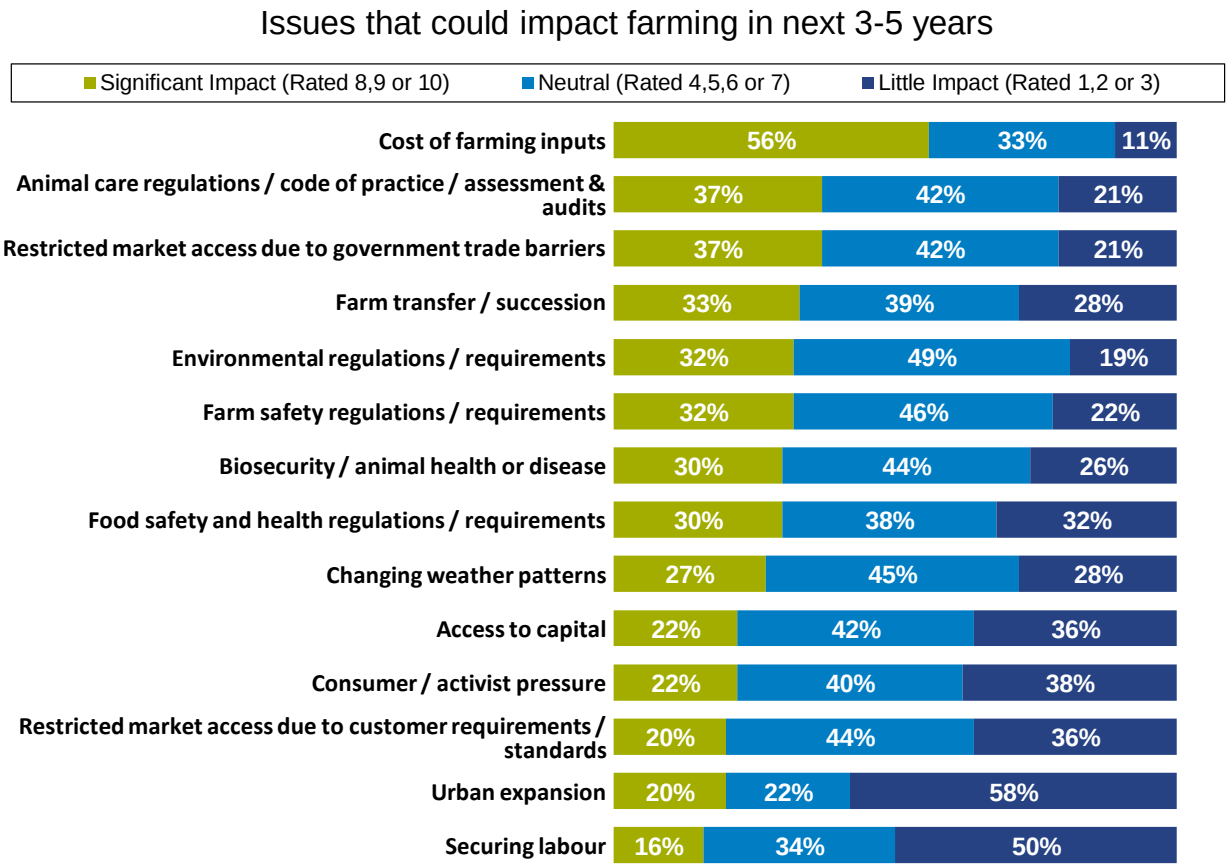
SUSTAINABILITY PROGRAMS AWARENESS AND USE

This section of the report provides the results of the new research objective for 2018, to measure awareness and readiness of Alberta producers to meet current and emerging sustainability schemes which have expectations on agricultural production systems.

With this research objective in mind we asked a series of questions to better understand where sustainability ranks in importance with other issues facing operators, which areas of sustainability are most important to the farm operators versus which they feel are most important to consumers. We then asked about familiarity with sustainability standards, their perceptions of the pros and cons of these standards and their experience with them to date.

Potential Impact of Various Farm Issues over the next 3-5 years

Above all other issues, the cost of farming inputs is the issue that more than half of operators' state could have a significant impact in the way they farm in the next 3-5 years. No other issue was ranked by more than half the operators as significant.



Q10B-1: Please indicate the extent you expect each topic could impact your farm using the following scale from 1 to 10 where 1 represents "very little impact" and 10 represents "very significant impact". Base: All Respondents (n=500) / [1] If at least one livestock type on farm (n=364)

After cost of inputs, there are two leading issues, followed by 5 more that are rated as having a significant impact on farming in the next 3-5 years:

- Animal care regulations
- Restricted market access due to trade barriers
    - Farm transfer/succession
    - Environmental regulations
    - Farm safety regulations
    - Biosecurity and animal health
    - Food safety and health regulations

Most of these top tier issues have the following in common:

- Can cause uncertainty
- Uncertainty and any change in farming process to comply with changes can affect cost
- If not complied with, these issues can lead to restricted market access, either from customers or countries

Lastly, most of these top tier issues are issues that are addressed in various sustainability standards. Therefore, if these issues are potentially impacting operators' farming processes, then sustainability will have a significant impact and the ways in which sustainability is addressed can or will affect the ways in which farming operations are managed.

Issues that Could Impact Farming in the Next 3-5 years
(% that rated these issues 8,9,10 – significant)

Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
Input costs 52%	Input costs 62%	Input costs 51%	Input costs 56%	Input costs 50%	Animal care 37%	Input costs 60%	Input costs 73%
Market access 42%	Animal care 40%	Changing weather 35%	Animal care 40%	Animal care 45%	Input costs 35%	Animal care 42%	Market access 50%
Biosecurity 32%	Env. Regs. 39%	Animal care 30%	Succession 39%	Market access 39%	Biosecurity 27%	Succession 37%	Succession 44%

Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
Input costs 65%	Input costs 55%	Input costs 53%	Input costs 60%	Input costs 66%	Input costs 49%
Market access 46%	Animal care 41%	Animal care 47%	Animal care 40%	Succession 44%	Animal care 42%
Env. Regs. 38%	Market access 39%	Env. Regs. 31%	Market access 39%	Market access 43%	Biosecurity 33%

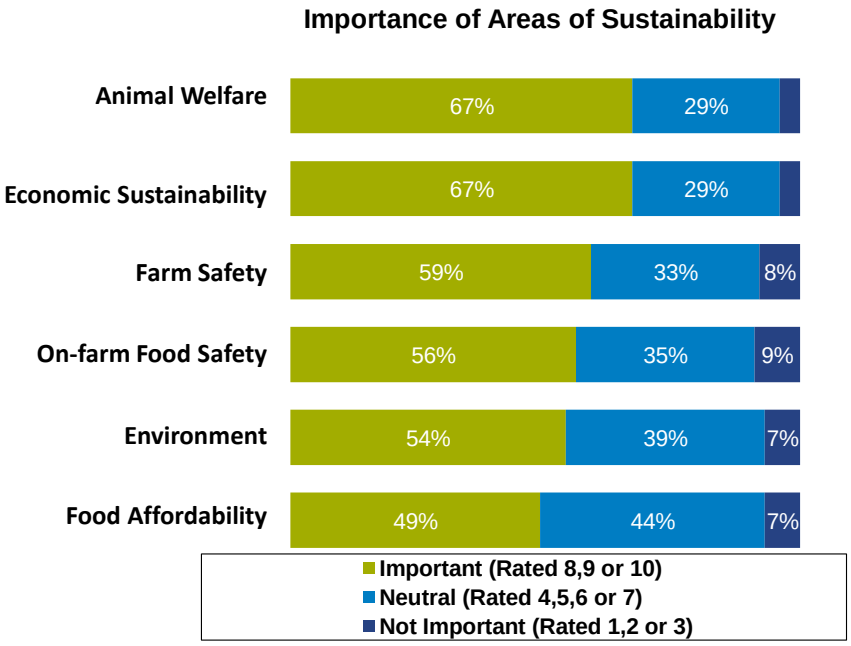
*All references to market access in the table reflect "restricted market access due to government trade barriers"

Areas of Sustainability: Importance and Consumer Pressure

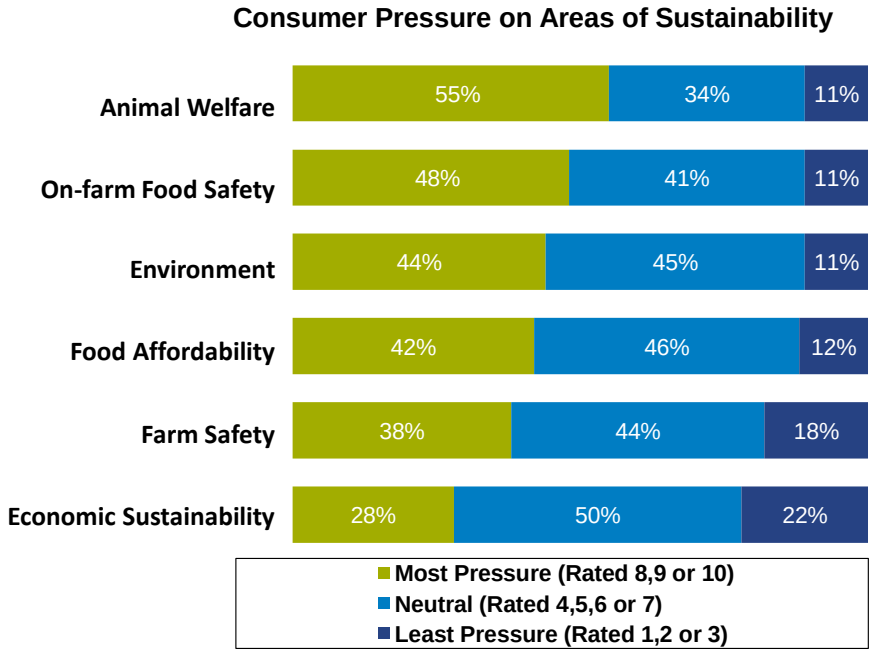
We asked operators to rate how important they thought various areas of sustainability are, to get a sense of which areas producers feel are more important than others. We then asked them to state in which areas they feel the most pressure from consumers.

The most important areas of sustainability, stated by farm operators, are equally animal welfare and economic sustainability. The environment, which is the 'traditional' definition of sustainability, rates lower on the list.

Whereas, from the consumer's perspective, farmers feel the most pressure with respect to animal welfare and on-farm food safety. Farm safety and economic sustainability, those areas that affect farming operations only, are the areas with the least pressure from consumers.



Q10B – 2: Please tell us how important you feel each area of sustainability is by using the following scale from 1 to 10, where 1 means not at all important and 10 means extremely important. Base: All Respondents (n=500)



Q10B – 3: Thinking of the agriculture industry as a whole, please tell us in which areas you feel the most pressure from consumers using the following scale from 1 to 10, where 1 means no pressure from consumers and 10 means significant pressure from consumers. Base: All Respondents (n=500)

Familiarity with Sustainability Standards

Farm operators were read a description of sustainability standards.

"Sustainability programs relate to the environmental, social, ethical, and food safety standards that are being adopted by companies to demonstrate more than just their economic performance. These programs are generally voluntary and may be assessed by a third-party.

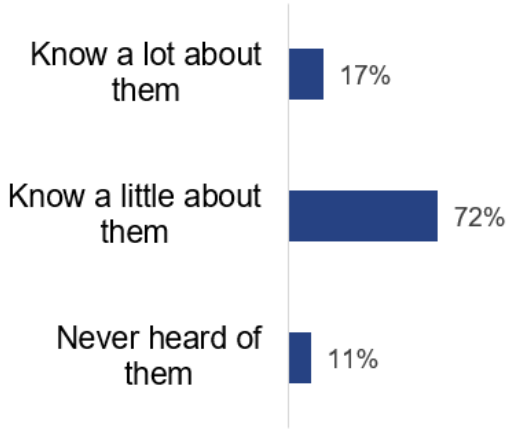
Some examples include the Environmental Farm Plan and Verified Beef Production Plus.

There are perhaps up to 500 such standards globally and the pace of introduction has increased in the last decade.

In recent years, such standards are increasingly being used as minimum standard requirements for farmers to be considered as suppliers. Most of them refer to environmental quality, social equity, and economic prosperity".

Nearly 90% of farm operators know about sustainability standards, but less than 1 in 5 farm operators know a lot about them. With the majority of operators knowing a little about sustainability standards, the issue is not awareness of the standards but familiarity with them.

