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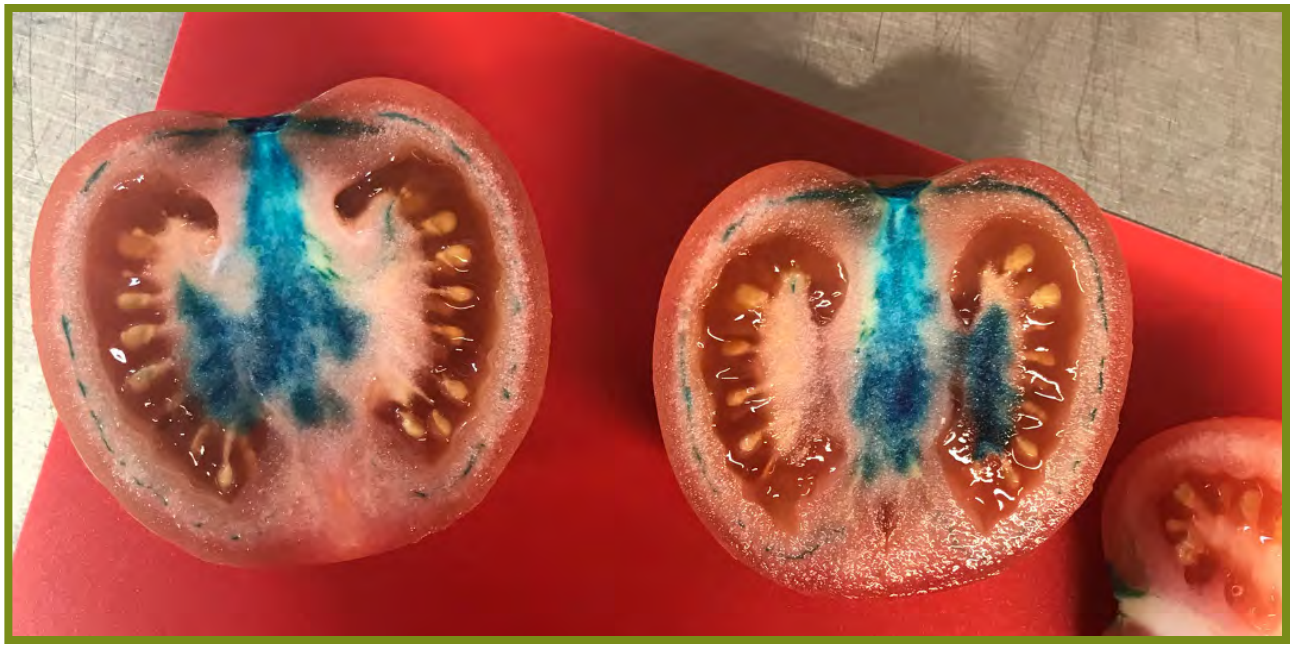

Produce Safety Alliance Grower Trainings: Activities to Increase Participant Engagement

ABSTRACT

The Produce Safety Alliance (PSA) created the first standardized and U.S. Food and Drug Administration–recognized Grower Training curriculum focused on the Produce Safety Rule. The standard PSA Grower Training is an 8-h, lecture-based training with limited opportunities for participant engagement. The objectives of this study were to increase PSA Grower Training participant engagement and assess immediate knowledge gain. We developed and incorporated supplemental learning activities into the existing training curriculum (PSA+). The two objectives were assessed using pre- and posttraining tests and evaluation comments, respectively, from 12 trainings (2019 to 2020; 6 PSA and 6 PSA+). Participant knowledge gain was significant ($t = -16.72$, $P < 0.01$) for each training and comparable between formats. Three questions with identical training content between PSA and PSA+ had significantly higher posttraining scores in PSA+. A question on what should guide risk management actions had less participants choosing the intended correct answer between pre- and posttest. Participants reported improved engagement in PSA+ and highlighted the need for more diversity and cultural sensitivity in PSA slides and verbal delivery of information. These findings identified additional resources that would be useful to participants and helped inform future training and trainer improvements.

INTRODUCTION

Foodborne outbreaks linked to the consumption of contaminated fresh produce continue to be a public health challenge in the United States. In 2011, the Food Safety Modernization Act (FSMA) was signed into law, thereby empowering the U.S. Food and Drug Administration's (FDA's) regulatory approach to enforce minimum science-based standards to improve food safety. Over the next few years, the FDA released seven major rules under the FSMA, including the Produce Safety Rule (PSR) that establishes minimum standards for the growing, harvesting, packing, and storing of produce *(10, 11)*. The PSR is the first FDA regulation to apply on produce farms, making it critical to effectively educate this newly regulated population to prepare for compliance.

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The PSR mandates that each "covered farm" have at least one individual complete a food safety training recognized by the FDA §112.22(c) *(11)*. The Produce Safety Alliance (PSA) developed the first standardized curriculum, the PSA Grower Training Course, that was recognized by the FDA to satisfy this requirement. The PSA Grower Training addresses the major requirements detailed in the PSR in an 8-h lecture format *(Table 1)* that covers seven major topics in eight lectures *(8, 13)*. Beginning in 2017, the Oregon Farm Food Safety Team was formed as a partnership between Oregon State University and the Oregon Department of Agriculture (ODA) with the aim of delivering PSA Grower Training workshops across the state. Between 2017 and 2018, they delivered 14 PSA Grower Training workshops to 504 participants. Attendees reported it was difficult to listen to 8 h of lectures. The PSA Grower Training is a time-efficient workshop (8 h); however, the predominant use of lecture-based instruction is known to have significant limitations when used exclusively in adult-learning settings. These limitations include few opportunities for participant engagement and formative assessment of participant understanding *(1)*.

The intent of the PSR training is to support farms as they work to minimize the risk of their produce being contaminated with foodborne pathogens (21 CFR § 112). The PSR training is intended to be a one-time training; however, it is likely that continued education will be required in the future. Failing to provide an engaging learning experience makes it unlikely that participants will retain key concepts and implement changes to reduce food safety risks. Participant satisfaction and overall workshop quality will be important considerations if ongoing trainings are required for produce farms.

