



North Central Region

Center for FSMA Training, Extension
and Technical Assistance

Produce Safety Alliance Grower Training Knowledge Assessment

IOWA RESULTS

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OUTREACH

Introduction

The Food Safety Modernization Act (FSMA) was passed by Congress, and then in January 2011, signed into law by President Obama. The law consists of seven Rules, including the Produce Safety Rule, which applies to those who grow, harvest, handle or pack fresh fruit and vegetables. One requirement of the Produce Safety Rule is that fruit and vegetable growers take an approved food safety course. The Produce Safety Alliance (PSA) Grower Training is the first approved course and in Iowa the training is offered by Iowa State University Extension and Outreach.

In collaboration with the North Central Region Center for FSMA Training, Extension and Technical Assistance (NCR FSMA), Iowa State University Extension and Outreach evaluated these trainings using a knowledge assessment. This report shares the results from 9 trainings held in the winter of 2019-20.

Methods

The knowledge assessment was developed by Dr. Catherine Shoulders at the University of Arkansas. The knowledge assessment is a quiz with 25 questions related to the seven modules of the PSA Grower Training. Training participants were asked to complete the quiz on paper before beginning the training and again after the training. The NCR FSMA states have been utilizing the knowledge assessment since 2017.

Trainers collected the paper copies and sent them to the NCR FSMA evaluation team. Data was entered into an Excel™ spreadsheet to create the dataset. Pre-test and post-test responses were matched using a unique identification number written on each quiz, along with the date of the training, and the state.

Only responses which included both a pre-test and a post-test from the same person were included in the analysis. (In a few cases, a person completed only the pre-test or only the post-test.) We received **130** complete responses from **9** trainings in Iowa in 2019-2020. In total, we have received 476 responses from Iowa since 2017, from 36 trainings.

The NCR FSMA evaluation team analyzed the data using SPSS™. They assigned each question to the related PSA Grower Training module and calculated a total score for each module. (The module to which each question was assigned is listed in Appendix A.) They averaged the scores by module and then rescaled the average so that each module is on a scale from zero to five. Rescaling allows comparison of participants' knowledge of each module with another.

In addition, trainers completed a cover sheet for each training and returned the cover sheet along with the pre-tests and post-tests. The cover sheets provided information including the date of the training, the location, names of trainers, the number of participants, and whether the training was targeted towards any special population. Special populations that were tracked included Plainclothes growers (which includes Amish and Mennonite growers), minorities, local food growers, military veterans, non-English/limited English language, and other.

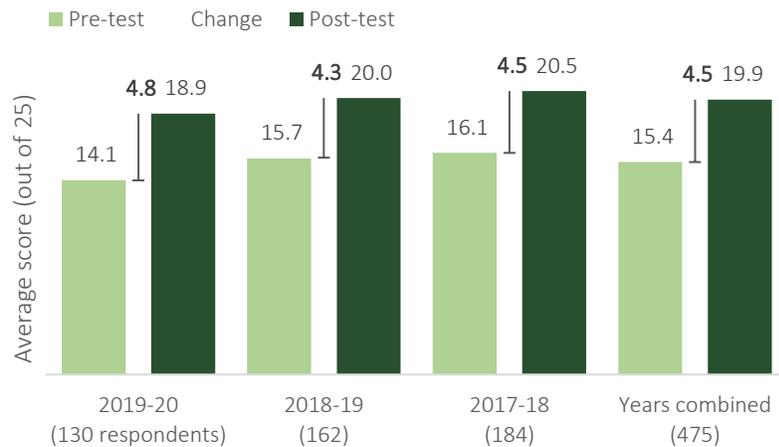
Results

How much did respondents' food safety knowledge improve during the training?

On average, scores increased by 4.8 points out of 25 possible in 2019-2020.

Respondents' knowledge of food safety and FSMA have improved in all years of training. On average, respondents' scores improved by 4.8 points (out of 25) from the pre-test to the post-test in 2019-2020, 4.3 points in 2018-19, and 4.5 points in 2017-18, as shown in Figure 1. The difference between pre-test and post-test scores is statistically significant for all years ($p=0.001$), meaning the difference is not likely due to chance, but to a true difference between pre-test and post-test scores in the population.

Figure 1: Knowledge gain continues to be good across years.