% of respondents who are familiar with Sustainability Standards



Q10B – 4. How familiar are you with these standards?
Base: All Respondents (n=500)

% of Farm Operations that know a lot about Sustainability Standards

Region					Gross Farm Sales		
South	Central	Northeast	Northwest	Peace	<$50K	$50K to <$250K	>$250K
23%	15%	16%	12%	24%	8%↓	14%↓	29%↑

Operation Type (main source of revenue)			Stage of Operation		
Crops	Livestock	Mixed	Beginning or Maintaining	Expanding	Reducing
15%	20%	17%	17%↓	33%↑	11%↓

Degree or Diploma		Environmental Agriculture Training		AF Program		Environmental Farm Plan		Working Well Program		AF or Municipal Staff	
Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
26%↑	14%	40%↑	12%	23%↑	6%	27%↑	10%	31%↑	12%	34%↑	11%

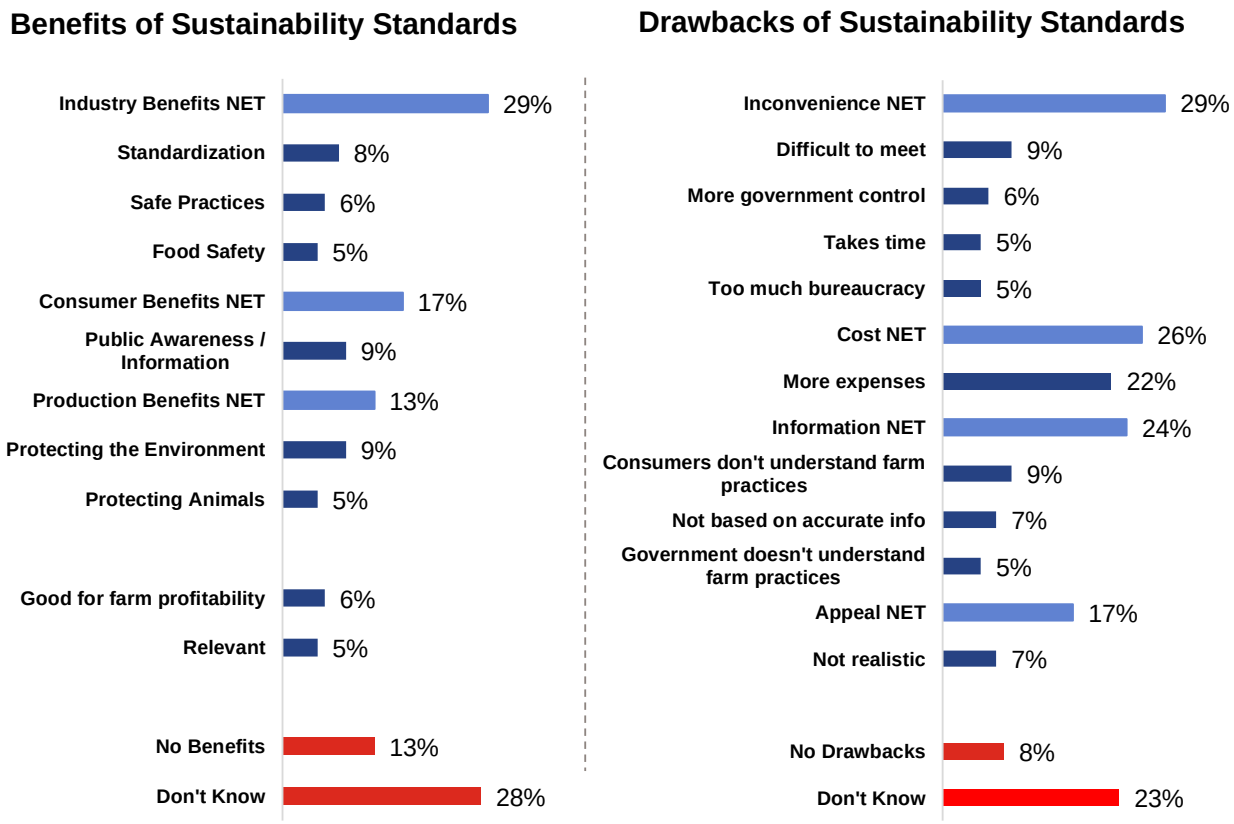
Familiarity with sustainability standards is significantly *higher* among operations:

- In the South (64%);
- With gross farm sales of $250K or more (29%);
- Those with expanding operations (33%);
- With producers that have an agriculture-related degree or diploma (26%) and,
- With a producer who has farm environmental agriculture training (40%) or has taken part in an AF program in the past five years (23%) – specifically, completed the Environmental Farm Plan process (27%), taken part in the Growing Forward Stewardship (37%), Water (38%), Energy (37%) Management or Working Well (31%) programs, or has worked with AF or Municipal staff (34%).

Operators understand that sustainability standards have industry benefits, production benefits as well as benefits from a consumers' perspective. Public awareness and availability of information, protecting the environment and standardizations are the three most referenced benefits of sustainability standards.

Oppositely, operators note some of the drawbacks of sustainability standards are the inconvenience they can cause trying to comply with new requirements and the difficulty in compliance, the cost and 'information confusion' such as lack of information and consumers not understanding how standards would affect production practices. By far, an increase in farm costs as a result of complying with sustainability standards was the most referenced drawback.

Overall, there is a relatively balanced perception toward sustainability standards with just over 10% of operators stating that there are no benefits and just under 10% of operators stating that there are no drawbacks.

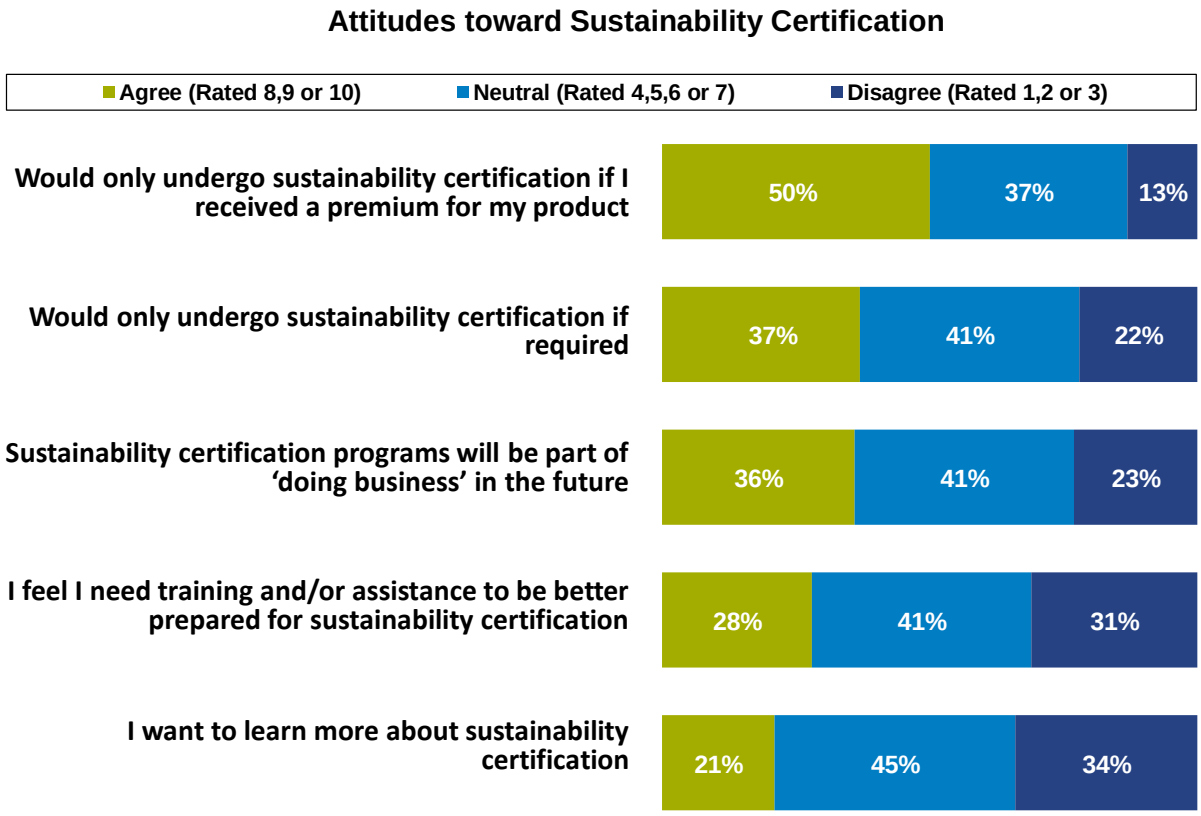


Q10B-5: What, if anything do you consider to the benefits or positive aspects of sustainability standards? Please be as detailed as possible.
Q10B-6: What, if anything, do you consider to be the drawbacks or negative aspects of sustainability standards? Please be as detailed as possible.
Base for Q10B-5 and Q10B-6: Respondents who know a lot or know a little from Q10B-4. (n=450)

Attitude toward Sustainability Standards

Response to the statements about sustainability standards and certifications reveals the degree to which these programs remain divisive; and that there is a large proportion of producers that really have no strong opinion about them.

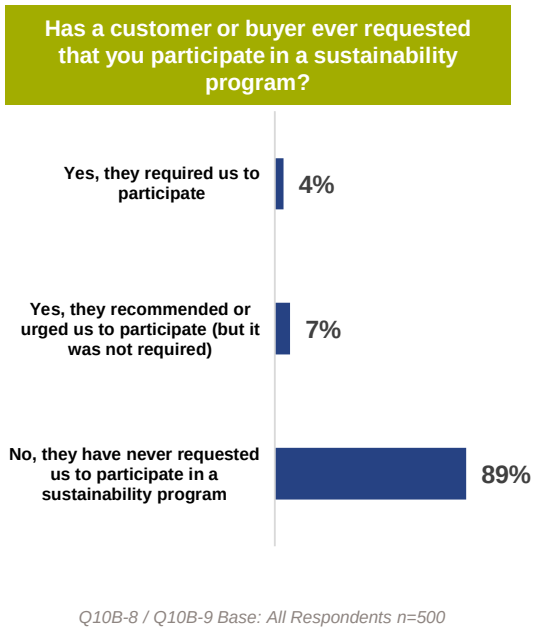
- Half of producers would only undergo certification if they received a premium for their products in return; whereas only 13% strongly disagree with that statement suggesting most producers will comply with certification when there is a financial reward
- Similarly, just over one-third of producers would only undergo certification if required suggesting they will comply only when it becomes a business risk not to; whereas 22% strongly disagree with that statement suggesting they would undergo certification whether it was required or not
- More producers than not (36% vs 23%) agree that such programs will be part of doing business in the future
- Nearly equal proportions agree/disagree they need training to be better prepared for sustainability certification
- Only 21% indicate they want to learn more, whereas one-third (34%) indicate they do not wish to learn more about sustainability certification



Q10B – 7. Please indicate your agreement with the statements below using a scale from 1 to 10 where 1 is completely disagree and 10 is completely agree..
Base: All Respondents (n=500)

Encountering Sustainability Standards in the Marketplace

Only 1 in 10 (11%) producers have been required or urged to participate in a sustainability program; and only 12% of producers have found market opportunities that require participation in a sustainability certification program. Given the lack of requirement or recommendation to participate in such programs, it's not unreasonable that familiarity with them is low. Most producers will likely only become familiar with a sustainability certification or standard program once they have been required or urged to participate.



Q10B-8 / Q10B-9 Base: All Respondents n=500

Familiarity with / Participation in specific Sustainability Certification Programs

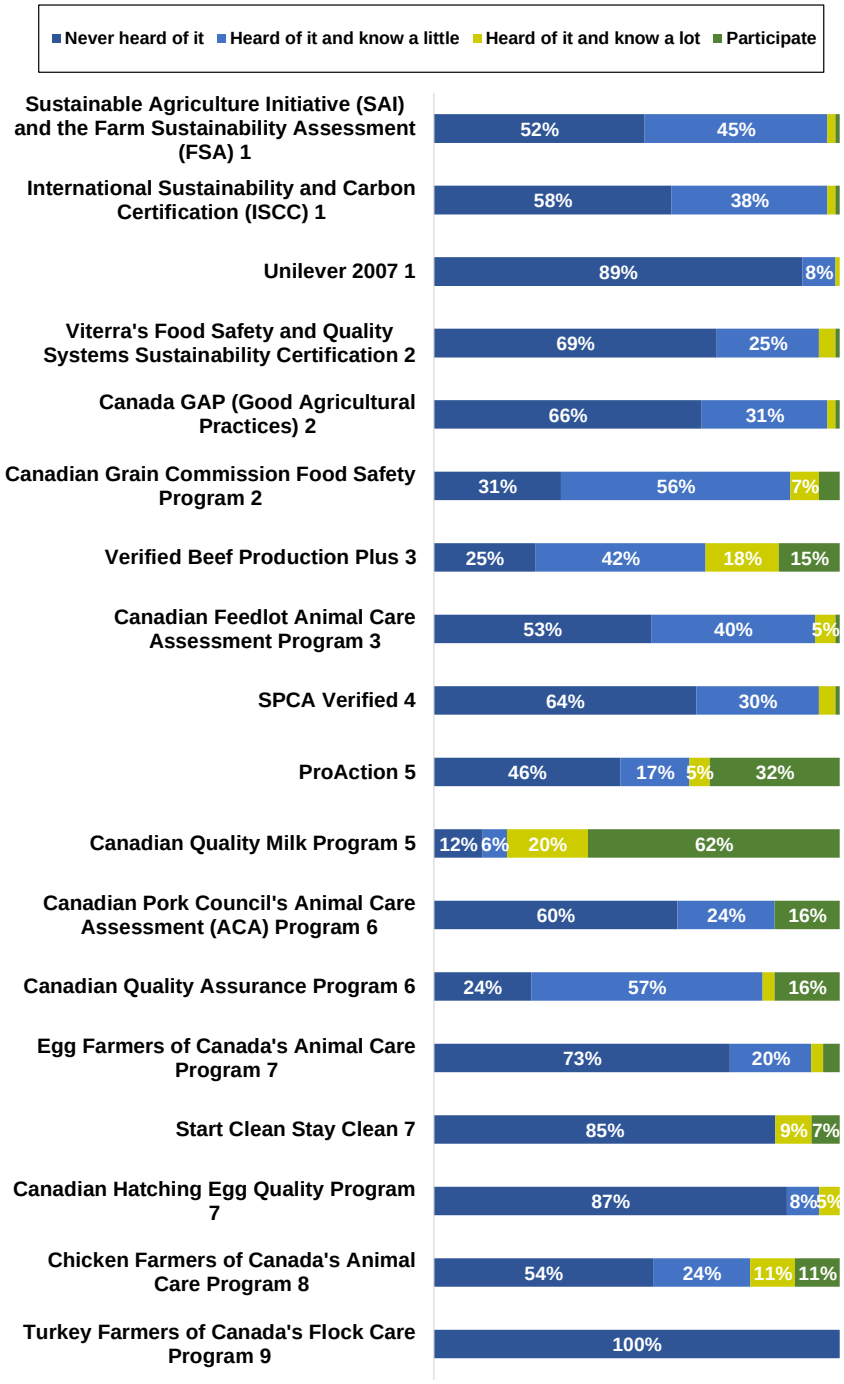
Overall, there is very little participation or familiarity with many of the voluntary sustainability certification programs that were tested in the survey.

