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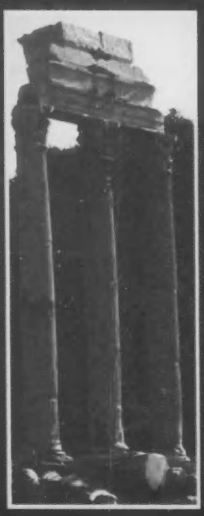

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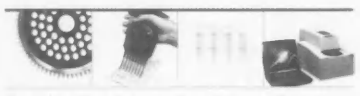

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The International Association for Food Protection seeks a Scientific Editor for *Food Protection Trends* to begin January 1, 2008.

Review the Duties and Responsibilities of the Scientific Editor. If interested in the position, forward a letter of interest and your C.V. to the Selection Committee Chairperson:

Jinru Chen
c/o International Association for Food Protection
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C.V.s must be received no later than September 25, 2007.

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"LONE STAR PERSPECTIVE"
FROM YOUR PRESIDENT

By GARY R. ACUFF
PRESIDENT

"IAFP journals and the IAFP Report provide opportunities for me to keep up with the field"

Change is something we deal with on a daily basis. And the older we get, the more we realize how little we control. In my youth, I remember thinking I was the master of my future, deciding what field I wanted to study for my career, determining where I wanted to live, etc. Like me, most of you probably invested a significant amount of time in college, and maybe graduate school, preparing to be employed in your chosen fields. I don't know how many of you are still actually employed in a position you trained for in college, but I would be willing to bet that a good number of you are doing something different right now. Changes like these sneak up on us, reminding us of how little we really control in our lives, especially regarding employment.

For example, I know many of our members were employed in positions that eventually evolved to address food safety issues. For a large group of us, this change occurred after a major event, like the hemorrhagic *Escherichia coli* outbreak in 1993. Such significant events always inspire a refocusing of priorities for the food industry, regulatory agencies and academia, which usually necessitates new jobs and responsibilities. The recent outbreak associated with spinach probably catalyzed similar changes. If you have been moved into a position with new food safety responsibilities, the first thing you have to do is get up to speed with the science and the issues. IAFP provides a great service to our members in this situation: Our journals are on the cutting edge of current science, The *IAFP Report* provides a continual and reliable monthly update on new and changing events, and the Annual Meeting provides a unique opportunity to hear from and visit with the people who are on the front line of food safety, dealing directly with current issues. Because we have such an evolving membership, our new membership dues are perfectly structured for people who are new to food safety, allowing them to select from a buffet of services. These new options allow members the ability to either stay up-to-date with current issues or completely immerse themselves in the field. Without negating any benefits to long-term members of the field of food safety, IAFP provides a perfect setting for integration of newcomers. However, we current members have to make sure our newer colleagues know IAFP exists.

On the other hand, there are likely several members of IAFP in my situation. I transferred into a position that, despite its significant food safety component, does not incorporate food safety as my primary job responsibility, and my focus has necessarily shifted away from my area of expertise. I now hold an administrative position for a large animal science department containing a group of food microbiologists. While I would love to spend all of my time working with the food micro group, I have many other responsibilities and simply cannot give as much time to food safety as I would like. I love my job, but I can feel myself being pulled away from food safety, slowly but surely, and I sense that I am losing touch with many important issues and events. IAFP journals and the *IAFP Report* provide opportunities for me to keep up with the field. I am able to spend as much or as little time as needed to maintain a connection with food safety and stay in touch with major issues. However, I have found that one of my major sources of help is our Annual Meeting. What an exciting four days we just spent in Orlando! Hearing all the symposia, visiting with poster presenters and just seeing old food safety friends for a few days reinvigorated all the momentum and excitement that

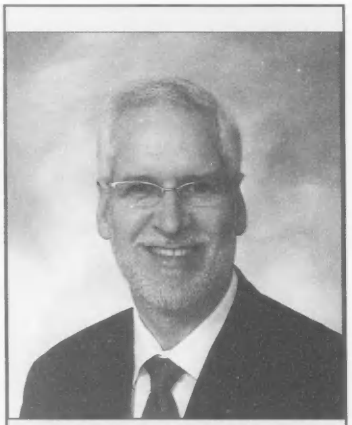
had begun to slip away. The Annual Meeting is my anchor in the food safety field. As long as I am a member of the Association, read the journals and keep attending the Annual Meeting, I know I can always return to my first choice in employment when I grow weary of university administration (or when the Dean gets tired of me—whichever comes first!).

Are you on the front line of food safety issues? Are you new to the field and wondering how you will ever get up to speed? Or are you someone whose job responsibilities have pulled them away from food safety but don't want to lose touch? Our new membership dues structure is designed to help serve the wide variety of needs in the field of food safety, of which I am sure I have only touched the "tip of the iceberg."

Advancing food safety worldwide takes all types of people in many different roles and levels of responsibility. The beauty of our association is that we are now equipped to serve all those individuals, but we still need your help. I believe there are many people out there who could benefit from the services IAFP provides, but they are unaware we exist. We need to make sure our colleagues know that we are here to help. Anyone with food safety responsibilities could benefit from membership in IAFP. Plus, the new, less expensive dues structure makes it even easier for us to recommend membership, and we all know that once someone signs up, they will be hooked!

I would love to hear from you regarding how IAFP serves your needs or how we might provide better service. As always, you can contact me anytime at gacuff@tamu.edu.

"COMMENTARY" FROM THE EXECUTIVE DIRECTOR



By DAVID W. THARP, CAE
EXECUTIVE DIRECTOR

"One IAFP Member can make a difference. We know that many IAFP Members help to promote IAFP in their daily work and for that we are thankful"

This month, I want to review the actions of one IAFP Member to provide an example of what good that one person can do! First though, we can now report that more than 2,100 people attended IAFP 2007! We thought you would be interested to know we not only broke 2,000 but breezed on by 2,100 attendees. That equals a 24% increase over our attendance of 1,705 in 2006! Thank you to all presenters and attendees who made IAFP 2007 a huge success and a gigantic thank you to our special contributors, sponsors and exhibitors!!! In October's *Food Protection Trends*, a full review of the Annual Meeting will be provided.

During July, Maria Teresa Destro visited three countries in Latin America to share her knowledge of food safety issues with those interested. Some may recognize that Maria Teresa just concluded a one-year term on the IAFP Executive Board, serving as the Affiliate Council Chairperson. Maria Teresa is a professor at the University of São Paulo in Brazil, became an IAFP Member in 1994 and has attended IAFP's Annual Meeting consistently since 1999. She, with the help of others at the University, established the Brazil Association for Food Protection as an Affiliate of IAFP in 2002.

So, in early July, Maria Teresa traveled to Costa Rica to talk on food safety issues with people from academia, government and some from private companies. In her presentation to the assembled group, she also incorporated a message about IAFP, about our leading food safety meeting and about our journals; *Food Protection Trends* and the *Journal of Food Protection*. She was somewhat surprised that a very small number in the audience were aware of IAFP, our Annual Meeting or our journals. In further discussions with leaders in Costa Rica, she encouraged their participation in IAFP through Membership and also encouraged them to consider establishing an Affiliate organization to address food safety issues "the IAFP way."

"The IAFP way" brings together food safety leaders from academia, government and industry to share information on protecting the food supply in order to provide for good public health. It is our mission "to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply." With Maria Teresa's leadership, it appears we will soon charter an Affiliate in Costa Rica!

Later in July, Maria Teresa journeyed to Peru and Colombia. She presented research information on *Listeria* and ISO 17025 to academia, lab workers and researchers from private companies and public institutions, such as those belonging to ministries of health or agriculture. In both countries, she again presented information about IAFP's activities. Maria Teresa reported that of 90 attendees in Peru and 70 in Colombia, only 2 in each country had heard about IAFP or the journals. She said, "They got really interested and asked me a lot of questions about the Association."

The reason I bring up Maria Teresa's experiences is two-fold. First, it is a good example of how one person, one IAFP Member can make a difference. We know that many IAFP Members help to promote IAFP in their daily work and for that we are thankful. If your employment positions you where you have the opportunity to

advance participation with IAFP, we encourage you to do so. Many times it is through peer-to-peer communication that we find new, active involvement with IAFP occurs.

The second reason for recapping Maria Teresa's promotion of IAFP is that she is also going to assist IAFP in organizing an IAFP Latin American Symposium on Food Safety for June of 2008. This Symposium, similar to our European Symposium on Food Safety, will allow for professionals to gather together under IAFP's name to learn from leaders in food safety, to network with peers, and to learn about products and services available in their more local regions. The Latin American Symposium on Food Safety is being scheduled for the São Paulo, Brazil area and will likely be two days in length. More information will be available in the coming months in our publications and at the IAFP Web site.

In her travels, Maria Teresa found there was great interest in a Latin American Symposium and the idea was well accepted in each of the countries she visited. We look forward to IAFP's continued international involvement through holding symposia outside of North America. It is an exciting time for YOUR Association! As the world's food supply becomes more mobile, moving from country to country, IAFP and our leaders in food safety can provide information on protecting the world's food supply.

As we conclude for this month, I want to summarize some of IAFP's international involvement. Over the past months, we have described our involvment in a meeting being held September 12 and 13 in Beijing, China (China International Food Safety & Quality 2007). Our European Symposium on Food Safety will be held next month on October 18 and 19 in Rome, Italy. Now, we will hold a meeting in Brazil in June of 2008 along with a fourth European Symposium in October or November of 2008! These symposia are in addition to our ongoing Annual Meeting with IAFP 2008 to be held in Columbus, Ohio from August 3–6, 2008. You can easily see, IAFP is now working to be a truly, international association.

So, thanks to Maria Teresa for her active participation in IAFP and for her efforts in promoting IAFP outside of North America. In addition, we thank all IAFP Members for your dedication to protecting the food supply and for your efforts in spreading the word about IAFP.

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International Association for Food Protection

Refrigerator Practices of Participants in the Meals on Wheels Program

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SUMMARY

Meals-on-wheels (MOW) recipients may be more at risk for foodborne illness than healthy elderly people. The objectives of this project were to conduct a survey of MOW participants for refrigerator food practices and monitor their refrigerator temperature for one week with a Temperature Data Tracker. Participants included 81 MOW recipients from 10 counties. Sixty percent stated that they usually eat all the food delivered soon after delivery, while 40 percent saved food. Meat and poultry were most often saved for an average of 4 days. Only 4 of the 81 participants had refrigerator thermometers with a temperature range of 38°F – 41°F. The average temperature from the Temperature Data Trackers (n = 81) was 41.3°F ± 3.98, with an average range of 37.6°F – 49.3°F. Thirty-four refrigerators averaged above 41°F (the recommended FDA Food Code temperature) while 43 refrigerators averaged above 40°F (the recommended home refrigerator temperature). Only one participant reported having a refrigerator that did not keep food cold. As a result of this project, it is concluded that MOW recipients would benefit from having a refrigerator thermometer to keep food safe in their refrigerators. Education may need to be focused on proper storage of uneaten food from the delivered meal.

INTRODUCTION

The National Nutrition Program for the Elderly in the Older Americans Act of 1972 provided for congregate nutrition services and home-delivered nutrition services *(25)*. The objective of the community based meals-on-wheels (MOW) program is to provide a nutritious meal for those, usually elderly, who have difficulty leaving their home because of injury, illness, or frailty. The population of the United States is aging, and demand for congregate nutrition services and home-delivered nutrition services will increase as well. From 1993 to 2003, the population over 65 years increased 9.5% *(24)*. The "oldest-old" age group is projected to increase from 4.7 million in 2003 to 9.6 million in 2030 *(24)*.