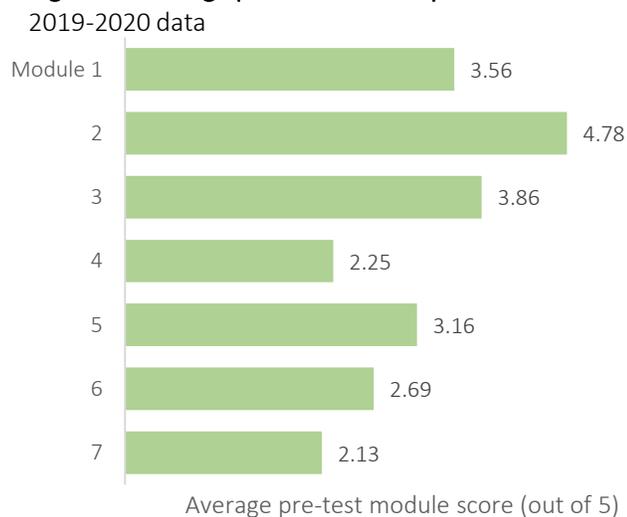


What baseline food safety knowledge do participants have prior to the training?

Prior to the training participants were most familiar with concepts related to Module 2: worker health, hygiene, and training.

The pre-test is especially useful for determining training participants' baseline knowledge prior to the training, so trainers can know which modules may need more emphasis. In the 2019-2020 trainings, participants came to the training with the highest baseline understanding of Module 2 (worker health, hygiene, and training), as shown in Figure 2. Therefore, future trainings may not need to emphasize this module as heavily. (However, the knowledge assessment only included two questions related to Module 2, making this module harder to measure.) Participants also came to the training with good understanding of Modules 3 and 1 (soil amendments and introduction to food safety, respectively). Respondents had the lowest baseline knowledge of Module 7 (how to develop a farm food safety plan), also shown in Figure 2. These results are consistent with results from previous years.

Figure 2: Average pre-test scores by module.



How did participants score on the post-test?

On average, participants' scores improved for all modules from the pre-test to the post-test.

Respondents showed the greatest gain in knowledge on Modules 5 (1.5 point increase) and 7 (1.4 point increase), about agricultural water and farm food safety plans, as shown in Figure 3.

Not surprisingly, they gained less knowledge on Modules 2 and 3, as these were the modules about which they already had a higher understanding prior to the training.

Figure 3: Scores improved the most on modules 5 and 7.

2019-2020 data



Which concepts continued to be unclear after the training?

Three of four questions measuring knowledge on Module 7 were among the most missed questions on the post-test.

Respondents scored lowest on Module 7 and 6 on the post-test, as shown in Figure 4.

Figure 5 shows the questions which respondents most often answered incorrectly on the post-test in 2019-2020. Six questions account for over half of all incorrect responses: questions 11, 12, 21, 22, 24 and 25. Three of these questions measured knowledge on Module 7: 22, 24, and 25. Therefore, it is not surprising that Module 7 on average had the lowest post-test score.

These same questions were often answered incorrectly by many respondents ever since the NCR FSMA began using the knowledge assessment. Following year 1, trainers from the North Central Region discussed how they might better deliver the training to improve understanding of the concepts covered by these questions. Years 2 and 3 data showed that respondents continued to answer these questions correctly at similar rates as they did in year 1. Therefore, one might conclude that these questions are “tricky” and improving scores may depend just as much on rewriting the questions as on delivering a higher quality training. For example, after year 1, trainers agreed that question 13 was poorly worded, so improvement was limited by the NCR FSMA’s inability to modify the evaluation instrument, because the survey is being used nationally. Although in Iowa, question 13 was not among the most missed questions in 2019-2020.

A t-test performed at the regional level comparing the scores on these problematic questions, comparing 2017-18 (year 1) scores with 2019-20 (year 3), showed that average scores have remained the same or even gone down (questions 11 and 25). Again, this shows that these questions may be especially hard or poorly written questions, and trainers may not be able to impact participants’ understanding beyond what they are already doing. This analysis was not conducted at the state level because of the smaller sample size.

