PEER-REVIEWED ARTICLE

Food Protection Trends, Vol 44, No. 5, p. 344–350
https://doi.org/10.4315/FPT-23-004

2900 100th Street, Suite 309, Des Moines, IA 50322-3855, USA

Claire Murphy,[1]* Connie Fisk,[2] Karen Ullmann,[2] Cathy Blood,[3] and Stephanie Smith[3]

[1]School of Food Science, Washington State University Irrigated Agriculture Research and Extension Center, Prosser, WA 99350, USA

[2]Produce Safety Program, Washington State Dept. of Agriculture, Olympia, WA 98504, USA

[3]School of Food Science, Washington State University, Pullman, WA 99164, USA

Identifying Training Needs in Washington through Insights from Produce Safety Alliance Grower Training

ABSTRACT

The Produce Safety Alliance was founded to provide standardized training on the Produce Safety Rule. An assessment of knowledge gained from Produce Safety Alliance grower trainings was conducted to identify topics needing additional educational support for the Washington State produce industry. Knowledge gain was assessed through a 25-question pretest (n = 152) and posttest (n = 138) conducted at 10 trainings in 2022. Overall, a significant 15.6% (four-point) improvement in knowledge was observed from the pre- to posttest. Module-specific changes varied from 1.4 to 22.3%. Despite significant knowledge gain, posttest correct response rates for the Wildlife, Domesticated Animals, and Land Use and How to Develop a Farm Food Safety Plan modules were below 75%, highlighting the need for targeted resources. Knowledge changes for the 25 questions ranged from –2.7 to 49.6%, revealing that specific topics lack adequate understanding, despite satisfactory overall module knowledge. Recommendations include the development of tailored materials for the produce industry (e.g., fact sheets), as well as resources to help educators facilitate learning (e.g., hands-on activities). A thorough review of the pre- and posttests is crucial to ensure that the current assessment accurately gauges training effectiveness. Continuous assessment of food safety education programs is essential for guiding current and future educational initiatives.

INTRODUCTION

When the Food Safety Modernization Act's Produce Safety Rule (PSR) was passed in 2015, it established the first federally mandated minimum standards for the growing, harvesting, packing, and holding of fruits and vegetables for human consumption *(10)*. These standards, rooted in fundamental good agricultural practices, encompass six critical aspects: (i) worker health, hygiene, and training, (ii) biological soil amendments of animal origin, (iii) domesticated and wild animals, (iv) production and postharvest agricultural water, (v) equipment, tools, buildings, and sanitation, and (vi) sprouts. With the establishment of the PSR, the U.S. Food and Drug

*Author for correspondence: Phone: +1 509.786.9201; Email: claire.murphy@wsu.edu

Administration acknowledged the need for education and training within the produce industry due to the complexity of implementing these regulations. Consequently, the collaborative effort of Cornell University, the U.S. Food and Drug Administration, and the U.S. Department of Agriculture (USDA) resulted in the establishment of the Produce Safety Alliance (PSA).

Formed with the primary objective of creating a standardized national training program, PSA became the cornerstone for preparing the produce industry to seamlessly adhere to the regulatory requirements imposed by the PSR. Currently, attending the PSA Grower Training course is one way to satisfy the PSR food safety educational training requirement that states that "at least one supervisor or responsible party for your farm must have successfully completed food safety training at least equivalent to that received under standardized curriculum recognized as adequate by the Food and Drug Administration" *(10)*. The PSA Grower Training course, which is frequently taught by extension educators, state departments of agriculture, and commodity organizations, is intended to familiarize attendees with the PSR requirements and the good agricultural practices supporting regulatory compliance. The PSA Grower Training course continues to be an essential resource for instructing the fundamentals of produce safety and fulfilling regulatory requirements. However, to efficiently target extension and outreach efforts that support the continued regulatory compliance needs of the state of Washington produce industry, it is essential to evaluate the short-term outcomes of the PSA grower trainings to better understand gaps in food safety knowledge that need further resources.

