

North Central Region Center for FSMA Training, Extension and  
Technical Assistance

# Evaluation Report

Produce Safety Alliance Grower Training one-year follow-up  
survey: NCR FSMA longitudinal regional results

July 2022

# Produce Safety Alliance Grower Training one-year follow-up survey: longitudinal regional results

## North Central Region Center for FSMA Training, Extension and Technical Assistance

### Abstract

The Food Safety Modernization Act (FSMA) was signed into law in 2011. It regulates fruit and vegetable farms and handlers. The law includes seven rules, one of which is the Produce Safety Rule.

One requirement of the Produce Safety Rule is that fruit and vegetable growers who are covered under the rule participate in an approved food safety course. The Produce Safety Alliance Grower Training is currently the only approved course being offered.

The North Central Region Center for FSMA Training, Extension, and Technical Assistance (NCR FSMA) works with food safety professionals and regulators from 12 Midwest states (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin). Among its many activities, the NCR FSMA has worked extensively with its partners to share ideas and best practices to effectively teach the Produce Safety Alliance Grower Training.

In five consecutive years, the NCR FSMA has collaborated with partners to evaluate the course using a follow-up survey with course participants. The survey is sent to participants approximately one year after participating in the course. It measures behavior change among participants. This report shares results from the five years that the survey has been conducted. New in this report is a more extensive evaluation of the impacts of trainings offered through remote delivery.

The following highlights the results of the evaluation:

- The survey is distributed electronically and on paper, depending on whether course participants use technology.
- A total of 1279 people have responded to the survey over the course of five years. The response rate is 24 percent. In addition, two states have shared results from surveys that they conducted on their own.
- 261 respondents participated in a training offered primarily for Plain clothes growers.
- 80 respondents participated in a remote delivery training.
- The vast majority of respondents are farmers, but people from other occupations have also responded, including staff from agricultural businesses, nonprofits, universities or colleges, and farm service agencies, etc.

- 46 percent (99 of 214) of non-farmer respondents had made a change related to food safety since attending the training.
- Farmers who responded were most commonly not covered by FSMA, because they sell on average less than \$25,000 in produce per year.
- 76 percent of farmer respondents made a change to improve food safety practices, infrastructure, and/or equipment since attending the PSA grower training.
  - The most common practice change was beginning or modifying training for employees, with 45 percent of respondents doing this since the training. This was followed by writing or modifying farm food safety plans (44 percent), changes in cleaning or sanitizing food contact surfaces (43 percent), and creating or modifying food safety record keeping systems (42 percent).
  - The most common infrastructure or equipment changes made by growers included adding or upgrading hand washing stations or facilities (101 respondents); adding new or improving equipment, such as packing line equipment (66); and constructing new, adding on to existing, or upgrading buildings (42).
- The percentage of farms that made a food safety practice or infrastructure/equipment change differed by the farm's FSMA coverage status. Respondents from qualified exempt farms made changes at the highest rate (86 percent). Fully covered farms made changes at a relatively lower rate (71 percent). Farms that are not covered by FSMA because they do not grow covered produce were the least likely to make food safety changes (63 percent).
- Limited time and finances are the top barriers to making food safety changes. The number of difficulties faced by farms differed by FSMA coverage status. Respondents for which part of the operation is required to comply but other parts are not faced the most challenges, on average 1.61. Farmers who are unsure of their FSMA coverage status also faced a high number of challenges (1.38). Interestingly, they are more likely than farmers of other statuses to indicate need for technical assistance as a challenge (16 percent versus 6 percent,  $p=0.001$ ). This may indicate these farmers left the training with lack of clarity regarding their FSMA status as well as how to apply the concepts to their own farms.
- While few respondents have participated in an OFRR (19 percent), the majority of those who have participated made changes on their farm as a result (64 percent).
- 61 farmers (10 percent) who responded to the survey have been inspected.
- An estimated \$1,101,615 has been invested by 235 respondents to make food safety improvements or reach FSMA compliance.
- Forty percent of those who identified financial limitations as a difficulty had made investments to improve food safety practices. They were more likely to have spent money than those who did not identify financial limitations as a difficulty, of whom 24 percent had spent money.

Those who identified financial limitations as a difficulty also spent more money (median of \$1,350), than those who did not identify finances as a difficulty (median of \$550).

- Out of five supplemental educational activities that could be offered at the training, live demonstrations received the highest ratings, followed by videos and breakout rooms or small

group activities. On average, remote delivery participants rated the five supplemental activities higher than participants in face-to-face trainings.

- Remote delivery participants agreed they were able to get their questions answered during the remote delivery training, the training was more accessible to them than a face-to-face training, and the format was engaging.
- Most remote delivery participants (55 percent) indicated they prefer the full course in one day, although several also preferred a course divided in two days (38 percent). The remainder were unsure.
- Eighty-eight percent (53 of 60) of respondents who participated in a remote delivery training made a change to practice, infrastructure, or equipment since attending the training. This is higher than for those who participated in face-to-face trainings (79 percent, 393 of 500).
- Results from Plain clothes growers differed in many ways than other growers:
  - Both Plain clothes growers and non-Plain clothes growers were most often not required to comply with FSMA, because they sell less than \$25,000 of produce annually, on average. However, the populations differed in two ways: non-Plain clothes growers were more likely to be from qualified exempt farms, and Plain clothes growers were more likely to be from farms where part is required to comply with FSMA and part not.
  - Growers who participated in a training for Plain clothes growers were less likely to make a food safety practice, infrastructure, or equipment change after the training (66 percent) than those who participated in a training for general audiences (80 percent). This difference is statistically significant ( $p=0.001$ ).
  - Plainclothes growers were more likely to identify limited time and lack of knowledge as difficulties in making food safety changes and less likely to identify financial limitations as a difficulty than other growers.
  - Plain clothes growers gave lower ratings to all training elements than people who participated in trainings not for Plain clothes growers. However, Plain clothes growers were like other audiences in that they rated small group activities or discussion and live demonstrations higher than other activities.

The following recommendations relate to the findings described in this report:

- Include a link in the electronic survey to the decision tree that helps growers identify their FSMA coverage status. This may help those who are unsure of their coverage status to identify it and increase accuracy of the survey results.
- Consider adding clarification to future surveys to help respondents identify if they have had a FSMA Produce Safety Rule inspection.
- Only 44 (6 percent) respondents indicated they need technical assistance and 42 (6 percent) responded they lacked knowledge to improve practices. This points to the fact that knowledge alone is not sufficient to create change. NCR FSMA partners may want to consider their role not just in educating farmers, but in contributing to policy, systems, and environmental changes that might help remove some of the barriers farmers face.

- Consider identifying farmers who have not yet identified their FSMA coverage status not only to help them identify their status, but also to offer additional technical assistance, if needed.
- Consider developing resources or highlighting stories of how farmers can make on-farm food safety practice, infrastructure, and/or equipment changes in no/low-cost ways.
- If allowed, continue to offer some trainings using remote delivery, because those trainings are more accessible to some people, because they do not have to travel to attend. Offer a mix of one-day and multi-day trainings to accommodate as many growers as possible.
- Share farm-based examples during trainings featuring a variety of types and sizes of farms.

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**North Central Region**  
Center for FSMA Training, Extension  
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## Introduction

The Food Safety Modernization Act (FSMA) was signed into law in 2011. The law is the first in decades to regulate fruit and vegetable farms and handlers. The law includes seven rules, one of which is the Produce Safety Rule.

One requirement of the Produce Safety Rule is that fruit and vegetable growers who are covered under the rule participate in an approved food safety course. The Produce Safety Alliance Grower Training is currently the only approved course being offered.

The North Central Region Center for FSMA Training, Extension, and Technical Assistance (NCR FSMA) works with food safety professionals and regulators from 12 Midwest states (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin). Among its many activities, the NCR FSMA has worked extensively with its partners to share ideas and best practices to effectively teach the Produce Safety Alliance Grower Training. Starting in March 2020, the NCR FSMA has worked with partners to adjust to the COVID-19 pandemic, including offering trainings remotely after the Produce Safety Alliance announced they could be offered in that way.

The NCR FSMA also collaborates with partners to evaluate the course. In five consecutive years, the NCR FSMA has worked with partners to conduct a follow-up survey with course participants. The survey is sent to participants approximately one year after participating in the course. It measures behavior change among participants. This report shares results from the five years that the survey has been conducted. New in this report is a more extensive evaluation of the impacts of trainings offered through remote delivery.

## Methods

The survey was first conducted in January 2018, sent to participants who took the course during the winter of 2016-17. The most recent survey was sent in January 2022, to participants who took the course during the winter of 2020-21. In total, partners from 11 states (all except Minnesota, who conduct their own survey) have participated in the survey, although not every state has participated in every year. The survey has followed up with participants from 280 trainings (although responses have not been received from all trainings).

