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Using a Training Video to Improve Agricultural Workers' Knowledge of On-Farm Food Safety

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Abstract: A training video was produced and evaluated to assess its impact on the food safety knowledge of agricultural workers. Increasing food safety knowledge on the farm may help to improve the safety of fresh produce. Surveys were used to measure workers' food safety knowledge before and after viewing the video. Focus groups were used to determine workers' views of the video and identify areas that could be improved. Results indicated a high level of food safety knowledge, but some significant improvements were observed. The project provides a framework for assessing videos as training tools and suggestions for further research.

Introduction

Fresh fruits and vegetables are generally perceived as safe to eat by many North Americans (Sagoo, Little, & Mitchell, 2003). However, examples of foodborne outbreaks traced to fresh fruits and vegetables can be found worldwide (Sewell & Farber, 2001). As consumers' health consciousness increases, so does the quantity of fresh produce consumed, thus increasing the related risk of foodborne illness (Lin et al., 2003; Sagoo et al. 2003; Sewell & Farber, 2001). Although produce can be contaminated at any point along the food chain from farm to fork, there are often few opportunities to introduce interventions to combat contamination risk. Preventing contamination on the farm and during packing or processing could reduce the potential for produce-related outbreaks (Lynch, Tauxe, & Hedberg, 2009). Hygiene and food handling practices by farm workers have been suggested as possible sources of produce contamination (Brackett, 1999). Increasing food safety knowledge on the farm may be an essential step in improving produce safety.

The objective of the research project reported here was to evaluate the effectiveness of an agricultural training video by determining the food safety knowledge acquired by participants as a result of viewing the training video. Published research has demonstrated that instructional videos are useful educational resources (Martin, Knabel, & Mendenhall, 1999). Videos can address issues related to literacy, language, and equipment (Martin et al., 1999), potentially making them valuable tools for on-farm training.

Materials and Methods

Video Development

In 2003, we developed a 12-minute training video, produced in English and Spanish, to provide information on good agricultural practices and safe food handling in the context of greenhouse vegetable production (archived at <http://www.foodsafety.ksu.edu/en/article-details.php?a=3&c=15&sc=128&id=701>). The goal was to promote awareness and improve knowledge amongst agricultural workers.

Survey Instrument

A survey was developed to determine agricultural workers' knowledge of food safety practices. It consisted of 13 statements related to the food safety information provided in the video. Participants responded according to a 5-point Likert scale, with anchors of 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree. The scale was reversed for statement six. The survey was pilot-tested to safeguard against question ambiguity and to ensure content validity. Identical surveys were used before and after workers viewed the video.

Fifty agricultural workers were recruited from greenhouses in area around Leamington, Ontario, Canada. Participants were given a brief explanation of the project prior to completing the initial survey. Surveys were available in English and Spanish. If literacy was a problem, statements were read to the participant, and their responses were recorded. The video was then shown to participants, and they completed the survey a second time.

To minimize bias, one researcher (Mathiasen) administered all surveys to participants before (pre) and after (post) they viewed the video. Retesting participants immediately after the video prevented influence from other sources of food safety information such as news media or additional training programs. Responses were analyzed using the Statistical Package for the Social Sciences (SPSS 11.5 for Windows). The total

knowledge score for each participant was calculated by summing the responses to the 13 statements, creating a possible range of 13-65. The frequency of each response was determined for each of the 13 statements. A Wilcoxon-signed rank test was used to determine significant differences between pre- and post-video responses.

Focus Groups

The training video was also evaluated using focus groups. Focus groups allow participants to react to and discuss material, providing insights that may not be obtained through other evaluation methods (Nordstrom, Wilson, Kelsey, Maretzki, & Pitts, 2000; Sevier, 1989). In the research, the purpose of the focus groups was to determine how the video was received by workers and what improvements should be made. Greenhouse workers who were aware of the project were invited to participate in the focus groups. Participants were randomly chosen from those who responded to the invitation. Each focus group was comprised of seven to 10 individuals, including a mix of males and females of various ages and race. Each discussion focused on eight topics related to the video: content, length, instructional clarity, language level, relevancy, likes, dislikes, and recommended changes. A moderator and an assistant moderator facilitated the focus groups. Calder (1977) recommended that focus groups should continue until the moderator can anticipate what is going to be said in the groups and that this typically happens by the third or fourth group. Four focus group discussions of approximately 40 minutes in length were conducted in the current study.

The focus group discussions were audio-recorded to facilitate data analysis. Audiotapes were transcribed and reviewed to identify similar topics. Morgan (1997) suggested that three factors influence how much emphasis a topic receives: how many people within a group mention the topic, how many groups mention it, and how much enthusiasm it generated among the participants. Using these factors and a deductive approach to content analysis, topics from the reviewed transcripts were categorized into themes and a summary report was compiled.