The elderly are more at risk for illness, including foodborne illness, and once ill, they require more time to recover from the illness *(9, 21)*. Although lower rates of foodborne illnesses occur in the elderly *(4)*, Smith *(20)* discussed a number of factors, including poor nutritional status, that increase the susceptibility of the elderly to foodborne illness. Coulston et al. *(5)* reported that 74% of the meals-on-wheels applicants were at risk for poor nutritional status. Meals-on-wheels recipients also do not eat the entire meal when received. Asp and Darling *(2)* reported

A peer-reviewed article

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that half of the recipients saved food to eat later and Lau et al. *(16)* found that only 12% of 444 meals delivered were eaten immediately. Participants who store part or all of their meal to eat later were more likely to be the oldest clients (> 75 y), women, those receiving Supplemental Security Income (SSI) and individuals at highest nutritional risk *(8)*. The total average delivery time from packing the meal to be delivered to the last delivery was 1.92 hours *(18)*.

Food storage conditions in the recipient's home are important in maintaining the safety of the meals, especially food items that are stored for later use *(3)*. In previous studies, foods that were not eaten immediately were not identified and storage conditions were not evaluated. Other food safety problems identified by Mathieu *(17)* were MOW participant forgetfulness and not properly storing foods or knowing how long the food item has been stored. She also mentioned that elderly people may need encouragement to throw out food, because many are on fixed incomes and were raised during the Great Depression, MOW participants may feel uncomfortable getting rid of anything.

The objectives of this project were to conduct a survey of MOW participants for their delivered meal practices, and refrigerator food practices and to monitor their refrigerator temperature for one week with a Temperature Data Tracker.

MATERIALS AND METHODS

Instrument development

A refrigerator evaluation form was developed to collect data on the contents and condition of the participant's refrigerator. The extension educator completed this form immediately after visiting the MOW participant for the first visit. The extension educator checked the refrigerator for a thermometer or a dial setting and recorded this information on the refrigerator evaluation form. The refrigerator evaluation form also included a scale consisting of a 165-mm line anchored with very dirty to very clean, to evaluate the cleanliness of the participant's refrigerator. The second instrument was a survey developed to determine the MOW participant's food-handling methods, refrigerator information and demographic information. This survey was completed by the MOW participant on the second visit, one week following the first visit. Extension educators were trained prior to conducting the study on placement of the temperature data tracker (DicksonWare, www.dicksonweb.com) in refrigerators and how to conduct the interview and survey. Preliminary research was done to determine the placement of a temperature data tracker in a home refrigerator. The temperature data tracker was able to record a temperature every 15 min and in this location, it collected fluctuations due to opening the refrigerator and placing hot food in the refrigerator. We chose a location where we could secure the temperature data tracker and also obtain reliable temperature data within the refrigerator.

Subject recruitment

After IRB approval was received from the University of Nebraska-Lincoln, MOW volunteers were recruited by extension educators in cooperation with local MOW providers. One week prior to the home visit, the MOW volunteer delivered a flier that explained the research project and invited the MOW recipient to participate. Participants contacted extension educators regarding their desire to participate. One day prior to the home visit, the MOW volunteer delivered a reminder letter to inform the participant of the visit by an extension educator.

Research study

On the day of the first visit, the extension educator explained the research study and asked the participant to sign the informed consent. The extension educator placed a temperature data tracker in the participant's refrigerator after explaining what the temperature data tracker did. When placing the temperature data tracker in the refrigerator, the extension educator was able to observe the refrigerator contents and conditions. The temperature data tracker was placed in the center of the side wall on the hinged side of the refrigerator. The educator also asked the participant for permission to take a digital photograph of the inside of the refrigerator to help remember where the temperature data tracker was placed. After leaving the home, the educator recorded information about the refrigerator contents and condition on the refrigerator evaluation form.

One week later, the extension educator returned to the participant's home to remove the temperature data logger from the refrigerator. The participant filled out the survey. For some participants, this survey was read to the participant and the extension educator recorded the responses. Participants received a refrigerator thermometer and a BacDown™ brochure *(23)*.

Data analysis

The temperature data tracker, refrigerator evaluation form and survey were sent to the investigators for analysis. The temperature data tracker results were downloaded and printed, and an average, minimum and maximum temperature were obtained for the 7-day period. Data were analyzed using SAS *(19)*.

RESULTS

Meals-on-wheels participants were recruited from 10 counties in Nebraska, with 81 participants completing the study. Demographic data for the MOW participants in this study are listed in Table 1. Sixty percent stated that they usually eat all the food delivered while 40 percent saved food (Table 1). More women than men participated in our study, but both men (n=8, 40% of total) and women (n=19, 39% of total) saved food for later consumption. Meat and poultry were most often saved, for an average of 4 days. The average temperature of the refrigerators for those who saved meat and poultry was 42.7°F ± 3.7 (range 34.8°F – 51.3°F), with the temperature of 74% of these refrigerators greater than the consumer recommendation of 40°F. The range of temperature fluctuation for these refrigerators was 4.9°F – 18.8°F.

Only four of the 81 participants had refrigerator thermometers (Table 2). The temperature range for these four thermometers was 38°F – 41°F. The average dial (range 1–7) setting that was observed was 3.8 ± 1.2. The distribution for the refrigerator age is listed in Table 2. Seventy-nine percent of the participants reported that the age of their refrigerator was 15 years or less. In addition, the age of the refrigerator was estimated by the data collector, who reported an average of 12.5 years, with a range of 1–32 years. The average temperature from the

TABLE 1. Demographics of Meals-on-wheels participants

	Percentage of participants (n)
Type of Home	
Single family dwelling	51.9 (42)
Apartment building	28.4 (23)
Retirement facility	8.6 (7)
Other	8.6 (7)
Missing	2.5 (2)
Location of Home	
City 1000 and under	8.6 (7)
City 1001–5000	19.8 (16)
City 5001–10,000	13.6 (11)
City 10,000–50,000	37.0 (30)
City over 50,000	18.5 (15)
Missing	2.5 (2)
Who receives the meal	
Female only	60.5 (49)
Male only	24.7 (20)
Female and male	13.6 (11)
Missing	1.2 (1)
Who is living with recipient	
0 sons	93.7
1 son	5.0 (4)
2 sons	1.3 (1)
0 daughters	95.0
1 daughter	3.7 (3)
2 daughters	1.3 (1)
Length of time receiving Meals on Wheels	
Less than one year	35.8 (29)
1 to 5 years	49.4 (40)
6 to 10 years	8.7 (7)
10 to 15 years	3.7 (3)
More than 15 years	1.2 (1)
Missing	1.2 (1)
Do you usually eat all the food delivered?	
Yes	60.8 (49)
No	38.0 (31)
Sometimes	1.2 (1)
Do you share your food with anyone?	
Yes	13.2 (11)
No	85.6 (69)
Sometimes	1.2 (1)
Types of foods that are kept:[1]	
Meats and poultry	26.0 (21)
Bread	22.2 (18)
Vegetables	13.6 (11)
Salads	8.6 (7)
Potatoes, rice, pasta	9.9 (8)
Dessert	21.0 (17)
Fruit	7.4 (6)
Milk	11.1 (9)

[1] Percentages total more than 100% because participants could check more than one response.

temperature data trackers was 41.3°F ± 3.98°F, with an average range of 37.6°F – 49.3°F for the 7-day period, and an average temperature fluctuation of 11.7°F. The range of temperature fluctuation for all the refrigerators was 3.6°F – 30.4°F. Age of the refrigerator did not correlate with the average refrigerator temperature or fluctuation ($P = 0.27$).

The cleanliness of the refrigerators was measured on a scale of 0–165 (82.5 midpoint). The average cleanliness score was 111.7 ± 32.2, with a range of 16 – 157. Digital pictures confirmed the cleanliness scores.

DISCUSSION

As indicated by this project, MOW recipients would benefit from having a refrigerator thermometer to keep food safe in their refrigerators. We recommend that refrigerator thermometers for MOW participants contain larger print for easy reading. One of the physical barriers associated with aging is impaired eyesight, and larger print for educational materials and on thermometers would increase their usability with this population.

FDA has provided guidance for seniors on food safety *(7)* based on the FightBac™ *(23)* messages of clean, separate, cook and chill. Recommendations that specifically address MOW participants are: reheat foods to 165°F, set your refrigerator no higher than 40°F, and refrigerate or freeze perishables, prepared food and leftovers within 2 hours.

Four participants with refrigerator thermometers had their refrigerators set so that the temperature read 38°F – 41°F on the initial visit by the extension educator. Only one participant reported that the refrigerator did not keep food cold, although 34 refrigerators averaged above (the recommended FDA Food Code temperature of 41°F) *(6)*; 43 refrigerators averaged above the recommended home refrigerator temperature of 40°F *(7, 23)*. The average 7-day temperature of 41.3°F ± 3.98°F for participants in our study would include temperature fluctuations that resulted when the refrigerator door was open and when warm foods had been placed in the refrigerator. Kosa et al. *(14)* found that older adults (> 60 years old) were more likely to have a refrigerator thermometer and have their refrigerators at the recommended temperature. In our study, approximately half of the meals-on-wheels participants maintained their refrigerator at the recommended temperature (40°F) to obtain an average temperature of 41.3°F ± 3.98°F. In a British study, 70% of the refrigerators of elderly people were too warm for the safe storage of food *(13)*. However, our participants did not have refrigerator thermometers to determine the temperature of their refrigerators. Instead, they used the dial as a guide to maintain the temperature in their refrigerators and judged the temperature based on how cold the food felt to them. Our findings on use of the dial as an indicator were similar to those of Hudson and Hartwell *(11)*. These researchers also stated that dial settings were not reliable and that dials are not calibrated to any standardized temperature by the manufacturer. In addition, the core food temperature can be higher than the air temperature of the refrigerator *(11)*. Because approximately one half of the average refrigerator temperatures were above the recommended temperature of 40°F, MOW participants could benefit from a refrigerator thermometer to insure that their food was maintained at a safe temperature.

Because the refrigerators of our participants had an average temperature fluctuation of 11.7°F, with a temperature fluctuation range of 3.6°F – 30.4°F, several factors could be responsible for this fluctuation. How often the refrigerator door was opened, and whether hot food was put into the refrigerator, as well as refrigerator age, could impact the temperature fluctuation. Refrigerators differ in their ability to recover from temperature fluctuations. A recent Consumer Reports article on refrigerators rated temperature performance of new refrigerator models *(1)*. These models were rated excellent or very good for temperature performance, which included how uniformly each refrigerator maintained 37°F in the refrigerator and 0°F in the freezer compartment. These refrigerators were new models for 2006, and older models may not be able to maintain this temperature, or as refrigerators age, the refrigerator's ability to maintain a temperature may decline. Some temperature fluctuation may have occurred because participants may have removed the temperature data tracker for a short period to examine it or, if it had become detached from the refrigerator wall, to replace it.

How full a person keeps the refrigerator could impact the average temperature. The digital pictures were visually categorized into three levels of fullness and compared to the average temperature and average temperature range. No statistical significance ($P = .71$) was found for the relationship of fullness of the refrigerator to the temperature data in our study. Temperatures can also vary in different locations inside a refrigerator *(12)*. In our study, we used only one temperature data tracker per refrigerator. More temperature data trackers per refrigerator would provide temperature data on hot and cold spots within each refrigerator.