Partners from each state sent invitations to participate in the survey to people who took the training in their state. The invitation was sent via email to those who use technology and on paper to those who do not use technology. The electronic survey was conducted using Qualtrics™. At least one reminder was sent to those who received the electronic invitation, and no reminder was sent to those who received paper invitations. The only variations were in Wisconsin in years 2-4 and North Dakota in year 4, when they sent a paper copy of the survey to all participants as well as an electronic invitation to those who use technology.

Table 1 shows the number of people invited to take the survey in each year and the number of responses received. The yearly response rate has ranged from 18 percent (year 1) to 26 percent (years 2 and 3). In total, 5,412 people were invited to take the survey and 1,279 responded. Therefore, the overall response rate is 24 percent, which is good for this type of survey.

**Table 1: 1,279 people responded to the follow-up survey over the course of five years.**

	# invited to take survey	# of responses	Response rate
Year 1 2016-17	781	141	18%
Year 2 2017-18	1,436	367	26%
Year 3 2018-19	1,426*	366*	26%
Year 4 2019-20	1,080	253	23%
Year 5 2020-21	766	152	20%
<b>TOTAL</b>	5,412	1,279	24%

\* does not include 60 responses collected by Iowa to their own survey.

The response rate to surveys distributed on paper (29 percent) was higher than the response rate to the electronic survey (18 percent). This may mean the sample is skewed to include a higher proportion of Plain clothes growers than participated in the training, because this population received paper copies of the survey only. (Year one is not included in paper versus electronic response rates, because whether responses were received electronically or on paper was not tracked.)

In two cases, partners shared data from the follow-up surveys that they had conducted themselves.

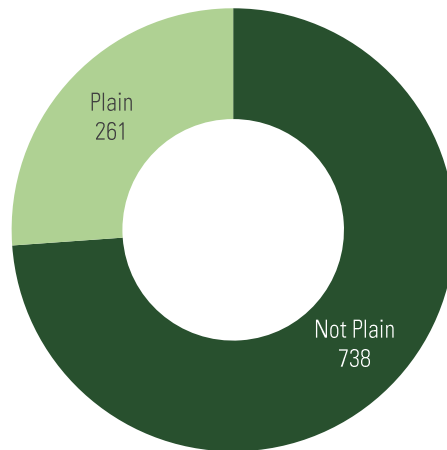
In the first instance, partners in Iowa surveyed training participants who had taken the course in the previous two years (the 2017-18 training season, and the 2018-19 training season). They sent their survey in November 2019. They shared raw, de-identified data, and their data was added to the year three regional dataset for a few questions that both surveys had in common. Iowa received 60 responses to that survey. These responses are not included in Table 1.

In the second case, Minnesota has conducted their own follow-up survey for three years, following up with participants from trainings starting in the 2017-18 training season (year 2) through 2019-20 (year 4). They shared aggregated results from four questions that were similar enough to the regional survey to be added to the regional results. They received 108 responses. The results were shared in aggregate, rather than raw data that could be added to the NCR FSMA dataset. It is not known how many invitations were sent for that survey. These responses are not included in Table 1.

Data was analyzed using descriptive statistics and t-tests using SPSS™(version 26) software.

In total, 261 respondents participated in a training offered primarily for Plain clothes growers (Figure 1). Not counting trainings for which we have no data regarding population served, 26 percent of respondents attended a training for Plain clothes growers. While we do not know if all participants in these trainings belong to a Plain community, throughout this report we assume that the majority who took part in those trainings belong to a Plain community.

**Figure 1: 26% of respondents participated in a training for Plain clothes growers.**  
(of 999 respondents)



Eighty respondents participated in a remote delivery training.

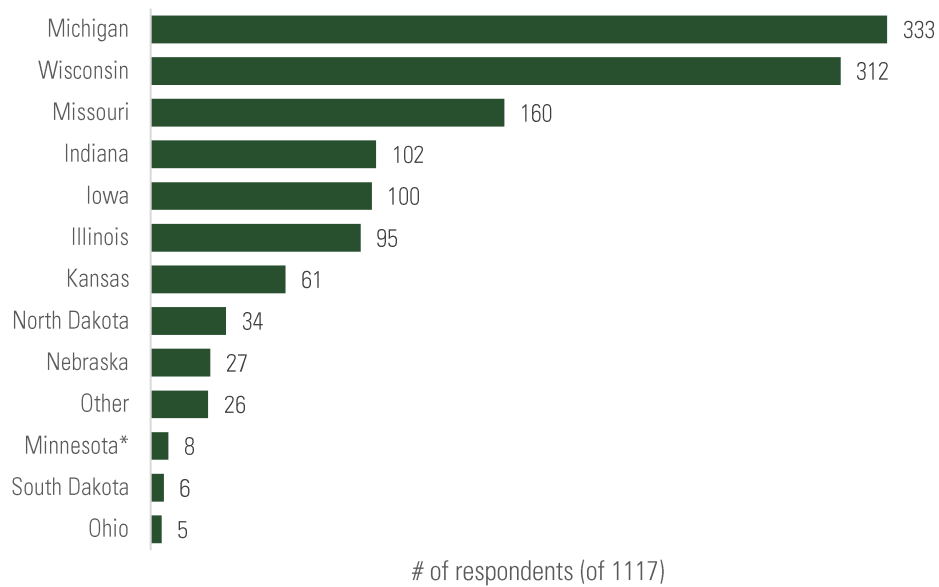


## Results

### ***In what states do respondents farm or work?***

Figure 2 shows which state respondents farm or work in. More people responded from Michigan (333 responses) than from any other state, followed by Wisconsin (312).

**Figure 2: Most respondents farm or work in Michigan or Wisconsin.**



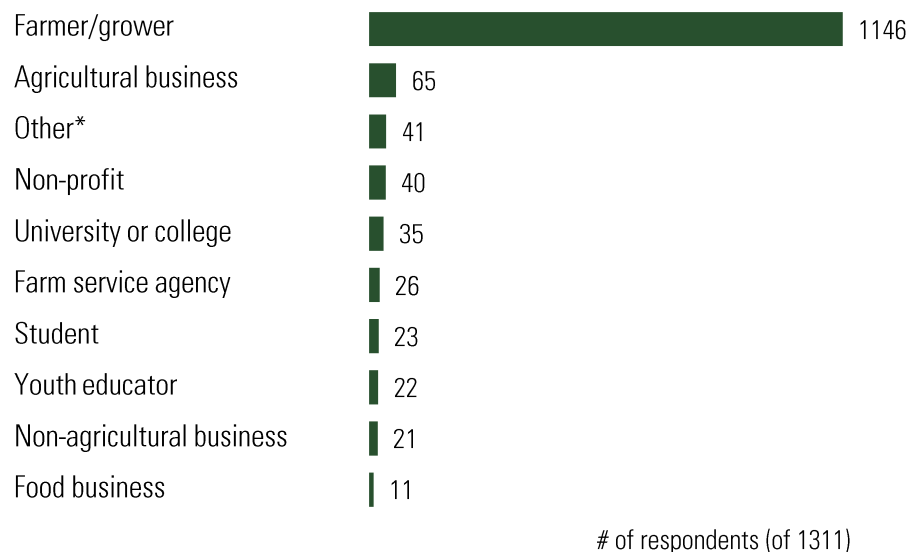
\*Minnesota's own survey is not included in this chart.

### ***In what industries do respondents work?***

*Respondents are most commonly growers or farmers.*

When asked their occupation, respondents were able to select multiple categories. In total, 1,146 (87 percent) respondents were produce farmers/growers (Figure 3). The remaining respondents fill a variety of occupations, such as agricultural businessperson (65), non-profit worker (40), college or university staff (35), farm service agency employee (26), student (23), youth educator (22), non-agricultural businessperson (21), and food business employee (11).

**Figure 3: Most respondents are farmers or growers.**



\*regulators, aspiring farmers, gardeners, land owner, regulators, local or tribal government, economic development, policy advocate, auctioneer, laboratoroty, agritourism, employees with food safety roles

### ***What changes have non-farm respondents made since the training?***

*46 percent (99 of 214) of non-farm respondents have made a change since attending the training.*

The most common change made by non-farm respondents was updating or improving education offered to clients, mentioned by 20 respondents. For example, one respondent shared, “I used the knowledge to develop a farmer coaching program which gives farmers a better understanding of the regulations and how to apply food safety best practices to their own farm through a written food safety plan.” Another said, “I used my training to better inform the Amish farmers I weekly buy produce from as an agent for [a local market and deli].”

