

## Using Role-Play to Enhance Foodborne Illness Crisis Management Capacity in the Produce Industry

### Abstract

Foodborne illness outbreaks have measurable public health effects and often lead to negative produce industry impacts. Reducing loss following a crisis event requires a management plan, although many fresh produce industry members don't have one. Evidence-based workshops using a role-play simulated outbreak were delivered to impact crisis management preparation. A self-reported pre-assessment demonstrated that 21% of participants had a crisis management plan in place prior to attendance, with 79% who employed GAPs. Following the role-play scenario, there was a significant increase in participants' perception of the likelihood of microbial contamination with their product and an increase in crisis planning activities.

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## Introduction

Foodborne disease causes an estimated 48 million illnesses and 3,000 deaths annually (Scallan, 2011), with U.S. economic costs estimated at \$152 billion to \$1.4 trillion annually (Roberts, 2007; Sharff, 2010). An increasing number of these illnesses are associated with fresh fruits and vegetables. An analysis of outbreaks from 1990-2003 found that 12% of outbreaks and 20% of outbreak-related illnesses were associated with produce (Klein & Smith DeWaal, 2008; Lynch, 2009). Once a product is implicated in an outbreak, the entire industry is affected, although the contaminated product may have come from one grower in a different locale. For example, in 2008 tomato growers, wholesalers, and retailers in Florida lost an estimated \$250 million in sales after

investigation of a possible *Salmonella* Saint Paul outbreak linked their product to a national health advisory (Alonso-Zaldivar, 2008). Consumer confidence around the safety of tomato products eroded, calling in to question food safety practices on the farm and throughout the supply chain. Other producers were also affected by this health advisory and found themselves answering questions about growing conditions, the safety of inputs (including water), and the handling and distribution of products.

It is incumbent on an agriculture operation to minimize risks when it comes to fresh produce safety. A 2008 Deloitte survey of 1,100 consumers demonstrated an increase in concern about the food they eat. Seventy-six per cent of consumers surveyed were more concerned than they were 5 years ago about the food they eat (Deloitte Development LLC, 2008). An *E. coli* O157:H7 outbreak linked to fresh spinach in 2006 (CDC, 2006) created an environment where it is not enough to proactively try to prevent foodborne illness outbreaks. Commodity groups and producers are now even more concerned about managing the fallout after an incident of foodborne illness. They are aware that industries strong in crisis management that includes information sharing, monitoring, and reactive crisis communication skills, can drastically reduce the impact of harmful media reports if an outbreak arises (Jacob, Lok, Morley, & Powell, 2011). Being prepared to speak openly about risk reduction strategies and demonstrating risk management practices can help with negative public perception (Hrudey, 1997, El-Begearmi, 1993).

It is difficult to put the methods of preparedness into action, although the potential impacts of not being prepared could be catastrophic to individuals and ultimately can have industry-wide effects. Aside from minimizing risks through good agricultural practices (GAPs), producers need to be prepared to answer difficult questions, take opportunities to educate consumers on industry standards, and have a recovery plan mapped out should a crisis occur. Even when producers are not implicated, they can be affected economically (Western Farm Press, 2011) by the loss of an entire market due to the outbreak. In the long term, a company's reputation can be negatively affected if outbreak mitigation goals and strategies are not employed.

A 2010-2011 survey of North Carolina producers employing risk reduction practices showed 79% followed good agricultural practices and 21% had a crisis plan in place (data not shown). Only three of the four commodity groups (N=20) in North Carolina surveyed possessed a crisis plan template for their members.