In our study, equal proportions of men and women stored food for later consumption. This result differed from results of previous research, in which women were more likely to store food *(8)*. Although our study did not address how participants handled their stored food, our results indicated that MOW participants keep meat and poultry and other perishable foods to be consumed later. When participants keep such foods to eat later, proper storage and reheating directions may be needed. Because the average temperature of 74% of the refrigerators was above the recommended 40°F for those who stored meat and poultry items for later consumption, the risk for foodborne illness is increased. Proper reheating of these products is necessary to reduce the risk of foodborne illness. Asp and Darling *(2)* reported that meals were often delivered at temperatures below the recommended temperature of 140°F. Although food can be in the temperature danger zone (40°F – 140°F) for up to 2 hours, the perception of a food safety issue exists. Namkung et al. *(18)* found that it took 1.92 hours from packing to delivery of the last meal, which falls within the 2-hour period recommended by FDA *(7)*. These researchers did not measure the initial temperature of the packed food or the temperature at delivery. Temperature of delivered foods was not a part of our study, but if participants receive food that they think is not hot enough, simple instructions may be needed to explain how to reheat the food. For some MOW participants who receive their meal at the end of a delivery route, storing uneaten food properly and immediately would be necessary. Participants may save food for later consumption because of personal schedule

TABLE 2. Information on refrigerators from Meals-on-wheels participants

	Percentage (No.) of participants
Thermometer present (n = 75)	
Yes	5.3 (4)
No	94.7 (71)
Dial that sets the temperature (n = 70)	
Yes	95.7 (67)
No	4.3 (3)
Refrigerator age (recipient)	
Less than 1 year	8.7 (7)
1–5 years old	27.2 (22)
6–10 years old	25.9 (21)
11–15 years old	17.3 (14)
16–20 years old	11.1 (9)
21–25 years old	2.5 (2)
26–30 years old	3.7 (3)
31–35 years old	1.2 (1)
Over 35 years old	1.2 (1)
Missing	1.2 (1)
How does your refrigerator work?	
Very well – Keeps food cold	67.9 (55)
Good – Most foods stay cold	27.2 (22)
Not very well – some foods do not stay cold	1.2 (1)
Poorly – does not keep food cold	0 (0)
Missing	3.7 (3)
Who cleans your refrigerator?	
I clean my refrigerator	65.4 (53)
Someone helps me	30.9 (25)
Self and help	2.5 (2)
Missing	1.2 (1)
How often do you/someone clean your refrigerator?	
Weekly	28.4 (23)
Every 2 weeks	11.1 (9)
Once a month	34.6 (28)
Every 2 months	6.2 (5)
Every 3–4 months	6.2 (5)
Every 5–6 months	7.4 (6)
As needed	4.9 (4)
Missing	1.2 (1)

conflicts, and freezing these meals may be an option for the MOW provider or the participant. Thole and Gregoire *(22)* examined freezing meals by the MOW provider and found that they had problems with maintaining a temperature of 0°F. Again, reheating instructions, along with thawing instructions, may need to be provided to MOW participants.

Our results of the evaluation of visual cleanliness indicate that most refrigerators were visually clean. However, in a recent study by Godwin et al. *(10)*, cleaning scores did not correlate with microbial ATP assessments. Therefore, visual assessment of cleanliness is not a good indicator of microbial contamination in a refrigerator.

The USDA FightBAC™/Be Food Safe *(23)* has recently added a BacDown™ *(23)* campaign for maintaining proper refrigerator temperatures to prevent foodborne illness. Guidance needs to be developed specifically for the MOW recipients based on the Bac Down™ *(23)* recommendations. The "To Your Health! Food Safety for Seniors" *(7)* booklet may be too complicated for some MOW participants and may provide information beyond what is needed for the delivered meals. MOW providers could develop simple messages to be placed on food containers for proper storage and reheating as appropriate for the food. Education may need to be focused on proper storage of foods not consumed immediately. The targeted audience for this education may be the MOW recipient, caregiver or meal delivery person.

Food safety aspects of the MOW program need evaluation. Meals are usually prepared in inspected kitchens, but food safety issues exist with delivery and, especially, with uneaten foods in the participant's home. In a recent Position Paper by the American Dietetics Association *(15)*, the authors recommended that the impact of food assistance/feeding programs for the elderly (such as MOW) needs to be evaluated and that this evaluation needs to include food safety.

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Evaluation of Cleaning Treatments for Almond-contact Surfaces in Hulling and Shelling Facilities

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SUMMARY

After harvest, almond hulls and shells are separated from kernels in specialized huller-sheller (HS) facilities. This study evaluated various cleaning and sanitizing treatments on contact surfaces typically found in HS facilities. Dust (hull, shell, and soil particulates) was collected from an HS facility and applied to samples of new and worn conveyor belting and painted and unpainted galvanized steel. Dust-contaminated surfaces (100 cm^2) were swabbed before and after blowing with air for 30 s and/or wetting with water, an aqueous commercial cleaner, or isopropyl alcohol quaternary ammonium (IPAQUAT) sanitizer. Aerobic plate counts (APCs) and, in some cases, adenosine triphosphate (ATP) levels were determined. Combinations of air, commercial cleaner, and IPAQUAT significantly reduced APCs and ATP levels; however, the correlation between APCs and ATP levels was poor. The use of water or aqueous cleaners is not recommended for HS facilities unless complete dust removal can be assured and there is adequate time for thorough drying of equipment (e.g., post- or pre-season). Air blowing reduced APCs by 10 fold (on worn and new belting) to 100 fold (on unpainted and painted steel). In the laboratory, applying an IPAQUAT sanitizer after air blowing reduced APCs by an additional 10 fold on belting or 100 fold on steel surfaces. However, when this same treatment was evaluated in a commercial HS facility, the APCs were not significantly reduced on any of the surfaces tested.

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INTRODUCTION

Huller and huller-sheller (HS) facilities receive harvested almonds and remove the hull only or the hull and shell to produce in-shell or shelled almond kernels, respectively. Large volumes of "dust"—composed primarily of shell and/or hull particulates and soil collected during harvest—are generated by the hulling and shelling operations *(10)*. This dust, which is ubiquitous in huller and HS facilities, coats conveyor and equipment surfaces shortly after almonds enter the facility and the hulling and shelling begin.

Almond-contact surfaces (e.g., processing equipment and conveyors) in HS facilities constitute important points at which microbial contamination could spread within and between production lots. HS facilities are in operation for about 5 months during the almond harvest, which generally runs from July through November. These facilities have not traditionally employed in-season cleaning and sanitizing programs beyond general housekeeping. Some of the HS dust is ducted to a cyclone or fabric filter for collection and disposal. Dust not captured by the cyclones is removed by periodic air blowing of the ceilings, walls, equipment, and floors, and then collecting and disposing of the dust *(1)*.

Many HS facilities are not constructed to meet the 21 Code of Federal Regulations (CFR) 110 Current Good Manufacture Practices (GMPs) because they have not traditionally been classified as food processors *(2)*. In addition, the equipment is not designed or intended to be broken down for regular cleaning except at the end of the season or while in repair.

After the 2000 to 2001 outbreak of salmonellosis associated with raw almond consumption *(5)*, HS facilities were asked to register as food processing facilities and to substantially increase the amount and frequency of in-season cleaning and sanitation, and GMPs for cleaning and sanitizing HS facilities were then established *(1)*. However, data validating the efficacy of sanitation in dry food facilities is difficult to find. Most textbooks on sanitation devote only minor chapters to dry facility sanitation methods, primarily for cereals, grains, and their products *(8, 9)*.

The overall objective of this research was to provide the almond HS industry with data on the efficacy of cleaning and sanitizing methods specific to their equipment and facilities. The following studies were carried out: (i) evaluating various cleaning and sanitizing treatments on surfaces typically found in HS facilities, for potential use in the off- or pre-season; (ii) evaluating the in-season industry practice of removing dust with air blowing followed by application of an alcohol-based quaternary ammonium sanitizer for reducing the microbial loads on kernel-contact surfaces; and (iii) evaluating the efficacy of this sanitizing method in an almond HS facility.

MATERIALS AND METHODS

Almond HS dust

As previously reported by our laboratory *(3)*, the aerobic plate counts (APCs) of almond dusts (hull, shell, and soil particulate material) collected from various locations in two HS facilities ranged from 5.8 to 6.8 log CFU/g. For this study, a single dust sample (with an APC of 6.8 ± 0.1 log CFU/g) collected from one of these facilities was selected as the representative dust to use for the contamination of surfaces. The dust sample was stored at ambient temperature (23 ± 3°C) in a sealed polyethylene bag (30.5 × 30.5 cm, Bitran; Com-Pac Int., Carbondale, IL), which was placed inside a sealed plastic tub.

Surfaces

Samples of conveyor belting commonly used in the HS industry, including unpainted new galvanized steel, and new or worn smooth belting or worn scalloped belting, were obtained from HS facilities. Each surface type was cut into 15 × 15 cm squares (225 cm^2). Some of the new galvanized steel squares were painted for use in the study.

A standard washing procedure was developed to prepare the surface samples before treatment (dust contamination and cleaning/sanitizing). Squares were rinsed with running distilled water for 1 min, sanitized with 75% ethanol by spraying to completely wet the surface, blotted with facial tissues, and then air dried at room temperature. Surfaces washed by this procedure were free of visible dust and had APCs of < 2.4 log CFU/100 cm^2.

A contamination protocol for surfaces

In initial experiments, which evaluated more traditional wet-processing cleaning and sanitizing protocols, 5 mg of HS dust was applied to surface samples. For subsequent experiments, 1 g of dust was applied; this quantity more closely represented dust levels observed in HS facilities during operation. A stainless steel fine-mesh strainer was used to evenly distribute 5 mg or 1 g of dust onto each surface as it was lying horizontally. All the dust-contaminated surfaces were left undisturbed for 10 s before applying a treatment; air blowing, tap water, cleaner, sanitizer, or various combinations of these treatments were used, as described below.

The movement and weight of almonds on conveyor belts and equipment surfaces may compress the dust, making its subsequent removal more difficult. To determine the effect of compacted dust on surface cleaning, 1 g of dust was spread over various surface squares and the same surface type was placed face down on top of the dust. A 1-l beaker filled with water to a weight of 1 kg was placed on the back side of the top square and left for 18 to 24 h to press the dust onto the test surface. The top square was removed and a cleaning or sanitizing treatment was applied to the bottom surface square, as described below.

Cleaner and sanitizer

A commercial cleaner (HC-10 Chlorinated Kleer-Mor; Ecolab, St. Paul, MN) that is representative of those used in wet food-processing facilities, and an alcohol-based quaternary ammonium (IPAQUAT) sanitizer (Alpet D2 [58.6% isopropyl alcohol]; Best Sanitizers Inc., Penn Valley, CA) used in HS facilities at the time of the study, were evaluated. The cleaner was prepared by adding 1 package (230 g) to 15 liter of warm water (49°C) as instructed on the label. The sanitizer was supplied at full strength (200 ppm) and was used at this concentration.

Cleaning and sanitizing treatment protocols

For the air blowing treatment, each dust-contaminated surface was placed

TABLE 1. Aerobic plate counts before and after contamination with dust and after cleaning treatments on new and worn surfaces found in HS facilities

Surface	Thickness (cm)	Aerobic plate count (log CFU/cm²)[a] Surface without dust (negative control)	Surface with dust (positive control)	30 s air	30 s air + 60 s IPAQUAT
New steel[b]	0.15	1.1 ± 0.3 A	5.1 ± 0.4 C	3.4 ± 0.2 B	1.5 ± 0.5 A
Painted steel[b]	0.15	1.6 ± 0.1 A	5.5 ± 0.8 C	3.5 ± 0.2 B	1.2 ± 0.9 A
New conveyor belting					
Smooth, yellow[cd]	0.5	1.6 ± 0.4 A	5.0 ± 0.0 D	4.1 ± 0.3 B	2.9 ± 0.2 B
Worn conveyor belting					
Smooth, white[ce]	0.4	1.5 ± 0.2 A	5.3 ± 0.7 D	3.9 ± 0.0 C	3.2 ± 0.0 B
Smooth, red, thick[f]	0.6	1.4 ± 0.6 A	5.3 ± 0.4 D	3.8 ± 0.4 C	2.8 ± 0.1 B
Smooth, red, thin[f]	0.2	1.7 ± 0.4 A	5.5 ± 0.0 D	4.1 ± 0.1 C	3.1 ± 0.0 B
Scalloped, black[g]	0.3–0.5	2.4 ± 0.5 A	5.3 ± 0.4 D	4.0 ± 0.2 C	3.2 ± 0.1 B
Scalloped, white[g]	0.3–0.7	2.2 ± 0.1 A	5.4 ± 0.4 D	4.1 ± 0.1 C	3.2 ± 0.0 B

[a]Means (n = 6) with different letters in the same row are significantly different ($P < 0.05$).