In most cases, the majority of eligible producers had not heard of the programs. If producers were familiar, they were more likely to know a little than a lot or actually have participated in the programs. Having more than 5% participation would be considered exceptional.

The exception are the certification programs dedicated to dairy production – with the greatest proportion of participants and familiarity.

Although participants previously stated they were aware of “sustainability standards” in general, and knew a little about them, these results show that there is an awareness issue when it comes to specific sustainability certification programs.

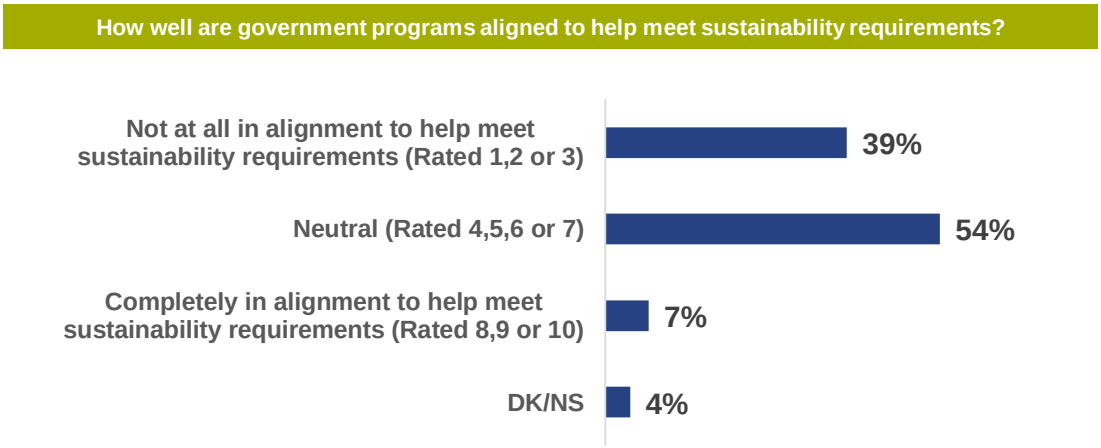
Familiarity with Voluntary Sustainability Certification Programs



Bases: 1: All respondents n=500 / 2: Crop Respondents n=392 / 3: Beef Producers n=292 / 4: Any livestock other than turkeys or horses n=337 / 5: Dairy Producers n=14* / 6: Pork Producers n=20* / 7: Layer Chicken Producers n=45* / 8: Broiler Chicken Producers n=17* / 9: Turkey Producers n=9*
*Caution Small Base Size

Government Alignment

Lastly, very few producers feel that government programs are in alignment to help them prepare to comply with sustainability certification programs. However, since there is very little familiarity with the programs themselves and therefore what they entail, producers don't know what the government should be providing.



Q10B – 11. As sustainability requirements from customers continue to grow, how well do you think that government programs and services are in alignment with helping you meet these requirements?

Base: All Respondents n=500

Sustainability Programs Summary

After cost of inputs, many areas of sustainability and how they are managed, rank as issues in which producers believe will have a significant impact on the way they farm in the next 3-5 years. These include:

- Animal care regulations / code of practice
- Restricted market access
- Environmental regulations
- Farm safety regulations
- Biosecurity / animal health and disease
- Food safety and health regulations

Therefore, if these issues are potentially impacting operator's farming practices, then, sustainability and/or sustainability programs could have a significant impact on the ways in which farming operations are managed.

Animal welfare has rated #1 for both the most important area of sustainability, as well as the area of sustainability in which farmers feel the most consumer pressure. Following animal welfare, the most important area of sustainability as perceived by operators is economic sustainability. The environment, which is the 'traditional' definition of sustainability rates lower on the list.

From the consumers' perspective, farmers feel the most pressure with respect to animal welfare and on-farm food safety. Farm safety and economic sustainability, those areas that have more of an impact on the farm itself, are the areas with the least pressure from consumers.

Nearly 90% of farm operators know about the concept of sustainability standards, suggesting this is not an awareness issue but a familiarity issue.

Sustainability standards and certification programs remain divisive and there's still a large proportion of operators who have no strong opinions about them. For most producers, participation in a sustainability standard will require a financial reward or a requirement from the customer. Because very few sustainability certification programs have been encountered in the marketplace, familiarity with specific programs is very low. This result may also be the reason that less than half of operators feel they need training to be prepared for participation and only 1 in 5 producers want to learn more about sustainability. There is opportunity for AF to help in promoting many of the specific programs to eligible operators, as awareness will then lead to familiarity and eventual participation and advocacy of the programs.

APPENDIX A: METHODOLOGY

A telephone survey with a random and representative sample of 500 Alberta agricultural producers was conducted between January 2nd and 21st, 2018. A telephone methodology was selected to be consistent with previous ESA tracking surveys. The average interview length was 34 minutes (this is slightly longer than we were expecting due to the number of questions that were cut in the tracking section of the survey to make room for the new sustainability section).

Interviews were stratified by five Alberta regions and quotas were established to ensure a reliable sample size within each region for regional analysis. The final data were weighted to ensure the overall sample's regional and gross farm sales composition reflects that of the actual distribution of farms in Alberta based on the 2016 Census of Agriculture.

With a sample of 500, results are considered accurate to within ±4.4 percentage points, 19 times out of 20, of what they would have been had the entire population of Alberta farms been surveyed. The margin of error is larger within regions and for other sub-groupings of the survey population.

Sampling Report

Target Population

The target population for this survey was primary agricultural operators in Alberta who had gross farm sales of at least $10,000 in 2017, and were most involved in making decisions about the practices and operations used on their farm.

The sample was drawn from Kynetec's proprietary provincially representative database of over 30,000 unique Alberta agricultural producers. The same sample source was used for the 2012, 2014 and 2016 surveys.

Key characteristics of the producer database are as follows:

- Contact information per record varies from a telephone number and Census Division only, through to a detailed set of information about type of operation, crops grown, total acres, farm sales and Internet access. All information gathered is done so with the agreement of the producer and is used for the purposes of identifying the appropriate individuals to include in a study.
- The database is updated and purged of non-responders on a regular basis.
- Producers in the Kynetec database that have been selected to participate in producer studies are, on average, contacted less than two times per year, with the vast majority (just under 60%) being contacted only once. The statistics that we currently have compiled indicate that less than 1% of producers contacted have been called more than five times in the past 12 months.

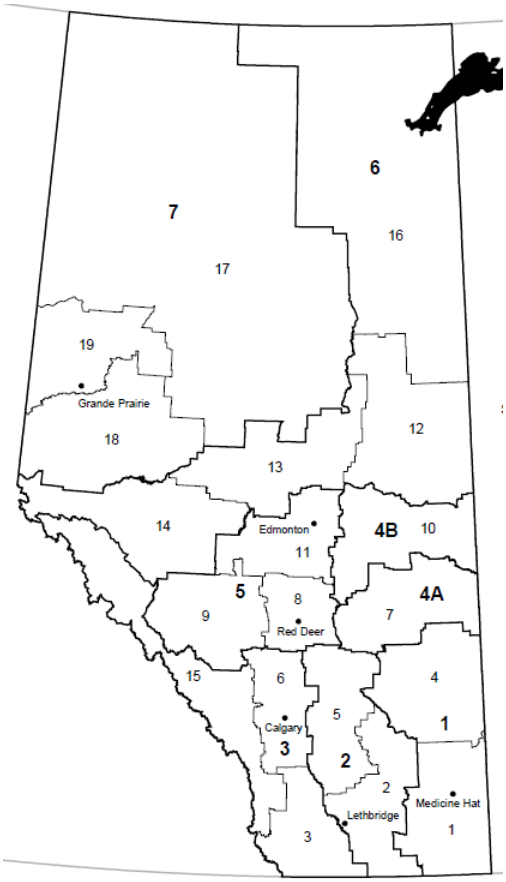
Key interviewing procedures through Ipsos' call centre include the following:

- Each contact with a producer is recorded on the database, including the results of that contact – complete, stop, refusal, disqualification or no longer farming.
- Kynetec maintains a list of all individuals who have requested not to take part in survey research. The survey sample for every project that is conducted using Ipsos call centres is compared against this list prior to starting the interview process, and contacts are removed where appropriate.

- No interviews are conducted with producers on Sundays unless a callback is scheduled.
- All specific call back appointments are met.
- Interviewing is restricted to after 6:00 p.m. unless a callback is otherwise scheduled.

Sampling Framework

The same sampling frame was used for the 2012, 2014 and 2016 surveys and was based on the 2011 Census of Agriculture. In 2018, the same sample process was followed but the sample frame was aligned to reflect that of the actual distribution of farms in Alberta based on the 2016 Census of Agriculture.



The five regions were defined by Census Division as follows:

- South = CDs 1, 2 and 3
- Central = CDs 4, 5, 6, 7, 8, 9 and 15
- Northeast = CDs 10 and 12
- Northwest = CDs 11, 13 and 14
- Peace = CDs 17, 18 and 19

In cases where the Census Division was not known from database statistics, each region was defined by County or Municipal District (that is, the respondent was asked in which County or MD their farm was located). The table on the following page outlines these region definitions.

Regions Classified by County or Municipal District

South
Cardston County
Cypress County
Forty Mile No. 8, County of
Lethbridge, County of
Medicine Hat
Newell, County of
Pincher Creek No. 9, M.D. of
Taber, M.D. of
Warner No. 5, County of
Willow Creek No. 26, M.D. of

Northwest
Athabasca County
Barrhead No. 11, County of
Brazeau County
Edmonton
Lac Ste. Anne County
Leduc County
Parkland County
Strathcona County
Sturgeon County
Thorhild No. 7, County of
Westlock County
Wetaskiwin No. 10, County of
Woodlands County
Yellowhead County

Central
Acadia No. 34, M.D. of
Bighorn No. 8, M.D. of
Calgary
Clearwater County
Consort
Flagstaff County
Foothills No. 31, M.D. of
Hanna
Kneehill County
Lacombe County
Mountain View County
Paintearth No. 18, County of
Ponoka County
Provost No. 52, M.D. of
Ranchland No. 66, M.D. of
Red Deer County
Rocky View County
Starland County
Stettler No. 6, County of
Vulcan County
Wainwright No. 61, M.D. of
Wheatland County

Northeast
Beaver County
Bonnyville No. 87, M.D. of
Camrose County
Lac La Biche County
Lamont County
Minburn No. 27, County of
Smoky Lake County
St. Paul No. 19, County of
Two Hills No. 21, County of
Vermilion River, County of

Peace
Big Lakes, M.D. of
Birch Hills County
Clear Hills County
Fairview No. 136, M.D. of
Grande Prairie No. 1, County of
Greenview No. 16, M.D. of
Lesser Slave River No. 124, M.D. of
MacKenzie, M.D. of
Northern Lights, County of
Northern Sunrise County
Opportunity No. 17, M.D. of
Peace No. 135, M.D. of
Saddle Hills County
Smoky River No. 130, M.D. of
Spirit River No. 133, M.D. of

Regionally, a disproportionate sampling plan was used in order to allow for a reliable sample size within each region for analysis. Target quotas by CD (within each region) were proportionate to 2016 Census of Agriculture data.

In addition to regional quotas, target quotas were also established for gross farm sales within each of the five regions based on 2016 Census of Agriculture data. While no hard quotas were set, targets were monitored throughout data collection. Respondents were asked to indicate their 2017 gross farm sales at the beginning of the survey, and those with gross farm sales of less than $10K in 2017 were not interviewed.

The table below summarizes the number of interviews conducted by region as well as the corresponding margins of error.

Region	% of 2016 Census Farms in Alberta with $10K+ in gross farm sales (34,859)	Number of Interviews	Maximum margin of error
South	**14.8%**	**105**	**±9.6%**
CD1	3.5%	25	
CD 2	7.1%	50	
CD 3	4.2%	30	
Central	**37%**	**100**	**±9.8%**
CD 4	3.2%	9	
CD 5	6.4%	17	
CD 6	9.0%	24	
CD 7	7.1%	19	
CD 8	8.8%	24	
CD 9	2.2%	6	
CD 15	0.3%	1	
North East	**16.2%**	**105**	**±9.6%**
CD 10	11.4%	74	
CD 12	4.8%	31	
North West	**20.0%**	**112**	**±9.3%**
CD 11	10.3%	58	
CD 13	8.4%	47	
CD 14	1.3%	7	
Peace	**12.0%**	**78**	**±11.1%**
CD 17	4.8%	31	
CD 18	1.2%	8	
CD 19	6.0%	39	
Total	**100%**	**500**	**±4.4%**

Response Rate

The call disposition and response rate for the 2018 ESA Survey is provided in the table below.

Codes	Measures	Call Disposition
A	Completed Interviews	500
B	Refused	4,104
C	Terminated/respondent unavailable for duration	68
D	No answer/busy/answering machine	5,827
E	Call back later	1,234
F	Language barrier	52
G	Phone number not in service/wrong number/business number/fax/modem	12,101
H	Respondent not qualified	170
I	Total numbers dialed at least once	24,231
J	Effective denominator (I-C-D-F-G-H)	6,013
	Response Rate (A/J)	8.3%

The 2018 response rate of 8.3% is a significant drop from the response rate of 2016 (14.2%) – in part due to the increased length of the survey which is always made known at the beginning of the call.