## Materials and Methods

### Theoretical Approach

Rather than a traditional, lecture-based adult education Extension activity, the project reported here was based on a participatory role-play framework where participants were asked to assume different roles within the produce industry as an outbreak unfolded. Tabletop and simulation exercises have been used successfully to prepare and evaluate the disaster management capacity of public health officials in the event of a pandemic (Steward & Wan, 2007). A tabletop exercise consists of a gathering of participants who are presented with a narrative by facilitators and attempt to emulate thoughts, decisions, and actions that would be taken in response to the hypothetical facts faced in

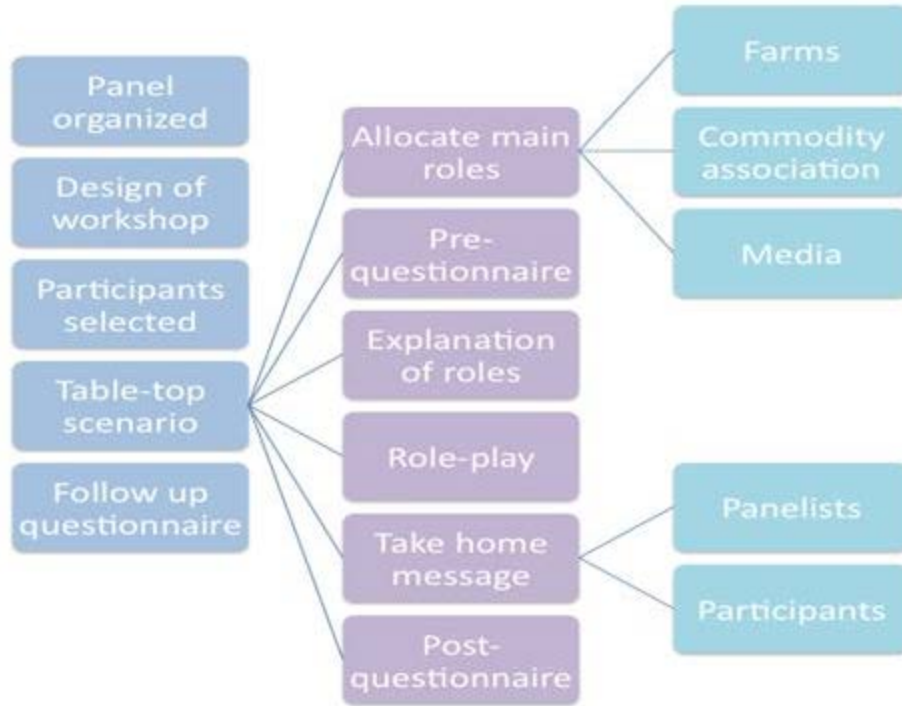
the narrative (Steward & Wan, 2007). These types of exercises utilize role-play, which promotes active learning, which is superior to passive learning (Bell, 2001; Van Ments, 1999). Role-play has been defined as "an experiential learning technique with learners acting out roles in case scenarios to provide targeted practice and feedback to train skills" (Kiger, 2004).

Using role-play in education improves the realism of the training situation and enables students to deal with difficult issues without consequences (Van Ments, 1999). Students develop skills, increase knowledge and form attitudes as a result of using role-play as a teaching method (Bell, 2001). Students recall more information from role-play sessions than from passive lectures (De Neve & Heppener, 1997). Medical students participating in role-plays reported the experience was valuable for learning and police agencies have also reported that role-play is a valuable tool for training, especially in tense situations such as negotiations (Nestel & Tierney, 2007; Nikendei et al., 2005; Sharp, 2000; Vechhi, Van Hasselt, & Romano, 2005).

## Design of Role-play

Using role-play, food safety experts guide students through a unique outbreak scenario, resulting in an emotional engagement with the material and deeper understanding of the need for crisis preparedness. The learning objectives for the simulation included developing crisis management skills that are needed to remain viable, instilling greater preparedness in participants on how to handle a foodborne illness outbreak, and increasing comprehension of what happens during an outbreak, leading to greater coordination and an overall higher level of knowledge around food safety risks. The 2.5-hour tabletop exercise on crisis management was designed as a role-play based on a real-life outbreak investigation, public discussion, and market response situations.