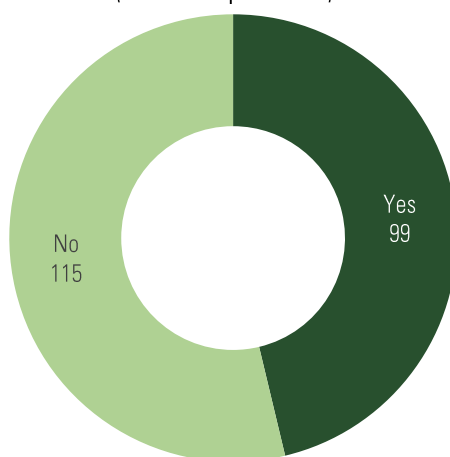
Many of the changes made by non-farm respondents were related to agricultural practices, showing that these respondents are involved in the growing and harvesting fresh produce, although in a noncommercial setting. Changes that they made include:

- improved harvest and postharvest practices (8 respondents),
- improved health and hygiene practices (8), and
- changing crop mix to focus on crops not covered by FSMA (1).

Additional changes made by non-farm respondents include:

- writing or implementing new or improved standard operating procedures, good agricultural practices, or food safety plans (13 respondents),
- identifying or improving credentials that buyers or market managers require from producers (7),
- improved record keeping (5), and
- new or improved infrastructure (3).

**Figure 4: 46% of non-farm respondents made a change following the training.**  
(of 214 respondents)



## What is the FSMA coverage status of growers who responded to the survey?

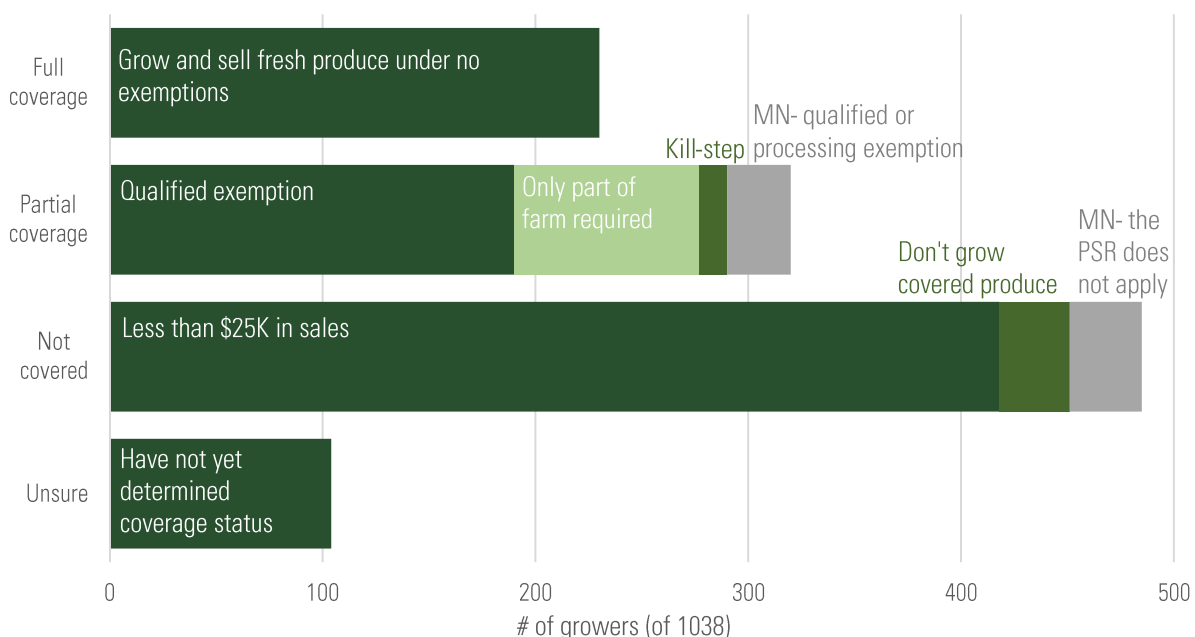
Farmers who responded were most commonly not covered by FSMA, because they sell on average less than \$25,000 in produce per year.

Farm respondents indicated that they are most commonly not covered by FSMA, with 42 percent fitting in into this category. This category is subdivided into those who are not covered by FSMA because they sell on average less than \$25,000 per year of produce and those who are not covered because they do not grow covered produce. This is also one of the questions that was included in the survey conducted independently by the Minnesota Department of Agriculture. Their survey included a category of those who are not covered by the Produce Safety Rule, but did not differentiate between those who sell less than \$25,000 per year and those who do not grow covered produce. Hence, their data is shown separately in Figure 5.

Only 18 percent of respondents are fully covered by FSMA, meaning they grow and sell fresh produce and are under no exemptions. These are the only growers who are required by law to take an FDA-approved produce safety course. This demonstrates that many people who participate in the course are not legally required to do so.

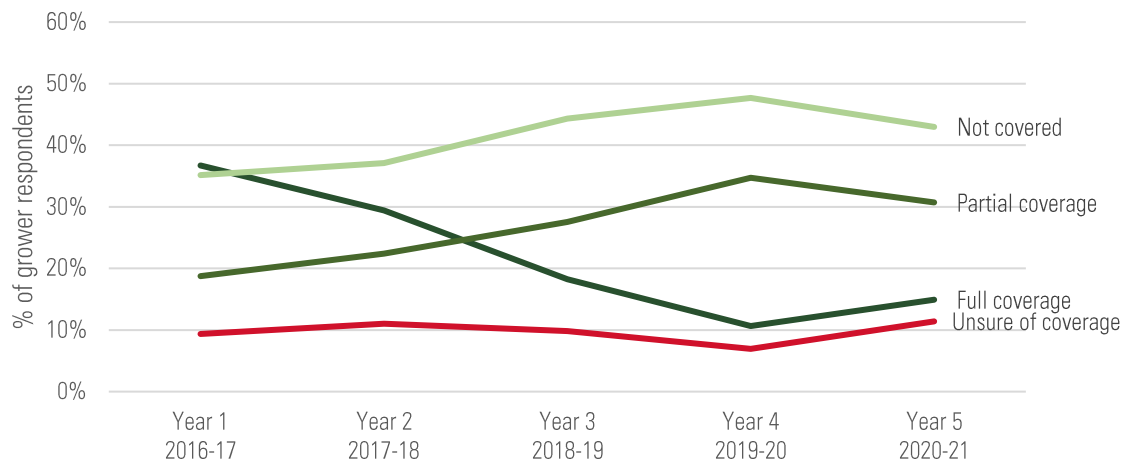
Ten percent of respondents indicated that they are unsure of their coverage status. These farms may need additional resources or consultation to determine their coverage status, because these farms had approximately one year since the training during which they could determine their status. Figure 6 (next page) shows the percentage of growers who are unsure of their status has remained somewhat steady over the course of 5 years.

**Figure 5: Most respondents know their coverage status. Respondents most commonly are not required to comply with FSMA, because their sales are lower than \$25,000/yr.**



Not surprisingly, the composition of types of farms which have sent people to the training has changed over time. Respondents who took the training in 2016-17 were most likely to come from farms that are fully covered by FSMA. The percentage of respondents from fully covered farms has steadily declined since then, while the percentage of respondents from not covered and partially covered farms has increased (Figure 6). This can be explained because fully covered farms are the only farms required to send someone to a training and they were expected to take the training prior to inspections, which began in 2019.

**Figure 6: People from fully covered farms were more likely to take the training when it was first offered.**



### ***What kinds of changes have farmers made since attending the training?***

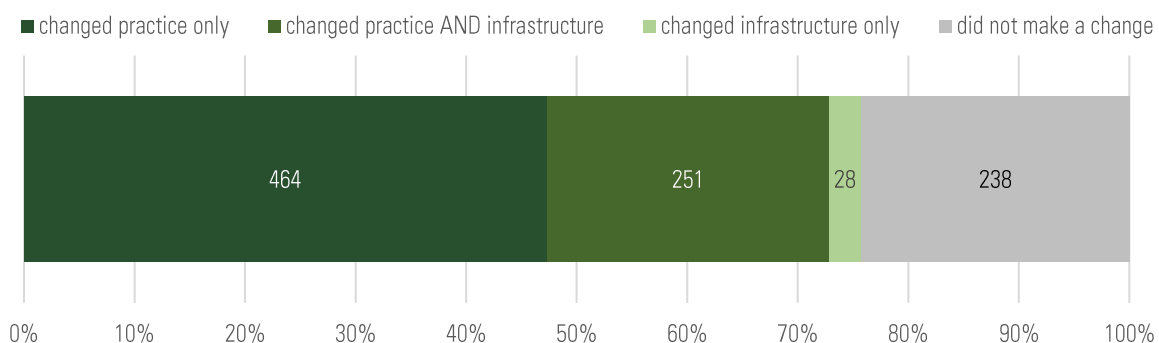
*Beginning or modifying farm employee training was the most common type of food safety practice change made since the training by respondents.*

*Adding new or upgrading existing handwashing stations or facilities was the most common type of infrastructure or equipment change.*

The survey asked about two categories of changes that farms might have made since taking the training. The first was changes to food safety practices and the second was changes to on-farm infrastructure and equipment.

When the two categories of change are combined, 76 percent of respondents made some sort of change since attending the PSA grower training. (This does not include Minnesota data.) Figure 7 shows that 47 percent made a change to practice only; 26 percent of respondents made a change to food safety practice *and* infrastructure or equipment; and 3 percent made a change to infrastructure only.