Beginning in 2018, the Oregon Farm Food Safety Team began developing supplemental activities for the PSA Grower Training to overcome the limitations associated with lecture-based training by including interactive educational experiences, supported by andragogical learning methods, beyond lecture (PSA+). These changes were designed to increase participant engagement, with the goal of improving knowledge gain, while also reducing lecture fatigue for both participants and instructors. Expansion focused on more complicated concepts (PSR exemptions, animal intrusion, agricultural water, and cleaning and sanitation) currently in the PSA training. The supplemental activities increased the time required to cover all of the necessary training components to 14 h, compared with the traditional 8-h experience. The objective of this study was to increase PSA Grower Training participant engagement and knowledge gain through the addition of supplemental training materials.

During 2019 and 2020, the team piloted PSA+ while continuing to offer standard PSA options throughout Oregon. This report critically evaluates participant feedback and knowledge gain from the two training formats (6 PSA and 6 PSA+) offered during this time period. This evaluation provides relevant information for continuing to improve extension and outreach programming to continue to support our farms with compliance with the PSR.

MATERIALS AND METHODS

Workshop schedule and advertisement

Fifteen PSA trainings were hosted across Oregon from January 2019 to March 2020, of which 12 were selected for this study *(Supplemental Table S1)*. Six PSA and six PSA+ courses were selected that used the same trainers and had similar participant population sizes (range: 12 to 39) to avoid confounding of these variables. The three courses not included in the analysis were excluded for one or more of the following reasons: participant numbers too few or too many, training targeted to individuals exempt from the PSR, and different trainers delivering content. The PSA+ courses, presented over 2 days, delivered the standardized curriculum supplemented with additional materials (e.g., slides, handouts) and group activities integrated throughout the standard seven modules. Differences between the PSA and PSA+ courses are shown in *Table 1*. All trainings were advertised at least 4 weeks before the training by using the ODA listserv, with flyers sent via GovDelivery Communications Cloud, including information about training dates, locations, training type (PSA or PSA+), and fees (from US$30 to US$35 PSA; from US$55 to US$70 PSA+). Individuals were able to self-select into the course of their choosing; therefore, there was no random assignment of individuals into courses. This study was determined exempt from the need for approval by the Institutional Review Board at the Oregon State University (study #8795; date of exemption: 12 October 2018).

PSA+ components and room layout

Materials and activities included in the PSA+ were designed or selected to focus on more complex training content within the modules, based on previous trainings that indicated incomplete participant understanding. For modules 1 *(3, 6)*, 4, 5.1, 5.2 *(4)*, and 6 *(5)*, supplemental activities were created and implemented *(Table 1)*. The slides and delivery information for these activities can be found on the Western Regional Center to Enhance Food Safety resources Web page *(12)* *(Table 1)* and the Food Safety Resource Clearinghouse *(2)* *(Table 1)*. To facilitate improved participant interaction and support peer-to-peer discussions, the seating layout for PSA+ was modified to create groups where participants could face each other while also seeing the instructor *(Supplemental Fig. S1)*.

Participant knowledge assessment

The PSA pretraining ("pretests") and posttraining ("posttests") tests developed by the Southern Center *(9)* were used to measure immediate knowledge gain of

TABLE 1. Module topics and training content for Produce Safety Alliance (PSA) Grower Training (PSA) or Produce Safety Alliance Grower Training with Supplemental Activities (PSA+) Workshops

Module	Content	Activity[a]	Total time (min) on topic	
	PSA	PSA+	PSA	PSA+
Introduction to produce safety	36 slides	FSMA exemptions – "Are you in or are you out?" and fictional farm scenarios[b] (H, Q)	60 min	90 min
Worker health and hygiene	29 slides	"Who comes to your farm?" (H)	45 min	60 min
Soil amendments	25 slides	None	40 min	45 min
Wildlife, domesticated animals, and land use	23 slides	Photos of different intrusion situations[b] (P, Q)	45 min	60 min
Agricultural water: production water	34 slides	Personal water quality sampling, calculate water quality profiles[b] (Q, D, S, H, P, T, O, A)	75 min	140 min
Agricultural water: post-harvest water	23 slides	Demonstration of water infiltration into produce[b,c] (D, H, Q)	50–60 min	60 min
Post-harvest handling and sanitation	37 slides	Photos of different food handling surfaces[b,c] (P, Q)	40–50 min	60 min
How to develop a farm food safety plan	26 slides	None	45 min	45 min
Total	**233 slides**		**445 min**	**570 min**

[a]Types of activities included the following: Q – Questions; P – Photographs; D – Demonstrations; T – Testing; O – Outbreak investigation examples; H – Handouts; S – Sample collection; A – Analysis of samples.

[b]Activity materials available at the Western Regional Center to Enhance Food Safety website at: https://agsci.oregonstate.edu/wrcefs/resources.

[c]Activity materials available at the Food Safety Resource Clearinghouse at: https://foodsafetyclearinghouse.org/.

participants. Participants were surveyed before the beginning of the workshop and then asked to complete the posttest immediately after the workshop. Both the pre- and posttests contained the same 25 multiple-choice questions, with four possible response options per question, in the same order. The internal validity of the assessment was calculated using Cronbach's alpha and was found to have internal reliability (7). Within each participant's PSA grower manual binder were uniquely numbered pretest and posttest copies to ensure the ability to match tests for analysis.

Training evaluations and demographics

Standardized PSA course evaluation forms were used to collect feedback from participants. Participants had the opportunity to evaluate instructor effectiveness and ability to answer questions as well as the option to leave comments for any open-ended feedback. Participants also were asked to share voluntary demographic information (gender, age, education, and ethnicity) and farm details on the evaluation forms. Evaluation forms were collected in addition to pre- and posttests, but were not linked to the tests; therefore, these data could not be linked during data analysis.

