2019

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

Produce Safety Alliance Grower Training Knowledge Assessment

IOWA RESULTS

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Introduction

The rise in reported food-borne illness outbreaks has sparked an urgent need for transformation regarding the nation's food safety system. The focus of responding to a food-borne illness shifted to prevention when the Food Safety Modernization Act (FSMA) was passed by Congress and then in January 2011, signed into law by President Barack Obama. The law consists of seven rules, one of which is the Produce Safety Rule, which applies to those who grow, harvest, handle or pack fresh fruit and vegetables. One of the requirements of the Produce Safety Rule is that fruit and vegetable growers take an approved food safety course. In Iowa, the Produce Safety Alliance (PSA) Grower 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 trainings held in year 1 (July 1, 2017-June 30, 2018) and year 2 (July 1, 2018-June 30, 2019), with an emphasis on year 2.

Methods

The Knowledge Assessment was developed by Dr. Amy Harder, an evaluator for the Southern Center for Training, Education, Extension, Outreach, and Technical Assistance to Enhance Produce Safety.

The Knowledge Assessment consisted of 25 questions related to the seven modules of the PSA Grower Training. Training participants were asked to complete the quiz in writing before beginning the training and again after the training.

Trainers collected the paper copies from the participants and sent them to the NCR FSMA evaluation team. Data was entered into Qualtrics; an online data collection and analysis platform, 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 184 complete responses from 11 trainings in Iowa in year 1, and 264 complete responses from 14 trainings in year 2.

The NCR FSMA evaluation team analyzed the data using SPSS™. Each question was assigned to the related PSA Grower Training module, and a total score of correct answers was calculated for each module. (The module to which each question was assigned is listed in Appendix A.) The scores by module were averaged and rescaled from zero to five. Rescaling allowed the evaluators to compare 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 we tracked included Plainclothes growers (which includes

Amish and Mennonite growers), minorities, local food growers, military veterans, non-English/limited English language, and other. Two trainings held in NCR targeted Plainclothes growers and one served a mix of Plainclothes growers and conventional populations and two training targeted other special population. The remaining eleven trainings did not target any special population.

Results

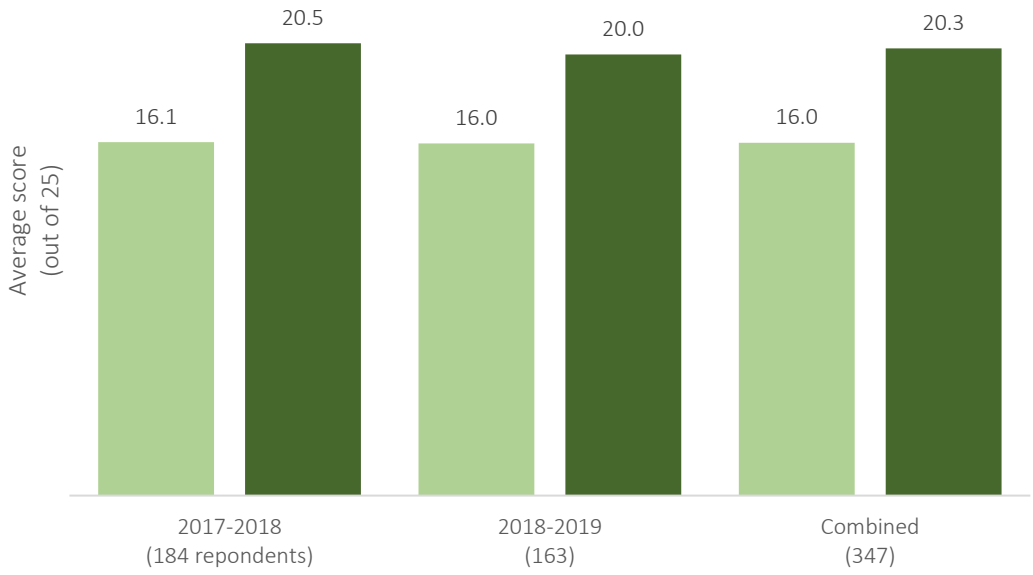
How much did respondents' food safety knowledge improve during the training?