[b]Manufacturer not available; [c]Goodyear, Marysville, OH; [d]Thermoid, Bellefontaine, OH;

[e]Scandura, Scottsdale, GA; [f]Nobet (location not available); [g]Belt Concepts, Marysville, OH.

horizontally in the bottom of a clear polypropylene bag (61 × 91 cm; Fisher, Fair Lawn, NJ) inside a large plastic tub. Tygon R-3603 tubing (4.8 mm I.D. and 14 mm O.D.; Fisher Scientific) was used to blow in-house air across the surface for 30 s by manually moving the tubing from side to side with one hand, while sealing the top of the bag with the other hand to prevent the dust from flying out of the bag.

For the liquid cleaning treatments, each dust-contaminated surface was placed vertically (to prevent pooling of liquid) into a plastic dishwashing basket set in a sink. Tap water or cleaner (200 ml) was slowly poured from the top over the entire surface. Alternatively, the IPAQUAT was sprayed over the surface, using five consecutive sprays to ensure that the surface was wetted for a minimum of 1 min, as per the manufacturer's instructions. All the liquid-treated surfaces were held at ambient temperature to dry (approximately 10 min) before swabbing.

Various combinations of the cleaning treatments were also examined for their efficacy in reducing microbial loads on the surfaces. These combination treatments were carried out following the protocols above, one following the other. For example, the air + water + cleaner treatment consisted of air blowing, followed directly by the tap water treatment and then followed by the cleaner treatment.

Swab sampling to evaluate surface microbial load

A 100-cm² area of each dust-contaminated surface was swabbed using a standard technique *(4, 6, 7)* before and after various cleaning treatments or combinations of treatments. A disposable sterile template (Weber Scientific, Hamilton, NJ) with a 10 × 10 cm opening was placed over each surface to ensure that a consistent area was swabbed. Commercial swabs in 7 ml neutralizing solution (buffered peptone water containing lecithin and Tween 80; Weber Scientific, Hamilton, NJ) were used. Each swab sample was vortexed at high speed for 5 s and the buffer was serially diluted (10 fold) in Butterfield's phosphate buffer (BPB). Appropriate dilutions were plated onto Petrifilm aerobic count (AC) plates (3M Microbiology Products, St. Paul, MN). Swabs of clean surfaces (no dust) were used as negative (uninoculated) controls, and swabs of surfaces covered with dust (no cleaning treatment) were used as positive (inoculated) controls.

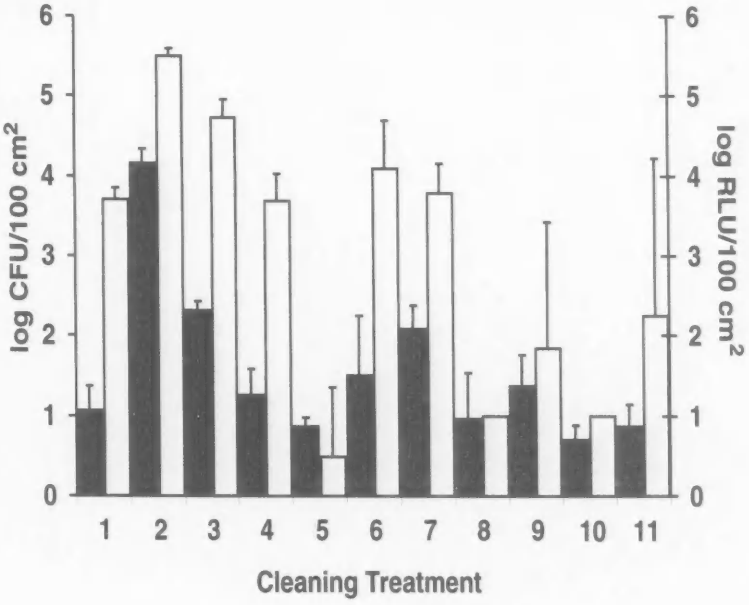
ATP-bioluminescence to evaluate surface cleanliness

A commercial ATP-bioluminescence monitoring system (LUMinator T; Charm Sciences, Lawrence, MA) was used on dust-contaminated unpainted steel surfaces before and after cleaning. Standard swabbing techniques for direct surface sampling were carried out using the PocketSwab (Charm Sciences). Results were expressed in relative light units (RLU).

Swab sampling of almond HS facility

Commercial swabs (Weber Scientific) were used to evaluate the efficacy of a representative sanitation routine used in one almond HS facility. To clean equipment surfaces, this facility removed dust with pressurized air and then ap-

FIGURE 1. Cleaning treatment efficacy as measured by aerobic plate count (■) or ATP bioluminescence (❑) on unpainted steel surfaces contaminated with 5 mg of dust. Treatments included: (1) uninoculated control, (2) inoculated control, (3) 30 s air, (4) 200 ml water, (5) 200 ml cleaner, (6) 60 s IPAQUAT, (7) 30 s air + 200 ml water, (8) 30 s air + 200 ml cleaner, (9) 30 s air + 200 ml water + 200 ml cleaner, (10) 30 s air + 200 ml cleaner + 60 s IPAQUAT, (11) 30 s air + 200 ml water + 200 ml cleaner + 60 s IPAQUAT.



plied an IPAQUAT sanitizer, as recommended in the almond Huller/Sheller Good Manufacturing Practices and Sanitation Manual *(1)*. Duplicate swab samples were collected from each of 20 sample sites before and after the facility's sanitation routine. Swabbing consisted of 10 horizontal strokes and 10 vertical strokes within an approximate 10 × 10 cm sampling area of various surfaces, including belting and steel (unpainted and painted) equipment. The swab samples were immediately placed in a cooler with freezer packs and were transported to the laboratory for microbiological analysis. All swab samples were analyzed within 24 h of sampling. Each swab sample was vortexed vigorously, and serially diluted (10 fold) in BPB, after which 1 ml was plated onto single Petrifilm AC and *E. coli*/coliform plates. The facility was swabbed twice during one harvest season and the data from each surface type were combined.

Statistical analysis

Data were analyzed using Statistical Analysis System (version 8.2) software (SAS Institute, Cary, NC). Analysis of variance by the General Linear Model (GLM) procedure and Duncan's multiple range tests were used to determine the significant differences ($P < 0.05$) among tests or methods.

RESULTS AND DISCUSSION

It is common for HS facilities to operate continuously during the harvest season, generating large volumes of dust that cover all surfaces soon after start up. Under conditions of high dust volume and low moisture, it is recommended that processing equipment not be cleaned using aqueous products *(9)*. Introducing moisture to this environment may increase the risk for almond contamination, by providing niches for microorganisms, such as *Salmonella*, to grow *(3)*. During the off-season, however, when equipment can be disassembled and completely dried, the use of an aqueous cleaner, in combination with other cleaning treatments, may be beneficial.

Cleaning treatment efficacy on unpainted steel surfaces, as evaluated by APC and ATP, is shown in Fig. 1. After application of 5 mg of dust, the APC was 4.2 ± 0.2 CFU/100 cm² (Fig. 1-bar 2), and following air blowing, the APC dropped by 1.9 log CFU/100 cm², to 2.3 ± 0.1 log CFU/100 cm² (Fig. 1-bar 3).

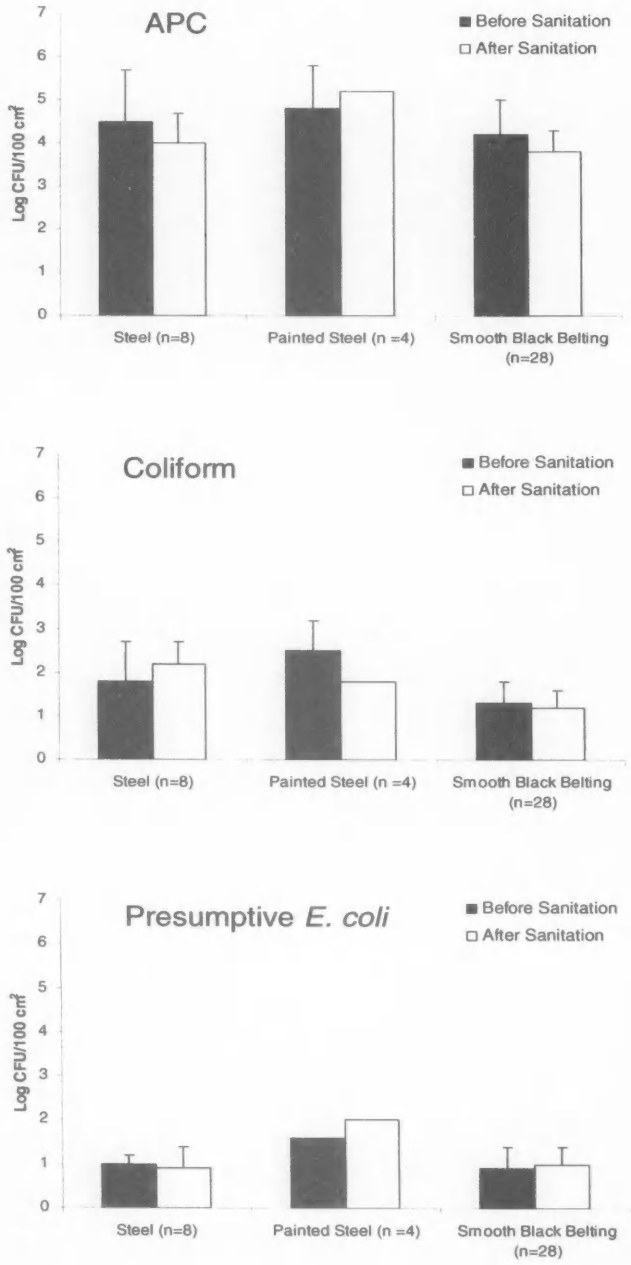
Significant ($P < 0.05$) reductions after air blowing, to the level of the uninoculated control, were observed for all treatment combinations, with the exception of 30 s air + 200 ml water (Fig. 1-bar 7). The greatest reductions in APC (3.6 log CFU/100 cm²) were observed following the combination of 30 s air + 200 ml cleaner + 60 s IPAQUAT (Fig. 1-bar 10). Applying a force to the surfaces to compact the dust did not have a significant effect ($P > 0.05$) on APCs, before or after cleaning or sanitizing, compared to surfaces where no force was applied (data not shown).

The ATP readings did not correlate well with the APCs (Fig. 1), particularly for treatment with 60 s IPAQUAT (Fig 1-bar 6; APC low/ATP high) and 30 s air + 200 ml water (Fig. 1-bar 7; APC higher/ATP equivalent to uninoculated control). For this reason, the ATP-bioluminescence system was not used in further experiments.