Figure 4: Average post-test scores by module.
2019-2020 data

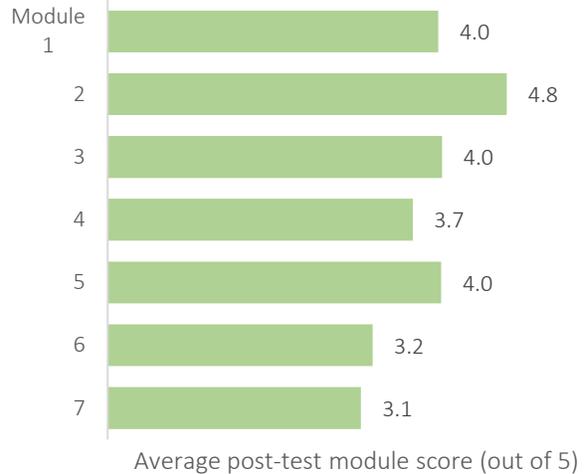
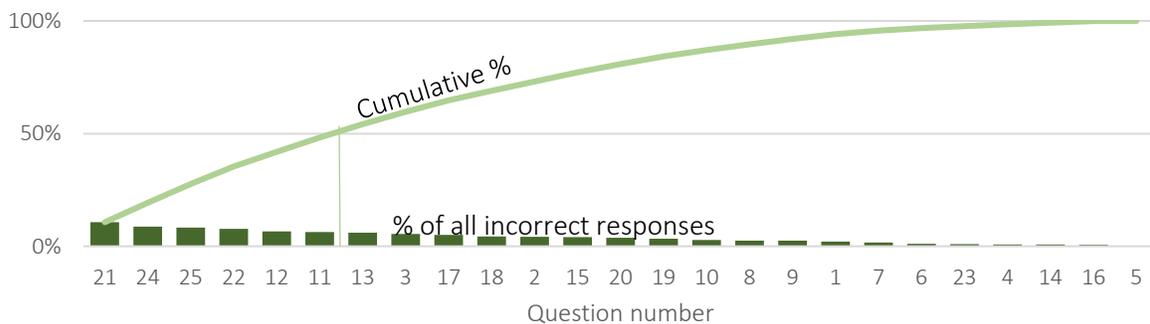


Figure 5: Nearly half of all incorrect responses on the post-test were from 6 questions.



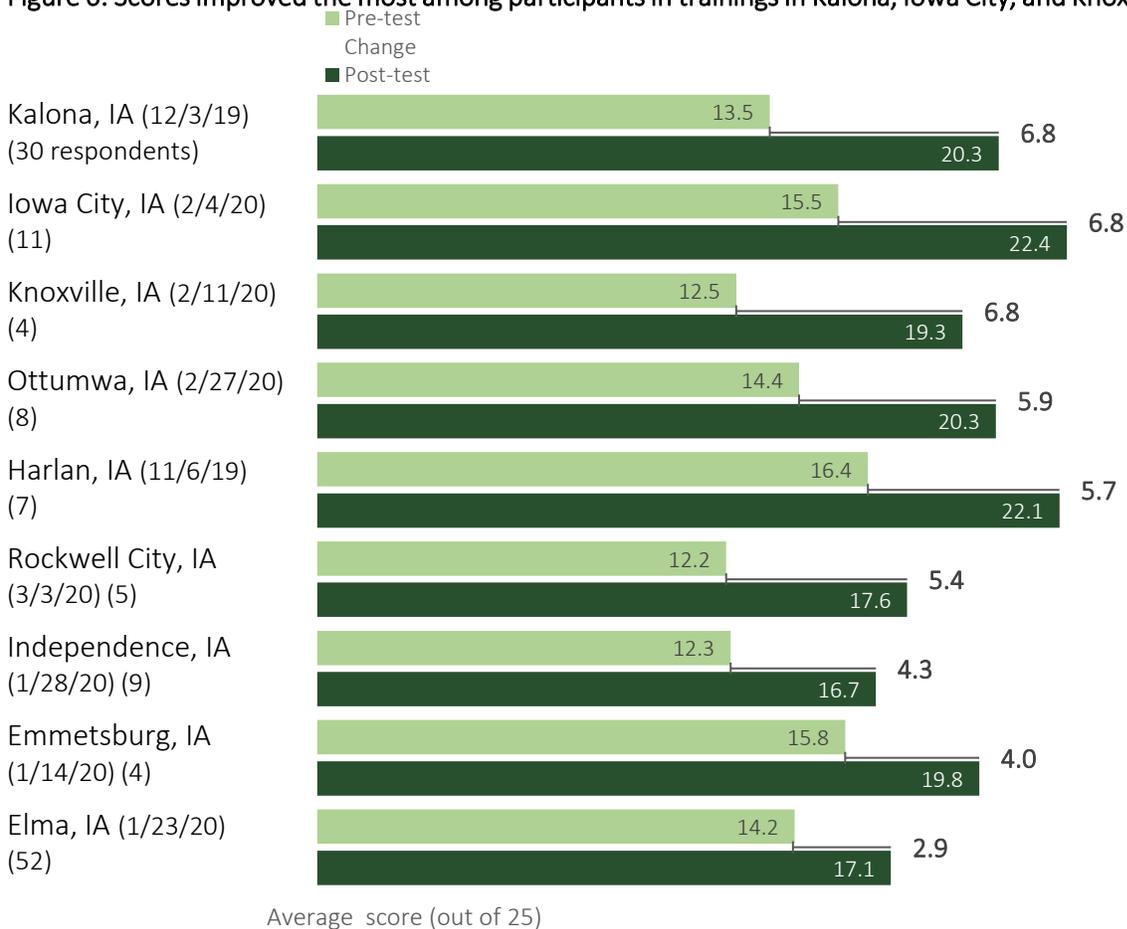
Did scores differ by training?