Overall scores increased by an average of 4.3 points out of 25 possible from pre-test to post-test.

Respondents' knowledge of food safety and FSMA improved in the last two years of training. On average, respondents scores improved by 4.4 points (out of 25) from the pre-test to the post-test in year 1 and by 4.7 points in year 2 (Figure 1). This averages out to a 4.3 point increase in scores across both years. The difference between pre-test and post-test scores is statistically significant at a level of α=0.05 in year 1 and year 2. This means the differences in pre-test and post-test scores are not likely due to chance, but to an actual difference between pre-test and post-test scores in the population.

Pre-test scores in year 2 were slightly lower than pre-test scores in year 1. The difference in average pre-test scores between year 1 and year 2 is not statistically significant, meaning we cannot conclude the participants entered the training with a different level of knowledge in year 2 than year 1. Average post-test scores were slightly lower in year 2 then in year 1 and this difference is also not statistically significant (p=0.144). The average increase in score in year 1 (4.4 points) was higher than in year 2 (4.0), and the difference is not statistically significant (p=0.195).

Figure 1: Scores improved more in year 1 (4.4) than year 2 (4.0). (n=347)

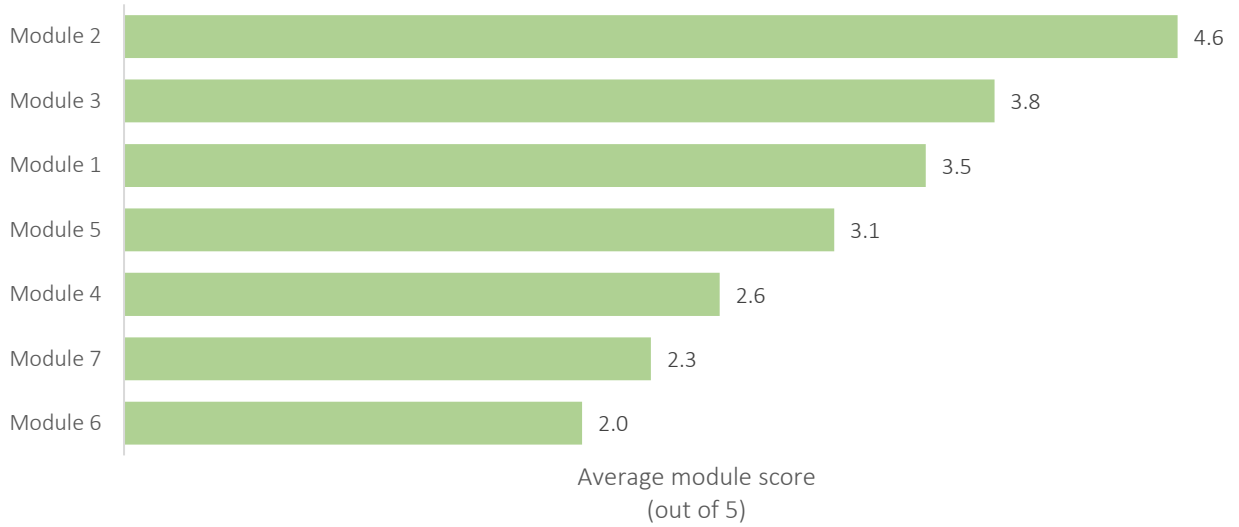


What baseline food safety knowledge did participants have before the training?

Participants were most familiar prior to the training with concepts related to worker health, hygiene, and training.

The pre-test is especially useful for determining training participants' baseline knowledge before the training, so trainers can know which modules may need more emphases. In Iowa, in year 2 (2018-19) training 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 it harder to assess.)

Figure 2: Participants scored highest on the pre-test. (2018-2019, n=163)



Participants also came to the training with a good understanding of Modules 3 and 1 (soil amendments and introduction to food safety, respectively). Respondents had the lowest baseline knowledge of Module 6 (post-harvest handling and sanitation), also shown in Figure 2.