Assessing knowledge gained through pre- and posttests is a standard tool used to evaluate the effectiveness and impact of extension programming *(1, 7, 8)*. In this model, a pretest is given to participants prior to starting the program, and the same test is given as a posttest at the end of the programming. Using the same test before and after a course provides a valuable means to gauge the change in participant's knowledge resulting from the training program and the understanding of the materials that were presented. When examining the knowledge gained from pre- to posttest, it is imperative to extend the analysis beyond overall test scores. To pinpoint specific areas in which gaps in understanding persist after a training program, a comprehensive assessment should investigate changes in knowledge on the basis of individual test questions and concepts. This approach allows for future programming and educational efforts to be tailored to address specific knowledge gaps and enhance overall comprehension. Therefore, this article outlines the knowledge change by question and topic for participants who attended a PSA Grower Training course in Washington State in 2022, highlighting topics that need additional educational resources according to the posttests.

MATERIALS AND METHODS

In 2022, every PSA grower training facilitated by Washington State University Extension (WSU) and the Washington State Department of Agriculture (WSDA) included the administration of an identical 25-question test both before (pretest) and after (posttest) each training. The pre- and posttest assessment was initially developed by the Southern Regional Center for Food Safety Training, Outreach, and Technical Assistance (https://sc.ifas.ufl.edu/), a program funded by the USDA National Institute of Food and Agriculture *(9)*. The assessment was reviewed for content validity by subject matter experts, and validation was achieved by administering the assessment to a group of untrained undergraduate students before and after a PSA grower training, revealing a significant difference in performance ($P < 0.05$) *(9)*. The pre- and posttest assessment is available for use by the three additional USDA National Institute of Food and Agriculture regional centers: the North Central Regional Center; the Northeastern Regional Center; and the Western Regional Center. These evaluations, offered in both English and Spanish, can be accessed at the following link: https://foodsafetyclearinghouse.org/resources/psa-training-pre-and-post-test-evaluation-english-and-spanish-versions. In addition, at all trainings in 2022, attendees were provided with the PSA Grower Training Manual (version 1.2; Ithaca, NY 14850).

Questions were categorized according to the specific PSA grower training module being assessed *(Table 1)*. The change in knowledge for each of the 25 questions was examined on the basis of the difference in the percentage of participants that correctly answered each question in the pre- and posttest. Changes in knowledge were characterized as either low (<15%) or high (≥15%). Also, on the basis of the posttest correct response rate, each module and question were categorized on the basis of the need for additional educational resources; ≥75% of participants answered correctly, no resources needed, and <75% of participants answered correctly, resources needed. Data analysis was performed using R (version 4.3.1; R Foundation for Statistical Computing, Vienna, Austria), and visualizations were crafted using Excel (Version 16.86; Microsoft Corporation, Redmond, WA). A binomial generalized regression with a χ^2 and a Bonferroni correction was used to determine whether the percentage of participants that answered a question or questions by topic differed between the pre- and posttest. Significance was set at $P \leq 0.05$.

RESULTS AND DISCUSSION

Pre- and posttest data were gathered from 10 PSA grower trainings held in Washington State throughout 2022. Among these sessions, nine were conducted virtually, and one was held in person. The pre- and posttest developed by the Southern Regional Center encompassed questions from all seven PSA grower training modules; however, the number

TABLE 1. Produce Safety Alliance grower training modules associated with each of the 25 questions on the pre- and posttest

Produce Safety Alliance grower training module	Corresponding test question
1. Introduction to Produce Safety	1, 2, 3, 4, 18
2. Worker Health, Hygiene, and Training	5, 6
3. Soil Amendments	7, 8, 9, 10
4. Wildlife, Domesticated Animals, and Land Use	11, 12, 13, 14
5. Agricultural Water	15, 16, 17
6. Postharvest Handling and Sanitation	19, 20, 21
7. How to Develop a Farm Food Safety Plan	22, 23, 24, 25