Results

Survey Results

Food safety knowledge of the agricultural workers measured pre- and post-video viewing is summarized in Figure 1. Post-video scores suggested the training video only improved overall worker knowledge by 2%. However, food safety knowledge scores proved to be high before the video was viewed, leaving little room for improvement. The average pre-video score was 59.3 out of 65, and the average post-video score was 60.7 out of 65. Despite no significant change in total knowledge score, a significant increase in knowledge of specific topics covered within the video was observed.

Figure 1.
Comparison of Survey Responses, Pre- and Post-Video

Statements	Frequencies of Responses^a, as Percentages (n=50)	Wilcoxon-signed Rank Test (p=0.05)	Significant
1. Germs live in our clothes, on		1.964 b (p=0.05)	Yes

<p>our hair and inside our bodies</p>			
<p>2. It is important to wash hands before beginning work</p>		<p>1.606 (p=0.11)</p>	<p>No</p>
<p>3. It is important to wash hands after using the washroom</p>		<p>1.897 (p=0.06)</p>	<p>No</p>
<p>4. Washing hands with soap and water helps remove bacteria</p>		<p>1.877 (p=0.06)</p>	<p>No</p>
<p>5. Hand washing is the most important part of food handler hygiene</p>		<p>0.626 (p=0.53)</p>	<p>No</p>
<p>6. It is okay to dry hands on clothes</p>		<p>2.341 (p=0.02)</p>	<p>Yes</p>
<p>7. Hand sanitizers do not replace hand washing</p>		<p>2.209 (p=0.03)</p>	<p>Yes</p>
<p>8. Hand sanitizers are a good alternative when water is not available</p>		<p>2.800 (p=0.01)</p>	<p>Yes</p>
<p>9. Gloves are worn to protect product from</p>		<p>0.209 (p=0.84)</p>	<p>No</p>

<p>hands</p> <p>10. Gloves can become contaminated</p>		<p>1.175 (p=0.24)</p>	<p>No</p>
<p>11. It is important to remove gloves before leaving your work station</p>		<p>1.633 (p=0.10)</p>	<p>No</p>
<p>12. When handling produce, sick workers can pass illness on to the product</p>		<p>1.275 (p=0.20)</p>	<p>No</p>
<p>13. It is unsafe to use product that has fallen on the ground</p>		<p>2.045 (p=0.04)</p>	<p>Yes</p>
<p>Total Change of Knowledge</p>		<p>1.889 (p=0.06)</p>	<p>No</p>
<p>^a Legend: Strongly agree ■; Agree ■; Neither agree nor disagree ■; Disagree ■; Strongly disagree ■</p> <p>^b Z-distributions as determined by the Wilcoxon-signed rank test</p>			

Focus Group Results

Summaries of key reactions and opinions by focus group participants are provided in Table 1. Overall, focus groups indicated that the video was enjoyable and of an appropriate length. They found it was a good reminder of proper practices. Most focus group participants could easily understand the words used in the video, even if they spoke neither English nor Spanish as their native language. Key messages (e.g., wash hands often) reportedly remained strong visually.

Table 1.
Summary of Focus Group Discussions

Theme	Question	Responses/ Evaluation	Example
Content	What did you learn from the video?	Hand Sanitizer Application	"I didn't really know how to use it and now I do."
		Hand Washing	"I didn't know you had to wash your hands so many times/ for that long."
		Skills Reminder	"It showed me that I am doing things right."
Length	Did you think the video was too long? Too short?	Good Length	"It was an okay length."
Instructions	Were the instructions easy to understand?	Clear Instructions	"I understood everything."
Language level	Were the words easy to understand?	Some Difficulty with Language	"I could pretty much understand, but not everything. Some of the words were pretty big and I have never heard them before."
Relevancy	Did the video apply to your work?	Applicable to Greenhouse Industry	"Yes it is the same thing that we do all of the time."
Likes	What did you like about it?	Simple Instructions	"It was pretty basic stuff but that is good sometimes. It makes it less confusing."
Dislikes	What didn't you like about it?	Boring	"A bit repetitive, a little boring."
Recommended Changes	What would you change about the video?	Few Changes Suggested	"Not much, this is for us and I think it was good."

Discussion

Survey responses indicated that, after viewing the video, workers significantly improved understanding of germs and where they come from, hand sanitizer use, and unsafe food handling practices, such as using food that has fallen on the ground. However, the total knowledge scores in pre- and post-video surveys and comments made during focus groups, reflected a high level of awareness of good food practices

among the participants. This may suggest a strong volunteer effect, as was observed in a similar study by Soon and Baines (2011) wherein farm managers took advantage of the training to maintain or refresh staff training.