**Figure 1.**  
Outline of Project



## The Outbreak Simulation Panel

The role-play was led by a panel including food safety experts, horticulturists, Extension agents, local government regulators, and a Farm Bureau representative. The panel had a wide range of expertise in all the areas that may be encountered when dealing with a produce-related outbreak.

## Participants

This study was conducted with produce farmers in North Carolina from Fall 2009 through Spring 2011. The project team, all members of the North Carolina Fresh Produce Safety Task Force, received requests from commodity groups, associations and growers for assistance assessing outbreak crisis management skills and helping them prepare in the case of a foodborne illness outbreak. The tabletop simulation was scheduled to coincide with an association's or group's annual meeting and was specific to their commodity (Kline, Kneen, Barrett, Kleinschmidt, & Doohan, 2012). The participating organizations and locations of meetings are listed in Table 1.

**Table 1.**  
Participating Organizations and Locations of Meetings

Organization	Location
Southeast Strawberry Expo	Durham, NC
Blackberry Growers	Kannapolis, NC
NC SweetPotato Commission	Wilson, NC
NC Tomato Growers	Mills River, NC

Southeast Vegetable & Fruit Expo	Myrtle Beach, SC
United States SweetPotato Council Convention	Orange Beach, AL

## The Role-Play

Each simulation consisted of an outbreak related to the group participating (e.g., a strawberry-linked outbreak was used for strawberry producers). Roles were allocated at random by a member of the panel as participants entered the workshop location. Each table represented a main role to be played during the simulation, such as a farm, the commodity association, or the media. Secondary roles were incorporated with a large group (>100 participants), such as wholesalers, distributors, grocers, restaurants, and assisted living communities.

In the pre-simulation questionnaire, participants were asked about whether they had food safety plans on their farm and to rate their crisis preparation and importance of crisis preparation. The role-play began with an introduction and description of each role and included time for participants to become acquainted with their role. During this time, participants worked through a group handout with a diagram of their supply chain and made decisions about the role food safety plays in their organization/company.

The role-play consisted of two timelines: one tracking the investigation by public health authorities as shown in Table 2 and one tracking the traditional and social media response to the outbreak as shown in Table 3. With the use of two PowerPoint presentations, both timelines (outbreak investigation and media) were presented simultaneously during the simulation. During the simulation, participants acted out their role by attempting to manage their responses to the information as it appears on the slides. Panelists probed groups that were not actively discussing the situation to maintain involvement in the simulation.

**Table 2.**  
Outline of Outbreak Investigation

Objectives	Descriptions
Press Releases	<ul style="list-style-type: none"> <li>Information from local health departments</li> </ul>
Damage Control	<ul style="list-style-type: none"> <li>Increase in traffic on farm</li> <li>Increase discussion of consumers</li> <li>Find other outlets for product</li> <li>Increase in local demand (Farmers' Market)</li> <li>Non-implicated farms – what is your message</li> </ul>

Industry investigations	<ul style="list-style-type: none"> <li>• Looking for the source</li> <li>• Discuss your distribution chain</li> <li>• Exclude your farm with documentation</li> <li>• Traceability</li> </ul>
Recalls	<ul style="list-style-type: none"> <li>• Categories of recalls</li> <li>• How do you get the product back?</li> <li>• Where did it go?</li> <li>• What documentation do you need?</li> </ul>
On-farm investigations	<ul style="list-style-type: none"> <li>• NCDA and FDA</li> <li>• Production and distribution records</li> <li>• Where they might start looking?</li> <li>• Water, hygiene, animals</li> </ul>
Recovery	<ul style="list-style-type: none"> <li>• Starts immediately</li> <li>• Market-wise</li> <li>• Reach out to media about what you have changed</li> <li>• What's next?</li> <li>• Who is affected?</li> <li>• What needs to be done to get things back on track?</li> </ul>

**Table 3.**  
Outline of Media Coverage

<b>Objectives</b>	<b>Descriptions</b>
Dealing with media	<ul style="list-style-type: none"> <li>• Respect deadlines and find out about the story</li> </ul>