Data analysis

Individual pretraining and posttraining tests were graded, and resulting scores were entered into Excel (Microsoft, Redmond, WA). Tests with <15 answered questions or those from participants with only one test completed were excluded from further analysis. A two-tailed independent samples *t*-test was conducted to compare the means of the pretests of the PSA and PSA+ trainings, in which no significant differences between the groups at baseline were found ($t = -1.999$, $P > 0.05$). A two-tailed paired samples *t*-test was used to assess knowledge gain between pre- and

TABLE S1. Training details for Produce Safety Alliance Grower Training (PSA) and Produce Safety Alliance Grower Training with Supplemental Activities (PSA+) offered in Oregon from January 2019–March 2020

Training type	Training location	Dates (MM/DD/YY)	No. of Participants	No. of exams included in analysis[a] (response rate %)
PSA	Canby	01/15/19	39	30 (77%)
	Central Point	01/22/19	25	22 (88%)
	Ontario	02/12/19	18	18 (100%)
	Beaverton	06/26/19	32	25 (78%)
	The Dalles	10/03/19	23	22 (96%)
	Eugene	11/21/19	18	14 (78%)
Total			**155**	**131 (85%)**
PSA +	Hillsboro	01/28–29/19	19	15 (79%)
	Aurora	02/25–26/19	35	21 (60%)
	Hood River	03/19–20/19	27	22 (81%)
	Eugene	04/29–30/19	14	14 (100%)
	Corvallis	02/10–11/20	12	10 (83%)
	Portland	03/03–04/20	14	12 (86%)
Total			**121**	**94 (78%)**

[a]If more than 10 of the 25 questions were left unanswered in either the pre- or posttraining test, participant data was excluded from the set. If only one of the tests (pre- or posttraining test) was obtained, participant data was also excluded.

posttests for all trainings (PSA and PSA+). Differences in individual posttest question scores between PSA and PSA+ were assessed using one-tailed independent samples *t*-test. Statistical significance was assumed at $P < 0.05$.

RESULTS AND DISCUSSION

Demographic information

In total, 276 participants attended 1 of the 12 produce safety trainings described herein, with 155 participants attending the PSA Grower Training compared with 121 participants completing the PSA+ *(Supplemental Table S1)*. Based on our exclusion criteria, pre- and posttests from 51 participants were not included in our analyses. From the 225 participant tests that were included in these calculations, 131 participants were included from PSA and 94 participants were from the PSA+. Course size ranged from 18 to 39 participants for the standard format and from 12 to 35 participants for the expanded PSA+ version. Overall, 85% (PSA) and 78% (PSA+) of participants completed both the pre- and posttests. The test completion rates for PSA+ were influenced by a low response rate for one PSA+ training in Aurora. This response rate is due to weather conditions on the first morning of the training, causing several participants to be late to the training and miss the pretest.

From 262 evaluation forms completed in total ($n = 148$ PSA; $n = 114$ PSA+), participants represented a diverse group of farm operations and backgrounds in both types of trainings *(Tables 2 and 3)*. Based on the voluntary responses in the evaluation forms, the majority of participants in both training types were male (PSA: 70 of 148, 47%; PSA+, 59 of 114, 52%), white (PSA: 101 of 148, 68%; PSA+, 85 of 114, 75%), and <40 years old (PSA: 68 of 148, 46%; PSA+, 51 of 114, 45%). The primary targeted occupations of farm owners or farm workers represented the majority of participants (186 of 262, 71%). The highest numbers of participants grew mixed vegetables (99 of 207, 48%), berries (96 of 207, 46%), and tree fruit (85 of 207, 41%). Thirteen percent (27 of 207) of farms indicated that they grow tree nuts. Farm sizes of participants were fairly equally distributed between small farms (<10 acres [<4 ha]; 33%), medium acreage (11 to 100 acres [4 to 40 ha]; 27%), and larger farms (>101 acres [>40 ha], 36%). Participants were from farms of all economic classifications, with the highest percentage (69 of 207, 33%) from farms with annual produce sales exceeding US$500,000, followed by participants from farms with annual produce sales between $25,000 and $250,000 or between $250,000 and $500,000 (60 of 207, 29%), which could potentially be "qualified exempt." Several participants

TABLE 2. Demographics of all participants completing either the PSA or PSA+ course in Oregon between January 2019 and March 2020 (n = 262)

Participant information		PSA (n = 148)	PSA+ (n = 114)	Combined (n = 262)
Gender	Female	55	43	98
	Male	70	59	129
	No Response[a]	23	12	35
Age (yr)	15–25	16	9	25
	26–40	52	42	94
	41–55	29	20	49
	56–65	22	22	44
	66+	9	8	17
	No Response	20	13	33
Ethnicity	White	101	85	186
	Hispanic/Latino	6	8	14
	Black/African American	2	0	2
	Native American/American Indian	4	0	4
	Asian/Pacific Islander	7	4	11
	Other	4	1	5
	No response	24	16	40
Highest level of education	No formal schooling	1	1	2
	8th grade	0	1	1
	High school/GED	42	19	61
	Associate's degree	24	13	37
	Bachelor's degree	43	47	90
	Master's degree	11	17	28
	Doctorate	5	4	9
	No response	22	12	34
Occupation	Farm owner	68	58	126
	Farm worker	36	24	60
	Extension educator	2	1	3
	Produce industry	8	6	14
	Government employee	3	6	9
	Other[b]	18	15	33
	No response	13	4	17

[a] Number of participants who did not select a response for the respective category.

[b]Responses for other occupation included the following: agriculture industry technical support, gleaner, consultant, grower's market manager, director of food safety, educator, government inspector, lawyer, non-profit worker, packer, processer, quality assurance, and student.

TABLE 3. Representation of farms by produce crops grown, size, and production practices of participants completing PSA or PSA+ courses in Oregon from January 2019 to March 2020

Farm Information		PSA (n = 117)	PSA+ (n = 90)	Combined (n = 207)
Produce type[b]	Leafy greens	35	33	68
	Tree fruit	42	43	85
	Tree nuts	14	13	27
	Berries	48	48	96
	Vegetables (mixed)	56	43	99
	Other[c]	28	15	43
Acreage	0–10	40	28	68
	11–25	7	3	10
	26–50	13	11	24
	51–100	10	13	23
	101–1000	43	32	75
	No response[d]	4	3	7
Average annual produce sales	<$25K	30	14	44
	$25–$250K	24	17	41
	$250–$500K	7	12	19
	$500K+	38	31	69
	No response	18	16	34
Growing practices	Conventional	52	50	102
	Certified organic	28	26	54
	Organic practices, but not certified	29	16	45
	Other[e]	1	3	4

[a]Participants may have selected multiple responses for produce type and growing practices, and not all participants answered every question.

[b]Participants may have selected multiple responses for produce type and growing practices; therefore, columns in these categories will not correlate to the number of respondents.

[c]Responses for other produce type included fresh herbs, grapes, hemp, hops, melons, microgreens, mushrooms, seeds, and wine grapes.

[d]Number of participants who did not select an answer for the respective category.