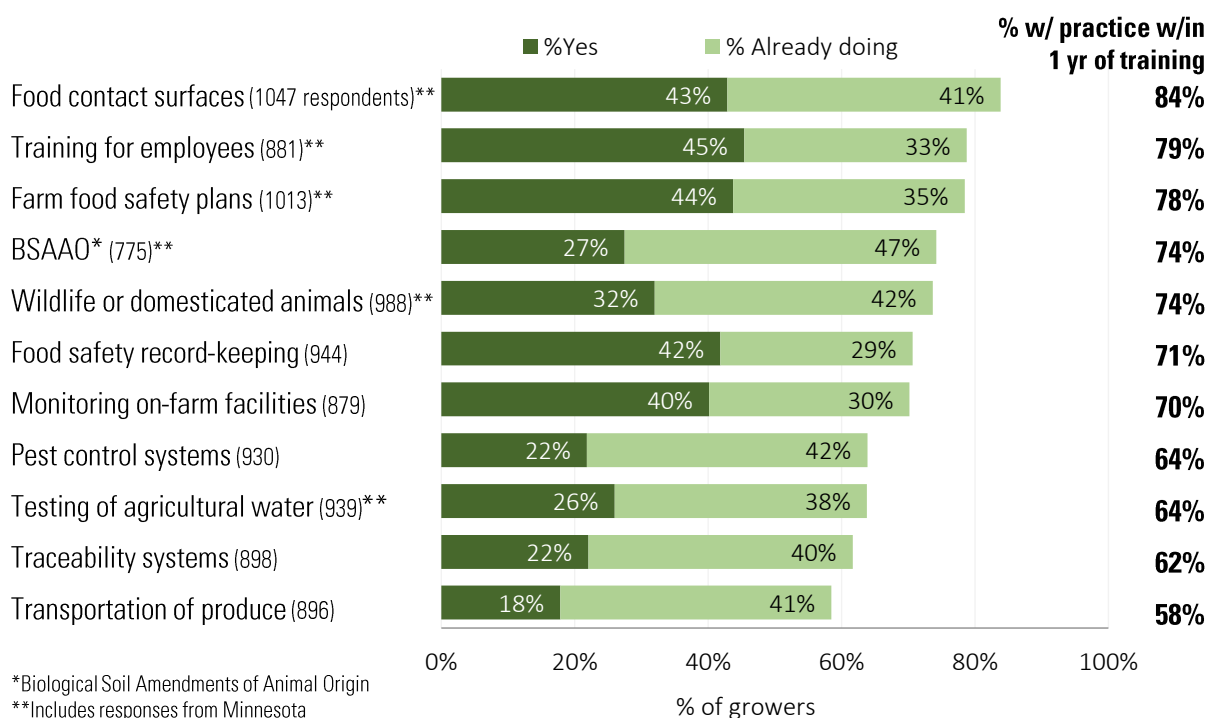
**Figure 7: Nearly 3 of 4 growers made a change to food safety practices and/or infrastructure.**



The most common practice change was beginning or modifying training for employees, with 45 percent of respondents doing this since the training (Figure 8). This was followed by writing or modifying farm food safety plans (44 percent), changes in cleaning or sanitizing food contact surfaces (43 percent), and creating or modifying food safety record keeping systems (42 percent). (Data for types of changes made includes Minnesota for select items, marked in the figure with a double asterisk.)

Respondents also identified farm food safety practices that they already had in place prior to the training. When respondents who already had practices in place are added in with those who made a change since the training, 84 percent of respondents reported having adequate practices in place for cleaning and sanitizing food contact surfaces, making this the most implemented practice, as shown in Figure 8. Interestingly, FSMA inspectors who participate in the NCR FSMA have observed during inspections that some farms have not identified all their food contact surfaces. They have also observed farm workers sanitizing food contact surfaces without first cleaning them. This serves as a reminder there may still be room for improvement even after practices are in place.

**Figure 8: Within one year of training, 84 percent of farms reported having sufficient practices for cleaning and sanitizing food contact surfaces.**



*"We used to have customers pick into 5-quart buckets, then at checkout we would weigh the bucket, then dump the berries into a cardboard flat for customers. Now, the customer picks into, weighs and transports berries home in ONE container."*

~Minnesota farmer describing a new practice to reduce risk of produce contamination

Infrastructure changes made by respondents included:

- adding or upgrading handwashing stations or facilities (101 respondents),
- adding new or improving equipment, such as packing line equipment (66),
- constructing new, adding on to existing, or upgrading buildings (42),
- adding new or upgrading existing restrooms or portable toilets (34),
- improving water systems, including switching to drip irrigation, or changing water sources (32),
- upgrading storage or picking containers so they are easily cleanable (14),
- upgrading food contact surfaces so they are easily cleanable (13),
- constructing fences, netting, or other barriers to deter wildlife or domesticated animals from production areas (12),
- dedicating vehicles for the transportation of produce (10), and
- creating clean zones within buildings (10).

*"We bought a clean steamer to add to our daily produce line cleaning/sanitation."*

~Indiana farmer



The percentage of farms that made a food safety practice or infrastructure/equipment change differed by the farm's FSMA coverage status. Figure 9 shows that respondents from qualified exempt farms made changes at the highest rate (86 percent). Fully covered farms made changes at a relatively lower rate (71 percent). Perhaps fully covered farms are more likely than other types of farms to already have been implementing good food safety practices, explaining why they made changes at a slightly lower rate than most other types of farms.

"So far, I have not sold \$25,000 worth of raw, eaten produce, but still, I consider it necessary, for the sake of the general public, to meet FSMA standards as nearly as possible."

~Wisconsin grower

Farms that are not covered by FSMA because they do not grow covered produce were the least likely to make food safety changes (63 percent). However, given the fact that the PSR does not apply to these growers (as it would for growers who are exempt for size reasons), a surprisingly high percentage made food safety changes since taking the training.

**Figure 9: The percentage of respondents who made a practice, infrastructure, or equipment changes differed by FSMA status.**



## What difficulties have respondents encountered in making food safety changes?

*Limited time and finances are the top barriers to making food safety changes.*

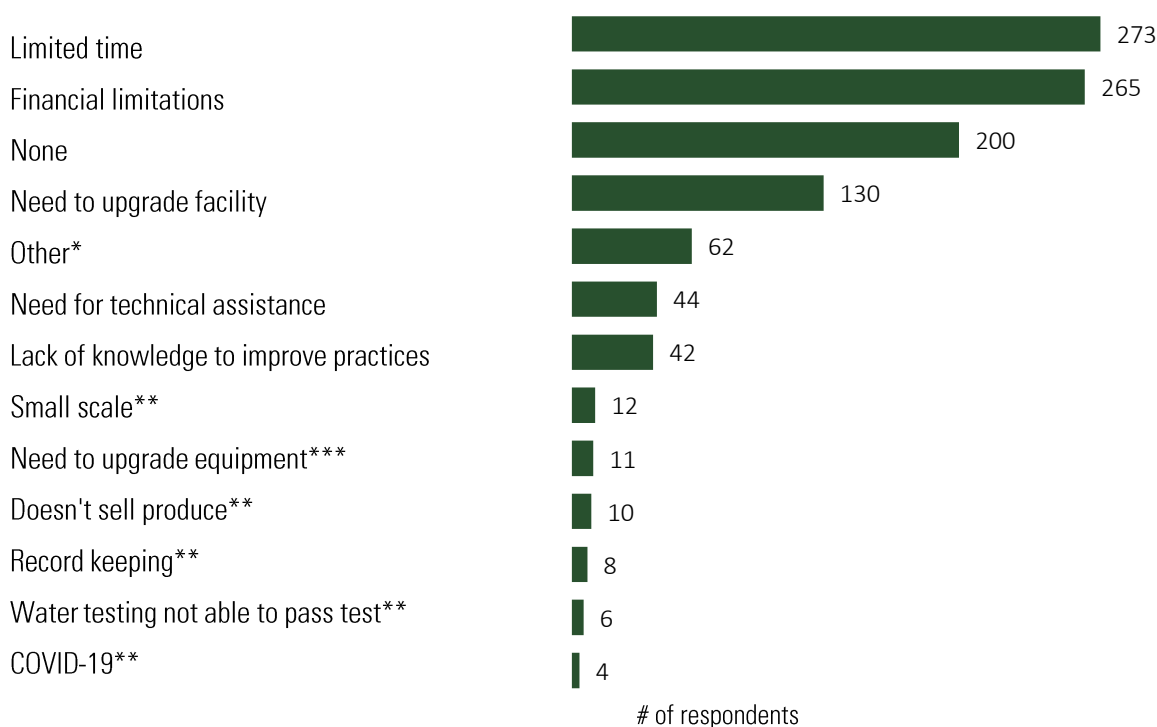
The survey in years three, four, and five asked respondents to identify barriers they have faced when making food safety changes. Figure 10 shows that financial and time limitations are the top barriers faced by respondents. In total, 200 (28 percent) respondents indicated they faced no barriers.