How did participants score on the post-test?

Knowledge improved the most on wildlife, domesticated animals, and land use.

Figure 3 reports the participants' average post-test scores. Like on the pre-test, respondents scored highest on the post-test on Module 2 (worker health, hygiene, and training).

Respondents scored lowest on the post-test on Module 7 (how to develop a farm food safety plan) in year 2, as shown in Figure 3. Only 32 percent of respondents answered question 24 (Figure 4) correctly on the post-test, making it the least understood question. This question is one of those which tests

knowledge of Module 7. It asks which records are required by the FSMA produce safety rule. The Produce Safety Alliance produced a handout entitled, "Records required by the FSMA Produce Safety Rule" (Produce Safety Alliance, 2018) which may help growers understand this module better. If not already doing so, trainers may want to include this handout in the materials they provide to growers.

Figure 3: Participants scored highest on Module 2 on the post-test.

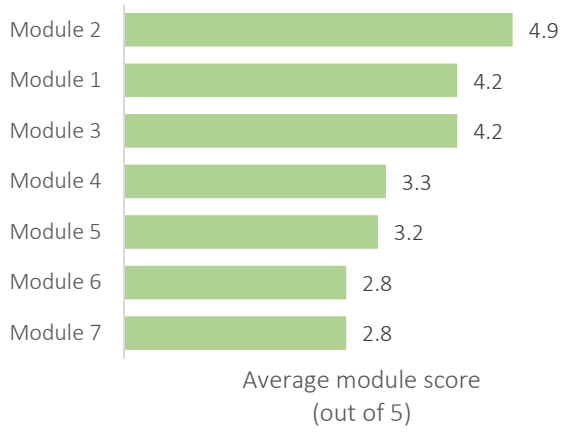


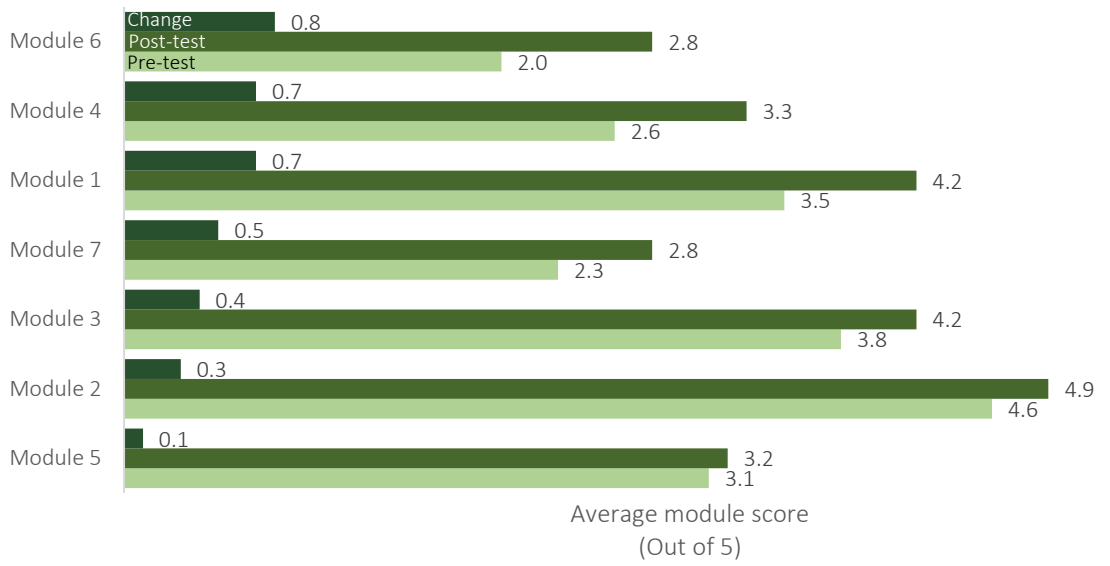
Figure 4: Question 24 was the question most often answered incorrectly on the post-test.