[e]Responses for other growing practices included global Good Agricultural Practices and regenerative.

(44 of 207, 21%) were also from farms with annual produce sales below $25,000, which would not be subject to the requirements of the PSR.

Pretraining participant knowledge assessment using individual questions

Knowledge evaluations based on tests administered before the training (pretests) demonstrated that, in general, participants came into the produce safety training with a relatively strong food safety knowledge base. Nine questions illustrated a consistently high level of participant knowledge before the training, with >80% of all participants answering these questions correctly on the pretest *(Fig. 1)*. The majority of these questions covered basic food safety practices or concepts that would likely be familiar to most growers before this training. Ninety-six percent of participants correctly

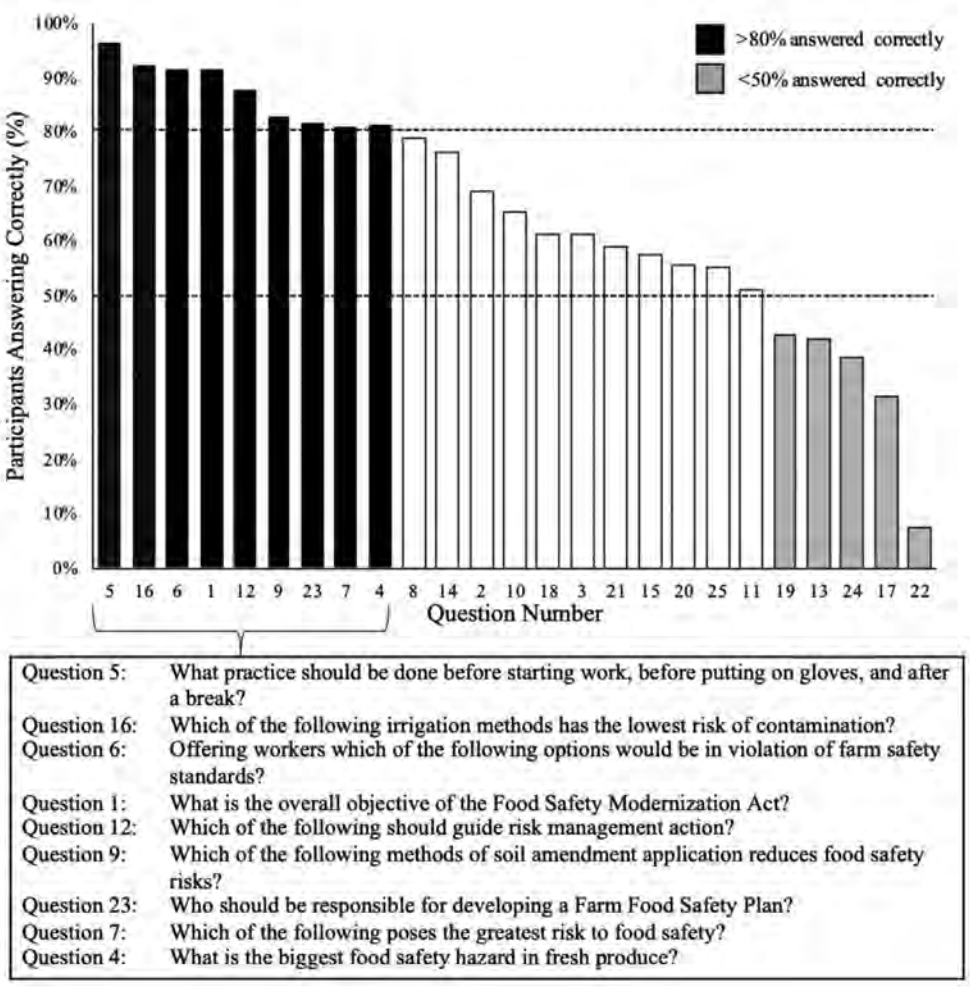

Figure 1. The overall percentage of participants in both the expanded and standard trainings (n = 225) that answered each question correctly on the pretraining test. Questions with >80% correct response rate (black bars) are shown in the box and indicated on the chart as those exceeding the top dotted line on the graph. Questions with <50% correct response rate (gray bars) are further described in *Fig. 2*.

identified when produce handlers should wash their hands (question 5). The overwhelming majority of participants (92%) also correctly identified that drip irrigation poses the lowest risk for contaminating the crop (question 16), that reusable towels are a violation of farm safety standards (question 6), and that preventing food safety issues is the primary objective of the FSMA (question 1). There were five test questions covering fecal contamination indication, packing house zones, farm food safety plans, required recordkeeping, and reducing wildlife on property in which <50% of participants answered correctly on the pretest *(Fig. 2)*. Four of these questions were specific to the context of the PSR, and participants were unlikely to be familiar with them before attending this training. Evaluation of the pretest scores from PSA workshops in the North Central Region also reported <50% correct responses for questions 17, 22, and 24 *(7)*. There was a single question (question 20) in which participants in the PSA+ workshops were significantly more likely ($t = -2.268$, $P < 0.05$) to answer correctly (63%) compared with participants in the PSA workshops (52%). This question focuses on terminology and logic surrounding cleaning and sanitizing.

Overall knowledge gain based on pre- and posttests

The distribution of pre- and posttest scores for all PSA and PSA+ trainings is shown in *Fig. 3*. Assessment scores significantly increased ($t = -16.72$, $P < 0.01$) between the pre- and posttests in all 12 PSA trainings (PSA and PSA+). Median test scores before training were 16 (PSA) and 17 (PSA+) of 25, with both training types seeing a significant increase in median score of 5 points. However, as the posttests were distributed immediately after the training, the knowledge gain assessed in this study is only short term. Long-term knowledge retention was not investigated for this study. This finding is consistent with the findings reported in other regions offering PSA trainings *(7)*. The distribution