Under laboratory conditions, the new and worn surfaces contaminated with 1 g of dust had APCs of 5.0 to 5.5 log CFU/100 cm² before sanitizing (Table 1). Air blowing for 30 s reduced APCs by 1 to 2 log CFU/100 cm², depending on the surface, with the greatest reductions observed on steel surfaces. Applying an alcohol-based sanitizer (IPAQUAT) after air blowing reduced APCs further, by 1 log CFU/100 cm² on belting surfaces and by 2 log CFU/100 cm² on steel surfaces. Air blowing followed by IPAQUAT was an equally effective treatment on all worn belting surfaces.

At the commercial HS facility tested, samples collected from equipment surfaces before air blowing and application of IPAQUAT had average APCs of 4.2 to 4.8 log CFU/100 cm², similar to the inoculated controls prepared for use in the laboratory (Fig. 2). Coliform counts were 1.8 ± 0.9, 2.5 ± 0.7, and 1.3 ± 0.5 log CFU/100 cm² for steel, painted steel,

FIGURE 2. Microbial populations on surfaces at a commercial almond HS facility before (■) and after (❑) pressurized air blowing followed by application of an alcohol-based sanitizer (IPAQUAT). Limit of detection (0.8 log CFU/100 cm²).



and smooth black belting, respectively. The presumptive *E. coli* counts were ≤ 2.0 log CFU/100 cm² in all samples collected. No significant changes in APCs, coliform counts, or *E. coli* counts were seen following sanitation of the HS facility for any of the three surfaces tested (steel, painted steel, or smooth black belting). Under commercial conditions, air was blown onto equipment starting at the highest point and working down, so the durations during which air was applied to individual surfaces varied but were generally less than 30 s. In the laboratory, air was applied to relatively small sample surfaces for 30 s. The difficulty in uniformly removing dust and applying IPAQUAT under commercial conditions may, in part, provide an explanation for the observed lack of microbial reduction compared with results of the laboratory experiments. In addition, dust levels equivalent to those present prior to cleaning and sanitizing were observed within minutes of resuming production.

RECOMMENDATIONS

Traditional wet facility cleaning and sanitizing methods using water and chemical cleaners were very effective in reducing APCs under laboratory conditions and may be appropriate for HS facilities in the off- or pre-season, when all parts of the equipment are accessible, dust can be completely removed, and time needed for thorough drying is available. This type of cleaning is not recommended during the processing season when water may provide harborage for pathogens in inaccessible areas of equipment. Based on the inconsistent results observed in this study, ATP is not recommended for monitoring sanitation in HS facilities.

Current recommended in-season HS cleaning and sanitation practices *(1)* significantly reduced microbial populations on both new and worn kernel-contact surfaces under laboratory conditions, but not when evaluated in a commercial facility. The volume of dust generated in HS facilities, the speed with which it is generated, and the inability to break down equipment for cleaning make it difficult to effectively sanitize these facilities in season, given current conditions and available methodology.

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Determining the Effect of Good Agricultural Practices Awareness on Implementation: A Multi-state Survey

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SUMMARY

A written survey on Good Agricultural Practices (GAPs) was sent to growers and packers in Florida, Texas, California, Georgia, Michigan, New York and Arizona. Approximately 5,000 surveys were mailed to respondents, of which 596 (12%) were completed and returned for statistical analysis. This study was conducted to assess grower and packer knowledge of GAPs and of related educational concepts, and implementation of changes in health and sanitation practices that may have resulted from grower possession of GAPs knowledge. Factors examined for effect on GAPs awareness were respondent age, acres farmed, years farming, and commodity grown.

The conclusions are that growers and packers who have knowledge of GAPs are more likely to provide handwashing and toilet facilities for workers on the farm and in the packinghouse and to encourage proper hygiene practices in agricultural operations. Further, GAPs training increases the likelihood that workers will receive hygiene-specific training. The GAPs program appears to have been successful in reaching agricultural operations, as more respondents were aware of GAPs than not aware for each analysis. Age of respondent, size of farm, and years farming did not affect GAPs awareness. In addition, size of the farm and age of the respondent did not affect the perceived usefulness of GAPs materials. Nearly all ages of farmers, size of farms, and tenure in farming systems reported widespread knowledge of GAPs. Implementation of hygiene practices, although recognized as needed, may be resisted because of perceived cost and perceived difficulty of provision. Changing these perceptions may be the next focus for GAPs outreach and extension.

A peer-reviewed article

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INTRODUCTION

Regular consumption of fresh fruits and vegetables is extremely important for optimal human health. Programs designed to increase consumption of fruits and vegetables in the United States include the US Dietary Guidelines *(14)*, MyPyramid, *(15)* Healthy People 2010 *(16)*, and the National Cancer Institute's Five-A-Day Program *(11)*. Fruits and vegetables offer vitamins, minerals, and fiber that facilitate proper body function. They are also sources of phytochemicals, antioxidants, and other compounds that promote health. However, consumers of fresh, raw, or unprocessed produce are at risk for microbial-based foodborne illnesses.

A highly publicized incident that helped bring foodborne illness into public view occurred in 1993, when an outbreak of *E. coli* O157:H7 in undercooked hamburgers from fast-food restaurants in several Western states caused 700 illnesses and four deaths *(5)*. In a 1996 incident, more than 66 people in the United States and Canada became ill and one child died from drinking unpasteurized apple juice contaminated with *E. coli* O157:H7 *(2)*. A recent *E. coli* O157:H7 on spinach outbreak in 2006 resulted in 205 confirmed illnesses and three deaths *(6)*.

Humans are constantly exposed to both beneficial and harmful microbes from the soil, water, plants, and animals in the environment, Americans are eating out more often, consuming foods such as raw vegetables and fresh juices and using salad bars, which present more risk than cooked or heated foods *(4)*. Of special concern are the harmful microbes that cause an estimated 76 million foodborne illnesses each year *(12)*. Many different foodborne pathogens are capable of causing illness in humans. It is estimated that foodborne illnesses result in 325,000 hospitalizations and 5,000 deaths each year in the United States *(3, 12)*. Of the many kinds of pathogenic organisms that could cause these problems, just seven pathogens (*Campylobacter jejuni*, *Clostridium perfringens*, *E. coli* O157:H7, *Listeria monocytogenes*, *Salmonella*, *Staphylococcus aureus* and *Toxoplasma gondii*) are implicated most often in foodborne disease outbreaks. These seven organisms are believed to cause 3.3 to 12.3 million illnesses each year in the United States *(1)*.

Several of these organisms implicated in outbreaks are microorganisms from the intestinal tracts of animals. These microbes move from animals to produce in many ways, including through irrigation water contaminated by feces, through use of manure as fertilizer for fruit and vegetable crops, or by human feces passed to produce through handling prior to consumption *(9)*. Ensuring the safety of fresh fruits and vegetables requires controlling pathogenic organisms on the farm and in the packinghouse, thus reducing the potential for produce-associated foodborne illnesses.

For the purposes of this research project, "fresh fruits and vegetables" are considered to be fresh produce that is sold to consumers in an unprocessed, minimally processed, or raw form. Fresh produce may be intact (strawberries, whole carrots, radishes, tomatoes, etc.) or cut during harvest (celery, broccoli, cauliflower, etc.). "Cut" also includes "fresh cut" produce such as lettuce that is pre-cut, packaged, and ready-to-eat *(8)*. This research project focuses especially on produce commonly consumed in the American diet. Tomatoes, cantaloupe, strawberries, parsley, broccoli and citrus, which are at high risk of contamination and among the most widely distributed and consumed products, are thus a focus of this project. Fresh fruit and vegetable juices are also of concern and are considered here as "produce". Acidic juices (pH $\leq$ 4.6) can harbor *E. coli* O157:H7, *Salmonella*, and the protozoan parasite *Cryptosporidium parvum*. Low-acid juices (pH > 4.6) such as carrot juice can potentially harbor *Clostridium botulinum (9)*. Problems with fresh juices arise because of the contact of the juices with contaminated materials and equipment and because of the lack of a thermal processing step. Juices are as susceptible to microbial contamination as are their whole produce counterparts.

Foodborne illnesses are generally classified as acute or chronic. Acute cases are usually self-limiting and of short duration and can range from mild to severe. Common symptoms of acute infections are nausea, vomiting, and gastrointestinal distress. Individuals do not usually die from acute infections, but the very young, the elderly, pregnant women, and those with compromised immune systems (including those who are already debilitated by other illness) are particularly vulnerable. Two to three percent of acute cases develop long-term, secondary illnesses called "chronic sequelae," which can affect the joints, nervous system, kidneys or heart, can persist for the rest of the patient's life, and may cause premature death *(1)*.

Responding to the rising incidence of produce-associated foodborne outbreaks, the US Secretaries of Health and Human Services and Agriculture issued "Good Agricultural Practices" (GAPs) and "Good Manufacturing Practices" (GMPs) Guidelines in 1998. By 2001, the US Food and Drug Administration (FDA) required "Hazard Analysis Critical Control Points" (HACCP) monitoring for all domestic and foreign fruit and vegetable juice processors, to be implemented within three years *(5, 8)*.

Food safety is a systems concept. Creating safe food handling, growing, and distribution systems requires that all involved in the chain of production, from the farm to the table, understand their respective contributions to a potential food safety problem Further, all must understand what corrective actions or interventions they as individuals must implement to create a safe food system. Although the concepts involved are simple, analysis of the effect of instructional and analytic efforts to create systemic knowledge has been lacking. To try to fill this void, this project focused on worker knowledge after initial instruction in the four basic concepts below:

Concept [1] There are many possible sources of contamination for fruits and vegetables from planting to harvest to consumption, both here and abroad. One major potential route of contamination on the farm is improperly handled manure or soil contaminated with pathogens. One study found that *E. coli* O157, *Salmonella*, *Campylobacter*, and *Listeria* survived in stored manure slurries and dirty water for up to three months. After the manure was applied to the land, *E. coli* O157, *Salmonella* and *Campylobacter* survived in the soil for up to one month, and *Listeria* commonly survived for more than one month in different types of soils *(13)*.

Concept [2] Water, whether used in growing produce or preparing produce for human consumption, is another potential source of pathogens. As an illustration of

FIGURE 1. The Eight Basic Principles of Good Agricultural Practices *(8)*

1. Prevention of microbial contamination of fresh produce is favored over reliance on corrective actions once contamination has occurred.
2. To minimize microbial food safety hazards in fresh produce, growers, packers, and shippers should use good agricultural and good management practices in those areas over which they have control.
3. Fresh produce can become microbiologically contaminated at any point along the farm-to-table food chain. The major source of microbial contamination with fresh produce is associated with human or animal feces.
4. Whenever water comes in contact with produce, its source and quality dictates the potential for contamination. Minimize the potential of microbial contamination from water used with fresh fruits and vegetables.
5. Practices using animal manure or municipal biosolid wastes should be properly managed to minimize the potential for microbial contamination of fresh produce.
6. Worker hygiene and sanitation practices during production, harvesting, sorting, packing, and transport play a critical role in minimizing the potential for microbial contamination of fresh produce.
7. Follow all applicable local, state, and federal laws and regulations, or corresponding laws, regulations, and standards for operators outside the US, for agricultural practices.
8. Accountability at all levels of the agricultural environment (farm, packing facility, distribution center, and transport operation) is important to a successful food safety program. There must be qualified personnel and effective monitoring to ensure that all elements of the program function correctly and to help track produce back through the distribution channels to the producer.