<p>representatives</p>	<ul style="list-style-type: none"> <li>• As safe as possible</li> <li>• Never say no comment</li> <li>• Don't over-promise</li> <li>• Speak plainly</li> <li>• Credibility</li> <li>• Show compassion and express concern</li> <li>• Lessons learned</li> </ul>
<p>Local and national news outlets</p>	<ul style="list-style-type: none"> <li>• Findings</li> <li>• Onsite interviews with producers, comparisons to previous outbreaks</li> <li>• Human interest stories</li> <li>• Mothers shopping at grocery store, children sick in hospital</li> <li>• One year anniversary</li> </ul>
<p>Social media</p>	<ul style="list-style-type: none"> <li>• Search engine news (Yahoo, Google)</li> <li>• Wikipedia</li> <li>• YouTube</li> <li>• Twitter</li> <li>• Blogs</li> </ul>
<p>Comedians and celebrities</p>	<ul style="list-style-type: none"> <li>• Late night television show commentary</li> <li>• Celebrities with illness</li> </ul>

During this time participants asked panelists questions related to the outbreak scenario and

discussed strategies to deal with the crisis. Some of the topics discussed are listed in Table 4. The outbreak investigation timeline included press releases with dates, damage control, industry investigations, recalls, on-farm investigations, and recovery. The media timeline included traditional news (findings, human interest stories, 1-year anniversary), social media networks (Wikipedia, YouTube, Twitter), and key points when dealing with media representatives, comedians, and celebrities. When dealing with the media, participants were reminded to avoid saying "no comment," to develop key messages, and to use the wording "as safe as possible." After the company associated with the outbreak was implicated, the media reacted with constant coverage, and all producers saw a reduction in sales and had to find alternate outlets their product.

**Table 4.**  
Outline of Discussion Topics

<b>Objectives</b>	<b>Descriptions</b>
Handouts	<ul style="list-style-type: none"> <li>• Individual group sheets</li> <li>• Hot topic</li> <li>• Pathogen information</li> </ul>
Know who to call for help	<ul style="list-style-type: none"> <li>• Commodity associations</li> <li>• Extension agents</li> <li>• University representatives</li> </ul>
Outlets for product	<ul style="list-style-type: none"> <li>• Secondary markets</li> <li>• Farmers' markets</li> <li>• Processors</li> </ul>
Dealing with media	<ul style="list-style-type: none"> <li>• Be proactive</li> <li>• How much information to divulge</li> <li>• As safe as possible</li> <li>• Key talking points</li> <li>• Spokesperson</li> </ul>



Dealing with regulators	<ul style="list-style-type: none"> <li>• Timeframe to produce documents</li> <li>• Investigation</li> <li>• They want to help</li> </ul>
Proactively marketing food safety	<ul style="list-style-type: none"> <li>• Connections with media before outbreak</li> <li>• Talk about food safety practices not only during crisis</li> </ul>

After completion of the slides, participants and panelists discussed the take-home messages. The participants were asked to report on their group's plan for recovery and each individual discussed what they learned. Each panelist covered key points that were instrumental in the management a crisis situations. In the post-simulation questionnaire, participants were asked about crisis management plans and their feelings regarding the simulation.

## Evaluation

Before the simulation began, participants were asked to complete a pre-questionnaire containing open-ended questions and questions on a 7-point Likert scale. Open-ended answers were categorized appropriately and ranked. After the role-play, all participants were asked to complete a post-questionnaire (similar to the pre-questionnaire, N=126), with an option to be part of the follow-up process by including their contact information. Only 80% of the post-questionnaires were completed due to participants leaving early. Participants were self-selected for the follow-up interview by reporting their contact information on the bottom of the post-questionnaire. There was a reduction in the number of respondents (N=25) compared to the workshop questionnaires due to difficulties in contacting participants and a decrease in self-selected participation. The follow-up questionnaire contained a majority of open-ended questions and was completed via telephone.