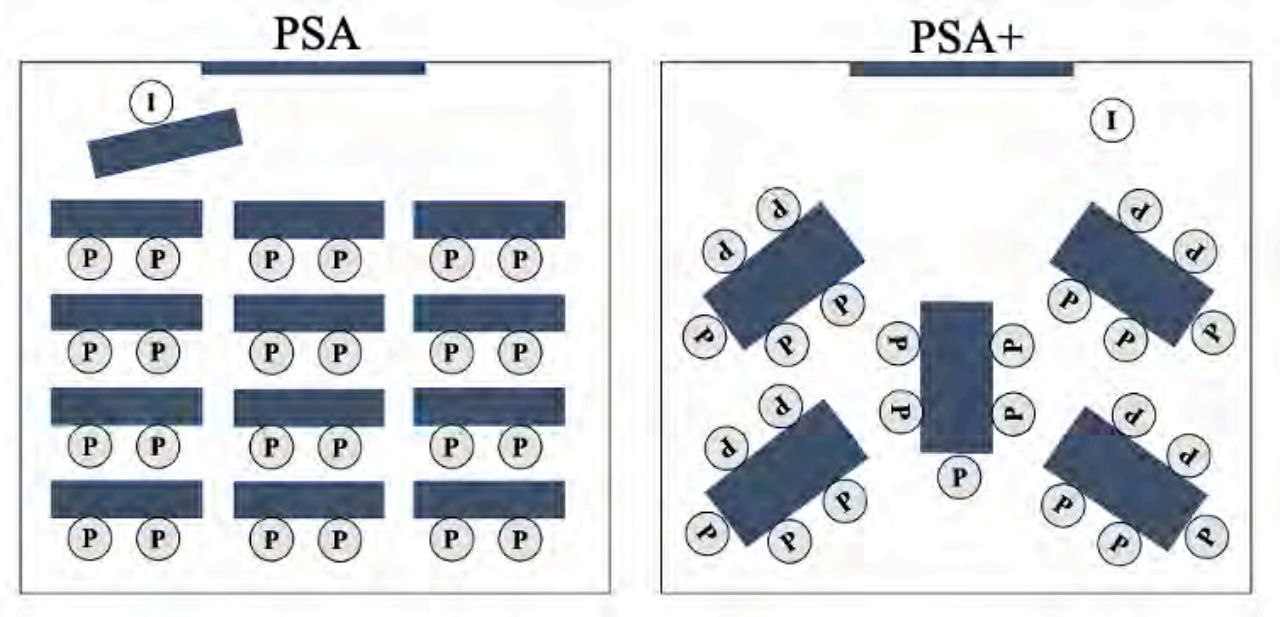

Figure S1. Representative seating arrangements for participants in the standard Produce Safety Alliance Grower Training (PSA) and the expanded Produce Safety Alliance Grower Training (PSA+). (I) indicates instructor location during lecture; (P) indicates participant locations.

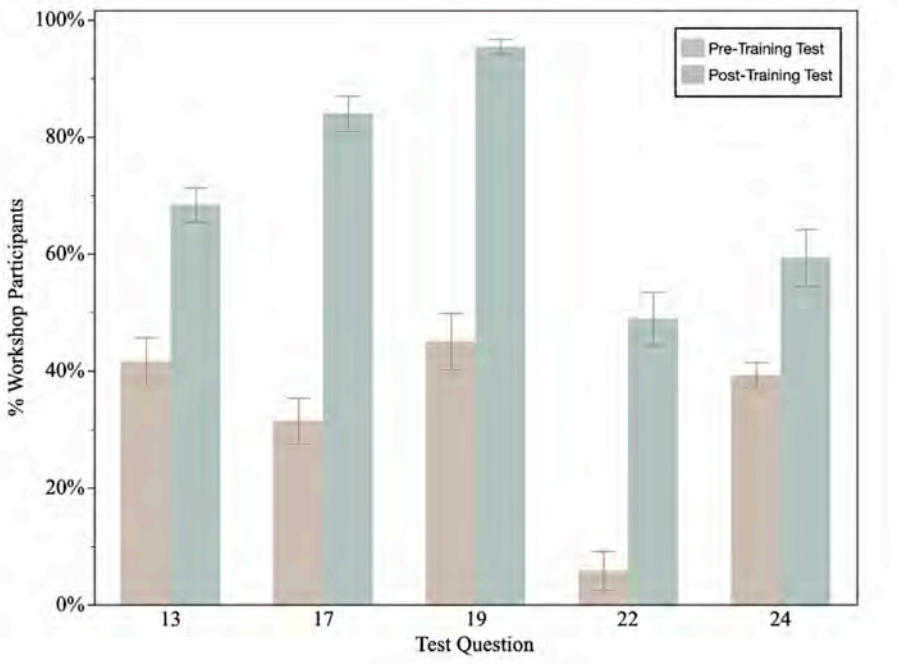

Figure 2. Effectiveness of produce safety trainings (PSA and PSA+ combined) to improve participant understanding of topics where <50% of participants answered correctly on the pretraining test. Data are presented as the mean percentage (± standard error) of participants in a training (n = 12) answering the test question correctly.