FIGURE 2. The six main stages during growing, harvesting, packing, storage, and shipping of produce to which GAPs principles can be applied *(7)*

1. Pre-harvest and harvest: these practices are applied to soil and land management, pesticides and fertilizers, water use and irrigation, equipment sanitation, and personal hygiene training for farm workers.
2. Field to cooling: these practices deal with the potential risks associated with packing produce in the field, transporting the produce to a cooling facility, and washing and cooling the produce.
3. Shipping and storage: these practices consider the conditions under which produce is transported from the cooling facility to cold storage.
4. Packing: these practices provide a standard for water quality, worker health and hygiene, equipment, pest control, and temperature.
5. Processing: these practices deal with water quality, equipment sanitation, employee training, and storage.
6. Transportation: these practices provide guidelines for delivering produce to a retailer or foodservice operator.

the pathways involved in disease transmission, a study by Islam et al. *(10)*, found that *E. coli* O157:H7 remained in soil more than five months after application of contaminated irrigation water. A large outbreak of *E. coli* O157:H7 occurred in September of 1999, at a county fair in New York. Heavy rainfall caused surface flooding over a shallow, recently dug well, and the water was contaminated by manure from a nearby cattle pasture. Water from this well was used at the fair to make beverages and ice. Approximately 1,000 people became ill in this outbreak and two people died *(17)*.

Concept [3] The GAPs concept arose from the need to implement a HACCP-based system in an area that did not lend itself to a strict HACCP design. HACCP relies upon establishment of critical control points, which are often not well defined in fresh produce systems. Encouraged by the USDA and FDA, GAPs have been voluntarily implemented across the country for many farms and commodities. Because they are voluntarily implemented, GAPs are considered guidance rather than regulation. Therefore, individual operations can tailor GAPs to best suit their specific needs *(7)*. Although GAPs can be applied to any stage of production, in the interest of cost-effectiveness, the focus is on the farm where produce is grown and on the packinghouse where produce is packaged for sale. GAPs are based on eight basic principles of microbial food safety *(7)* (Fig. 1). There are six main stages during growing, harvesting, packing, storage, and shipping of produce to which GAPs principles can be applied *(7)* (Fig. 2).

Concept [4] Good worker health and hygiene is possibly the single most important factor in reducing the risk of contamination on the farm and in the packinghouse. Growers and packers should follow the relevant standards of the Occupational Safety and Health Act (OSHA), the US Code of Federal Regulations (CFR), and GMPs. GAPs provide additional education and training methods for facilitating proper worker hygiene practices. Outbreaks of foodborne illness from fresh produce are usually caused by fecal contamination. Open lesions, sores, infected wounds, or diseases that cause diarrhea are also sources of pathogens. Education about the importance of good personal hygiene and the relation of personal hygiene to food safety is critical

TABLE 1. GAPs survey responses by state

State	Number of Responses (%)
Florida	367 (62)
California	196 (33)
Texas	16 (3)
Arizona	8 (1)
Michigan	4 (<1)
New York	2 (<1)
Georgia	1 (<1)
Total	594 (100)

TABLE 2. Effect of age and GAPs awareness

Age	Aware of GAPs	Number of Responses (%)
25 – 34	21	28 (75)
35 – 44	61	83 (73)
45 – 54	137	170 (81)
55 – 64	98	131 (75)
65+	100	154 (65)
Total (n)	417	568 (73)

Level of significance: 0.035

TABLE 3. GAPs awareness by acres farmed

Acres	Aware of GAPs	Number of Responses (%)
<500	176	281 (63)
501–1,000	45	56 (80)
1,001–1,500	19	28 (68)
1,501–2,000	25	28 (89)
>2,000	122	142 (86)
Total (n)	387	535 (72)

Level of significance: < 0.0001

for all employees in produce operations. Producers should have in place effective education and training programs appropriate for worker knowledge level and assigned responsibilities. For certain employees, such as seasonal workers, verbal instruction and visual demonstration may be needed to convey important concepts such as proper handwashing techniques *(7)*.

Supervisors should be aware of and look for the symptoms of infectious diseases among workers. Employees showing signs of active illness should not handle produce directly or indirectly, and employees should be instructed to notify supervisors of any illnesses. Any open sores or wounds should be covered to prevent contact with produce. Handwashing facilities should include running water (warm if possible), soap, and single-use disposable towels. Workers should be educated on proper handwashing techniques. Toilet facilities should be accessible to workers to encourage use, should be cleaned on a regular basis, and should be stocked with toilet paper *(7)*.

The purpose of this project was to determine if growers and packers were familiar with the GAPs initiative, specifically in the four aforementioned concept areas, and if exposure to the GAPs program had any effect on produce handling and processing procedures. This research was based on a companion GAPs survey effort conducted at Cornell University. This project was designed to extend the research conducted in New York to other areas of the country.

METHODS

A written survey instrument exploring Good Agricultural Practices (GAPs) implementation was mailed to approximately 5,000 growers and packers in Florida, Texas, California, Georgia, Michigan, New York and Arizona. The study assessed grower and packer knowledge of GAPs, and of related educational concepts, as well as implementation of changes in health and sanitation practices that may have resulted from incorporation of GAPs awareness into production units.

This study was designed to determine the degree of GAPs implementation and related food handling and sanitation education programs nationwide. The data were developed from a survey instrument (questionnaire) designed to address information gaps exposed through reviewing the literature. The questionnaire was based on a survey used in similar research conducted by Cornell University and was approved by the Internal Review Board of the University of Florida.

The questionnaire was designed to determine exposure to GAPs, degree of understanding of concepts presented, and effectiveness of GAPs knowledge in changing sanitation practices. Survey subjects were chosen based on geographic location in the United States and membership in agricultural organizations affiliated with the Tri-State Consortium of the University of Florida, the University of California at Davis, and Texas A&M University. Individuals living in Florida,

TABLE 4. GAPs awareness and years farming

Years	Aware of GAPs	Number of Responses (%)
< 15	47	80 (59)
16–30	165	226 (73)
31–45	89	131 (68)
46–60	64	78 (82)
> 60	27	30 (90)
Total (n)	392	545 (72)

Level of significance: 0.0021

TABLE 5. GAPs awareness and toilets provided in the field

Aware of GAPs	Toilets provided in the field				
	Never	Not often	Most of the time	Always	Total (n)
Yes	4%	2%	13%	79%	346
No	20%	3%	16%	59%	94

Level of significance: < 0.0001

TABLE 6. Obstacles to providing toilets in the field

Response	Percent
Moving toilets to different fields	64
Cost	43
Scheduling cleaning	40
Stocking toilets with toilet paper	36
Repairing toilets	27
Money invested not worth return	8
No supplier in area	7
Other	24

*Note: Respondents were allowed to indicate more than one response

Texas, California, Georgia, Michigan, New York and Arizona were included in this survey. All subjects were involved in agricultural production, with emphasis on oranges and other citrus products, parsley, cilantro, cantaloupe, tomatoes, and strawberries, because these crops present a particular microbial risk and have significant economic impact in their respective growing regions.

Respondent age, number of acres farmed, years farming, and commodity grown were considered as factors potentially affecting GAPs awareness and were thus the data of inquiry. Also considered were the effects of the GAPs program on the provision of handwashing and toilet facilities on farms and in packinghouses, as well as the provision of hygiene-specific worker training.

Acres farmed was included as a data set to evaluate the effect of this variable on perceived need for GAPs training. Interaction of acres farmed with age of respondent was surveyed to determine effect on perceived usefulness of GAPs educational materials.

Surveys, in paper form, were mailed to participants along with a postage-paid return envelope. A reminder card followed the survey approximately two weeks after the initial mailing. Subjects were informed that responses would be kept strictly confidential and that there were no rewards or risks associated with participation in this research project.

Subjects returned the surveys to the Florida Survey Research Center for analysis. At the conclusion of the study, researchers evaluated the validity of the survey as a research instrument. Thirteen correlations were examined by use of the chi-square tests for significance. For the purposes of the chi-square analysis, a P value of < 0.05 was considered significant. Multiple two-sample tests of proportions using a z-test were used to determine statistical differences between categories. A Bonferroni adjustment was used to account for the type 1 error rate for the categorical comparisons.

RESULTS AND DISCUSSION

Of the approximately 5,000 surveys mailed out between September 2004 and June 2005, 596 were completed and returned to the project leaders. Of the responses (approximate response rate of 12%), the majority came from Florida (62%), mostly from respondents in the citrus industry (Table 1).

Factors affecting awareness of the GAPs program

Effect of age on GAPs awareness. Table 2 illustrates the relationship between respondent age and awareness of the GAPs program. Respondent age was grouped into the following categories of subject age in years for analysis: 25–34, 35–44, 45–54, 55–64, and 65 or older. Significantly more respondents in each category were aware than not aware of the GAPs program. All age categories seemed nearly equally likely to have heard of GAPs, with nearly equal numbers of responses obtained as a percent of subjects in any group.

Effect of acres farmed on GAPs awareness. Acres farmed by the respondents were grouped into the following

TABLE 7. GAPs awareness and handwashing facilities provided in the field

Aware of GAPs	Handwashing facilities provided in the field				
	Never	Not often	Most of the time	Always	Total (n)
Yes	5%	3%	13%	80%	342
No	13%	3%	11%	72%	432

Level of significance: 0.031

TABLE 8. Obstacles to providing handwashing facilities in the field

Response	Percent
Moving facilities to different fields	56
Stocking facilities with supplies	50
Cost	36
Repairing facilities	27
Scheduling cleaning	25
Money invested not worth return	11
No supplier in area to purchase/rent sinks from	9
Other	26

*Note: Respondents were allowed to indicate more than one response

categories: less than or equal to 500 acres, 501 to 1,000 acres, 1,001 to 1,500 acres, 1,501 to 2,000 acres, and greater than 2,000 acres. The largest raw number of respondents farmed 500 or fewer acres, but as a percentage of class (53%) this group had the fewest responses. The largest number of responses came from farms larger than 1,500 acres (89 and 86%). Significantly more respondents, regardless of farm size, were aware of GAPs than were not aware, as illustrated in Table 3.

Effect of years farming on GAPs awareness. Table 4 shows the relationship between years farming and awareness of the GAPs program. Numbers of years the respondents have been farming were grouped into the following categories for analysis: 15 years or less, 16 to 30 years, 31 to 45 years, 46 to 60 years, and 61 years or more. The 15 years or less group had the lowest percentage of respondents (59%) aware of GAPs, while the largest percentage (90%) was seen for the group which had been farming for 61 years or more. Except for the category of those farming for 15 or fewer years, subjects were almosts equally likely to respond to the questionnaire, and those who responded were almost equally aware of GAPs in all categories.

Impact of GAPs awareness on agricultural practices

Effect of GAPs awareness on providing toilets in the field. One of the fundamental concepts of GAPs training is the importance of providing proper toilet facilities for workers in the field. Significantly more respondents were aware of GAPs than not aware, as shown in Table 5. In addition, respondents who were aware of GAPs were significantly more likely to provide toilet facilities in the field "most of the time" or "always" than respondents who were not aware of GAPs. This suggests that GAPs awareness appears to be effective in increasing the likelihood that proper toilet facilities will be provided for agricultural workers in the field. Obstacles given by respondents to providing toilets for workers in the field are given in Table 6. Perhaps not surprisingly, the major obstacle to toilet provision is effort and cost of moving the units. Data suggest that most growers are not unwilling to provide this service but feel constrained by what they perceive as an added production cost.

Effect of GAPs awareness on handwashing facilities provided for workers in the field. Another fundamental concept of GAPs is the provision of adequate facilities to facilitate proper handwashing. Respondents who were aware of GAPs were significantly more likely to provide handwashing facilities for workers in the field "most of the time" or "always" than respondents who were not aware of GAPs, although the difference is slight (Table 7). This may be because of grower awareness of worker protection regulations and OSHA requirements. Nevertheless, GAPs awareness is associated with an increasing likelihood that handwashing facilities will be provided in the field. Obstacles given by respondents to providing handwashing facilities in the field are listed in Table 8. The obstacles cited are almost a mirror of those cited as difficulties perceived in providing toilets. In both cases growers appear willing to provide these necessitites, although not enthusiastic about it.