Which of the following records is required by the FSMA Produce Safety Rule?

a. Worker training dates
b. Water change schedules
c. Soil amendment applications
d. Management of sanitary facilities

When the post-test scores were compared to the pre-test, it showed the greatest gain in knowledge on Modules 4 and 6, about wildlife, domesticated animals, and land use; and post-harvest handling and sanitation, as shown in Figure 5. Not surprisingly, they gained less knowledge on Modules 5 and 2, as these were the modules about which they already had a higher understanding before the training.

Figure 5: Scores imporved most on Module 6.
(2018-2019, n=163)



How did scores differ by training location?

On average scores improved the most at trainings in Ames (on June 10, 2019), Bloomfield, and Ames (on June 27, 2019).

First, incoming levels of food safety knowledge varied slightly across locations, with average pre-test scores ranging from 11.5 points at Ames (June 10, 2019) to 19.1 points at Bettendorf (Figure 6).

Change in scores from pre-test to post-test varied widely, from a 2.4 point increase in Bettendorf to 6.3 points at Ames on June 10, 2019 on December 17, 2018 (Figure 7). The cover sheets for the trainings held in Iowa indicated that eight of the trainings targeted any special populations. Trainers may want to discuss what factors might have led to lower average knowledge increase at some trainings, especially Bettendorf, and higher increases in scores at the training in Ames on June 10, 2019, Bloomfield and Ames on June 27, 2019.