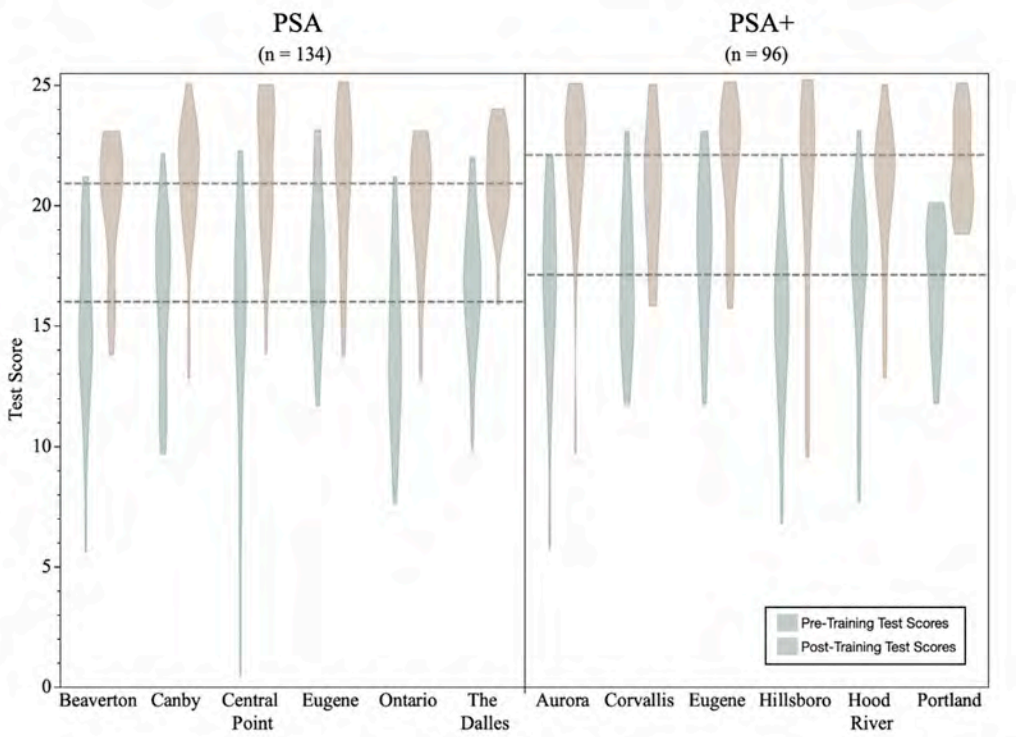

Figure 3. Pretraining and posttraining exam score distributions from PSA and PSA+ workshops in Oregon from January 2019 to March 2020. Maximum possible score on training exam is 25 points. Dashed lines indicate median score of pretraining and posttraining tests from each training format.

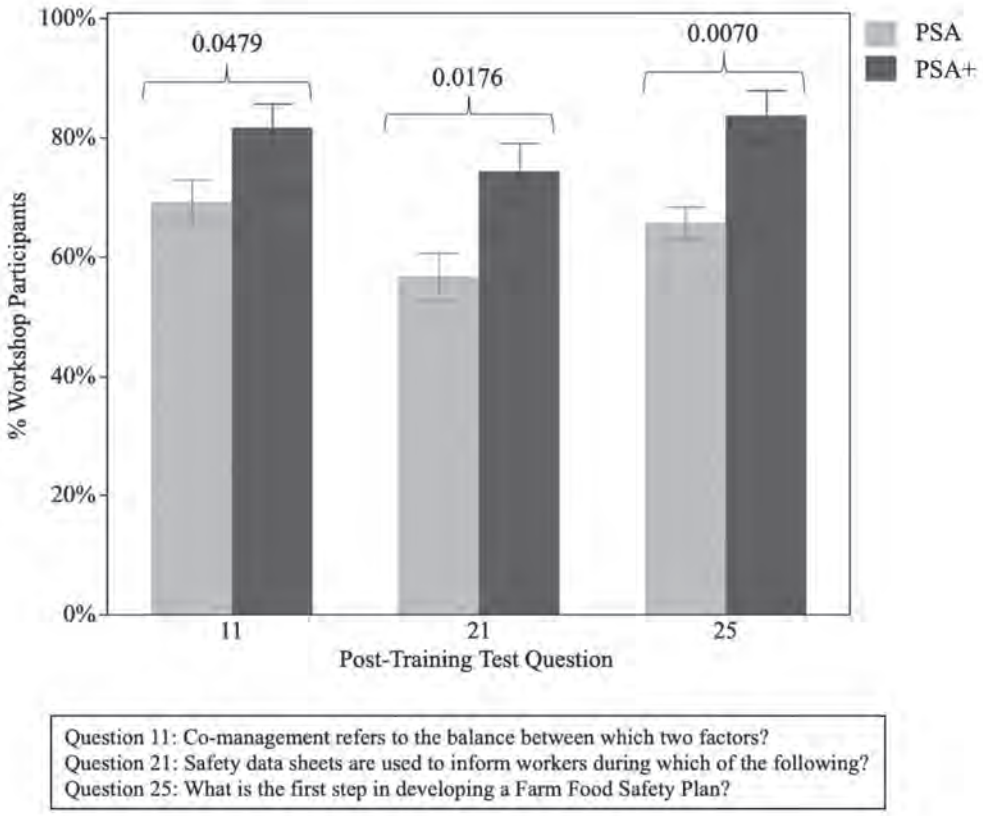

Figure 4. Posttraining test questions with a significant difference in the average percentage of participants answering correctly after completing PSA and PSA+ training (n = 6 trainings per type). Data are presented as the mean ± standard error with the *P*-value shown above each pair of bars (two-tailed *t*-test).

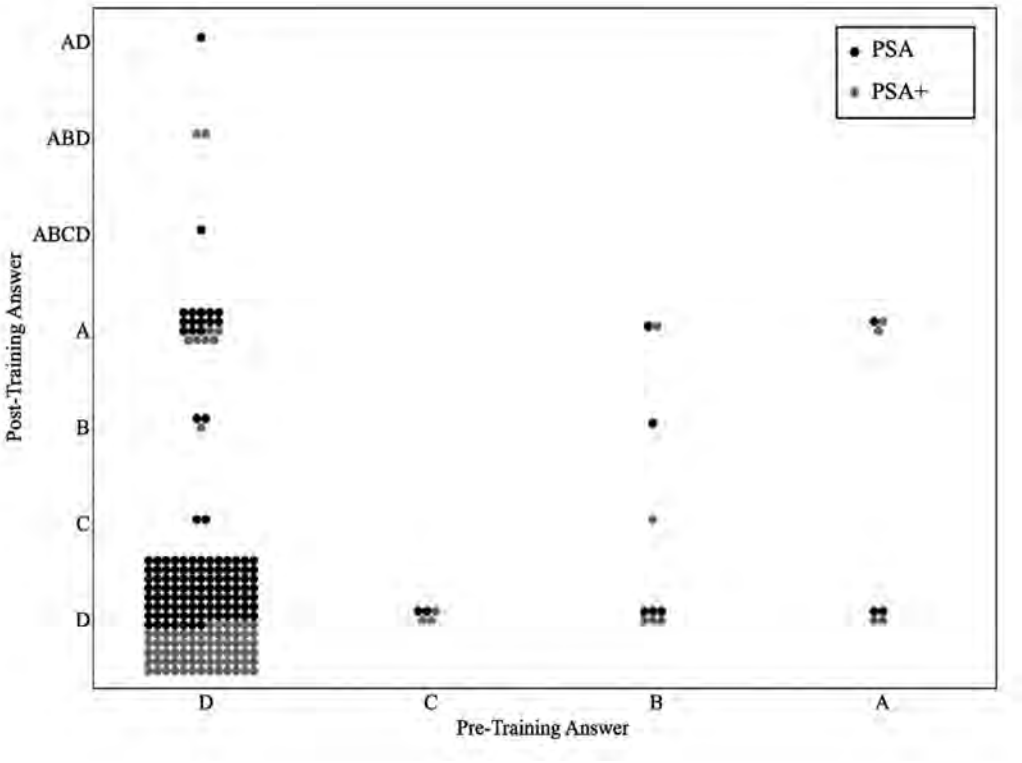

Figure 5. Pretraining and posttraining test answers to Question 12: Which of the following should guide risk management actions? Possible answer choices were (A) personal expertise, (B) recommendations of seasoned producers, (C) suggestions from consumers, and (D) scientific evidence (correct). Bottom row indicates all participants that answered "correctly" after completion of a produce safety training (PSA represented by black circles or PSA+ represented by grey circles). Left column indicates participants that answered "correctly" or as intended in the training on the pretraining test but changed their answer to unintended answers ("incorrect") after completion of a produce safety training.

of posttest scores revealed that there were participants with perfect posttest scores (25 of 25 correct answers) in all of the PSA+ trainings compared to only half of the PSA trainings *(Fig. 3)*.