Questionnaire Design

The 2010 ESA Survey underwent a thorough review. In February, 2011 an "Environmentally Sustainable Agriculture Tracking Survey Team" formed to oversee the development and delivery of the "2012 ESAT Survey". The Team's task was to:

- Review and build on the recommendations made in the 2010 ESAT survey report related to suggested modifications to the ESA practice questions for inclusion in the next survey;
- Develop a set of criteria to help specialist teams and the ESAT Survey Team determine which key environmentally sustainable agriculture practices are included in adoption score calculation for inclusion in the AF Goal 2a performance measure and for tracking purposes;
- Determine key focus areas for the 2012 survey; and,
- Ensure the final list of identified practices are aligned with Ministry priorities and programming focus.

Based on recommendations from the ESAT team, and in close collaboration with the AF project team, Ipsos revised the 2012 ESA questionnaire. Key changes were made to the focus areas as well as the ESA practices.

- ***Focus Areas:*** A new section on *Grazing Management* was added while the *Planning* section was deleted. That being said, two of the four practices from the *Planning* section were retained – the 'Environmental Farm Plan' practice was moved to the *General Practices* section, while the practice of 'timing grazing to avoid vulnerable times of the year for riparian areas' was included in the new *Grazing Management* section.
- ***ESA Practices:*** 1) The total number of practices to be included in the Goal 2a

Performance Measure was reduced to 41 from 67; 2) 29 of the 2010 practices were deleted; 3) A number of new practices were added; 4) The wording of most of the practice questions was changed (some minor and some major); and, 5) Where applicable, screening questions were added to ensure each practice question was only asked of producers qualified to adopt the practice (i.e. in order to decrease 'not applicable' responses and shorten the length of the questionnaire).

In 2014, Ipsos, in close collaboration with the AF project team, made a number of minor revisions to the questionnaire. Key revisions included:

- The base for the General Practice of *soil sampling fields at least once every three years* was corrected. In 2012, producers who answered 'none' to Q62: "*Do you typically soil sample all, some or none of your fields?*", were not asked Q63: "*Do you typically soil sample your fields yearly, at least once every three years, less than once every three years*?" In 2014, those who answered 'none' to Q62 were asked Q63 and Q63 was revised to: "*Do you typically soil sample your fields yearly, at least once every three years, less than once every three years or never*?" This resulted in a significant drop in the adoption of this practice – from 76% in 2012 to 51% in 2014. When the 2014 adoption level is calculated using the 2012 base, adoption increases to 83% and the General Practices adoption score increases to 49% from 44%. This change, however, did not have a statistically significant impact on the overall ESA adoption score.
- In 2012, the question (Q45) used to assess the Manure Management practice of *sampling and analyzing the manure for nutrient content* was: "*Do you typically apply Manure – either, solid or liquid based on a soil or tissue test, manure nutrient test or book values?"* Possible responses were 'a soil or tissue test', 'a manure nutrient test', 'book values', 'not applicable' and 'don't know' – a 'none of the above' option was inadvertently left off the response list. In 2014, this was corrected.
- The other key change was to add an 'attribution' question (Q70A) to determine if producers who took part in one or more of five specific AF programs assessed differed in ESA adoption from to those who had not.

In 2016, Ipsos and the AF project team again made a number of minor revisions to the questionnaire. Key revisions included:

- Two questions pertaining to the manure management practice/performance measure 'extend the grazing season' were removed from the questionnaire as AF is no longer funding portable windbreaks. Consequently, the number of manure management practices was reduced to 11 and the total number of ESA practices was reduced to 40.
- The question on 'perceptions of ESA issues' was deleted in favour of a question about 'decision making support resources and tools' which focuses on projects, programs and services delivered by the Environmental Stewardship Division. Familiarity with and use of 11 support resources and tools (including 4R nutrient stewardship) were assessed.
- Three new questions were added regarding the use of commercial fertilizer – time of application, placement and product.
- Two questions were added to better understand why some producers incorporate manure (solid, compost, liquid) within 48 hours or less – in order to assess the extent to which reduction of nitrogen loss is mentioned.

In 2018, the overall objective to measure farm-level change in sustainable agriculture that has occurred since 2016 remains. However, a new research objective was also included – to measure awareness and readiness of Alberta producers to meet current and emerging sustainability schemes which have expectations on agricultural production systems.

As a result of the inclusion of the new research objective, the goal was to remove 15% of the 2016 survey questions to make room for the new 'sustainability' questions. In October 2017, Kynetec and the ESAT Project team met in Edmonton for a working session with two objectives:

1. Review the 2016 ESAT survey to determine which questions could be removed without jeopardizing any performance measure analysis
2. Discuss the vision of the 'sustainability' section of the survey and exactly what the team was looking to accomplish

For objective one and the tracking part of the survey, eight key environmental practice areas were examined in the 2018 survey. Within these eight agri-environmental risk areas, a total of 40 practices serve as ESA performance measures – and are used to derive the biennial result for AF Measure 3a. The remaining measures are not classified as performance measures. Non-performance measures are practices that are emerging as future practices to measure and could potentially be tracked as a performance measure for AF. Currently there are limited direct resources allocated to these practices, however, tracking of adoption is important to inform future policy and program decisions. Along with deleting some questions to make room in the survey for the new objective, Kynetec and AF carefully reviewed the tracking questions and reworded some, asked some questions slightly differently and included more attributes or programs in some of the listed questions, all for the purposes of gaining more usable data that AF can utilize. The full 2018 questionnaire is included in Appendix B with changes from 2016 noted.

In addition to environmentally sustainable agricultural practices, the 2018 survey fully explored the awareness, familiarity and perceptions of the different areas of sustainability as well as standards and certification programs.

Data Analysis

Weighting

As was the case with previous surveys, the final data were weighted to ensure the overall sample's regional and gross farm sales composition reflects that of the actual distribution of farms in Alberta based on 2016 Census of Agriculture statistics. The table below shows the actual distribution of respondents along with the weights applied to the data.

Region & Gross Farm Sales	# of 2016 Census Farms with $10+ in Gross Farm Sales	2016 Census Distribution (Weights)	Survey Count Unweighted	Survey Distribution Unweighted	Weighting Factor	Survey Count Weighted
South $10K to <$25K	557	0.016	9	0.02	0.89	8
South $25K to <$50K	591	0.017	3	0.01	2.83	8
South $50K to <$100K	718	0.021	15	0.03	0.69	10
South $100K to <$250K	1084	0.031	20	0.04	0.78	16
South $250K to <$500K	736	0.021	19	0.04	0.56	11
South $500K +	1481	0.042	39	0.08	0.54	21
Total South	5167	0.148	105	0.21	0.71	74
Central $10K to <$25K	2119	0.061	12	0.02	2.53	30
Central $25K to <$50K	1829	0.052	14	0.03	1.87	26
Central $50K to <$100K	1998	0.057	22	0.04	1.30	29
Central $100K to <$250K	2644	0.076	18	0.04	2.11	38
Central $250K to <$500K	1754	0.050	15	0.03	1.68	25
Central $500K +	2554	0.073	19	0.04	1.93	37
Total Central	12898	0.370	100	0.20	1.85	185
Northeast $10K to <$25K	954	0.027	5	0.01	2.74	14
Northeast $25K to <$50K	857	0.025	16	0.03	0.77	12
Northeast $50K to <$100K	911	0.026	19	0.04	0.69	13
Northeast $100K to <$250K	1141	0.033	23	0.05	0.71	16
Northeast $250K to <$500K	787	0.023	20	0.04	0.56	11
Northeast $500K +	991	0.028	22	0.04	0.65	14
Total Northeast	5641	0.162	105	0.21	0.77	81
Northwest $10K to <$25K	1617	0.046	18	0.04	1.29	23
Northwest $25K to <$50K	1216	0.035	18	0.04	0.97	17
Northwest $50K to <$100K	1227	0.035	23	0.05	0.77	18
Northwest $100K to <$250K	1354	0.039	24	0.05	0.81	19
Northwest $250K to <$500K	688	0.020	13	0.03	0.76	10
Northwest $500K +	874	0.025	16	0.03	0.78	13
Total Northwest	6976	0.200	112	0.22	0.89	100
Peace $10K to <$25K	761	0.022	4	0.01	2.73	11
Peace $25K to <$50K	669	0.019	6	0.01	1.60	10
Peace $50K to <$100K	661	0.019	15	0.03	0.63	9
Peace $100K to <$250K	841	0.024	17	0.03	0.71	12
Peace $250K to <$500K	538	0.015	16	0.03	0.48	8
Peace $500K +	701	0.020	20	0.04	0.50	10
Total Peace	4171	0.120	78	0.16	0.77	60
TOTAL	34,853	1.00	500	1.00		500

Data Analysis

Survey results are presented for the overall weighted sample of primary agricultural operators in Alberta with gross farm sales of $10K or more. Further, significant differences – by region as well as farm and operator characteristics – are highlighted throughout the report.

Additionally, findings are tracked against 2012, 2014 and 2016 measures and significant year-to-year changes are also highlighted.

We refer to 'significantly' different results when statistically meaningful differences occur. In simple terms, statistical significance means that two (or more) numbers are different from one another for reasons other than by chance. In statistical terms, it means that a null hypothesis is rejected and that the same result will occur, given similar circumstances, within a set of specified limits (19 times out of 20). Significance tests allow researchers to say, with a specified degree of certainty, that two numbers are different.

The simplest measure of significance is the confidence level given to a percentage in the survey. Most surveys contain a qualifying statement, such as, *"the results of this survey have a margin of error of ±4.4 percentage points, 19 times out of 20."* This number reflects the window or spread of values expected across different survey samples. As well, we use propmean t-tests, which are t-tests run on column means and column proportions.

Data tables were created (in MSExcel format) that show the Total results for each question and also allow for analysis by the following categories:

- Region: South, Central, Northeast, Northwest, Peace
- Gross Farm Sales: <$50K, $50K to <$250K, $250K+
- Main Source of Gross Farm Revenue: Crops, Livestock, Mixed (i.e. equal mix of both)
- Stage of Operation: Beginning or maintaining, Expanding, Reducing
- Agriculture Degree or Diploma: Yes, No
- Farm Conservation Training: Yes, No
- Taken part in any of the five AF programs assessed: Yes, No
- Taken part in each specific AF program: Yes, No
- 2018 versus 2016

ESA Adoption Score Calculation

AF Performance Measure 3a

Agriculture and Forestry Performance Measure 3a is defined as ***'the average percentage of improved environmentally sustainable agriculture practices adopted by producers'***. This measure tracks primary producers' success in addressing a broad range of environmental issues relating to soil conservation, water quality, grazing management, wildlife habitat conservation, energy and climate change (adaptation), manure management and agricultural waste management, as well as planning approaches regarding sustainable agriculture. Specifically, this measure tracks the level of adoption of environmentally sustainable agriculture practices by primary producers seeking to improve environmental stewardship on their farm operations.

The 2018 measure is an average of adoption scores of ESA practices by primary producers to improve environmental stewardship on their farm operations. The adoption score for each survey respondent is weighted to reflect the distribution of gross farm sales across the five regions, based on the 2016 Census of Agriculture.

A total of 40 ESA practices, that could be used to address soil conservation, water quality, grazing management, wildlife habitat conservation, energy and climate change (adaptation) manure management, agricultural waste management, as well as planning approaches regarding sustainable agriculture, were used to derive the result for this measure. An eligible ESA practice (or group) for the base calculation is based on farm type, farm site characteristics and operation practices.

For each respondent, the total number of eligible practices (i.e. appropriate to their operation) is determined, and then the percentage of these eligible practices currently adopted is calculated. For example, if an operator is eligible to adopt 20 of the 40 ESA practices, and has adopted 10 of the 20 practices, the producer's individual adoption score would be 50%.

The percentage of eligible environmentally sustainable agricultural practices adopted by each respondent is multiplied by a weighting factor to generate a weighted adoption score for each respondent. The result of Performance Measure 3a is the average weighted adoption score of all respondents expressed as a percentage.

Practice Adoption

An eligible practice for the base calculation was one where the respondent was asked the question, it was applicable to their operation, and was answered. Responses of “not applicable” or “don’t know” were excluded from the base calculation.

For example, the 2018 survey had 12 water quality/quantity practices that were included in the overall ESA adoption score, one of which was ‘Maintain buffer areas along edge of natural water bodies’.

- All respondents (n=500) were asked: *Are there any natural rivers, streams wetlands or sloughs on the property that you farm*?
  - 350 responded “Yes” while 150 responded “No”.
- Those who said “Yes” (n=350) were asked the following question to measure adoption of ‘Maintain buffer areas along edge of natural water bodies’: *Did you maintain buffer areas of grass and/or trees along the edge of rivers, streams, sloughs, wetlands or ditches?*
  - 269 responded “Yes”, 72 responded “No” and 9 responded “not applicable” or “don’t know”.
  - Adoption of the practice was defined as those who said “Yes” (n=269).
  - Eligible respondents were defined as all those asked the question excluding “not applicable” and “don’t know” responses (350 - 9 = 341).
- Thus, the percentage adopting the practice is 269/346 = 79%

Adoption of each of the 40 ESA practices included in Performance Measure 2a was calculated, along with the average adoption of practices in each area (e.g. soil conservation, grazing management). In all cases but one, the eligible base was defined as those respondents asked the question excluding "not applicable" and "don't know" responses.