Only 44 (6 percent) of respondents indicated they need technical assistance and 42 (6 percent) they lacked knowledge to improve practices. Knowledge alone is not sufficient to create change. NCR FSMA partners may want to consider their role not just in educating farmers, but in contributing to policy, systems, and environmental changes to help overcome the difficulties farmers face.

Open ended responses identified several unique challenges identified by respondents, including operating small-scale farms (12 respondents), record keeping (8), difficulties with worker and visitor compliance (7), a belief that previous practices were already good (5), challenges with wildlife management (4), etc.

**Figure 10: Limited finances and time are the most common barriers to making food safety changes.**

(703 respondents, includes Minnesota)



\*worker and visitor compliance (7), difficulty changing habits (5), previous practices were already good (5), animal/wildlife management (4), lack of financial benefit (3), gray areas (3), relocated farm (2), belief that FSMA is unnecessary or unfair (2), sourcing equipment and consumables (2), indecision (2), lack of space (2), lack of concrete info to put in food safety manual (1), rules are vague (1), apathy from farm management (1), farm is exempt (1), aesthetics preferences of farm owner (1), under multiple regulations (1), soil amendment and infrastructure for storage of vegetables (1), and consumers need to change (1).

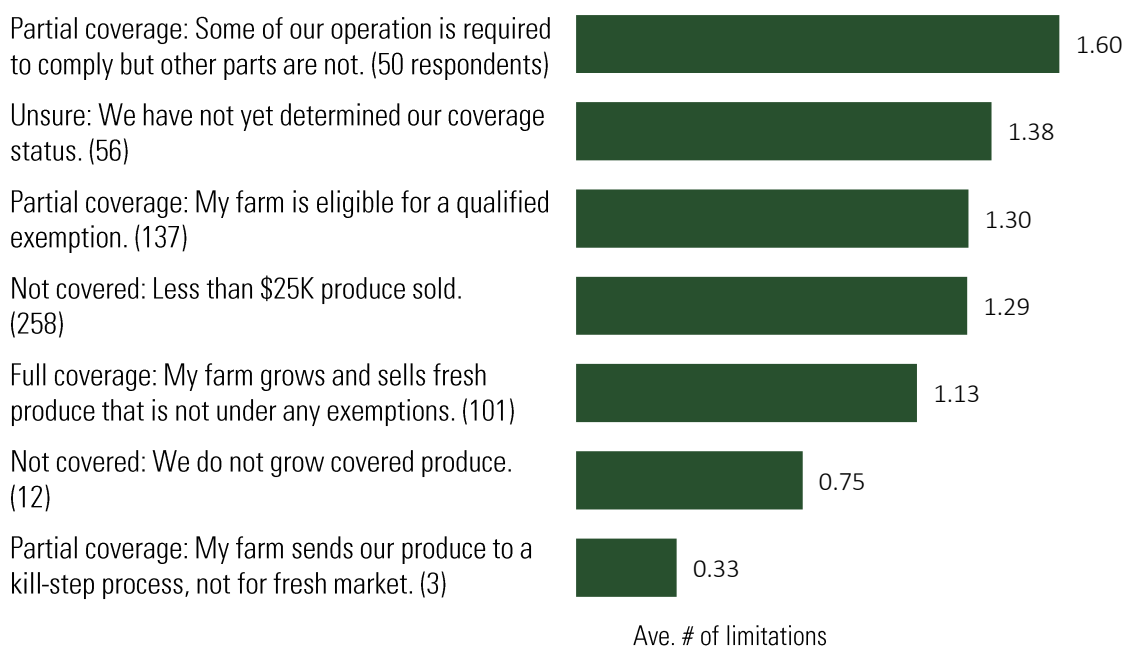
\*\*These responses were coded from information respondents wrote in beside "other."

\*\*\*New category added to year 5 survey.

The number of difficulties faced by farms differed by FSMA coverage status. Figure 11 shows that respondents for which part of the operation is required to comply but other parts are not faced the most challenges, on average. These farmers likely operate diversified farms that produce fruits or vegetables as well as grain or livestock. To add context, 46 percent of these farms are from a Plain clothes community. They may face unique challenges, because they may use horses in vegetable or fruit production fields to plow, cultivate, or pull wagons to transport harvest which adds challenges with preventing contamination by manure.

Farmers who are unsure of their FSMA coverage status also faced a high number of challenges. Interestingly, they are more likely than farmers of other statuses to indicate need for technical assistance as a challenge (16 percent versus 6 percent,  $p=0.001$ ). This may indicate these farmers left the training with lack of clarity regarding their FSMA status as well as how to apply the concepts to their own farms. If NCR FSMA partners are able to identify which growers they serve who have not yet determined their coverage status, they may also simultaneously identify farmers who would benefit from additional technical assistance.

**Figure 11: The average number of challenges differs by a farm's FSMA coverage status.**



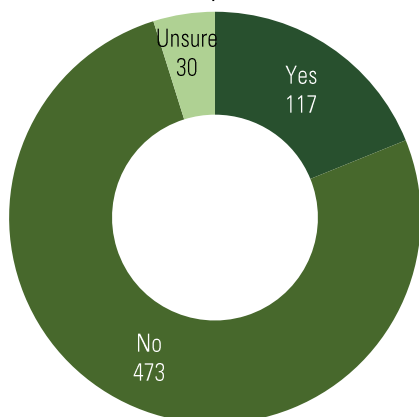
## ***To what extent have respondents participated in On-Farm Readiness Reviews (OFRR)?***

*While few respondents have participated in an OFRR, the majority of those who have participated made changes on their farm as a result.*

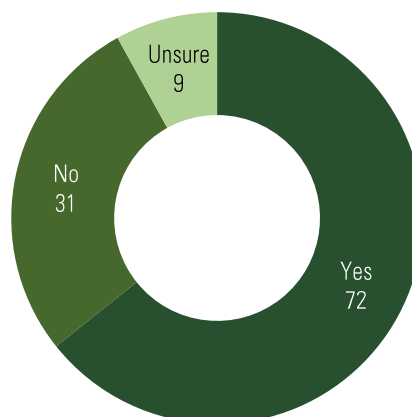
Nineteen percent of farm respondents indicated they have participated in an OFRR (Figure 12). These reviews are intended to prepare farmers for inspection by conducting an on-farm visit during which food safety professionals identify practices or infrastructure that could be improved.

Sixty-four percent of respondents who have participated in an OFRR indicated they made a change to practices or infrastructure as a result of what they learned, demonstrating that OFRRs are effective at helping growers make on-farm changes (Figure 13). Therefore, NCR FSMA partners should continue to offer OFRRs to the extent possible.

**Figure 12: 19% of farm respondents have participated in an OFRR.**  
(of 620 respondents)



**Figure 13: 64% of OFRR participants made a change based on what they learned during the review.** (of 112 respondents)



Changes they made included:

- changes in cleaning and sanitizing practices (18 respondents),
- updating record keeping (10),
- creating clean zones (9),
- adding new handwashing stations or increased handwashing (8),
- improving worker training (5),
- updating water and irrigation systems (6),
- improving field hygiene (4),
- posting new signs (3),
- implementing new or different water testing (3), and
- obtaining new or updated equipment (2).

Not surprisingly, those who participated in an OFRR were most commonly from fully covered farms (33 percent). Another 21 percent of respondents who participated in an OFRR were from qualified exempt farms; 21 percent from farms not covered by FSMA because they sell less than \$25,000 annually of produce, on average; and 20 percent from farms which are partially covered by FSMA, because part of the farm is required to comply and other parts are not. These statistics show that even farms that will not be inspected chose to participate in an OFRR.

### ***How many respondents have been inspected?***

*61 farmers (10 percent) who responded to the survey have been inspected.*

However, respondents shared contradictory answers to the question related to inspection and the question asking for their FSMA coverage status. One would expect all of those who indicated they have been inspected to be fully covered by FSMA. However, only 28 (46 percent) of those who indicated they have been inspected are fully covered by FSMA, and eight are from farms where part is required to comply, and part is not (16 percent). The remainder of respondents are not likely to have been inspected for FSMA: qualified exempt (10 respondents), send their produce through a kill step (1), not covered (8), or unsure (2). Perhaps these respondents were inspected for something else on their farm, such as value-added processing or have had a Good Agricultural Practices (GAPs) audit. These responses call into question whether respondents interpreted the questions about FSMA status and inspections as intended and whether these questions could be further clarified in future iterations of the survey.

### ***How much have respondents invested in food safety or FSMA compliance?***

*An estimated \$1,101,615 has been invested by 235 respondents to make food safety improvements or reach FSMA compliance.*

In total, 235 respondents have made financial investments for food safety improvements or FSMA compliance. Of these respondents, 168 shared the total amount they had invested: \$1,006,615. If those who did not share how much they had invested spent the median amount of \$1,000 (a more conservative measure than using the average in this case), then respondents have invested \$1,101,615 for food safety.