of questions was not distributed evenly among the modules *(Table 1)*. When initially formulated, the test was intended to emphasize and evaluate comprehension of essential concepts, without striving for an even distribution of questions across modules *(9)*. Notably, module 2 (Worker Health, Hygiene, and Training) had only 2 of the 25 questions, while module 1 (Introduction to Produce Safety) featured 5 questions *(Table 1)*. In total, 152 pretests and 138 posttests were available for analysis. The average pretest score was 66.0% (16.5 of 25), and the average posttest score was 81.6% (20.4 of 25), indicating an overall significant ($P \leq 0.05$) knowledge improvement of 15.6% (3.9 points) *(Fig. 1)*. The change in overall pre- and posttest scores of approximately four points is consistent with the findings reported in other states (i.e., Oregon, Pennsylvania) and regions (i.e., North Central Regional Center, Southern Regional Center) offering PSA grower trainings *(2, 4, 6, 9)*. The consistent overall knowledge change across diverse regions suggests that the PSA course is effective at disseminating and enhancing overall knowledge of the PSR.

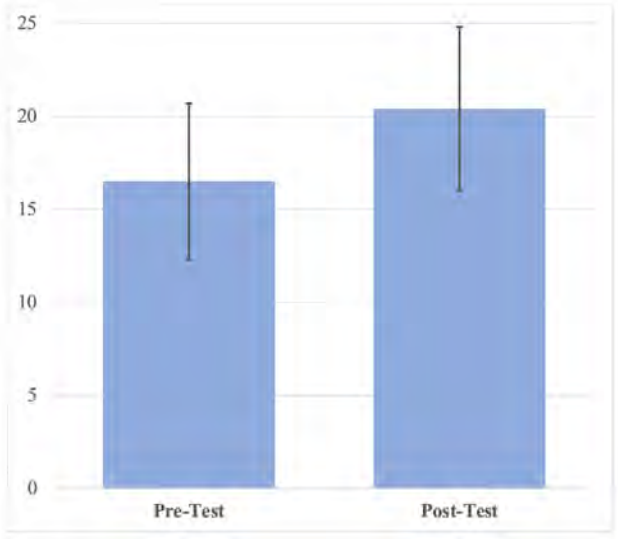

FIGURE 1. Average and standard deviation of pre-and posttest scores (of 25) from participants who took the Produce Safety Alliance Grower Training course in Washington in 2022.

Changes in knowledge classified by the combination of all questions within each module topic varied from 1.4 to 22.3% *(Table 2)*. Module 2 (Worker Health, Hygiene, and Training) exhibited the smallest change in knowledge (1.4%) yet presented the highest pre- and posttest correct response rate at 96.1% (292 of 304) and 97.5% (269 of 279), respectively. Among the seven modules, four (modules 1 to 4) experienced low knowledge changes (<15%). However, within these four modules, only module 4 (Wildlife, Domesticated Animals, and Land Use) displayed an overall average posttest correct response rate below 75% (i.e., 408 of 552, 73.9%), suggesting the need for additional educational materials related to this topic. Although modules 1 to 3 exhibited low knowledge gain, participants showed high correct response rates on both the pre- and posttests, suggesting familiarity with these practices before undergoing PSA training. Conversely, modules 5 to 7 demonstrated high knowledge gains at 19.8, 22.3, and 21.6%, respectively. Despite these notable increases, module 7 (How to Develop a Farm Food Safety Plan) exhibited a posttest correct response rate of 71.7% (396 of 552), indicating the need for further educational resources on this topic *(Table 2)*. Except for module 2, there was a significant increase in knowledge ($P \leq 0.05$) between the pre- and posttests for the remaining six modules, as indicated by χ^2 analysis.