Posttest participant knowledge assessment using individual questions

For 24 of 25 test questions, the percentage of participants answering individual questions correctly increased or remained constant on completion of both the PSA and PSA+ trainings. The percentage of participants correctly answering questions 11 ($t = -2.255$, $P < 0.05$), 21 ($t = -2.855$, $P < 0.05$), and 25 ($t = -3.533$, $P < 0.05$) in the posttests was significantly higher for PSA+ than PSA trainings *(Fig. 4)*. Notably, the training content related to these questions was identical between the PSA and PSA+ trainings. Each of these questions relates to very minor components of the PSA Grower Training curriculum, with each question topic being covered in only one or two slides within the entire PSA curriculum (question 11: module 4, slide 8; question 21: module 6, slide 42; and question 25: module 7, slides 11 and 12). The increase in correct answers cannot be directly attributed to the delivery of the curriculum. However, it is possible that the format of the PSA+, with shorter daily training durations and lectures interrupted with activities and discussions, helped to improve participant focus and retention during trainings.

The aforementioned five questions that had <50% of participants answering correctly on the pretest all had significant increases in the percentage of participants answering correctly after training, regardless of training type *(Fig. 2)*. However, the percentage of participants answering these questions correctly remained below 80% for three of the five questions (e.g., reducing wildlife on property, farm food safety plans, and required records). Perry et al. *(7)* reported that participants completing PSA courses in the North Central Region also struggled to answer these same questions correctly (<60% of participants answered correctly). Future trainings may need to better emphasize sections of the curriculum related to wildlife intrusion management, required records, and the lack of strict requirement for a farm food safety plan.

Notably, the percentage of participants correctly answering question 12, focused on the activities that guide risk management action, decreased between the pre- and posttests, suggesting that knowledge decreased as a function of the training *(Fig. 5)*. The majority of participants (169 of 219, 77%) answered correctly, selecting "D: scientific evidence" on both tests. However, 28 participants changed their pretest "correct" answer on this question to another answer or combination of answers during the posttest. Most often (19 of 28, 68%), these participants selected "A: personal expertise" as their answer on the posttest. It should be noted that during all trainings, instructors emphasized that the participants "know their farms best" and should feel confident taking the information learned from the training and apply it to their unique operation. The use of this statement may have influenced these results and could

TABLE S2. Selected open-ended participant feedback from PSA and PSA + courses

Participant feedback – overall comments

PSA	*PSA +*
An immense amount of resources. Good job training is very long. It would probably be better over two days. This is mindbogglingly boring and a waste of my time. No disrespect to the presenters who did a fine job.	It lacked a compelling intro to create buy-in general info about common foodborne illness would help.

Module 1		**Module 4**	
PSA	*PSA +*	*PSA*	*PSA +*
Unknown answer to question not previously considered were investigated and an answer was provided immediately – right during the training – well done. It was really hard to stay awake during the training. You guys need to make it more interactive and not just read the slides and what we have in the binder.	Not having all the slides was confusing and distracting. Better to have all or none. Exercise was informative. I would have more of the exercises with audience participation as you did with photos and water sample analysis. Good exercise for evaluation of farms and what category they fall under.	Reminding farmers to make decisions about protocol rather than making the solutions feel unattainable. E.g., dogs on site: your farm can have dogs on site. It up to each farm to make a policy based on GAP and FSMA regs Very informative I will actually be utilizing a pre-harvest assessment in my gleaning practices. Thank you.	Birds don't follow the rules. Photographs were useful for more discussion at tables. Pictures came entirely without labels. One picture looked like lettuce but turned out to be seed (not food!). Could not define quarantine areas nor guidelines for establishing them. Good exercise with pictures and talking through examples. Liked the photos.

Module 5.1

PSA	*PSA +*
Good info but the math portion was hard to follow. This was a very dense module and happened late in the day – started to feel information overload. A lot of testing with water that I need more familiarization with. My attention is spotty not the fault of the presenter. Good thing I have workbook. Can this be interactive at all and more adult learning? Hands on with water – for an example?	The handouts are an invaluable component of this training. I can review them to refresh my memory in the future and further explain the process; Well prepared. I appreciated the material outside the scope of the binder. I love her lectures. I've been to her trainings before and they're so practical, specific, and relevant. She includes a ton of examples and conversations to get people thinking about how it could affect them and how they can problem solve. Good background in water; Interactive; Very helpful. Very interesting and kept my attention. I understood this part of the seminar very well. I found this module the most useful in classifying water sources and requirements. I liked the handouts and exercises with the audience. I liked the class participation with the water sample analysis. Definitely one of the most helpful modules for me personally. Not sure on the math calculations yet.

Continued on next page.

TABLE S2. Selected open-ended participant feedback from PSA and PSA + courses (cont.)

Participant feedback – overall comments

Module 5.2		Module 6	
PSA	*PSA +*	*PSA*	*PSA +*
Not relevant to operation. A lot of testing with water that I need more familiarization with – need hands on. Melon infiltration photo was very effective. Gave helpful links to get more information. My issue was understanding sanitation from the standpoint of gleaning. It was less the content and more my own appreciation – and how tired I am.	Great resources and perspective – loved the handouts. Very helpful module.	Very helpful – great at answering additional questions. This part was great – clear and comprehensive. Went through this module too quickly.	Appreciated emphasis on risk reduction vs. risk elimination. Great discussion through picture scenario exercises. I like audience participation.

explain why the participants felt that "personal experience" would be important in guiding risk management actions. These findings suggest that these individuals felt more knowledgeable about food safety practices on their farms. It would be of interest to investigate whether responses to question 12 are similar in other regions to determine whether participant answers are unique to Oregon growers, Oregon trainers, or both.