Figure 14 shows that 168 of the 432 (39 percent) respondents who indicated they had made practice and/or infrastructure changes to improve food safety on their farm also indicated that they did *not* spend money to do so. Nearly as many (165 of 432, 38 percent) indicated they did spend money to improve food safety practices or infrastructure on their farm. (Ninety-nine respondents were unsure if they had spent money.) This shows that many, although not all, improvements can be made without spending additional funds.

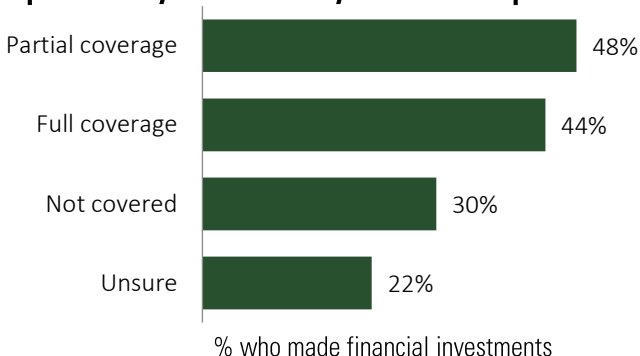
**Figure 15: Of those who made a food safety practice or infrastructure change, about as many spent money to do so as did not.\* (432 respondents, years 3-5 data)**



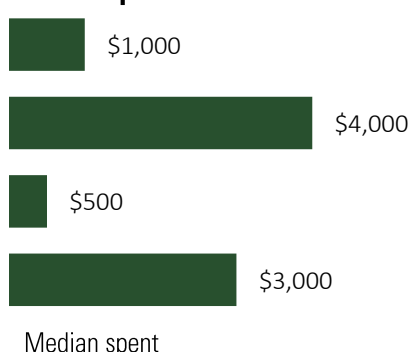
\*8 respondents indicated they spent money to make food safety practice or infrastructure changes, but did not identify any changes made in other portions of the survey.

When comparing types of farms, farms partially covered by FSMA reported spending money on for food safety or FSMA compliance at the highest rate (48 percent, Figure 15). These farms also made changes at the highest rate, making it logical that they would spend money at the highest rate. This is followed by fully covered farms, of which 44 percent reported spending money. However, farms fully covered by FSMA spent more (median of \$4,000), by median spent, than any other type of farm.

**Figure 15: Partially covered farms were most likely to spend money for food safety or FSMA compliance...**



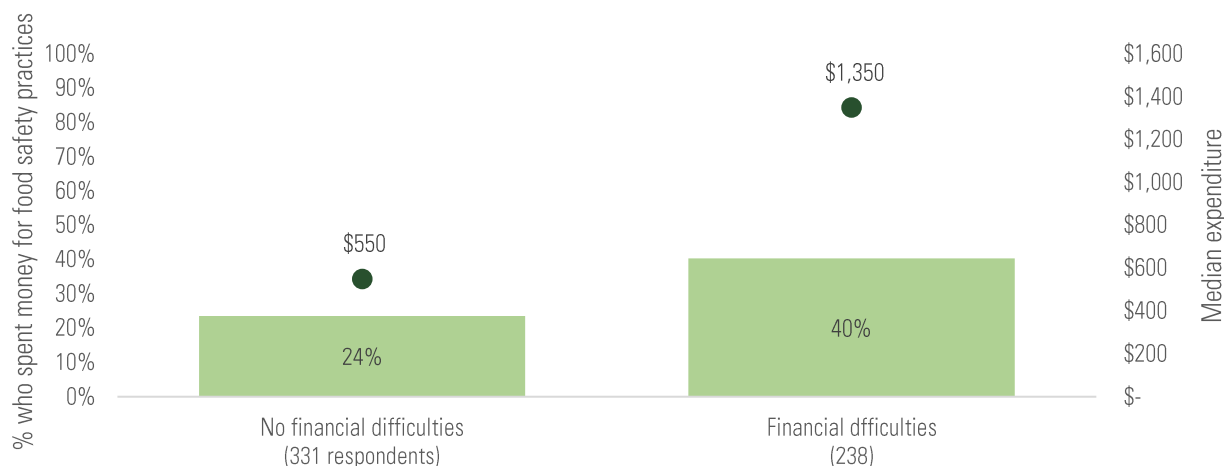
**...but fully covered farms spent more, by median spent.**



Forty percent of those who identified finances as a difficulty had made investments to improve food safety practices (Figure 16). They were more likely to have spent money than those who did not identify financial limitations as a difficulty, of whom 24 percent had spent money (Figure 17). This is somewhat counterintuitive, because one might expect that those who believe they cannot afford to make changes would not do so. Perhaps the act of spending money for food safety has made these respondents more aware of the challenge it was to make the change.

Those who identified financial limitations as a difficulty also spent more money (median of \$1,350), than those who did not identify finances as a difficulty (median of \$550).

**Figure 16: Those who identified finances as a limitation to make food safety changes on their farm were more likely to have spent money on food safety and spent more than those who didn't identify finances as a limitation. (569 respondents)**



## Which supplemental educational activities offered during the training were most useful?

*Live demonstrations received the highest ratings.*

Starting in year four and continuing in year 5, respondents were asked to rate how engaging supplemental educational activities were during the grower training. Figure 17 shows that live demonstrations received the highest rating, followed by videos and breakout rooms or small group activities. Polls received the lowest ratings, on average.

**Figure 17: Live demonstrations were the highest rated element trainings.**  
(276 respondents)

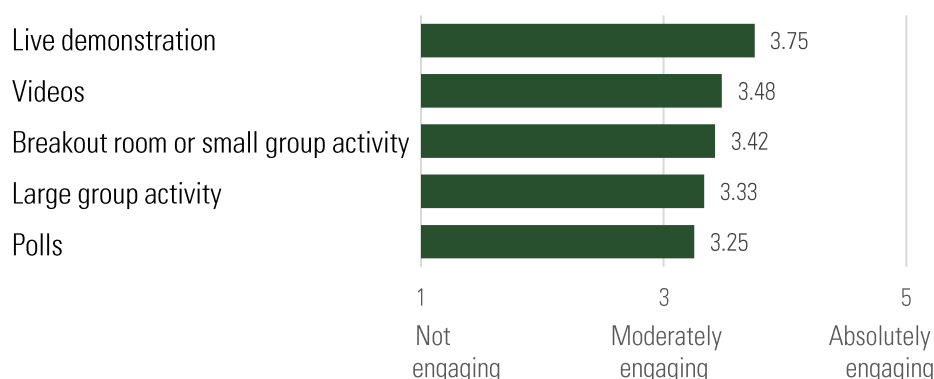
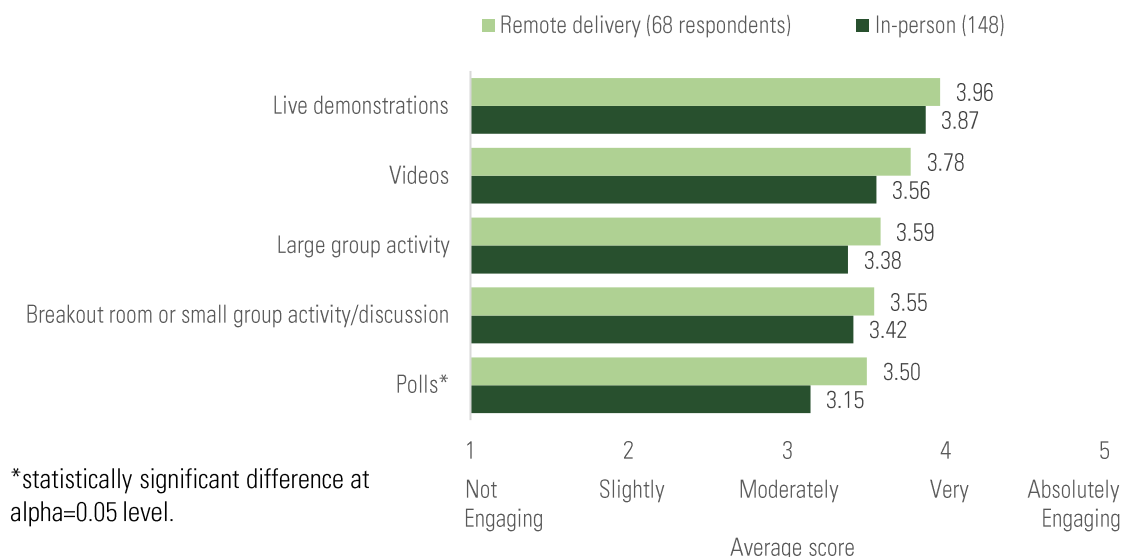


Figure 18 shows remote delivery participants rated training elements higher than face-to-face participants, on average, but most preferred the same activities as face-to-face participants, with live demonstrations and videos rated the highest.