Interestingly, findings from a previous assessment of 2 years (2018 and 2019) worth of PSA pre- and posttest data collected by the North Central Regional Center *(6)*, alongside an evaluation covering 3 years (2017 to 2019) of data from the Southern Regional Center *(9)*, align with the findings of the current survey. Similar to the present study, participants demonstrated the highest pre- and posttest

TABLE 2. Pre- and posttest correct response rate and change in knowledge by Produce Safety Alliance grower training module

Module	No. of questions	Pretest % (no.) of correct response rates	Posttest % (no.) of correct response rates	Knowledge change (%)
1. Introduction to Produce Safety	5	70.3 (534/760)	82.9 (572/690)	**12.6**[a]
2. Worker Health, Hygiene, and Training	2	96.1 (292/304)	97.5 (269/279)	1.4
3. Soil Amendments	4	75.0 (456/608)	85.9 (474/552)	**10.9**
4. Wildlife, Domesticated Animals, and Land Use	4	61.8 (376/608)	73.9 (408/552)	**12.1**
5. Agricultural Water	3	61.8 (282/456)	81.6 (338/414)	**19.8**
6. Postharvest Handling and Sanitation	3	58.3 (266/456)	80.7 (335/414)	**22.3**
7. How to Develop a Farm Food Safety Plan	4	50.2 (305/608)	71.7 (396/552)	**21.6**

[a]Percentages in bold indicate that the change in knowledge was significant ($P \leq 0.05$) by a binomial generalized regression with a χ^2 and a Bonferroni correction.

correct response rate for module 1 (Introduction to Produce Safety), module 2 (Worker Health, Hygiene, and Training), and module 3 (Soil Amendments) *(6, 9)*. This suggests a consistent pattern across different geographical regions and years, indicating that individuals had a greater baseline understanding of these specific modules before and after undergoing PSA training. The substantial level of preexisting knowledge on these broad topics could be linked to the availability of educational resources, along with growers' involvement in supplementary food safety programs (such as good agricultural practices and National Organic Program) or third-party audits. Furthermore, in the present study, module 7 (How to Develop a Farm Food Safety Plan) exhibited the lowest pre- and posttest correct response rate, while module 6 (Postharvest Handling and Sanitation) had the second lowest pretest and the third lowest posttest correct response rate. This echoes the observations made by the North Central Regional Center *(6)* and Southern Regional Center *(9)*, when modules 6 and 7 consistently showed the lowest correct response rate on both pre- and posttests. Note that in previous studies, as well as the current assessment, module 6 experienced the largest knowledge gain *(2, 6, 9)*. This indicates effectiveness in how the PSA training addressed the complexities or difficulties inherent to Postharvest Handling and Sanitation, enabling participants to substantially enhance their grasp of the content.

Low overall posttest correct response rates for module 4 (Wildlife, Domesticated Animals, and Land Use) are of particular concern because incidents of animal intrusion and practices on neighboring land have been identified as contributing factors in past produce outbreaks *(3, 5, 11–13)*. For instance, during the traceback investigation of the 2020 multistate outbreak of *Salmonella* Enteritidis linked to peaches, it was suggested that nearby animal operations, including both poultry and cattle, were likely contributing factors to the outbreak *(11)*. Under the PSR, covered farms must take appropriate measures to not only monitor fields for the contamination of produce associated with likely and foreseeable hazards from adjacent lands, domesticated animals, and wildlife but also ensure corrective actions are taken when necessary *(10)*. Therefore, addressing the low posttest correct response rates for module 4 is not only crucial for ensuring that the Washington produce industry complies with the PSR but is also essential for preventing potential foodborne outbreaks.

As for the low posttest correct response rates associated with module 7, this may be related to the fact that the PSA Grower Training course has an entire module dedicated to the development of a farm food safety plan, even though a written food safety plan is not required under the PSR. A written farm food safety plan becomes a document when an operation keeps records and documentation on assessed risks, practices to reduce those risks, and standard operating procedures, as well as housing required records. Although a farm food safety plan is not mandatory, maintaining one helps keep produce safety documents organized and focused and is beneficial for buyer requirements and third-party audits.