## Statistical Analysis

Qualitative data were analyzed using the general linear models with Tukey adjustment of the SAS version 9.1 (SAS Institute, Cary, NC). Results were considered significant when the P-value was  $P < 0.05$ .

## Results

Participants were asked about their food safety plans and crisis management background in the pre-questionnaire, and the results are shown in Table 5 and 6. Results indicated that only 21% (26) of participants had a crisis management plan in place prior to attendance compared to 79% (108) who employed good agricultural practices. Only 21% (15) of participants knew of a foodborne illness outbreak linked to their products. Following the workshop, there was a significant increase in the

participants' perception of the likelihood of their products being contaminated with microbial hazards. Regardless of participation in the role-play, participants reported being somewhat confident in their ability to trace where their product went in the event of an issue (5.01 + 0.35 as based on a Likert scale, 1 not confident – 7 confident), ready to deal with a crisis (4.20 + 0.77), their business could recover from a crisis (4.12 + 0.39). Overall participants felt this session made them more prepared (5.98 + 0.28).

Participants' responses to open-ended questions are shown in Table 7. Before the workshop, participants identified education/training, plans, and traceability as the top three areas they needed to improve in the area of crisis management. Before the workshop, the top three areas identified by participants that worried them the most about an outbreak situation were financial loss/sales, whole production system and reputation/recovery compared to whole production system, financial loss/sales, and media/public relations after the workshop. After the workshop, participants identified plans, records/ documentations, education/training, and traceability as areas where changes could be made to improve their ability to respond to an outbreak with their product. Upon completion of the workshop, participants reported learning about dealing with media/public relations, plans, and the process and timeline of an outbreak.

**Table 5.**  
Participants' Responses to Demographic Questions

Questions	No. of Respondents (%)			
	Pre-Questionnaire		Follow-Up Questionnaire	
	Yes	No	Yes	No
Are you aware of any foodborne illness outbreaks linked to the products you grow?	15 (12)	111 (88)		
Do you employ good agricultural practices or have a food safety program in place?	108 (79)	21 (21)		
Do you have a written crisis management plan in place?	26 (21)	100 (79)	11 (44)	14 (56)
Are you doing anything different now, with respect to preparing for a crisis, that you were not doing before the session?			13 (52)	12 (48)
Do you feel that the session impacted your ability (positively or negatively) to deal with a crisis?			25 (100)	0 (0)

**Table 6.**  
Participants' Responses to Pre- and Post-Questionnaire (*P* < 0.05)

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Question	Likert Scale Response (mean + SD) <sup>a</sup>		Significant Difference
	Pre-	Post-	
How important is it for you to prepare for a crisis?	5.76 ± 0.60	6.37 ± 0.28	NS
How would you rate the likelihood of the products you grow being contaminated with microbial hazards?	3.59 ± 0.50	4.44 ± 0.62	S
How would you rate your business' ability to recover from a crisis?	3.91 ± 0.49	4.12 ± 0.39	NS
Are you confident in your ability to trace where your product went in the event of an issue?	5.04 ± 0.60	5.01 ± 0.35	NS
How would you rate your readiness to deal with a crisis?	4.07 ± 0.24	4.2 ± 0.77	NS
Do you feel this session made you more prepared (7) or no more prepared (1)?		5.98 ± 0.28	
a Results are reported as mean values + standard deviation of Likert scale (1-7)			