The tables that follow summarize the 40 ESA practices, the question(s) used to measure each practice, and how adoption of each practice was defined.

ESA Practice	Question	Adoption =
Soil Conservation – 3 Practices		
Use reduced tillage	Q13. Please indicate which of the following best describes how you seeded the majority of your crop acres in 2017?	The seeding operation into the stubble of the previous crop was the only tillage pass completed.
Use legumes in rotation	Q15. Did you use pulse crops in your cropping rotation in 2017?	Yes
Use winter cereals in rotation	Q15. Did you use winter cereals in your cropping rotation in 2017?	Yes
Water Quality / Quantity – 12 Practices		
Maintain buffer areas along edge of natural water bodies	Q16. Did you maintain buffer areas of grass and/or trees along the edge of rivers, streams, sloughs, wetlands or ditches?	Yes
Avoid draining or filling in natural wetlands/sloughs	Q18. Did you drain or fill in natural wetlands or sloughs?	No
Apply chemical fertilizer at recommended rate	Q19. Did you apply commercial fertilizer based on the results of a soil or tissue test?	Yes
Control runoff from manure storage	Q20. Did you control runoff from all, some or none of your Manure Storage?	All or Some
Control runoff from livestock pens	Q20. Did you control runoff from all, some or none of your Livestock Pens?	All or Some
Control runoff from feeding areas	Q20. Did you control runoff from all, some or none of your Overwintering In-field Feeding Areas?	All or Some
Plug or seal abandoned wells	Q20B – Total # of inactive, abandoned or unused wells (>0)	Q20B – Total # of inactive, abandoned or unused wells that are properly sealed or plugged (>0)
Properly seal and maintain active wells	Q20B – Total # of active wells (>0)	Q20B – Total # of inactive, abandoned or unused active wells that are properly maintained (>0)
Maintain a 10m buffer area from water bodies when applying pesticides	Q25. In 2017, did you maintain at least a 10m buffer area from water bodies when applying crop protection products?	Yes
Maintain a 10m buffer area from water wells when applying pesticides	Q25. In 2017, did you maintain at least a 10m buffer area from water wells when applying crop protection products?	Yes
Manage livestock access to water bodies that are used as a water source	Q28. In 2017, did you manage or control livestock access to water bodies that are used as a water source?	Yes
Choose wintering site to avoid manure contamination	Q30. Did you locate all, some or none of your winter feeding and bedding sites to prevent runoff from manure entering natural water bodies?	All or Some
Grazing Management – 2 practices		
Protect riparian areas from grazing to prevent over use	Q31. Which of the following do you typically do on your farm? *Avoid or minimize grazing in riparian and/or bush areas in the late summer or autumn*	Yes
Time grazing to avoid vulnerable times of the year for riparian areas	Q31. Which of the following do you typically do on your farm? *Time the grazing of riparian areas to avoid grazing during spring and early summer*	Yes

ESA Practice	Question	Adoption =
Wildlife Habitat Conservation – 3 Practices		
Retain bush or native grassland	Q32. Do you retain woodlands, bush or native grassland?	Yes
Manage grazing for wildlife habitat	Q33. In 2017, did you manage your livestock grazing to provide habitat for wildlife?	Yes
Manage grazing to encourage natural rejuvenation of understory in woodlands	Q35. In 2017, did you manage grazing to encourage natural growth of understory in woodlands? Understory may include small trees, shrubs, forbes and grasses.	Yes
Manure Management – 11 Practices		
Avoid applying manure or compost on frozen or snow-covered ground	Q37. Do you typically apply manure on frozen or snow-covered ground?	No
	Q37. Do you typically apply compost on frozen or snow-covered ground?	No
Avoid storing manure near water wells	Q39. Did you store manure within 100m of Active water wells?	No
	Q39. Did you store manure within 100M of Abandoned water wells?	No
Frequency of application	Q40. On the fields that you have manure applied, how frequently do these fields typically receive manure?	Once every two years, three years or less
Incorporate manure after applying	Q42. Do you typically incorporate Solid manure with 24 hours, 48 hours or greater than 48 hours?	Within 24 or 48 hours
Applying liquid manure	Q43. Thinking about liquid manure, do you typically…?	Broadcast with incorporation within 24 or 48 hours after application
Avoid applying close to waterways to minimize increased nutrient runoff	Q44. Do you typically take into account any of the following factors when applying either solid or liquid manure? Distance between manure applications and waterways – that is low lying paths where surface water collects and flows, slope of land, application method	Yes to any item
Sampling and analyzing the manure for nutrient content	Q45. Do you typically apply manure – either solid or liquid, based on a soil or tissue test, manure nutrient test or book values?	Yes to soil or tissue test OR manure nutrient test OR book values
Manure application based on P or N&P	Q46. Are your manure application rates typically based on crop nitrogen requirements, crop phosphorus or neither?	Crop nitrogen or phosphorus requirements
Keeping manure records	Q49. Do you typically keep records detailing the amount and field location of where the manure is spread for all, some or none of your fields?	All or Some

ESA Practice	Question	Adoption =
Agricultural Waste Management – 1 Practice		
Recycle Plastics	Q52. Please indicate if you did each of the following on your farm in 2017. *Recycle plastics such as baler twine, feed bags, silage wraps and/or bale wraps*	Yes
Energy and Climate Change – 3 Practices		
Energy saving practices	Q53A. Other than the main utility meter that shows the total electricity usage for your entire property, do you have any sub-meters – that is, extra	Yes
Renewable power	Q55. Do you produce grid-connected electricity using any of the following Renewable Energy methods? Solar panels, not counting for water pumping or electric fencing, wind turbine generator on a tower, biogas generator using farm waste. / Q56. Do you produce heat from any of the following Renewable Energy methods? Solar thermal water heating, solar thermal air heating incorporated into farm building walls, wood combustion (whole, pellets, chips), combustion of any other biomass (straw bales, straw pellets, grain)	Yes to any item in Q55 or Q56
Participate in carbon credit trading	Q57. Are you currently participating in the Alberta Carbon offset market?	Yes
General practices – 5 practices		
Precision farming – VRT	Q59. Last year, did you utilize variable rate technology in the application of commercial fertilizer?	Yes
	Q59. Last year, did you utilize variable rate technology in the application of crop protection products such as herbicides, insecticides and fungicides?	Yes
Environmental Farm Plan	Q60. Have you completed the Environmental Farm Plan process?	Yes
Soil sampling fields at least once every three years	Q63. Do you typically soil sample your fields yearly, at least once every three years or less than once every three years?	Yearly OR at least once every 3 years
Trees for agricultural purposes	Q64. Have you planted trees on your farm in the past 2 years for agriculture purposes (shelterbelts/windbreaks, wildlife habitat, soil conservation, odor control, etcc)?	Yes

APPENDIX B: QUESTIONNAIRE

Agriculture and Forestry:
2018 Environmentally Sustainable Agriculture Survey
Final Questionnaire: December 11, 2017

NOTE: Question changes (new, deleted, or reworded questions) are shown in RED text.

INTRODUCTION

Hello, my name is (FIRST NAME) and I'm calling on behalf of Kynetec, formerly Ipsos Agriculture and Animal Health. Alberta Agriculture and Forestry has commissioned Kynetec to conduct a survey with agricultural operators in Alberta.

This is an important initiative on sustainable agriculture and an aggregate summary of results will be posted on Alberta Agriculture's website, Ropin' the Web.

The survey will take approximately 20 minutes and all your responses will managed and protected in accordance with the FOIP Act.

For the purposes of this study, I need to speak to the person in your household who is **most** involved in making decisions about the practices and operations used on your farm. May I please speak to that person?

Yes, speaking
Yes, I'll get them
No, not available
[IF YES SPEAKING, CONTINUE]
[IF YES, I'LL GET THEM, REINTRODUCE]
[IF NO, NOT AVAILABLE, SCHEDULE CALLBACK]

(INTERVIEWER NOTE: YOU CAN READ THIS QUICKLY. IF NEEDED: "I am required to read this")
The personal information collected during this survey is for the purpose of research and evaluation and will be used to better understand environmentally sustainable practices in the agriculture industry. The collection is authorized under section 33(c) of the Freedom of Information and Protection of Privacy (FOIP) Act and managed and protected in accordance with the Act. If you have any questions about the collection of your information, please contact the Provincial Evaluation Specialist with Alberta Agriculture and Forestry at 6547 Sparrow Drive, Leduc, Alberta, T9E 7C7 or 780-980-4200.

(IF ASKED: *Provincial Evaluation Specialist is Laura Ung. Can be contacted at 780-980-4200 or toll-free at 310-0000; or by email at laura.ung@gov.ab.ca)*

IF AT ANY POINT DURING THE SURVEY, THE RESPONDENT HAS COMMENTS/REQUESTS INFORMATION ON BILL 6 – ALBERTA'S NEW FARM SAFETY LEGISLATION:

- Web: www.alberta.ca/farm-and-ranch.aspx
- Email: farmandranch@gov.ab.ca
- Occupational Health and Safety contact centre: 1-866-415-8690
- Employment Standards contact centre: 1-877-427-3731

SCREENING

S1. Do you currently own or rent your farm land or both?

Own land only
Rented land only
Both own and rented land
No
Don't know

[IF NO, DK/NS OR REF THANK & TERMINATE]

S2. What was your gross farm revenue in 2017? Please stop me when I reach your category. **(READ LIST)**

Under $10,000
$10,000 to under $25,000
$25,000 to under $50,000
$50,000 to under $100,000
$100,000 to under $250,000
$250,000 to under $500,000
$500,000 to under $1,000,000
$1,000,000 to under$2,000,000
$2,000,000 or more
Don't know

[THANK & TERMINATE IF UNDER $10,000, DK/NS OR REF]

[ASK S4 ONLY IF CENSUS DIVISION IS NOT PROVIDED IN THE SAMPLE FILE]
S4. In order to ensure we have representation from all regions of Alberta, could you please tell me in which County or Municipal District your farm is located (IF NECESSARY: I assure you that this information will remain completely confidential. We will only use it for aggregate classification purposes.)

Acadia, M.D. of
Athabasca County
Barrhead, County of
Beaver County
Big Lakes, M.D. of
Bighorn, M.D. of
Birch Hills County
Bonnyville, M.D. of
Brazeau County
Camrose County
Calgary
Cardston County
Clear Hills County
Clearwater County

Consort
Cypress County
Edmonton
Fairview, M.D. of
Flagstaff County
Foothills, M.D. of
Fort McMurray
Forty Mile, County of
Grande Prairie, County of
Greenview, M.D. of
Hanna
Kneehill County
Lac La Biche County
Lac Ste. Anne County
Lacombe County
Lamont County
Leduc County
Lesser Slave River, M.D. of
Lethbridge, County of
MacKenzie, M.D. of
Medicine Hat
Minburn, County of
Mountain View County
Newell, County of
Northern Lights, County of
Northern Sunrise County
Opportunity, M.D. of
Paintearth, County of
Parkland County
Peace, M.D. of / Peace River
Pincher Creek, M.D. of
Ponoka County
Provost, M.D. of
Ranchland, M.D. of
Red Deer County
Rocky View County
Saddle Hills County
Smoky Lake County
Smoky River, M.D. of
Spirit River, M.D. of
St. Paul, County of
Starland County
Stettler, County of
Strathcona County
Sturgeon County
Taber, M.D. of
Thorhild, County of

Two Hills, County of
Vermilion River, County of
Vulcan County
Wainwright , M.D. of
Warner, County of
Westlock County
Wetaskiwin, County of
Wheatland County
Willow Creek, M.D. of
Wood Buffalo, Regional Municipality of
Woodlands County
Yellowhead County
None of the above
Don't know

[IF NONE OF THE ABOVE, DK/NS OR REF THANK & TERMINATE]
[ASSIGN CENSUS DIVISION BASED ON RESPONSE TO S4]

SECTION 1: FARM OPERATIONS

I'd like to start by asking a few questions about your operation.

1. In 2017, did the area you farmed include acres in…? **(READ LIST) (IF ASKED:** 'Area you farmed' includes both land that is owned or rented from someone else)

Crop production
Summerfallow
Forages or hay
Improved land used for pasture or grazing
Undisturbed wetlands
Unimproved land in bush, native grasses, etc.
Anything else (please specify)

Yes
No
Don't know

[IF DK/REF TO ANY ITEM OTHER THAN 'ANYTHING ELSE' IN Q1, THANK & TERMINATE]

[ASK Q1A1 IF YES TO CROP PRODUCTION OR SUMMERFALOW IN Q1]
1A1. Approximately how many acres of **cropland seeded to annual crops** did you have on your farm in 2017?

[RECORD NUMBER. RANGE = 1 TO 99,999]

[ASK Q1A2 IF YES TO FORAGES OR HAY OR IMPROVED LAND OR UNDISTURBED WETLANDS OR UNIMPROVED LAND IN BUSH IN Q1]

1A2. Approximately how many acres of **perennial cover** did you have on your farm in 2017?

[RECORD NUMBER. RANGE = 1 TO 99,999]

[ASK Q1B IF YES TO CROP PRODUCTION IN Q1]
1B. Did you have any irrigated cropland last year?

Yes
No
Don't Know

[IF DK/REF TO Q1B, THANK & TERMINATE]

[ASK Q1C IF YES TO FORAGES OR HAY OR IMPROVED LAND USED FOR PASTURE OR GRAZING IN Q1A]
1C. Did you have any irrigated pasture or forages or hay last year?

Yes
No
Don't Know
[IF DK/REF TO Q1C, THANK & TERMINATE]

2. Has the percentage of acres in summerfallow on your farm increased, decreased or remained the same in the past two years?