General participant feedback

Trainers observed both modes of training and found that the PSA+ format resulted in higher levels of engagement among the participants and with the instructors. In the PSA+, trainers observed participants exchanging contact information and discussing their farming practices during breaks and within the context of group activities. The PSA evaluation form provided a more formal mechanism for gathering participant feedback.

The most common comments on the evaluation forms were related to participant comfort and convenience including issues with seating, temperature of the rooms, lack of snacks and allergen-free foods, location issues, and lack of parking. These comments demonstrate the importance of supporting the comfort and welcoming of participants to the training success and overall satisfaction of workshop participants. In addition, both positive and negative feedback directed at presenters was given, ranging from "stop reading the slides" to "instructor was very knowledgeable." *Supplemental Table S2* identifies select participant feedback from the PSA and PSA+ evaluations. The positive comments on both the PSA and PSA+ show that the material itself is effective at communicating the desired materials; however, specific comments about the exercises from the PSA+ trainings show that these add-on materials and activities help reinforce concepts and increase participant engagement.

Participant feedback related to diversity and inclusion

For one of the standard PSA trainings (Beaverton), participants commented on racial, cultural, and classist biases in the PSA curriculum (slides) and verbal presentation of materials. Specific participant comments included the following: "These slides are racist. All workers are brown. Anyone on a tractor or representing supervisors are white"; "Making the statements about worker deficits are extremely offensive and harmful"; "Albeit language – don't call things 'crazy' – you wouldn't say 'retarded' would you?"; "Toilet paper disposal in a toilet is not a cultural practice, it's an infrastructure practice – saying so is racist. Plenty of American folk who use septic systems use toilet paper buckets"; and "Some of the content is only directed to white farmers. You need people of color teaching that can relate to some of us. Some of your content is culturally insensitive." The comments show room for increased sensitivity and inclusion among the images used to depict

TABLE 4. Participant ideas for support and resources to help with understanding or implementation of the PSR requirements

Content type	Resource suggested
Training materials [Videos/fact sheets]	Online short videos on selected topics (i.e., taking water samples from groundwater and surface water sources)
	Bacteria, parasite, virus fact sheet
	Examples of a "safe practice harvest" of particular products
	Practical experience: mock inspections
	Reference to real world products to use for water sanitization
Summary documents	Summary of documentation requirements
	Printed version of the rarely consumed raw produce list
Checklists, templates	Checklist developed for each type of farming
	Detailed generic safe operating practices for all written policies (or a fictitious company written policy)
	More flow charts
	Recordkeeping templates
Information, trainings on specific commodities, business types	Specific group training: small urban farms, gleaners, outdoor organic, hydroponic, aquaponic
	Value-added products and income calculations
	Resources for specific commodities: medicinal herbs, mushrooms, diversified vegetables
Harmonization resources	An overview of Harmonized Good Agricultural Practices (HGAP) audit
	Good Agricultural Practices (GAP) training materials
	An overlap with third party certifications, such as GAP, GAP global GAP
Electronic resources	Digital database or an app on the Code of Federal Regulations
	Links by email – food safety plan example
	Electronic versions of all handouts
	List of web-based resources that may be helpful
Training materials in other languages	Spanish video for worker training
	Materials in Russian
Expanded topics	Cleaning and approved sanitizing cleaners
	Science of foodborne illnesses
	Information on how and where to get information if any of the rules or laws change in the future
	Environmental monitoring, risk assessment exercise
	OR-OSHA field sanitation, testing for [pesticide] residue or proximity drift
	Worker Protection Standard requirements
	Housing regulations and labor housing
	Testing of ground water chemical hazards

growing operations and the language used when discussing workers. These changes are important for creating a safe and comfortable learning environment for all participants. A thorough review and discussion of this feedback is helpful to any instructional team delivering PSA training to continue to improve their approach to make these trainings more welcoming and inclusive to all participants.

Requested resources for future trainings

In the course evaluations, participants also were prompted to provide ideas for support materials that would assist in understanding or implementing the requirements of the PSR. Through this mechanism, 43 participants across both training types suggested resources, indicating that participants felt that trainers would consider their feedback. Notable suggestions included a "digital database or an app on the Code of Federal Regulations," Web-based or digital resources, indicating that participants desire searchable mechanisms for regulations and associated supporting documents. Participant suggestions for additional resources are summarized in *Table 4*, including additional or targeted training opportunities, checklists and templates, translation into other languages, and resources to support harmonization with Good Agricultural Practices (GAP) programs. These suggestions will be used by the Oregon Farm Food Safety Team to prioritize and guide the development of new produce safety resources to help farms with PSR compliance.

CONCLUSIONS

Overall, significant mean differences occurred between the pre- and posttests of PSA grower trainings. Although the knowledge gain between the PSA+ and PSA courses was comparable, the observational testimony and comments left after each module in the evaluations elucidate the positive impact of the activities and modifications included in the extended trainings (PSA+). Importantly, the findings of this comparative analysis suggest that the inclusion of supplemental activities did not detract from the mandated curriculum. Hands-on activities, breakout group discussions, and scenarios that allow for the participants to apply what they have learned in the lectures were shown to be engaging and promote discussion. However, the challenge with these supplemental activities is that they require extra time to conduct. While not within the scope of this study, determining the effects of the integrated activities on behavioral changes after these trainings and long-term retention is necessary for future delivery considerations of the PSA+ material.

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SUPPLEMENTAL MATERIAL

Supplemental material associated with this article can be found online at: https://www.editorialmanager.com/fpt/download.aspx?id=4258&guid=a1a6071e-6c15-4839-a669-918511410f84&scheme=1.

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In Memory

Douglas L. Archer

We extend our deepest sympathy to the family of Douglas Archer who recently passed away. Dr. Archer joined the Association in 2000. IAFP will always have sincere gratitude for his contribution to the Association and the profession.

In Memory

Martin W. Mitchell

We extend our deepest sympathy to the family of Martin Mitchell who recently passed away. Mr. Mitchell joined the Association in 1977. IAFP will always have sincere gratitude for his contribution to the Association and the profession.