**Table 7.**  
Participants' Responses to Open-Ended Questions

Question	Pre-Questionnaire <sup>a</sup>	Post-Questionnaire <sup>a</sup>	Follow-Up Questionnaire <sup>b</sup>
When thinking of a crisis or outbreak situation, what areas of your business do you worry about the most?	1. Financial Loss/Sales (28%) 2. Whole Production System (18%) 3. Reputation/Recovery (12%)	1. Whole Production System (28%) 2. Financial Loss/Sales (17%) 3. Media/Public Relations (8%)	1. Financial Loss/Sales (27%) 2. Reputation/Recovery (19%) 3. Customer/Patrons/Consumers and Traceability (15%)
Can you identify areas where you need to improve your crisis management?	1. Education/Training (17%) 2. Plans (15%) 3. Traceability (13%)		1. Plans (34%) 2. Traceability (28%) 3. Education/Training, Media/Public Relations,

			and Communications (10%)
When thinking of a crisis or outbreak situation, what areas of your business do you worry about the most?		1. Plans (22%) 2. Records/Documentation (21%) 3. Education/Training (14%) 4. Traceability (11%)	1. Traceability (27%) 2. Plans (23%) 3. Records/Documentation and Communications (12%)
What did you learn that you did not know before?		1. Media/PR (29%) 2. Plans (10%) 3. Process of an outbreak and timeline (8%)	
a Pre-questionnaire N=157, Post-questionnaire N=126 b One month follow up N=25			

One month after the workshop, participants were surveyed regarding changes in crisis management practices that could be attributed to their participation in the tabletop simulation. Participants felt the session affected their ability to deal with a crisis and described the experience as eye opening, overwhelming, and helpful. One month after the simulation, 44% of participants had a crisis management plan in place (Table 5).

Following the workshop, participants identified having crisis plans in place (34%) as the top area where they could improve their crisis management capacity. Participants identified financial loss/sales as an area they worry about the most when thinking of a crisis (pre- and follow-up). In follow-up interviews, traceability was the number one change participants reported they could make to address their ability to respond to an outbreak. The top five areas participants identified where they could improve in crisis management were: plans (34%), traceability (28%), education/training, media/public relations, and communications (10%). After participation in the role-play, participants reported learning for the first time about media/public relations (29%), crisis plans (10%), and the process and timeline of an outbreak (8%, data not shown).

## Discussion

Addressing food safety for an individual firm includes the ability to manage and respond to a crisis

when stakeholders and media are challenging practices and responses. The tabletop simulation described here was developed to lead participants through a reality-based foodborne outbreak, resulting in increased crisis management awareness and understanding of the timeline and process of an outbreak investigation.

More than ever, crisis management plans are vital, given the increasing speed with which information is communicated through the Internet. Wikipedia pages on specific outbreaks and twitter trending topics discussing an outbreak are now the norm. By simulating a produce-related outbreak, participants in the study had the opportunity to respond and discuss the best strategies to deal with a crisis and initiate recovery thus influencing their crisis preparation. By actively playing their roles, the participants could personalize with the subject matter to gain a deeper understanding of the material. This type of training encourages the participant to play an active role in learning (Kurz, 1998) and will promote creative thinking by not offer immediate solutions to problems.

After participating in the workshop in the study, participants felt more prepared (5.98 out 7-point Likert scale) to deal with a crisis situation. Each workshop was different based on the participants but all workshops addressed these main themes: dealing with media and government representatives; process and timeline of an outbreak investigation; traceability and documentation; and, recovery.

The study reported here involved a majority of participants (>60%) involved in sweet potato production (NC produces ca. 40% of U.S. production), which is categorized as a low-risk produce item. This may have limited the scope of our results. There were no data collected on the characteristics of the participants such as farm size, revenue, location, etc., which could have provided further insight. The tabletop simulation design is limited by a large number of participants and panelists. In certain rural areas, there may be only one representative with knowledge about foodborne outbreaks to participate on the panel. The workshop is not as effective if there are not enough participants to fill the groups. Each of the main roles is necessary to complete an effective workshop.

Overall, the role-play was effective in raising awareness of crisis management gaps, increasing preparation through experience and encouraging conversations regarding other management strategies. The purpose of creating a role-play workshop was achieved as farmers reported understanding the process and timeline associated with an outbreak situation.

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