Effect of GAPs awareness on toilets provided in the packinghouse. Providing proper toilet facilities in the packinghouse is important to help reduce risk of microbial contamination of produce from workers. Significantly more respondents were aware of GAPs than not aware, as shown in Table 9. Respondents who were aware of GAPs were significantly more likely to provide toilets "always" in the packinghouse than respondents who were not aware of GAPs. Therefore, GAPs awareness appears to increase the likelihood that toilet facilities will be provided in the packinghouse. However, reading these data together with those of Table 10 ("Obstacles given by respondents to providing toilets in the packinghouse"), one can see that the packinghouses are likely more central to supplier or cleaning access and thus are not perceived to be as difficult to service as those in agricultural fields.

Effect of GAPs awareness on handwashing facilities provided in the packinghouse. Handwashing facilities are also very important for hygiene in the packinghouse. Significantly more respondents were aware of GAPs than not

TABLE 9. GAPs awareness and providing toilets for workers in the packinghouse

	Provide toilets in the packinghouse		
Aware of GAPs	Never	Always	Total (n)
Yes	2%	97%	181
No	17%	74%	21

Level of significance: < 0.0001

TABLE 10. Obstacles to providing toilets in the packinghouse

Response	Percent
Cost	40
No supplier in area to purchase toilets from	40
Lack proper plumbing	35
Not enough workers/no need	30
Money invested not worth return	10
Repairing toilets	5
Stocking with toilet paper	5
Other	30

*Note: Respondents were allowed to check more than one response

TABLE 11. GAPs awareness and handwashing facilities provided in the packinghouse

	Provide handwashing facilities in the packinghouse		
Aware of GAPs	Never	Always	Total (n)
Yes	1%	99%	179
No	20%	80%	20

Level of significance: < 0.0001

aware, as shown in Table 11. Respondents who were aware of GAPs were significantly more likely to provide handwashing facilities "always" in the packinghouse than respondents who were not aware of GAPs. As with previously discussed sanitary facility provision, GAPs awareness appears to increase the likelihood that handwashing facilities will be provided in the packinghouse. Obstacles given by respondents to providing handwashing facilities in the packinghouse are given in Table 12. Conceptually these obstacles differ from those cited as reasons for not providing toilets and handwashing facilities in the field. Here the difficulty is directly related to the mechanical aspects of installation: plumbing and supplies. In previous categories, the difficulty seemed to be the labor of providing facilities.

Effect of GAPs awareness on hygiene-specific worker training. Potentially the most important analysis included in this study was the effect of GAPs awareness on the provision of hygiene-specific training for agricultural workers. Although it is important to provide facilities, it may be even more important to train employees to use these facilities. Availability of worker training was determined by the question "Do you offer worker training that specifically addresses the importance of handwashing and personal hygiene?" Significantly more respondents were aware of GAPs than not aware, as shown in Table 13. Respondents who were aware of GAPs were significantly more likely to provide hygiene-specific worker training than respondents who were not aware of GAPs. Thus, GAPs awareness appears to increase the likelihood that worker training specifically targeted to proper hygiene will be provided. Indeed, anecdotal data suggest that if any topic is addressed in a GAPs on-farm training, the topic will be hygiene. Hygiene is relatively easy both to enforce and to provide for, and it has the advantage of being readily understandable to field workers.

Usefulness of GAPs materials and desire for additional training

Effect of acres farmed on perceived usefulness of GAPs educational materials. This study also considered the relationship between farm size and usefulness of GAPs materials. Respondents were asked to indicate if they had received any materials from the GAPs program, and those who had received these materials were asked to rate their usefulness. Responses were then analyzed based on acres farmed. Acres farmed were grouped into the following categories: less than or equal to 500 acres, 501 to 1,000 acres, 1,001 to 1,500 acres, 1,501 to 2,000 acres, and greater than 2,000 acres. Perceived usefulness of GAPs materials was rated on a scale including "not at all useful", "somewhat useful" and "very useful". The two variables were not significantly related, as shown in Table 14. Therefore, size of the farm does not appear to affect the perceived usefulness of GAPs materials. This may be a function of age of farmer vs. size of farm. Considering the data in previous tables, we can speculate that younger farmers of any size farm would be more likely to see GAPs as useful, but that farmers of any age were equally as likely to have heard of GAPs.

Effect of age on perceived usefulness of GAPs educational materials. This study also considered the effect of respondent age on perceived usefulness of GAPs materials. Age responses were grouped into the following categories: 25–34, 35–44, 45–54, 55–64, and 65 or older.

TABLE 12. Obstacles to providing handwashing facilities in the packinghouse

Response	Percent
Lack proper plumbing	56
Cost	44
No supplier to purchase sinks from	44
Money invested not worth return	33
Not enough workers/no need	11
Stocking with supplies	6
Repairing facilities	6
Other	28

*Note: Respondents were allowed to check more than one response

TABLE 13. GAPs awareness and hygiene-specific worker training provided

	Worker training provided		
Aware of GAPs	Yes	No	Total (n)
Yes	81%	19%	394
No	39%	61%	133

TABLE 14. Effect of acres farmed on perceived usefulness of GAPs materials

	Usefulness of GAPs materials			
Acres farmed	Not at all	Somewhat	Very	Total (n)
≤ 500	<1%	64%	35%	78
501–1,000	0	57%	43%	21
1,001–1,500	0	93%	7%	15
1,501–2,000	0	53%	47%	15
> 2,000	0	53%	47%	83

Level of significance: 0.0681

Perceived usefulness of GAPs materials was rated on a scale including "somewhat useful" and "very useful." The two variables were not significantly related, as shown in Table 15. Thus, age of the respondent does not appear to affect the perceived usefulness of GAPs materials.

Effect of acres farmed on perceived need for GAPs training. Size of the farm was also considered for effect on the respondent's perceived need for GAPs training. Acres farmed were grouped into the following categories: less than or equal to 500 acres, 501 to 1,000 acres, 1,001 to 1,500 acres, 1,501 to 2,000 acres, and greater than 2,000 acres. Perceived need for GAPs training was based on the question "Do you feel that you or your workers need additional training in the GAPs program?" Acres farmed and perceived need for GAPs training were not significantly correlated, as shown in Table 16. Thus size of the farm does not appear to affect the respondent's interest in receiving GAPs training. This is consistent with previous results showing that most respondents regardless of age had heard of GAPs. Again, this may be a function of age of farmer vs. size of farm. Considering the previous results we can speculate that younger farmers of any size farm would be more likely to see GAPs training as needed, despite the fact that farmers of any age were nearly equally as likely to have heard of GAPs.

Respondent demographics

Ninety percent of survey respondents were male. The majority of respondents (49.8%) were college graduates; 20.9% had some college education, and 17.6% had a graduate or professional school education. The majority of respondents (65.9%) were farm owners; 12.5% were farm managers, 6.9% were both owner and manager, and 14.8% held "other" positions. Overall, 73% of respondents stated they were aware of the GAPs Program, and 57% had received materials from the GAPs Program. Three-hundred respondents (74.1%) had implemented GAPs in their operations. Factors cited as obstacles to implementing GAPs are listed in Table 17. Those obstacles suggest that GAPs may be viewed as less essential to an operation than is direct production equipment, because the primary factor cited as an "obstacle" is cost. Respondents are not seeing prevention or risk management as cost saving or "adding to the bottom line." Were GAPs touted for its value-adding potential, GAPs might be regarded less as an obstacle and more as a market differentiator.

CONCLUSIONS

Food safety is a systems concept. Creating safe food handling, growing, and distribution systems requires that all involved in the chain of production, from the farm to the table, understand their respective contributions to a potential food safety problem. All must "buy in" to the notion that safe food is the desired production output. Further, all must understand what corrective actions or interventions they as individuals must implement to create a safe food system. Although the concepts involved are simple, the effects

TABLE 15. Effect of age and perceived usefulness of GAPs materials

	Usefulness of GAPs materials		
Age	Somewhat	Very	Total (n)
25–34	57%	43%	14
35–44	59%	41%	37
45–54	62%	38%	89
55–64	46%	52%	51
> 64	67%	33%	39

Level of significance: 0.374

TABLE 16. Effect of acres farmed and perceived need for additional GAPs training

Acres farmed	Respondents that said workers needed additional training
≤ 500	40%
501–1,000	41%
1,001–1,500	47%
1,501–2,000	42%
> 2,000	50%

Level of significance: 0.5526

TABLE 17. Obstacles to implementing GAPs

Response	Percent
Cost	58
Not enough time	49
Not enough workers	24
Technical solutions don't exist	22
Money invested not worth return	26
Not sure how to prioritize GAPs	23
Other	14

*Note: Respondents were allowed to check more than one response

of instructional and evaluative efforts to create and assess systemic knowledge have been lacking. To try to fill this void, this project evaluated producer knowledge of GAPs and how that knowledge was reflected in practices.

The primary aim of this project was to determine the effect of GAPs awareness on practices related to the prevention of foodborne illness in the field and packinghouse. Specifically, this project focused on the areas of provision of proper handwashing, toilet facilities, and hygiene-specific worker training. Also considered were factors affecting GAPs awareness, factors influencing how useful GAPs educational materials are to respondents, and respondent interest in additional GAPs training.

Factors considered as instrumentally influencing awareness of the GAPs program were age of respondent, size of the farm, and years in operation. These factors were included in a written survey and applied in many combinations in an attempt to separate cause and effect of GAPs awareness and implementation. Although significantly more respondents were aware of GAPs than not aware for each of these variables, none of these factors individually appeared to affect awareness of GAPs. Nearly all ages of farmers, size of farms, and tenure in farming systems reported widespread knowledge of GAPs. Implementation of hygiene practices is recognized as needed yet resisted because of cost and perceived difficulty of provision. From a legal viewpoint, this might suggest potential negligence problems for farming operations, in that those who are aware of a danger do not act to curb the risk of injury.

Table 2 shows that there was no significant difference in GAPs awareness between age categories. Thus, results indicate that age of respondent does not affect GAPs awareness, which support the null hypothesis. As seen in Table 3, there was no significant difference in awareness between categories. Therefore, the data supports the null hypothesis that farm size does not affect GAPs awareness. Significantly more respondents were aware than not aware of GAPs. There was no significant difference in awareness between categories. Therefore, the data support the null hypothesis that years farming does not affect GAPs awareness.

The most important component of the analysis was the awareness of GAPs influencing behavior. Based on this study, growers and packers who have knowledge of GAPs are significantly more likely to provide handwashing and toilet facilities "always" for workers in the farm and packinghouse. Therefore, GAPs awareness appears to increase the likelihood that handwashing facilities and toilets will be provided, which encourages proper hygiene practices by employees in agricultural operations. The most common reason given for not providing handwashing facilities and toilets in the field was the perceived difficulty of transporting

the facilities to different fields. The most common reason for not providing handwashing facilities in the packinghouse was the lack of proper plumbing, while cost and lack of a supplier in the area were the two most common reasons given for not providing toilets in the packinghouse.

Potentially the most important conclusion of this study was that respondents who were aware of the GAPs program were significantly more likely to provide hygiene-specific training for workers. Although it is important to provide facilities to encourage sanitary practices, it is even more important that employees be adequately trained in the proper use of these facilities to decrease the risk of foodborne illness associated with contaminated fresh produce.

This is the largest, most comprehensive survey to date on the effectiveness of GAPs. Based on this study, promotion of GAPs appears to have been effective. Consistently more respondents were aware of GAPs than not aware in this population sample. GAPs educational materials also appear to be useful to individuals involved in agriculture, in as much as 98% of all respondents who had received GAPs materials found these materials either "very useful" or "somewhat useful". Size of the farm and respondent age does not appear to affect perceived usefulness of materials. Respondents are not seeing prevention or risk management as cost saving or "adding to the bottom line." Were GAPs touted for its value-adding potential, GAPs might be regarded less as an obstacle and more as a market differentiator. If initial GAPs training programs nationally raised consciousness, further training may need to be focused on benefits to the operation.