Changes in knowledge by individual questions ranged from −2.7 to 49.6% *(Table 3)*. Approximately half (12 of 25) of the individual questions resulted in significant knowledge gains between the pre- and posttest. Interestingly, question 12 (Q12), addressing actions that should guide risk management decisions, exhibited a higher pretest correct response rate (134 of 152, 88.2%) compared with the posttest (118 of 138, 85.5%); however, the pre- and

TABLE 3. Pre- and posttest correct response rates and change in knowledge by question

Test question	Pretest % (no.) of correct response rates	Posttest % (no.) of correct response rates	Knowledge change (%)
1	93.4 (142/152)	94.2 (130/138)	0.8
2	63.2 (96/152)	87.0 (120/138)	**23.8**[a]
3	52.6 (80/152)	74.6 (103/138)	**22.0**
4	82.2 (125/152)	95.7 (132/138)	13.4
5	98.0 (149/152)	100.0 (138/138)	2.0
6	94.1 (143/152)	94.9 (131/138)	0.8
7	79.6 (121/152)	87.0 (120/138)	7.4
8	75.0 (114/152)	84.8 (117/138)	9.8
9	77.0 (117/152)	87.0 (120/138)	10.0
10	68.4 (104/152)	84.8 (117/138)	**16.4**
11	49.3 (75/152)	68.1 (94/138)	**18.8**
12	88.2 (134/152)	85.5 (118/138)	–2.7
13	32.2 (49/152)	50.0 (69/138)	**17.8**
14	77.6 (118/152)	92.0 (127/138)	**14.4**
15	53.3 (81/152)	76.8 (106/138)	**23.5**
16	89.5 (136/152)	93.5 (129/138)	4.0
17	42.8 (65/152)	74.6 (103/138)	**31.9**
18	59.9 (91/152)	63.0 (87/138)	3.2
19	60.5 (92/152)	86.6 (124/138)	**29.3**
20	55.3 (84/152)	85.5 (118/138)	**30.2**
21	59.2 (90/152)	66.7 (92/138)	7.5
22	10.5 (16/152)	60.1 (83/138)	**49.6**
23	82.2 (125/152)	91.3 (126/138)	9.1
24	44.1 (67/152)	60.1 (83/138)	**16.1**
25	63.8 (97/152)	75.4 (104/138)	11.5

[a]Percentages in bold indicate that the change in knowledge was significant ($P \leq 0.05$) by a binomial generalized regression with a χ^2 and a Bonferroni correction.

posttest correct response rates were not significantly different ($P > 0.05$). Similarly, an examination of 12 PSA grower training sessions conducted throughout Oregon State also demonstrated that Q12 was the only question in which the correct response rate decreased between the pretest (169 of 219, 77.2%) and posttest (141 of 219, 64.4%) *(2)*. Note that throughout the PSA training, instructors consistently stress that participants know the operations best and should feel confident in applying the acquired knowledge to unique circumstances. The emphasis on this self-awareness may have influenced the lower posttest score, with participants believing that "personal experience" plays a larger role in guiding risk management than "scientific evidence."

Question 5, which corresponded to hand washing (module 2: Worker Health, Hygiene, and Training) was the only question that 100% of participants answered correctly on the posttest. Among the 14 questions with changes in knowledge less than 15%, only 2 questions (Q18 and Q21) had posttest correct response rates <75% *(Table 4)*. Notably, these two questions, characterized by both low knowledge gain and low posttest correct response rates, did not correspond with the two modules identified as needing additional educational materials (i.e., modules 4 and 7). Specifically, Q18 assessed participants' knowledge of covered produce commodities (module 1; posttest correct response rate of 63.0%; 87 of 138), while Q21 inquired about information on safety data sheets

TABLE 4. Questions with correct response rates less than 75% on posttest[a]

Q3	Why is the FSMA different from previous federal guidelines regarding produce, such as the "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables?"
Q11	Comanagement refers to the balance between which two factors?
Q13	Which of the following choices is least likely to reduce your property's wildlife population?
Q17	Which of the following is used as an indicator of fecal contamination of a water supply?
Q18	Which of the following is considered covered produce by the FSMA?
Q21	Safety data sheets are used to inform workers during which of the following?
Q22	Which of the following statements regarding farm food safety plans is true?
Q24	Which of the following records is required by the FSMA Produce Safety Rule?