Increased
Remained the same/ had none
Decreased
Don't know

3. By unimproved land, we mean land not under production, excluding summerfallow. Thinking about your total farm area, has the percentage of acres in unimproved land increased, decreased or remained the same in the past two years?

Increased
Remained the same/ had none
Decreased
Don't know

4. In 2017, did you have any…? **(READ LIST)**

Beef cattle
Dairy cattle
Pigs
Broiler Chicken
Layer Chicken
Turkeys
Sheep or lambs

Horses
Any other livestock (please specify)

Yes
No
Don't know

[IF DK/REF TO ALL, THANK & TERMINATE]

[IF NO TO ALL ITEMS IN Q4, SKIP TO INSTRUCTION BEFORE Q6B]

5. Do you graze any livestock on your land?

Yes
No
Don't know

[THANK & TERMINATE IF DK/REF]

[ASK Q6 IF YES TO BEEF CATTLE IN Q4, OTHERWISE SKIP TO INSTRUCTION BEFORE Q6B]

6. Do you operate a feedlot?

Yes
No
Don't know

[THANK & TERMINATE IF DK/REF]

[ASK Q6B IF YES TO CROP PRODUCTION OR YES TO FORAGES OR HAY IN Q1A AND YES TO ANY ITEM IN Q4.]

6B. Was the **main** source of your gross farm revenue in 2017 – crops, livestock or an equal mix of both? **(PROBE TO CLARIFY IF REQUIRED)**

Crops
Livestock
Equal mix of both
Don't know

OPERATION TYPE [DO NOT ASK]
[CROPS = YES TO CROP PRODUCTION OR YES TO FORAGES AND HAY IN Q1A AND NO TO ALL ITEMS IN Q4; OR, CROPS SELECTED AT Q6B / LIVESTOCK = NO TO CROP PRODUCTION AND NO TO FORAGES AND HAY AT Q1A, AND YES TO ANY ITEM IN Q4; OR, LIVESTOCK SELECTED AT Q6B / MIXED = EQUAL MIX OF BOTH SELECTED AT Q6B]

Crops

Livestock
Mixed

7. In 2017, which of the following was applied to your land? **(READ LIST)**

Commercial fertilizers
Solid manure
Liquid manure
Compost manure – that is, manure that is actively managed, not manure that has been piled and left
Crop protection products such as herbicides, insecticides and fungicides

Yes
No
Don't know

[IF DK/REF TO ALL, THANK & TERMINATE]

[ASK Q8 IF YES TO SOLID MANURE OR LIQUID MANURE OR COMPOST IN Q7]

8. Did you have any manure custom applied in 2017?

Yes
No
Don't know

9. Did you store any solid manure on your farm last year? How about liquid manure? How about compost manure?

Solid manure
Liquid manure
Compost manure

Yes
No
Don't know

[THANK & TERMINATE IF DK/REF]

10. Are there any natural rivers, streams, wetlands or sloughs on the property that you farm?

Yes
No
Don't know

[THANK & TERMINATE IF DK/REF]

[ASK Q11 IF YES TO Q10]

11. Do you have any drained wetlands or sloughs?

Yes
No
Don't know
Not applicable

SECTION 2: DECISION MAKING SUPPORT RESOURCES AND TOOLS

12.

12NEW.For each of the following, please tell me which statement best describes how familiar you are with it or if you've used it to help you make management decisions. The first one is **[INSERT FIRST ITEM]**. Would you say, you have not heard of it, you have heard of it but haven't considered using it, you are considering using it, or you have used it? How about **[INSERT NEXT ITEM]? (REPEAT SCALE AS NECESSARY)**

[RANDOMIZE ORDER]
Programs that support you in adopting environmentally beneficial management practices/technologies – for example, energy saving practices, or practices that reduce agriculture's risk to water resources
Local extension personnel for information or events – for example, local newsletters, workshops or tours
Alberta Government sources of information on current and new environmentally sustainable agricultural practices
Requirements and standards provided in the Agriculture Operation Practices Act – AOPA when making management decisions.
Requirements and standards provided in the Alberta Soil Conservation Act, Weed Act or Pest Act when making management decisions.
Agroclimatic Information Services – ACIS – website for weather information
Alberta Soil Information Viewer for soil information and planning
Environmental Farm Plan
[INSERT IF YES TO LIQUID, SOLID OR COMPOST MANURE OR COMMERCIAL FERTILIZERS AT Q7] The 4R Nutrient Stewardship Principles when applying manure or fertilizer on your farm (IF ASKED: 4R's are defined as: the Right product, at the right rate, right time and right place)
Manure Management or Fertilizer Management decision support tools – for example, manure management planner, manure transportation calculator or ammonia loss calculator
The Alberta Farm Fertilizer Information and Recommendation Manager (AFFIRM)
Alberta Phosphorus Management Tool (APMT)
Alberta Agriculture's ManureTracker App
FarmSafe
[INSERT IF YES TO IRRIGATION AT Q1B] the Alberta Irrigation Management Model (AIMM) tool when irrigating your crops

You have not heard of it
You have heard of it but haven't considered using it
You are considering using it

You have used it
(DO NOT READ) Don't know

SECTION 3: SOIL CONSERVATION PRACTICES

[ASK SECTION 3 IF YES TO CROP PRODUCTION IN Q1A, ELSE SKIP TO NEXT SECTION]

This set of questions address crop production.

13. Please indicate which of the following **best** describes how you seeded the majority of your crop acres in 2017. **(READ LIST)**

The seeding operation into the stubble of the previous crop was the only tillage pass completed – this may have included the use of harrows prior to seeding
In addition to the seeding operation, one tillage pass was completed either in the spring or fall prior to seeding – tillage practices include disc or cultivator
In addition to the seeding operation, two or more tillage passes were completed either in the spring or fall prior to seeding
(DO NOT READ) Don't know
(DO NOT READ) Not applicable

[ASK Q14 IF 3RD ITEM SELECTED IN Q13, ELSE SKIP TO Q15]

14. What are the **main** reasons you completed two or more tillage passes prior to seeding? **(DO NOT READ LIST) [ACCEPT MULTIPLE RESPONSES]**

Seeding equipment required a tillage pass for seed bed preparation
To incorporate manure
To manage excess straw
To manage excess moisture
To manage weed populations
No additional passes are made
Other (please specify)
Don't know
Not applicable

15. Did you use **[INSERT FIRST ITEM]** in your cropping rotation in 2017? How about **[INSERT NEXT ITEM]**?

Perennial forages
Pulse crops
Winter cereals

Yes
No
Don't know
Not applicable

SECTION 4: PRACTICES THAT IMPACT WATER QUALITY / QUANTITY

This set of questions address water issues. Please answer the questions thinking about your farm in 2017 unless otherwise instructed.

[ASK Q16 IF YES TO Q10, ELSE SKIP TO INSTRUCTION BEFORE Q19]

16. Did you maintain buffer areas of grass and/or trees along the edge of rivers, streams, sloughs, wetlands or ditches?

Yes
No
Don't know
Not applicable

17. [DELETED QUESTION]

18. Did you drain or fill in natural wetlands or sloughs?

Yes
No
Don't know
Not applicable

[ASK Q19, 19A, 19B & 19C IF YES TO COMMERCIAL FERTILIZERS AT Q7, ELSE SKIP TO INSTRUCTION BEFORE Q20]

19. Did you apply commercial fertilizer based on the results of a soil or plant tissue test?

Yes
No
Don't know
Not applicable

19A. Thinking about the total amount of commercial fertilizer you applied or had applied in 2017, about what percentage was applied in (READ LIST)? (IF NOT SURE, PROBE FOR BEST ESTIMATE)

Spring
Fall
Other time of year

% **[RECORD PERCENTAGE]**
Don't know
Not applicable

19B. Which of the following application methods were used for the fertilizer you applied or had

applied in 2017? **(READ LIST)**

[DO NOT RANDOMIZE] [MULTI-PUNCH]
Banded
Broadcast and incorporated
Broadcast but not incorporated
In furrow with the seed
Fertigation (injection of fertilizer into an irrigation system)
Other (Please specify)
Don't know
Not applicable

19C. Did you use any Nitrogen Use Efficiency products in 2017, for example, products such as ESN, Super U, Urea with Agrotain, Anhydrous Ammonia with N-serve, etc. – that is, products that are nitrogen inhibitors or stabilizers that reduce nitrogen loss?

Yes
No
Don't know
Not applicable

[ASK Q19D IF YES IN Q19C]

19D. Of all the acres that you could use Nitrogen Use Efficiency products on, on your operation, what percentage of your acres are you using them on?

[VALUE 0 – 100%]

[ASK Q20 IF YES TO ANY ITEM IN Q4 OR Q9, ELSE SKIP TO Q21]

20. Did you control runoff from all, some or none of your **[INSERT FIRST ITEM]?** How about **[INSERT NEXT ITEM]**? **(REPEAT SCALE AS NECESSARY)**

[ASK IF YES TO ANY ITEM IN Q9] Manure storage
[ASK IF YES TO ANY ITEM IN Q4] Livestock pens
[ASK IF YES TO ANY ITEM IN Q4] Overwintering in-field Feeding areas

All
Some
None
Don't know
Not applicable

Q20B. Thinking about all the water wells on your farm property, how many of each of the following do you have?

[LIST – DO NOT RANDOMIZE]

Total wells: including active, inactive, abandoned or unused wells [VALUE 0 – 100] **[IF 0/DK/REF DO NOT ASK FURTHER ITEMS]**
Total active wells [VALUE 0 –ANSWER PROVIDED FOR TOTAL WELLS]
[DO NOT ASK IF Total active Wells = SAME VALUE AS Total wells] Total inactive, abandoned or unused wells (e.g. a well that is no longer being used or maintained for future use) [VALUE 0 – ANSWER PROVIDED FOR TOTAL WELLS MINUS the number of Total Active Wells]
[DO NOT ASK IF Total active Wells = 0/DK/REF OR IF Total inactive = SAME VALUE AS TOTAL WELLS] Total number of active wells that are properly maintained (examples of well maintenance include shock chlorination, collection of water samples, visual inspection, etc.) [VALUE 0 – ANSWER PROVIDED FOR ACTIVE WELLS]
[DO NOT ASK IF Total inactive Wells = 0/DK/REF OR IF Total active = SAME VALUE AS TOTAL WELLS] Total number of inactive, abandoned or unused wells that are properly sealed or plugged using bentonite or other approved material. [VALUE 0 – ANSWER PROVIDED FOR TOTAL INACTIVE, ABANDONED OR UNUSED WELLS]

21. [DELETED QUESTION]

22. [DELETED QUESTION]

23. [DELETED QUESTION]

24. [DELETED QUESTION]

[ASK Q25 IF YES TO CROP PROTECTION PRODUCTS IN Q7 AND YES TO Q10, Q20B_ACTIVE WELLS >0 ELSE SKIP TO INSTRUCTION BEFORE Q26]

25. In 2017, did you maintain at least a 10-meter buffer area from **[INSERT FIRST ITEM]** when applying crop protection products? How about **[INSERT NEXT ITEM]? (IF NECESSARY**: Did you maintain at least a 10-meter buffer area from…when applying crop protection products?)

[INSERT IF YES TO Q10] Natural Water bodies
[INSERT IF YES TO Q20B_ACTIVE WELLS >0] Water wells

Yes
No
Don't know
Not applicable

26. [DELETED QUESTION]

27. [DELETED QUESTION]

[ASK Q28 IF YES TO Q5 AND YES TO Q10, ELSE SKIP TO SECTION 6]

28. In 2017, did you manage or control livestock access to water bodies that are used as a water source?

Yes
No
Don't know
Not applicable

[ASK Q29 IF YES TO Q28, ELSE SKIP TO Q30]

29. Which of the following methods did you use? **(READ LIST)**

Fencing to prevent direct access – this includes temporary and permanent fencing
Off stream watering
Livestock movement tools such as salt blocks, windbreaks and herding to distribute livestock away from water bodies.
Pasture water pipelines

Yes
No
Don't know
Not applicable

[ASK Q30 IF YES TO Q5 AND YES TO Q10]

30. Did you locate all, some or none of your in-field winter feeding and bedding sites to prevent runoff from manure entering natural water bodies

All
Some
None
Don't know
Not applicable

SECTION 6: GRAZING MANAGEMENT PRACTICES

[ASK SECTION 6 IF YES TO Q5, ELSE SKIP TO NEXT SECTION]

31. Which of the following do you typically do on your farm? **(READ ITEMS) [DO NOT RANDOMIZE]**

Annually consider or adjust your stocking rate to balance livestock forage demand with the available forage supply
Rotate use of your pastures as part of your grazing management
Avoid or minimize grazing in riparian and/or bush areas in the late summer or autumn
Move livestock away from riparian areas using tools and methods such as salt blocks, windbreaks and herding
Time the grazing of riparian areas to avoid grazing during spring and early summer
Manage native rangelands – that is, those lands on which the vegetation is mostly native grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing use that are not introduced or tame cultivated varieties

[INSERT ONLY IF YES TO MANAGE NATIVE RANGELANDS] Time the grazing of native rangelands

Yes
No
Don't know
Not applicable

SECTION 5: WILDLIFE HABITAT CONSERVATION PRACTICES

The next set of questions address wildlife habitat on your farm.