While polls were rated lowest by all participants, remote delivery participants rated polls significantly higher than face-to-face participants ( $p=0.040$ ). (The analysis excludes Plain clothes growers.)

**Figure 18: Remote delivery trainings were rated higher than in-person trainings, on average.**



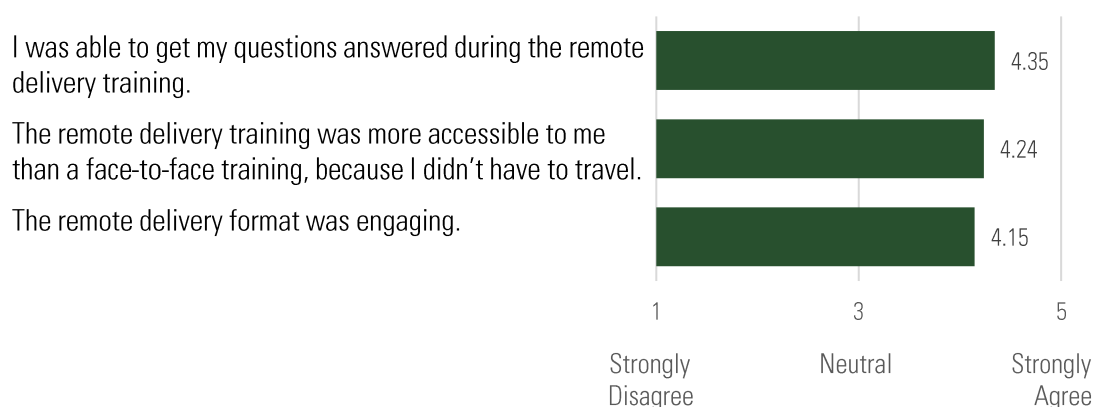


## How did remote delivery training participants like the format?

*Overall, respondents rated the remote delivery trainings highly.*

The survey asked three questions related to the experience of remote delivery participants (Figure 19). Respondents agreed they were able to get their questions answered during the remote delivery training. Participants also agreed the remote delivery training was more accessible to them than a face-to-face training, because they did not have to travel. This provides evidence that remote delivery trainings could continue to meet a need going forward, if allowed by the Produce Safety Alliance. Participants also agreed that the remote delivery format was engaging. Maintaining engagement in a day long course is challenging even in face-to-face trainings, but is especially difficult when participants are in the midst of the distractions of home and lacking personal connection with the trainer and other participants.

**Figure 19: Remote delivery trainings received high ratings.  
(55 respondents)**



Using open-ended questions, 22 participants gave feedback and suggestions for future remote delivery trainings. Eight respondents indicated the training was good, especially given the limitations of remote delivery. One said, "The remote delivery was very good. Everyone participated and I personally got a lot out of the course, just as if I were face-to-face. Don't get me wrong, I prefer face-to-face, but this was good." Three respondents requested the training include more examples, especially examples that apply to many types and sizes of produce farms or farms from the area. One said, "Have more evidence based, real-time examples from the farm than general lecture."

However, the remote delivery course was difficult to access for some respondents, because of lack of high-speed Internet where they live. One described traveling to a friend's house eight miles away to use the high-speed connection and another went to the local extension office. On the other hand, two indicated they appreciated that they did not have to travel for the training, because they were able to access it from home.

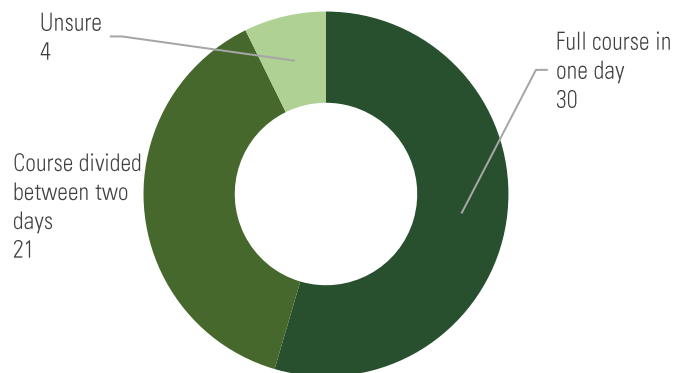
Three respondents describe the importance of having breaks because of the difficulty of sitting in front of a screen for a long time. One said that the interactive components of the training were helpful in breaking up the screen time, whereas two suggested other ways of breaking the screen time: one requested 15-minute

breaks between each module, and another suggested splitting the course into multiple sessions, rather than a day-long training.

Similarly, trainers have suggested that offering remote delivery trainings divided over the course of two days rather than one full day would help participants maintain their attention. Remote delivery participants were asked via the survey if they would prefer a one-day course or two-day course, and the majority (55 percent) indicated they prefer the full course in one day, although several also preferred a course divided in two days (38 percent, Figure 20). One respondent wrote in the margins that a full-day course is best in winter, and a course divided over two days is best during the growing season.

Because respondents' preferences regarding a one-day or two-day course are mixed, it may be wise to offer some courses in one day and others over the course of multiple days to accommodate as many growers as possible.

**Figure 20: Most respondents prefer a full course offered in one day.** (55 responses)



### ***Did participants in remote trainings make food safety changes at the same rate as participants in face-to-face trainings?***

*Remote delivery respondents made changes at a higher rate than those participating in face-to-face trainings, and the difference is statistically significant.*

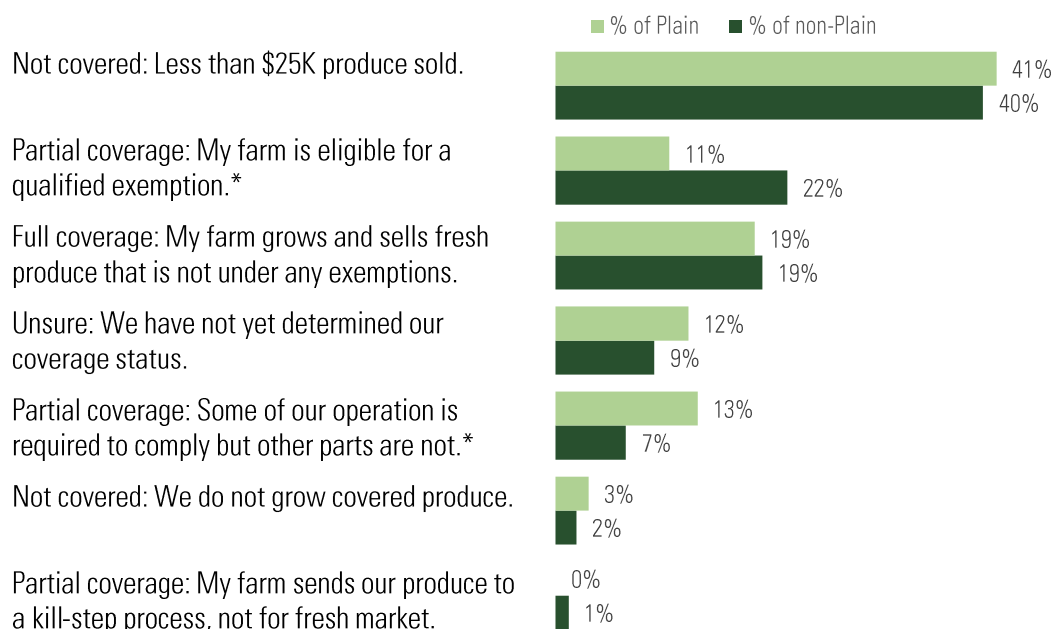
Eighty-eight percent (53 of 60) of respondents who participated in a remote delivery training made a change to practice, infrastructure, or equipment since attending the training. This is higher than for those who participated in face-to-face trainings (79 percent, 393 of 500). The difference is statistically significant, but at the alpha level of 0.10 ( $p=0.077$ ). Whether the difference is due to the format of training delivery, differences in the people who attend remote delivery trainings and those who attend face-to-face, or other factors cannot be determined from the data collected. (Plain clothes growers were removed from the analysis, because they do not participate in remote delivery trainings.)

## How did responses of Plain clothes growers differ from other growers?

*Plain clothes growers are less likely to be qualified exempt and more likely to be from farms where part of the operation is required to comply and some not.*

Both Plain clothes growers and non-Plain clothes growers were most often not required to comply with FSMA, because they sell less than \$25,000 of produce annually, on average. However, the populations differed in two ways: non-Plain clothes growers were more likely to be from qualified exempt farms, and Plain clothes growers were more likely to be from farms where part is required to comply with FSMA and part not (Figure 21). These operations may include multiple enterprises, such as a vegetable farm that also has a dairy.

**Figure 21: Plain clothes growers differed from other growers in their FSMA coverage status.**



\*statistically significant difference, alpha = 0.05.