[a]Q, question; FSMA, Food Safety Modernization Act.

(module 6; posttest correct response rate of 66.7%; 92 of 138) *(Table 3)*. Both Q18 and Q21 were identified by the Southern Regionals Center's assessment as frequently incorrectly answered questions, with low scores attributed to confusing wording (Q18) and lack of topic coverage under the PSR *(9)*, indicating that these assessment questions may not accurately gauge understanding and might require modifications.

Eleven questions demonstrated high knowledge gains (≥15%). Among these, six questions had posttest correct response rates below 75% (Q3, Q11, Q13, Q17, Q22, and Q24), spanning four separate modules (modules 1, 4, 5, and 7). Question 22, registering the highest knowledge gain at 49.6% (pre- and posttest correct response rates of 10.5% [16 of 152] and 60.1% [83 of 138], respectively), focused on the relationship between the PSR and farm food safety plans (module 7). Also, Q13, with the lowest posttest correct response rate among all 25 questions (69 of 138, 50.0%), tested knowledge related to reducing wildlife intrusion (module 4). The findings suggest that although overall knowledge within specific module themes may be satisfactory, certain topics within these modules still lack sufficient understanding.

In both Oregon and the north central region, participants consistently struggled with Q13, Q17, Q22, and Q24 (modules 4, 5, and 7), as evidenced by notably lower correct response rates *(2, 6)*. In Washington, despite significant knowledge gain, the posttest correct response rate for these four questions remained consistently below the 75% benchmark. Considering the challenges posed by these questions across various regions and over multiple years, additional resources such as targeted educational materials or supplementary training presentations may be needed to address the current difficulties on the topic covered by these four questions. However, this pattern should also prompt an examination of the test itself to understand whether the current test questions effectively capture participant's understanding or if there is a need to revise the questions to ensure they are clear and align with the intended learning outcomes. Striking this balance between the development of education resources and test refinement is crucial for ensuring participant's knowledge gains and educational needs are captured to best allocate resources.

On the basis on the results of the present study, identified knowledge gaps highlight areas in which using supplemental teaching strategies to emphasize specific topics during training (e.g., hands-on activities, discussions) or the development of supplemental educational materials (e.g., fact sheets, videos) or a combination of both are needed to facilitate enhanced learning. This could involve distributing and discussing a summary sheet detailing the necessary records under the PSR compared with beneficial components for a food safety plan during module 7 or identifying signs of animal intrusion, whether through photographs or staged scenarios, for module 4. A recent study compared the traditional PSA training with an enhanced PSA+ training, which incorporated additional activities, including peer-to-peer discussions, demonstrations, supplemental handouts, and hands-on sample testing, while extending the training time by 125 min *(2)*. Evaluations from both trainings showed that the activities and modifications in the PSA+ training had a positive impact on participant engagement, while posttest scores revealed that the percentage of correctly answered questions either increased or remained constant for the PSA+ compared with the traditional PSA training *(2)*. Although adding activities and supplemental materials may help reinforce and emphasize concepts that need assistance with knowledge retention, the challenge with these supplemental activities is that they require additional time and resources.

CONCLUSIONS

In summary, the success of the PSA grower trainings in Washington State is evident in the notable improvement in food safety knowledge, particularly in areas in which pretraining knowledge was low. Despite these gains, there remains a crucial need for additional educational resources, such as workshops, fact sheets, or training, to support the produce industry in Washington State. Specifically, efforts should focus on increasing the understanding of how to evaluate and manage the risks related to wildlife, domesticated animals, and land use, as well as how to develop a comprehensive farm food safety plan. Extension educators should emphasize these and other low posttest correctness content areas and topics during PSA grower training. Moreover, creating and disseminating activities for trainers to use during PSA grower trainings can further enhance participant engagement and facilitate improved learning outcomes. Ongoing evaluation of food safety trainings through pre- and posttests is essential for gauging overall knowledge gain and identifying topic areas when there are gaps in understanding.