32. Do you retain woodlands, bush or native grassland?

Yes
No
Don't know
Not applicable

[ASK Q33 IF YES TO Q5, ELSE SKIP TO Q34]

33. In 2017, did you manage your livestock grazing to provide habitat for wildlife?

Yes
No
Don't know
Not applicable

34. Do you have woodlands or bush on your operation?

Yes
No
Don't know
Not applicable

[ASK Q35 IF YES TO 34 AND YES TO Q5, ELSE SKIP TO INSTRUCTION BEFORE Q36]

35. In 2017, did you manage grazing to encourage natural growth of understory in woodlands? Understory may include small trees, shrubs, forbs and grasses

Yes
No
Don't know
Not applicable

[ASK Q36 IF YES TO Q11, ELSE SKIP TO SECTION 7]

36. [DELETED QUESTION]

36X. Did you avoid bringing into production land that has not been previously cropped, including woodlands and bush, wetlands, and native grassland?

Yes, I avoided bringing land like that into production
No, I was unable to avoid it and brought some of that land into production

SECTION 7: MANURE MANAGEMENT PRACTICES

[ASK SECTION 7 IF YES TO LIQUID, SOLID OR COMPOST MANURE IN Q7 OR YES TO LIQUID, SOLID OR COMPOST MANURE IN Q9, ELSE SKIP TO NEXT SECTION]

The next set of questions address manure management.

[ASK Q37 IF YES TO LIQUID, SOLID OR COMPOST MANURE IN Q7, ELSE SKIP INSTRUCTION BEFORE Q39]

37. Do you typically need to apply **[INSERT FIRST ITEM]** on frozen or snow-covered ground? How about **[INSERT NEXT ITEM]**?

Manure [INSERT IF YES TO LIQUID OR SOLID MANURE IN Q7]
Compost [INSERT IF YES TO COMPOST IN Q7]

Yes
No
Don't know
Not applicable

38. [DELETED QUESTION]

[ASK Q39 IF YES TO LIQUID, SOLID OR COMPOST MANURE IN Q9 AND >0 for Q20B: Total active wells **AND/OR IF Q20B:** Total inactive, abandoned or unused wells **DOES NOT EQUAL Q20B:** Total number of inactive, abandoned or unused wells…**]**

39. Did you store manure within 100 metres of **[INSERT FIRST ITEM]**? How about **[INSERT NEXT ITEM]?**

Active water wells [**INSERT IF >0 TO Q20B:** Total active wells]
Abandoned, inactive or unused water wells that have not been properly plugged, or sealed [**INSERT IF Q20B:** Total inactive, abandoned or unused wells **DOES NOT EQUAL Q20B:** Total number of inactive, abandoned or unused wells…**]**

Yes
No
Don't know
Not applicable

[ASK Q40 IF YES TO SOLID MANURE OR COMPOST MANURE OR LIQUID MANURE IN Q7, ELSE SKIP TO INSTRUCTION BEFORE Q46]

40. On the fields that you have manure applied, how frequently do these fields typically receive manure? **(READ LIST)**

One or more times a year
Once every two years
Once every three years
Less frequently than once every three years
Don't know
Not applicable

[ASK Q41 IF YES TO SOLID MANURE OR COMPOST MANURE IN Q7]

41. On annually cropped fields that are not direct seeded, do you typically incorporate **[INSERT FIRST ITEM]**? How about **[INSERT NEXT ITEM]?**

Solid manure [INSERT IF YES TO SOLID MANURE IN Q7]
Compost manure [INSERT IF YES TO COMPOST MANURE IN Q7]

Yes
No
Don't know
Not applicable

[ASK Q42 IF YES TO EITHER ITEM IN Q41]

42. Do you typically incorporate **[INSERT FIRST ITEM]** within 24 hours, 48 hours or greater than 48 hours? How about **[INSERT NEXT ITEM]**?

Solid manure [INSERT IF YES TO SOLID MANURE IN Q41]
Compost manure [INSERT IF YES TO COMPOST MANURE IN Q41]

Within 24 hours
Within 48 hours
Greater than 48 hours
Don't know
Not applicable

42A. [DELETED QUESTION]

[ASK Q43 IF YES TO LIQUID MANURE IN Q7]

43. Thinking about <u>liquid</u> manure, do you typically…? **(READ LIST) [ACCEPT ONE RESPONSE ONLY]**

<u>[DO NOT RANDOMIZE LIST]</u>

Inject – that is, shank or disc – the manure into the ground
Broadcast the liquid manure with no incorporation – incorporation means cultivation, discing or harrowed after application
Broadcast with incorporation within 24 hours after application
Broadcast with incorporation within 48 hours after application, OR
Broadcast with incorporation greater than 48 hours after application

43A. [DELETED QUESTION]

[ASK Q44 IF YES TO COMPOST MANURE SOLID MANURE OR LIQUID MANURE IN Q7]

44. Do you typically take into account any of the following factors when applying either solid or liquid manure? **(READ LIST)**

Distance between manure application and waterways – that is, low lying paths where surface water collects and flows
Slope of land
Application method

Yes
No
Don't know
Not applicable

[ASK Q45 IF YES TO COMPOST, SOLID MANURE OR LIQUID MANURE IN Q7]

45. Do you typically apply **[INSERT FIRST ITEM]** based on a soil or tissue test, manure nutrient test or book values? How about **[INSERT NEXT ITEM]?** (**REPEAT RESPONSE CATEGORIES IF NECESSARY)**

Compost [INSERT IF YES TO COMPOST IN Q7]
Manure – either, solid or liquid [INSERT IF YES TO SOLID OR LIQUID MANURE IN Q7]

Soil or tissue test
Manure nutrient test
Book values
None of the above
Don't know
Not applicable

[ASK Q46, Q47 & Q48 IF YES TO SOLID MANURE OR LIQUID MANURE OR COMPOST MANURE IN Q7, ELSE SKIP TO INSTRUCTION BEFORE Q50]

46. Are your manure application rates typically based on crop nitrogen requirements, crop phosphorus requirements or neither? **(ACCEPT ONE RESPONSE ONLY) (IF RESPONDENT SAYS BOTH, RECORD DK)**

Crop nitrogen requirements

Crop phosphorus requirements
Neither
Don't know
Not applicable

47. Do you typically time manure application within one month of seeding a crop, into an established crop or forage stand or after crop removal or harvest? **(ACCEPT MULTIPLE RESPONSES)**

Within one month of seeding a crop
Into an established crop or forage stand
After crop removal/harvest
Don't know
Not applicable

48. Do you typically manage – that is, receive or produce – more than 500 tonnes of manure per year?

[IF NECESSARY – FOR FIELDING INSTRUCTIONS: 500 tonnes of manure is: 35 head of hogs farrow to finish; 102 head of hogs farrow to wean; 22 head of milking cows; 227 head of beef animal >900 lbs; 357 head beef animals <900 lbs; 455 head of cows – cow/calf operation, 6 months on pasture; 682 head of cows; cow/calf operation 8 months on pasture; 19,230 birds, poultry breeders; 31,250 bird of poultry layers; 50,000 birds of poultry broilers; 25,000 birds, turkey broilers]

Yes
No
Don't know
Not applicable

[ASK Q49 IF YES TO Q48]

49. Do you typically keep records detailing the amount and field location of where the manure is spread for all, some or none of your fields?

All
Some
None
Don't know
Not applicable

[ASK Q50 IF YES TO ANY ITEM IN Q9]

50. In 2017, did you use any of the following practices to manage odour or dust from your farm? If the practice does not apply to you, please say so. **(READ LIST)**

Manure storage covers
Shelterbelts
Routine manure removal from feedlot pens and barns

Dust control materials applied on gravel roadways and feedlots – for example, water mulches and salts
Manure injection or band spreading or broadcasting followed by immediate incorporation
Kept neighbours informed about your farming activities – for example, manure application schedule

Yes
No
Don't know
Not applicable

[ASK Q51 IF YES TO BEEF CATTLE, DAIRY CATTLE, SHEEP OR LAMBS, HORSES OR ANY OTHER LIVESTOCK AT Q4]

51. Do you typically house livestock outside during the winter?

Yes
No
Don't Know

[AKS Q51B IF YES IN Q51]

51B. Thinking about livestock that are housed outside during the winter, how do you typically manage them? **(READ LIST)** (INTERVIEWER NOTE: includes cattle, sheep, goats, horses etc.)

In corrals or feed pens
Loafing pens – that is, temporary daytime housing
One field site all season
Corn graze
Graze bales left in field
Bales moved to other field and fed using electric fence
Bales hauled to field and unrolled or feed in feeders
Stockpiled forages
Portable windbreaks

Yes
No
Don't know
Not applicable

SECTION 8: AGRICULTURAL WASTE MANAGEMENT PRACTICES

[ASK SECTION 8 IF YES TO ANY ITEM IN Q4 OR YES TO CROP PROTECTION PRODUCTS IN Q7, ELSE SKIP TO SECTION 9]

Another agricultural issue that farmers must deal with is agricultural waste management. This is not waste or garbage that comes from the home.

52A. Please indicate if you used each of the following on your farm in 2017. Did you use… (READ LIST)

[INSERT IF YES TO ANY ITEM IN Q4] Plastics such as baler twine, feed bags, silage wraps and/or bale wraps
[INSERT IF YES TO CROP PROTECTION PRODUCTS IN Q7] Crop protection product containers

Yes
No
Don't know
Not applicable

[IF NO/DK/REF TO ALL ITEMS IN 52A, SKIP TO NEXT SECTION]

52. Please indicate if you did each of the following on your farm in 2017. Did you… (READ LIST)

[INSERT ITEMS 'YES' IN Q52A]
Recycle plastics such as baler twine, feed bags, silage wraps and/or bale wraps
Recycle your crop protection product containers

Yes
No
Don't know
Not applicable

SECTION 9: ENERGY AND CLIMATE CHANGE PRACTICES

The next topic is energy and climate change.

53. [DELETED QUESTION]

53A. Do you have separate electricity meters for your barn(s) and/or workshops? **(IF NECESSARY ADD**: Are they separate from the electricity meters for your residential buildings on your farm property?)

Yes
No
Don't know

53B. Do you have separate gas meters for your barn(s) and/or workshops? **(IF NECESSARY ADD**: Are they separate from the gas meters for your residential buildings on your farm property?)

Yes
No
Don't know

54. Do you produce grid-connected electricity?

Yes

No
Don't know
Not applicable

[ASK Q55 IF YES TO Q54]

55. Do you produce grid-connected electricity using any of the following Renewable Energy methods (excluding electrical company leases)? **(READ LIST)**

Solar panels, not counting for water pumping or electric fencing
Wind turbine generator on a tower
Biogas generator using farm waste

Yes
No
Don't know
Not applicable

56. Do you produce heat from any of the following Renewable Energy methods? **(READ LIST)**

Solar thermal water heating
Solar thermal air heating incorporated into farm building walls
Large-scale wood combustion (whole, pellets or chips) for your barn
Combustion of any other biomass (straw bales, straw pellets, grain)

Yes
No
Don't know
Not applicable

57. Are you currently participating in the Alberta Carbon offset market?

Yes
No
Don't know
Not applicable

58. [DELETED QUESTION]

58B. [DELETED QUESTION]

SECTION 10: GENERAL PRACTICES

The next set of questions covers a few different topics.

[ASK Q59 IF YES TO COMMERCIAL FERTILIZERS OR CROP PROTECTION PRODUCTS AT Q7]

59. Last year, did you utilize Variable Rate Technology in the application of…? **(READ LIST)**

Commercial fertilizer [INSERT IF YES TO COMMERCIAL FERTILIZER AT Q7]
Crop protection products such as herbicides, insecticides and fungicides [INSERT IF YES TO CROP PROTECTION PRODUCTS AT Q7]

Yes
No
Don't know
Not applicable

60. Have you completed the Environmental Farm Plan process?

Yes
No
Don't know
Not applicable

61. [DELETED QUESTION]

[ASK Q62 IF YES TO CROP PRODUCTION, FORAGES OR HAY OR IMPROVED LAND USED FOR PASTURE OR GRAZING AT Q1A, ELSE SKIP TO Q64]

62. Do you typically soil sample all, some or none of your fields?

All
Some
None
Don't know
Not applicable

[ASK Q63 IF ALL OR SOME OR NONE IN Q62]

63. Do you typically soil sample your fields yearly, at least once every three years, less than once every three years or never?

Yearly
At least once every three years
Less than once every three years
Never
Don't know
Not applicable

64. Have you planted trees on your farm in the past two years for agriculture purposes? (Examples; Shelterbelts/windbreaks, Wildlife habitat, soil conservation, odour control, etc.)

Yes

No
Don't know
Not applicable

65. [DELETED QUESTION]

66. [DELETED QUESTION]

67. [DELETED QUESTION]

Section 10B: SUSTAINABILITY PROGRAMS (NEW SECTION IN 2018)

Q10B1. I am going to read you a list of potential topics that could impact the way you farm over the next 3-5 years. Please indicate the extent you expect each topic could impact your farm using the following scale from 1 to 10 where 1 represents "very little impact" and 10 represents "very significant impact".

[SCALE 1-10]
Not sure / Don't know

[RANDOMIZE]
Access to capital
[ONLY ASK IF YES TO AT LEAST ONE LIVESTOCK TYPE IN Q4] Animal care regulations/code of practice requirements/animal care assessments and audits
[ONLY ASK IF YES TO AT LEAST ONE LIVESTOCK TYPE IN Q4] Biosecurity/Animal health or disease
Cost of farming inputs
Changing weather patterns
Environmental regulations or requirements
Consumer pressure or activist pressure
Farm transfer or succession
Food safety and health regulations or requirements
Urban expansion onto farmland
Restricted market access due to government trade barriers or policies
Restricted market access due to retailers/restaurants/food companies requiring additional standards for on-farm practices
Securing labour
Farm safety regulations or requirements

Q10B2. I'm going to read a list of areas of sustainability. Please tell us how important you feel each area of sustainability is by using the following scale from 1 to 10, where 1 means not at all important and 10 means extremely important. How important do you think [INSERT ITEM] is when it comes to sustainability, on a scale of 1 to 10? How about [INSERT ITEM]?....