Figure 6: Average pre-test scores ranged from 11.5 to 19.1

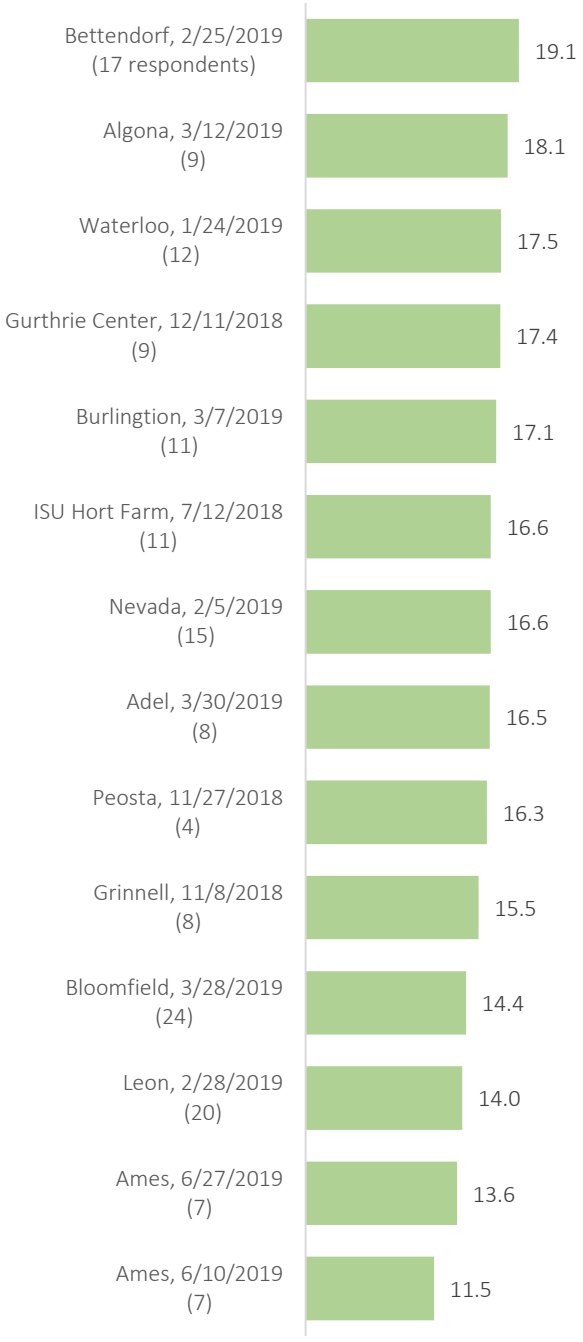
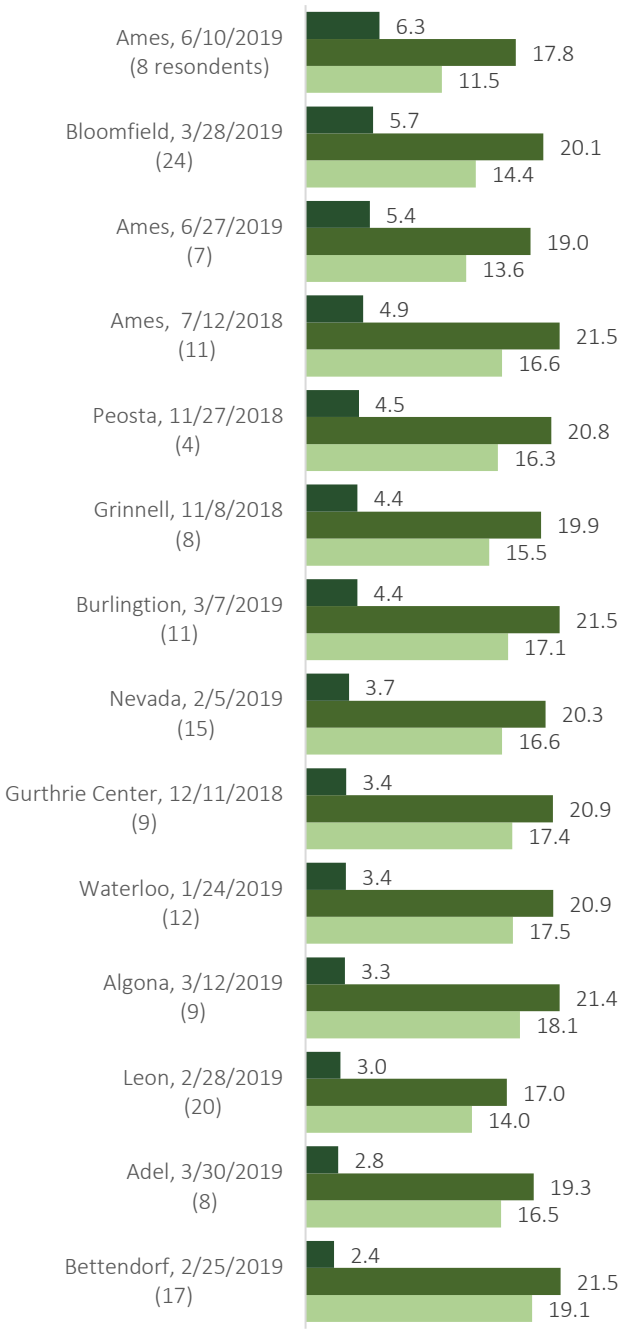


Figure 7: Scores increase the most, on average, at the Ames training on June 19, 2019



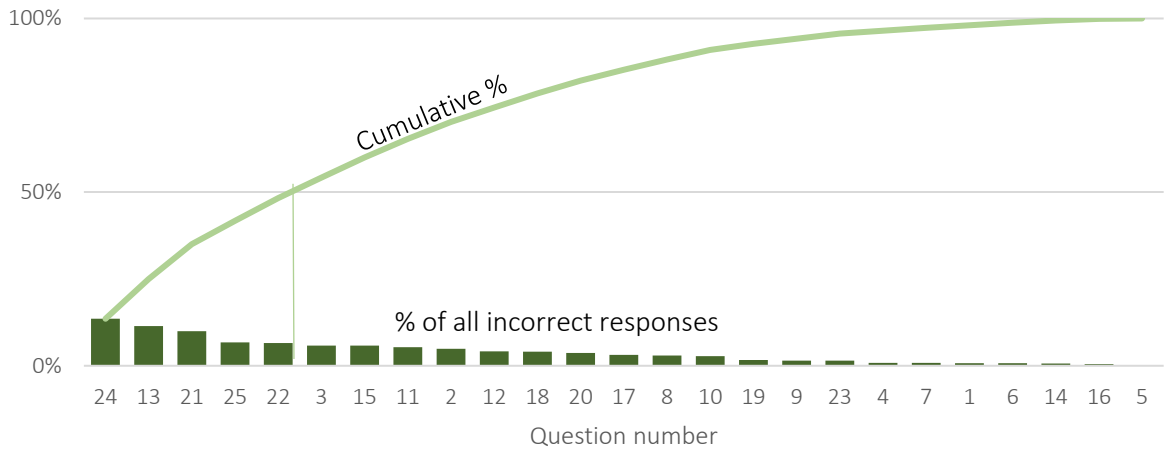
Which concepts continued to be unclear after the training?