ACKNOWLEDGMENT

The authors thank Stephanie Brown, Western Regional Center to Enhance Food Safety, for assistance with pre- and posttest data formatting.

REFERENCES

1. Allen, J. M., and K. Nimon. 2007. Retrospective pretest: a practical technique for professional development evaluation. *J. Ind. Teach. Educ.* 44:27–42.
2. Alvarado, S., R. Bland, S. R. Brown, J. Waite-Cusic, and J. Kovacevic. 2022. Produce Safety Alliance grower trainings: activities to increase participant engagement. *Food Prot. Trends* 42:124–138.
3. Centers for Disease Control and Prevention. 2006. Multistate outbreak of *E. coli* O157:H7 infections linked to fresh spinach (final update). Available at: https://www.cdc.gov/ecoli/2006/spinach-10-2006.html. Accessed 30 January 2024.
4. LaBorde, L., J. Stoltzfus, and K. Thorn. 2021. Farm food safety training for Amish produce growers covered under the Food Safety Modernization Act (FSMA). J. *Amish and Plain Anabapt. Stud.* 9:151–64.
5. Laidler, M. R., M. Tourdjman, G. L. Buser, T. Hostetler, K. K. Repp, R. Leman, M. Samadpour, and W. E. Keene. 2013. *Escherichia coli* O157:H7 infections associated with consumption of locally grown strawberries contaminated by deer. *Clin. Infect. Dis.* 57:1129–1134.
6. Perry, B. J., A. M. Shaw, A. E. Enderton, S. S. Coleman, and E. E. Johnsen. 2021. North Central Region produce grower training: pretest and posttest knowledge change and produce safety behavior assessment. *Food Prot. Trends* 41:266–273.
7. Pratt, C. C., W. M. McGuigan, and A. R. Katzev. 2000. Measuring program outcomes: using retrospective pretest methodology. *Am. J. Eval.* 21:341–349.
8. Rockwell, S. K., and H. Kohn. 1989. Post-then-pre evaluation: measuring behavior change more accurately. *J. Ext.* 27:X. Available at: https://archives.joe.org/joe/1989summer/a5.php. Accessed 13 January 2024.
9. Schneider, K. R., M. Schroeder, A. Gutierrez, K. Kharel, R. G. Schneider, A. Harder, A. P. Perez, K. Woods, L. L. Dunn, P. Priyesh, C. Gunter, E. Rogers, C. Simmons, L. Johnston, C. Carter, T. M. Taylor, A. Castillo, J. Anciso, J. Masabni, L. K. Strawn, A. Vallotton, K. Stull, T. O'Bannon, and M. D. Danyluk. 2024. Southern region produce safety alliance grower training: using pre-and post-training knowledge assessments to understand training effectiveness. *J. Food Prot.* 87:100266.
10. U.S. Food and Drug Administration. 2015. Standards for the growing, harvesting, packing, and holding of produce for human consumption. *Fed. Regist.* 80:74353–74568.
11. U.S. Food and Drug Administration. 2021. Factors potentially contributing to the contamination of peaches implicated in the summer 2020 outbreak of *Salmonella* Enteritidis. Available at: https://www.fda.gov/food/outbreaks-foodborne-illness/factors-potentially-contributing-contamination-peaches-implicated-summer-2020-outbreak-salmonella. Accessed 30 January 2024.
12. U.S. Food and Drug Administration. 2021. Factors potentially contributing to the contamination of red onions implicated in the summer 2020 outbreak of *Salmonella* Newport. Available at: https://www.fda.gov/food/outbreaks-foodborne-illness/factors-potentially-contributing-contamination-red-onions-implicated-summer-2020-outbreak-salmonella. Accessed 30 January 2024.
13. U.S. Food and Drug Administration. 2023. FDA issues report highlighting *Salmonella* outbreak in cantaloupe during summer of 2022. Available at: https://www.fda.gov/food/cfsan-constituent-updates/fda-issues-report-highlighting-salmonella-outbreak-cantaloupe-during-summer-2022. Accessed 30 January 2024.