Incoming and outgoing knowledge differed greatly between participants in each training.

First, participants entered trainings with very different levels of food safety knowledge, with pre-test scores ranging from 12.2 (48.8 percent) at the Rockwell City training to 16.4 (65.6 percent) at the Harlan training (Figure 6). Knowledge gained, measured by the difference in average post-test and pre-test scores, varied from 6.8 at the trainings in Kalona and Iowa City to 2.9 at Elma.

Outgoing knowledge also differed greatly from training to training, ranging from 16.7 at Independence to 22.4 in Iowa City. The cover sheet indicated that the trainings in Elma and Independence were for Plain clothes grower communities and these two trainings had the lowest post-test scores, on average. This indicates that these communities learned less from the training, which is a finding that has been consistent across years. The cover sheet also said that the knowledge assessment questions were read aloud at the training in Kalona, where knowledge gain was highest. Trainers may want to reflect on whether they believe reading the quiz out loud contributed to the higher score change or whether that was a coincidence.

Figure 6: Scores improved the most among participants in trainings in Kalona, Iowa City, and Knoxville.



Did test scores differ by population type?

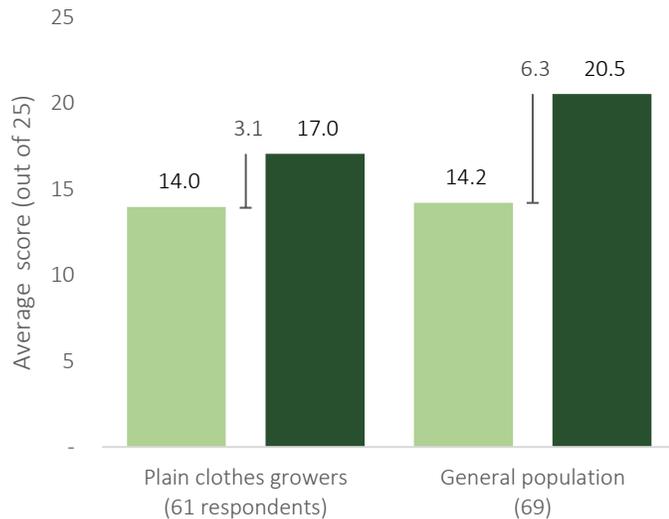
Participants in trainings for Plain clothes growers scored lower than the general population on the post-test.

Iowa State University Extension and Outreach offered two trainings for Plain clothes growers in January 2020. Figure 7 shows that Plain growers scored lower than the general population on the pre-test, but the difference was not statistically significant ($p= 0.698$), meaning we cannot conclude they came to the training with lower knowledge of FSMA or food safety than the general population. Iowa trainers may want to consider whether anything was done differently to help this audience of Plain clothes growers come to the training with a better baseline knowledge than in the past.

They also scored lower on the post-test and gained less knowledge. Those differences are statistically significant ($p=0.001$ in both cases). These differences are similar to findings in previous years.

Follow-up surveys conducted by the NCR FSMA in 2020 with participants in trainings held in from June 2018 to July 2019 showed that Plain community growers were more likely to share negative comments on the survey about FSMA than the general population. Negative attitudes may contribute to a lower knowledge gain among Plain clothes grower participants.

Figure 7: In 2020, Plain clothes growers came to the training with the same level of knowledge as the general population.



Conclusions and recommendations

The third year of conducting knowledge assessments for the Produce Safety Alliance Grower Training Confirms that participants' knowledge does increase by taking the course. The data has been consistent across years showing that participants generally come in with a high knowledge of Modules 1, 2, and 3 and learn much about Modules 5, 6, and 7.

While results in year 3 were like previous years, one difference in year 3 merits further investigation. The knowledge assessment questions were read aloud at the training in Kalona, where knowledge gain was highest. Trainers may want to reflect on whether they believe reading the quiz out loud contributed to the higher score change or whether that was a coincidence.

Appendix A: Individual questions, Iowa results

2019-20	Pre-test	Post-test	Assigned module
Question	% correct	% correct	
1	84%	88%	1
2	49%	75%	1
3	53%	66%	1
4	75%	95%	1
5	90%	99%	2
6	87%	93%	2
7	65%	90%	3
8	66%	85%	3
9	82%	85%	3
10	76%	83%	3
11	37%	62%	4
12	64%	60%	3
13	38%	63%	4
14	76%	95%	4
15	51%	76%	5
16	92%	96%	5
17	11%	69%	5
18	64%	74%	1
19	49%	79%	6
20	33%	77%	6
21	34%	35%	6
22	8%	53%	7
23	65%	95%	7
24	28%	47%	7
25	32%	50%	7
	Pre-test	Post-test	
Most often correct	Question 16	Question 5	
Least often correct	Question 22	Question 21	