Many of the questions that were frequently answered incorrectly in year 1 on the post-test continued to be frequently missed in year 2.

Figure 8 shows the questions which respondents most often answered incorrectly on the post-test. Five questions account for half of all incorrect responses: questions 13, 21, 22, 24, and 25a.

These same questions were often answered incorrectly in year 1. 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. However, year 2 data showed that respondents continued to answer these questions correctly at similar rates as they did in year 1. Therefore, we 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.

Figure 8: Nearly half of all incorrect responses on the post-test were from 5 questions.



Conclusions and recommendations

While many factors contribute to respondents' scores on the PSA Grower Training Knowledge Assessment, such as trainer competency, course content and the quality of the assessment tool, Iowa trainers may be able to further contribute to participants' knowledge gain by adjusting strategies. These recommendations flow from evaluation summarized in this report:

> If not already doing so, include the following Produce Safety Alliance handout with training materials: "Records required by the FSMA Produce Safety Rule." Perhaps dedicate time during the training to review the handout and answer any questions regarding the content.

Discuss with the Ames and Bloomfield trainers if they observed any differences in the populations or teaching methods that may have contributed to higher score improvements when compared with other trainings.

Consider what factors may have contributed to low knowledge gain at the Bettendorf training.

Appendix A: Individual questions, Iowa Results

	2017-18		2018-19		
Question	Pre-test % Correct	Post-test % Correct	Pre-test % Correct	Post-test % Correct	Assigned Module
1	92.9%	97.3%	92.5%	96.3%	1
2	48.9%	77.7%	51.4%	75.6%	1
3	64.1%	77.2%	62.1%	70.7%	1
4	83.7%	98.4%	79.8%	95.7%	1
5	96.7%	100.0%	96.8%	99.4%	2
6	91.3%	97.3%	89.7%	96.3%	2
7	76.6%	85.3%	76.4%	95.7%	3
8	70.7%	91.3%	70.1%	85.4%	3
9	82.1%	90.8%	83.3%	92.7%	3
10	70.7%	87.5%	71.8%	86.0%	3
11	51.6%	78.8%	49.1%	73.2%	4
12	85.9%	84.8%	81.9%	79.3%	3
13	36.4%	55.4%	34.8%	42.7%	4
14	71.2%	88.0%	75.0%	97.0%	4
15	72.3%	81.0%	70.7%	70.7%	5
16	91.3%	96.2%	90.8%	97.6%	5
17	26.6%	70.1%	25.6%	84.1%	5
18	69.6%	84.2%	69.3%	79.9%	1
19	47.8%	95.7%	54.3%	91.5%	6
20	59.2%	91.3%	54.9%	81.7%	6
21	45.1%	45.1%	46.3%	50.0%	6
22	8.2%	70.1%	8.0%	66.9%	7
23	83.7%	93.5%	83.6%	92.7%	7
24	26.1%	46.7%	29.0%	32.3%	7
25	53.3%	70.7%	55.2%	66.5%	7
TOTAL	64.2%	82.2%	64.0%	80.0%	
	Pre-test	Post-test	Pre-test	Post-test	
Most often correct	Questions 1 and 5	Questions 4 and 5	Question 5	Question 5	
Least often correct	Question 22	Question 24	Question 22	Question 24	