Language issues were a concern in the study. Although the majority of participants indicated having no difficulty with the words used in the video, a distinct group emerged that struggled with food safety jargon such as bacteria, contamination, and hygiene. This problem may have been exaggerated for workers who spoke neither English nor Spanish as a native language.

Discussions within focus groups suggested that visual images provided by the video were sufficient to overcome most language barriers. Past research agrees that illustrative tools such as videos can convey meaning, not only by a clear level of language but also by using visual images (Lundgren, 1994).

Conclusions and Recommendations

The project reported here demonstrated that video can be a useful tool in raising awareness of and reinforcing good practices with agricultural workers. Training videos should be developed to reflect the reality of the target audience's workplace situation. The use of food safety jargon should be limited in favor of terms familiar to most workers, and language issues should be addressed. The visual aspects of video appeared to help mitigate difficulties in message comprehension due to language barriers or unfamiliar terminology.

A limitation of the study was that the evaluation relied on self-reported improvements in knowledge. While important, evaluations that incorporate measurements of behavior change and the barriers to implementation of prescribed practices would make the assessment more robust. It would also be beneficial to repeat the study in a variety of agricultural premises. Past research has demonstrated that the transfer of knowledge to everyday practice is not predictable and often does not occur (Howes, McEwen, Griffiths, & Harris, 1996; Medeiros, Hillers, Kendall, & Mason, 2001). This point was in fact discussed by one focus group participant who said, "I agree with all of it [information from the video] but not even half of what you guys show us will be followed because of carelessness." Therefore, it is recommended that future training video evaluations be designed to assess a change in both knowledge and behaviors.

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References

- Brackett, R. E. (1999). Incidence, contributing factors, and control of bacterial pathogens in produce. *Postharvest Biology and Technology*, 15, 305-311. doi:10.1016/S0925-5214(98)00096-9
- Calder, B. J. (1977). Focus groups and the nature of qualitative research. *Journal of Marketing Research*, 14, 353-364. doi:10.2307/3150774
- Howes, M., McEwen, S., Griffiths, M., & Harris, L. (1996). Food handler certification by home study: Measuring changes in knowledge and behavior. *Dairy, Food and Environmental Sanitation*, 16, 737-744.
- Lin, C. M., Wu, F-M., Kim, H-K., Doyle, M. P., Michaels, B. S., & Williams, L. K. (2003). A comparison of hand washing techniques to remove *Escherichia coli* and caliciviruses under natural or

artificial fingernails. *Journal of Food Protection*, 66, 2296-2301.

Lundgren, R. (1994). *Risk Communication: A handbook for communication environmental safety and health risks* (pp. 109-132). Columbus, OH: Battelle Press.

Lynch, M. F., Tauxe, R. V., & Hedberg, C. W. (2009). The growing burden of foodborne outbreaks due to contaminated fresh produce: Risk and opportunities. *Epidemiology and Infection*, 137, 307-315. doi:10.1017/S0950268808001969

Martin, K. E., Knabel, S., & Mendenhall, V. (1999). A model train-the-trainer program for HACCP based food safety training in the retail/food service industry: An evaluation. *Journal of Extension* [On-line], 37(3) Article 3FEA1. Available at: <http://www.joe.org/joe/1999june/a1.php>

Medeiros, L., Hillers, V., Kendall, P., & Mason, A. (2001). Evaluation of food safety education for consumers. *Journal of Nutrition Education and Behavior*, 33, S27-S34.

Morgan, D. (1997). *Focus group as qualitative research* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Nordstrom, P. A., Wilson, L. L., Kelsey, T. W., Maretzki, A. N., & Pitts, C. W. (2000). The use of focus group interviews to evaluate agriculture education materials for students, teachers, and consumers. *Journal of Extension* [On-line], 38(5) Article 5RIB2. Available at: <http://www.joe.org/joe/2000october/rb2.php>

Sevier, R. (1989). Conducting focus group research. *The Journal of College Admissions*, 122, 4-9.

Sagoo, S. K., Little, C. L., & Mitchell, R. T. (2003). Microbiological quality of open ready to eat salad vegetables: Effectiveness of food hygiene training of management. *Journal of Food Protection*, 65, 1581-1586.

Sewell, A. M. & Farber, J.M. (2001). Foodborne outbreaks in Canada linked to produce. *Journal of Food Protection*, 64, 1863-1877.

Soon, J. M., & Baines, R. N. (2011). Farm food safety and diseases risk assessments: Case studies from the horticultural and salmonid farms. *Journal of Risk Research*. Advance online publication. doi:10.1080/13669877.2011.634518

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