*Plain clothes growers were less likely to have implemented on-farm food safety practice or infrastructure changes since the training than other growers.*

Growers who participated in a training for Plain clothes growers were less likely to make a food safety practice, infrastructure, or equipment change after the training (66 percent) than those who participated in a training for general audiences (80 percent). This difference is statistically significant ( $p=0.001$ ). It might be explained by Plain clothes growers being more likely to express negative attitudes regarding food safety or FSMA which was explored more fully in the year three follow-up survey report<sup>1</sup>.

<sup>1</sup> [https://www.ncrfsma.org/files/page/files/region\\_results\\_12\\_month\\_follow\\_up\\_survey\\_2020\\_.pdf](https://www.ncrfsma.org/files/page/files/region_results_12_month_follow_up_survey_2020_.pdf)

*Plain clothes growers are more likely to indicate they lack knowledge to change practices and less likely to identify limited finances as a challenge.*

Plain clothes growers and non-Plain clothes growers experienced three difficulties at statistically significant different rates. First, Plain clothes growers were much less likely than non-Plain clothes growers to identify finances as a difficulty (29 percent versus 48 percent, respectively,  $p=0.001$ ). This may indicate that Plain clothes farms are better resourced than other farms.

Second, while only a minority of respondents indicated that a lack of knowledge of how to change practices was a difficulty, Plain clothes growers identified it as a difficulty at a higher rate than non-Plain clothes growers (10 percent versus 5 percent, respectively,  $p=0.017$ ). The knowledge assessment that NCR FSMA partners conduct during the PSA Grower Trainings confirms that Plain clothes growers enter trainings with a lower baseline knowledge of food safety and FSMA than non-Plain clothes growers and learn less at the trainings. This may indicate that additional education or educational resources directed at Plain clothes growers may be warranted.

Finally, Plain clothes growers identified lack of time as a difficulty at a higher rate than non-Plain clothes growers. That difference is statistically significant, (46 percent versus 37 percent) ( $p=0.047$ ).

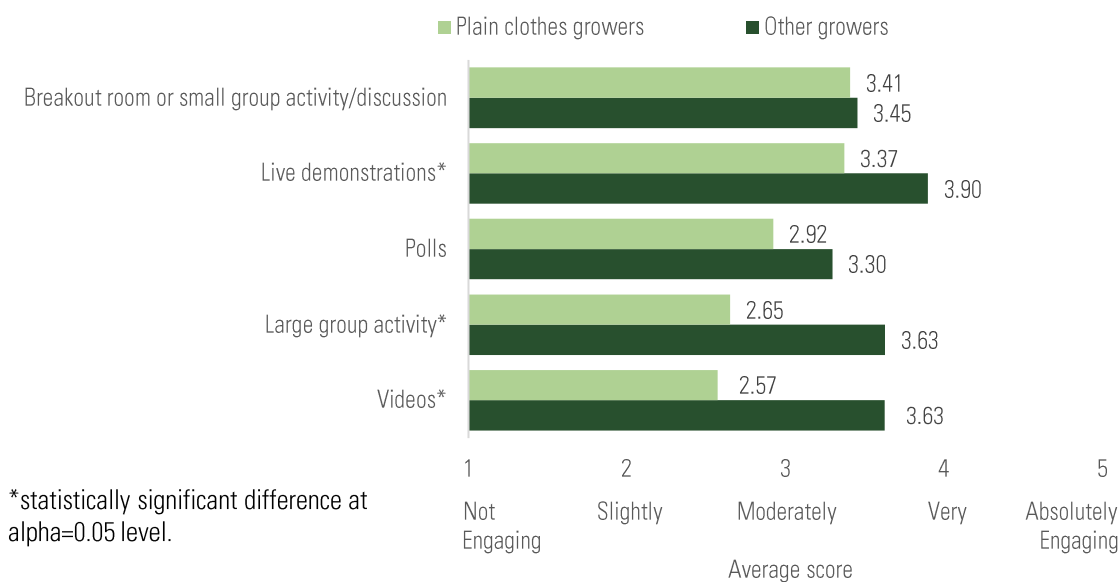
*Plain clothes growers gave lower ratings to all training elements than people who participated in trainings not for Plain clothes growers.*

Plain clothes growers found the training to be less engaging than people who attended trainings for other populations. Figure 22 shows that for every training element, Plain clothes growers rated it lower, on average, than other growers. It is not known whether these differences in ratings are due to the lower use of technology in Plain clothes trainings versus other trainings, to differences in how Plain clothes growers perceive FSMA when compared with other growers, or other factors.

Interestingly, some Plain clothes growers provided a rating for videos, although videos were unlikely to have been used during a training for Plain clothes growers due to limiting the use of technology during these trainings. Plain clothes growers rated videos at a much lower rate than other audiences, and the difference is statistically significant ( $p = 0.001$ ). This shows that at least in the case of videos, some respondents provided their perceptions of different training elements not based on what was offered during the training, but on how they view that activity in general. This may indicate that caution may need to be used when interpreting results related to training elements.

Plain clothes growers were similar to other audiences in that they found small group activities or discussion and live demonstrations most engaging.

**Figure 22: Participants in trainings for Plain clothes growers rated training elements lower than participants in trainings not for Plain clothes growers.**



## Conclusions and recommendations

The longitudinal follow-up survey results show that participants in the Produce Safety Alliance grower training report making changes at a high rate. Approximately three of four growers who responded to the survey made at least one change to food safety practice, infrastructure, or equipment since participating in the training.

Only those who are fully covered by FSMA are required to take the course, but the majority of those who take the course do not fall in this category. One might expect that only those who are required to comply with FSMA would make changes following the course. However, these results show that those who are partially covered by FSMA have made changes at a higher rate than those who are fully covered. This shows that the course is effective in eliciting change even if it is not required by law.

Yet, the information shared on the survey are respondents' perceptions. For example, 84 percent of respondents reported they had adequate practices for cleaning and sanitizing food contact surfaces in place within one year of taking the training. However, inspectors involved in the NCR FSMA report that farmers commonly have not identified all food contact surfaces on their farm and commonly sanitize surfaces without first cleaning them. This shows there may still be room for improvement even after practices are in place.

Nearly half of respondents who indicated they had made a change to practice, structure, and/or equipment to improve food safety on their farm also indicated they had spent money to make changes. Finances were also identified as being one of the top difficulties growers face when making food safety changes. Yet, many growers indicated they have made food safety changes, without spending additional funds. This points to an opportunity for NCR FSNA partners to highlight ways that food safety changes can be made in no/low-cost ways on farms.

Participants in the remote delivery trainings found the training elements more engaging than participants in face-to-face trainings. They also made changes after the training at a higher rate. These results, combined with the results from the knowledge assessment, which showed remote delivery participants learned more at the training, provide evidence that remote trainings may be superior to face-to-face trainings. However, it is not known if differences between results of remote delivery trainings and face-to-face trainings are due to the differences in the format or differences between the people who take each type of training. The only way to determine what might be the causal factor(s) would be to conduct an experiment, where participants are randomly assigned to face-to-face and remote delivery trainings.

While more remote delivery participants preferred a day long training over a two-day training, both lengths were preferred by some growers. Therefore, trainers may want to consider offering both one-day and two-day trainings to accommodate as many growers as possible.

Finally, some conflicting answers regarding FSMA status and inspections showed that some respondents may not have shared accurate information on the survey. This may indicate that some of the survey questions are not clear to respondents. Alternatively, it could mean additional support to help participants in the PSA grower training determined their coverage status or to know what an FSMA PSR inspection is may be warranted.

Farmers who are unsure of their FSMA coverage status faced a higher number of challenges than other farmers and were more likely to indicate need for technical assistance. This may indicate these farmers left the training with lack of clarity regarding their FSMA status as well as how to apply the concepts to their own farms. If NCR FSMA partners can identify which growers have not yet determined their coverage status, they may also simultaneously identify farmers who would benefit from additional technical assistance

This leads to the recommendations of this report:

- Include a link in the electronic survey to the decision tree that helps growers identify their FSMA coverage status. This may help those who are unsure of their coverage status to identify it and increase accuracy of the survey results.
- Consider adding clarification to future surveys to help respondents identify if they have had a FSMA Produce Safety Rule inspection.
- Only 44 (6 percent) of respondents indicated they need technical assistance and 42 (6 percent) reported they lacked knowledge to improve practices. This points to the fact that knowledge alone is not sufficient to create change. NCR FSMA partners may want to consider their role not just in educating farmers, but in contributing to policy, systems, and environmental changes that might help remove some of the barriers farmers face.
- Consider identifying farmers who have not yet identified their FSMA coverage status not only to help them identify their status, but also to offer additional technical assistance, if needed.
- Consider developing resources or highlighting stories of how farmers can make on-farm food safety practice, infrastructure, and/or equipment changes in no/low cost ways.
- If allowed, continue to offer some trainings using remote delivery, because those trainings are more accessible to some people, because they do not have to travel to attend. Offer a mix of one-day and multi-day trainings to accommodate as many growers as possible.
- Share farm-based examples during trainings featuring a variety of types and sizes of farms.