[LIST - RANDOMIZE]
Environment
Animal Welfare
Farm Safety

On-farm Food Safety
Food Affordability
Economic Sustainability

[SCALE 1-10]

Q10B3. I'm going to re-read the list of areas of sustainability. Thinking of you're the agriculture industry as a whole, please tell us in which areas you feel the most pressure from consumers using the following scale from 1 to 10, where 1 means no pressure from consumers and 10 means significant pressure from consumers.

[LIST - RANDOMIZE]
Environment
Animal Welfare
Farm Safety
On-farm Food Safety
Food Affordability
Economic Sustainability

[SCALE 1-10]

I am going to read you a description of sustainability standards. As I am reading this, please consider your familiarity with such standards or certification programs.

(READ, RE-READ IF NECESSARY)
Sustainability programs relate to the environmental, social, ethical, and food safety standards that are being adopted by companies to demonstrate more than just their economic performance. These programs are generally voluntary and may be assessed by a third-party.

Some examples include the Environmental Farm Plan and Verified Beef Production Plus. (NOTE TO INTERVIEWER: RESPONDENTS MAY MENTION "Certified Humane" OR "THE EARL'S SITUATION". WHILE THIS SPECIFIC CASE IS AN EXAMPLE, EMPHASIZE THERE ARE MANY OTHER SUCH STANDARDS AND THAT THIS STUDY IS NOT A SPECIFIC RESPONSE TO THE EARL'S SITUATION).

There are perhaps up to 500 such standards globally and the pace of introduction has increased in the last decade.

In recent years, such standards are increasingly being used as minimum standard requirements for farmers to be considered as suppliers. Most of them refer to environmental quality, social equity, and economic prosperity.

Q10B4. How familiar are you with these standards? Have you… **(READ LIST)**

Never heard of them
Know a little about them
Know a lot about them

[IF KNOW A LITTLE OR KNOW A LOT, ASK Q10B5 and Q10B6 OTHERWISE SKIP TO Q10B7]

Q10B5. What, if anything, do you consider to be the benefits or positive aspects of sustainability standards? Please be as detailed as possible. (PROBE AND CLARIFY FULLY)

[OPEN-ENDED]

Q10B6. What, if anything, do you consider to be the drawbacks or negative aspects of sustainability standards? Please be as detailed as possible. (PROBE AND CLARIFY FULLY)

[OPEN-ENDED]

Q10B7. In many cases, sustainability programs include a certification requirement. Typical requirements of sustainability certification protocols currently implemented by food retailers, restaurants and processors can include aspects of environmental management, animal welfare, farm safety and on-farm food safety to name a few. Please indicate your agreement with the following statements using a scale from 1 to 10 where 1 is completely disagree and 10 is completely agree.

[LIST - RANDOMIZE]
I want to learn more about sustainability certification
I would only undergo sustainability certification if required
I would only undergo sustainability certification if I received a premium for my product
Sustainability certification programs will be part of "doing business" in the future
I feel I need training and/or assistance to be better prepared for sustainability certification

[1-10]

Q10B8. Has a customer or buyer ever requested that you participate in a sustainability program? (CLARIFY FROM LIST IF NEEDED)

[LIST]
Yes, a customer/buyer required us to participate
Yes, a customer/buyer recommended or urged us to participate (but it was not required)
No, a customer/buyer has never requested us to participate in a sustainability program
Can't Remember

Q10B9. Have you ever searched for new market opportunities and found some that required participation in a sustainability certification program that require 3rd party verification? (CLARIFY FROM LIST IF NEEDED)

[LIST]
Yes, I have found market opportunities that require participation in a sustainability certification program
No, I have searched for market opportunities and have not come across any that require participation in a sustainability certification program
I have not searched for new market opportunities in a number of years
Can't remember

Q10B10. Next, I'll read a list of voluntary sustainability certification programs. Let me know how familiar are you with each. The first is… [INSERT ITEM]? (READ LIST THE FIRST TIME THEN AS NEEDED) And how about [INSERT ITEM]?

[LIST - RANDOMIZE]
Viterra's Food Safety and Quality Systems Sustainability Certification **[ASK IF YES TO CROP PRODUCTION IN Q1]**
Canada GAP (Good Agricultural Practices) **[ASK IF YES TO CROP PRODUCTION IN Q1]**
Sustainable Agriculture Initiative (SAI) and the Farm Sustainability Assessment (FSA)
International Sustainability and Carbon Certification (ISCC)
Unilever 2017
Verified Beef Production Plus **[ASK IF BEEF SELECTED IN Q4]**
ProAction **[ASK IF DAIRY SELECTED IN Q4]**
SPCA Verified **[ASK IF RESPONDENT HAS ANY LIVESTOCK OTHER THAN TURKEYS OR HORSES]**
Canadian Feedlot Animal Care Assessment Program **[ASK IF BEEF SELECTED IN Q4]**
Canadian Pork Council's Animal Care Assessment (ACA) Program **[ASK IF PIGS SELECTED IN Q4]**
Egg Farmers of Canada's Animal Care Program **[ASK IF LAYER CHICKEN SELECTED IN Q4]**
Chicken Farmers of Canada's Animal Care Program **[ASK IF BROILER CHICKEN SELECTED IN Q4]**
Turkey Farmers of Canada's Flock Care Program **[ASK IF TURKEYS SELECTED IN Q4]**
Canadian Quality Milk Program **[ASK IF DAIRY SELECTED IN Q4]**
Canadian Quality Assurance Program **[ASK IF PIGS SELECTED IN Q4]**
Start Clean Stay Clean **[ASK IF LAYER CHICKEN SELECTED IN Q4]**
Canadian Hatching Egg Quality Program **[ASK IF LAYER CHICKEN SELECTED IN Q4]**
Canadian Grain Commission Food Safety Program **[ASK IF YES TO CROP PRODUCTION IN Q1]**

[SCALE]
Participate in this program
Have heard of it and know a lot about it
Have heard of it and know a little about it
Have never heard of it

Q10B11. As sustainability requirements from customers continue to grow, how well do you think that government programs and services are in alignment with helping you meet these requirements? **(For interviewer: Cost share, research, training, technical assistance, information)** Please use a scale from 1 to 10 where 1 represents "No, government programs are not at all in alignment to help meet sustainability requirements" and 10 represents "Yes, government programs are completely in alignment to help meet sustainability requirements
Unsure".

[SCALE 1-10]

SECTION 11: RESPONDENT PROFILE

I just have a few final questions about you and your farm. Your responses will be used for classification purposes only and only aggregate results will be used for reporting purposes.

68. [DELETED QUESTION]

69. Have you attended a degree or diploma program, specifically in an agriculturally-related area? **(DO NOT READ LIST)**

Yes
No
Maybe/Perhaps
Don't know

70. Have you attended any environmental agriculture training sessions in the past two years? **(DO NOT READ LIST)**

Yes
No
Maybe/Perhaps
Don't know

70A. I'm going to read descriptions of a number of programs that assist producers to make environmental improvements on their farm. For each one, please indicate if you have taken part in it in the **past 5 years**. In the **past 5 years**, have you **[INSERT FIRST ITEM].** And, in the **past 5 years** have you **[INSERT NEXT ITEM].** Have you **[INSERT NEXT ITEM]. (REPEAT TIME FRAME IF NECESSARY)**

[ITEMS – RANDOMIZE ORDER]
Taken part in the Growing Forward Stewardship Program? (READ IF NO IMMEDIATE RESPONSE OR DK/NS: This Program funds projects that help livestock and crop producers implement on-farm management practices that positively impact water quality.)
Taken part in the Growing Forward Water Management Program? (READ IF NO IMMEDIATE RESPONSE OR DK/NS: This program provides technical assistance to agricultural producers to complete a Long-Term Water Management Plan and shares the cost of related enhancements of their on-farm water supply management.)
Taken part in the Growing Forward Irrigation Efficiency Program (READ IF NO IMMEDIATE RESPONSE OR DK/NS: This program helps producers invest in new or upgraded Low Pressure Center Pivot irrigation equipment for their operations, improving the efficiency of energy and water use on Alberta farms.)
Taken part in the Growing Forward Energy Management Program? (READ IF NO IMMEDIATE RESPONSE OR DK/NS: This program shares the cost of investments that improve energy efficiency on Alberta farms.)
Made use of any of the information resources or tools of the Working Well Program? (READ IF NO IMMEDIATE RESPONSE OR DK/NS: This program provides technical assistance to rural water well owners through workshops, factsheets, and online interactive tools to properly operate and maintain their water wells.)
Worked with Alberta Agriculture and Rural Development staff or Municipal Staff to help you make environmental improvements on your farm?

[SCALE]
Yes

No
Don't know (DO NOT READ)

71. Which of the following best describes the current state of your farm operation? **(READ LIST) (ACCEPT ONE RESPONSE ONLY)**

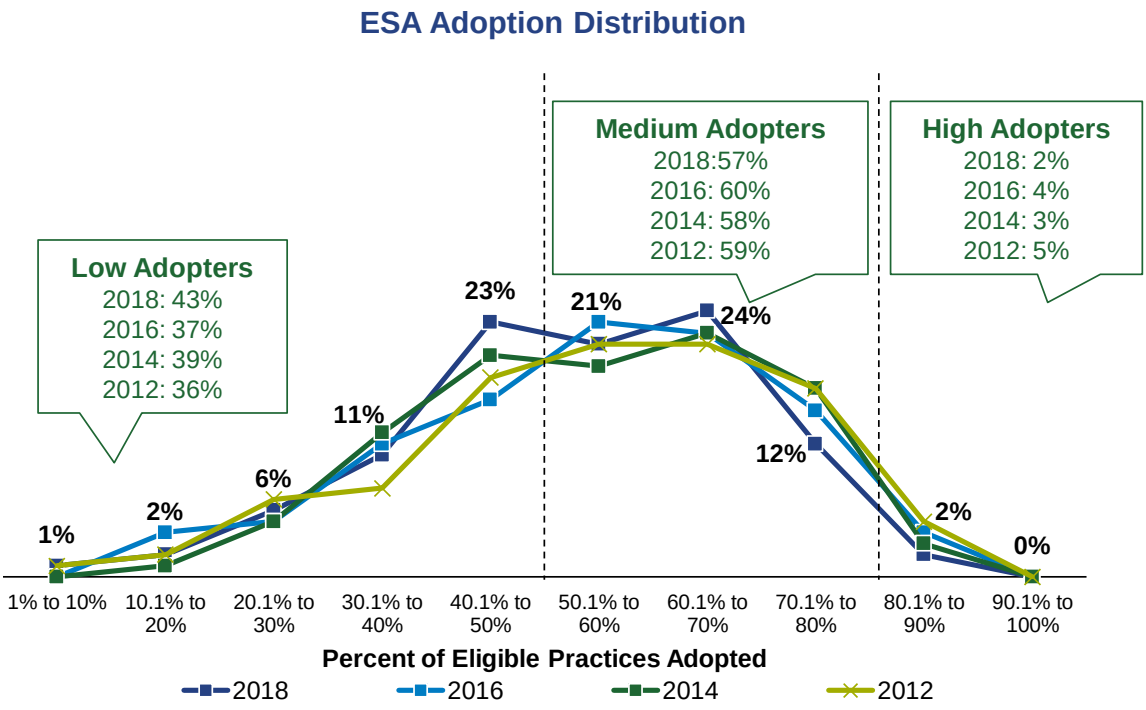
I am just getting my farming operation established
I am maintaining my farming operation at a steady level
I am expanding my farming operation
I have started to reduce or scale down my farming operation
I plan to sell my farming operation in the near future
(DO NOT READ) Don't know

72. And finally, what is your age? **(READ LIST AS NEEDED – ACCEPT RESPONSE BEFORE FINISHING)**

18 to 24
25 to 34
35 to 44
45 to 54
55 to 64
65 to 74
75 or older
Decline to respond

APPENDIX C: ESA ADOPTION: DISTRIBUTION AND TRACKING BY AGRI-ENVIRONMENTAL RISK AREA

Based on the 40 ESA practices used to calculate the adoption score, the majority (57%) of operations are classified as *medium* adopters – that is, they have adopted 50.1% to 80% of the practices for which they are eligible. Over four-in-ten (43%) *are low* adopters (have adopted 50% or less eligible practices), while only 2% are *high* adopters (have adopted more than 80% of eligible practices). The graph below illustrates the distribution of adoption for all measures which is consistent with the previous three years of tracking.



*Showing 2018 data labels.

The following table breaks down adoption distribution by agri-environmental risk area, showing the results from 2016 compared to 2018.

Agri-Environmental Risk Area	Year	% Low Adopters	% Medium Adopters	% High Adopters
Water Quality and/or Quantity	2018	27%	33%	40%
	2016	20%	34%	45%
Wildlife Habitat Conservation	2018	28%	10%	62%
	2016	28%	11%	61%
Manure Management	2018	21%	46%	32%
	2016	22%	41%	37%
Grazing Management	2018	40%	-	60%
	2016	41%	-	59%
General Practices	2018	73%	25%	2%
	2016	66%	24%	9%
Soil Conservation	2018	77%	20%	3%
	2016	85%	14%	1%
Energy and Climate Change	2018	94%	6%	1%
	2016	94%	5%	1%

*Agricultural waste management practices are not included in this table – there is only one practice included in the ESA performance measure.