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95th Annual Meeting

IAFP 2008

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Call for Abstracts

IAFP 2008

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General Information

1. Complete the Abstract Submission Form Online.
2. All presenters must register for the Annual Meeting and assume responsibility for their own transportation, lodging, and registration fees.
3. There is no limit on the number of abstracts individuals may submit. However, one of the authors must deliver the presentation.
4. Accepted abstracts will be published in the Program and Abstract Book. Editorial changes may be made to accepted abstracts at the discretion of the Program Committee.
5. Membership in the Association is not required for presenting a paper at IAFP 2008.

Presentation Format

1. Technical – Oral presentations will be scheduled with a maximum of 15 minutes, including a two to four-minute discussion. LCD projectors will be available and computers will be supplied by the convenors.
2. Poster – Freestanding boards will be provided for presenting posters. Poster presentation surface area is 48" high by 96" wide (121.9 cm × 243.8 cm). Handouts may be used, but audio-visual equipment will not be available. The presenter is responsible for bringing pins and velcro. All posters should include the title and author information.

Note: The Program Committee reserves the right to make the final determination on which format will be used for each presentation.

Instructions for Preparing Abstracts

1. All abstracts must be written in English. If the author is non-English speaking, consider having the abstract reviewed by an English-speaking person before submitting.
2. All abstracts must be approved and signed off by all authors before submission.
3. Title – The title should be short but descriptive. The title should be in title case.
4. Authors – List all authors using the following style: first name followed by the surname.
5. Presenter Name and Title – List the full name and title of the person who will present the paper.
6. Presenter Address – List the name of the department, institution and full postal address (including zip/postal code and country).
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9. E-mail – List the E-mail address for the presenter.
10. Format preferred – Check the box to indicate oral or poster format. The Program Committee reserves the right to make the final determination of presentation format.
11. Category – The categories are used by the Program Committee to organize the posters and technical sessions. Please check 2–3 boxes which best describe the categories for which the abstract is suitable.
12. Developing Scientist Awards Competition – Check the box to indicate if the presenter is a student wishing to be considered in this competition. The student will make the initial submission, and IAFP will E-mail the abstract to the major professor, who will complete the submission process. For more information, see "Call for Entrants in the Developing Scientist Awards Competitions."
13. Abstract – Key the abstract into the web-based system. In addition, a double-spaced copy of the abstract, typed in 12-point font in MS Word, should be E-mailed to abstracts@foodprotection.org at the time of submission. Use no more than 300 words. Abstracts are most often rejected because of a failure to follow the instructions below.

In addition to following these instructions, authors should carefully review the sections on selection criteria and rejection reasons as well as the sample abstract before submitting the abstract. Original research abstracts MUST be in the following format:

Introduction: State the reason for pursuing this work (2–3 sentences)

Purpose: State the purpose or objectives of the study (1–2 sentences)

Methods: State the methodology used in the study (2–3 sentences). The methods should be specific enough that researchers in the same or similar field would understand the basic experimental design or approach.

Results: Describe the results obtained in the study (2–3 sentences). NOTE: Specific results, with statistical analysis (if appropriate), MUST be provided. A statement of "results pending" or "to be discussed" is not acceptable and will be grounds for abstract rejection. Results should be summarized; do NOT use tables or figures.

Significance: State the significance of the findings to food safety and/or public health (1–2 sentences) NOTE: Do not include reference citations in the Abstract. Please see sample abstracts for further guidance on abstract structure.

Education abstracts MUST present an improvement or innovation on a proven method in order to educate others (about a food protection related topic). There should be a way to measure the outcomes and substantiate the improvements and/or outcomes. If measured, the sample size should be sufficiently large to represent the intended population.

Abstract Submission

Abstracts submitted for IAFP 2008 will be evaluated for acceptance by the Program Committee. Please be sure to follow the instructions above carefully; failure to do so may result in rejection. Information in the abstract data must not have been previously published in a copyrighted journal.

Abstracts must be received no later than January 29, 2008. Completed abstract and information must be submitted online. Use the online submission form at www.foodprotection.org. In addition, a double-spaced copy of the abstract, typed in 12-point font in MS Word, should be E-mailed to abstracts@foodprotection.org at the time of submission. You will receive an E-mail confirming receipt of your submission.

Selection Criteria

1. Abstracts must be structured as described above.
2. Abstracts must report the results of original research pertinent to the subject matter. Papers should report the results of new, applied studies dealing with: (i) causes (e.g., microorganisms, chemicals, natural toxicants) and control of all forms of foodborne illness; (ii) causes (e.g., microorganisms, chemicals, insects, rodents) and control of food contamination and/or spoilage; (iii) food safety from farm-to-fork (including all sectors of the chain including production, processing, distribution, retail, and consumer phases); (iv) novel approaches for the tracking of foodborne pathogens or the study of pathogenesis and/or microbial ecology; (v) public health significance of foodborne disease, including outbreak investigation; (vi) non-microbiology food safety issues (food toxiology, allergens, chemical contaminants); (vii) advances in sanitation, quality control/assurance, and food safety systems; (viii) advances in laboratory methods; and (ix) food safety risk assessment. Papers may also report subject matter of an educational nature.
3. Research must be based on accepted scientific practices.
4. Research should not have been previously presented nor intended for presentation at another scientific meeting. Papers should not appear in print prior to the Annual Meeting.

Rejection Reasons

1. Abstract was not prepared according to the "Instructions for Preparing Abstracts." This includes abstracts that are too lengthy.
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4. Potential for the approach to be practically used to enhance food safety is not justified.
5. Work reported appears to be incomplete and/or data and statistical validity are not presented. Percentages alone are not acceptable unless sample sizes (both numbers of samples and sample weight or volume) are reported. Detection limits should be specified when stating that populations are below these limits. Indicating that data will only appear in the presentation without including them in the abstract is NOT acceptable.
6. Abstract was poorly written or prepared. This includes spelling and grammatical errors or improper English language usage.
7. Results have been presented or published previously.
8. Abstract was received after the deadline for submission.
9. Abstract contains information that is in violation of the International Association for Food Protection Policy on Commercialism.
10. Abstract subject is similar to other(s) submitted by same author. (The committee reserves the right to combine such abstracts.)
11. Abstracts that report research that is confirmatory of previous studies and/or lacks originality will be given low priority for acceptance.

Projected Deadlines/Notification

Abstract Submission Deadline: January 29, 2008

Submission Confirmations: Within 48 hours of submission

Acceptance/Rejection Notification: March 21, 2008.

Contact Information

Questions regarding abstract submission can be directed to Tamara P. Ford, 515.276.3344 or 800.369.6337; E-mail: tford@foodprotection.org

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Call for Entrants in the Developing Scientist Awards Competitions

Supported by the International Association for Food Protection Foundation

The International Association for Food Protection is pleased to announce the continuation of its program to encourage and recognize the work of students and recent graduates in the field of food safety research. Qualified individuals may enter either the oral or poster competition.

Purpose

1. To encourage students and recent graduates to present their original research at the Annual Meeting.
2. To foster professionalism in students and recent graduates through contact with peers and professional Members of the Association.
3. To encourage participation by students and recent graduates in the Association and the Annual Meeting.

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Oral Competition – The Developing Scientist Oral Awards Competition is open to graduate students (enrolled or recent graduates) from M.S. or Ph.D. programs or undergraduate students at accredited universities or colleges. Presentations are limited to 15 minutes, which includes two to four minutes for discussion.

Poster Competition – The Developing Scientist Poster Awards Competition is open to students (enrolled or recent graduates) from undergraduate or graduate programs at accredited universities or colleges. The presenter must be present to answer questions for a specified time (approximately two hours) during the assigned session. Specific requirements for presentations will be provided at a later date.

General Information

1. Competition entrants cannot have graduated more than a year prior to the deadline for submitting abstracts.
2. Accredited universities or colleges must deal with environmental, food or dairy sanitation, protection or safety research.
3. The work must represent original research completed and presented by the entrant.
4. Entrants may enter only one paper in either the oral or poster competition.
5. All entrants must register for the Annual Meeting and assume responsibility for their own transportation, lodging, and registration fees.
6. Acceptance of your abstract for presentation is independent of acceptance as a competition finalist. Competition entrants who are chosen as finalists will be notified of their status by the chairperson by April 30, 2008.
7. Entrants who are full-time students, with accepted abstracts will receive a complimentary, one-year Student Membership with *JFP* Online.
8. In addition to adhering to the instruction in the "Call for Abstracts," competition entrants must check the box to indicate if the paper is to be presented by a student in this competition. A copy of the abstract will be E-mailed to the major professor for final approval.
9. You must also specify full-time student or part-time student.

Judging Criteria

A panel of judges will evaluate abstracts and presentations. Selection of up to ten finalists for each competition will be based on evaluations of the abstracts and the scientific quality of the work. All entrants will be advised of the results by April 30, 2008. Only competition finalists will be judged at the Annual Meeting and will be eligible for the awards.

Judging criteria will be based on the following:

1. Abstract – Clarity, comprehensiveness and conciseness.
2. Scientific Quality – Adequacy of experimental design (methodology, replication, controls), extent to which objectives were met, difficulty and thoroughness of research, validity of conclusions based upon data, technical merit and contribution to science.
3. Presentation – Organization (clarity of introduction, objectives, methods, results and conclusions), quality of visuals, quality and poise of presentation, answering questions, and knowledge of subject.

Finalists

Awards will be presented at the International Association for Food Protection Annual Meeting Awards Banquet to the top three presenters (first, second and third places) in both the oral and poster competitions. All finalists are expected to be present at the banquet where the award winners will be announced and recognized.

Awards

First Place – $500 and an engraved plaque
Second Place – $300 and a framed certificate
Third Place – $100 and a framed certificate

Award winners will receive a complimentary, one-year Membership including *Food Protection Trends*, *Journal of Food Protection*, and *JFP* Online.

Policy on Commercialism

for Annual Meeting Presentations

1. INTRODUCTION

No printed media, technical sessions, symposia, posters, seminars, short courses, and/or other related types of forums and discussions offered under the auspices of the International Association for Food Protection (hereafter referred to as to Association forums) are to be used as platforms for commercial sales or presentations by authors and/or presenters (hereafter referred to as authors) without the express permission of the staff or Executive Board. The Association enforces this policy in order to restrict commercialism in technical manuscripts, graphics, oral presentations, poster presentations, panel discussions, symposia papers, and all other type submissions and presentations (hereafter referred to as submissions and presentations), so that scientific merit is not diluted by proprietary secrecy.

Excessive use of brand names, product names or logos, failure to substantiate performance claims, and failure to objectively discuss alternative methods, processes, and equipment are indicators of sales pitches. Restricting commercialism benefits both the authors and recipients of submissions and presentations.

This policy has been written to serve as the basis for identifying commercialism in submissions and presentations prepared for the Association forums.

2. TECHNICAL CONTENT OF SUBMISSIONS AND PRESENTATIONS

2.1 Original Work

The presentation of new technical information is to be encouraged. In addition to the commercialism evaluation, all submissions and presentations will be individually evaluated by the Program Committee chairperson, technical reviewers selected by the Program Committee chairperson, session convenor, and/or staff on the basis of originality before inclusion in the program.

2.2 Substantiating Data

Submissions and presentations should present technical conclusions derived from technical data. If products or services are described, all reported capabilities, features or benefits, and performance parameters must be substantiated by data or by an acceptable explanation as to why the data are unavailable (e.g., incomplete, not collected, etc.) and, if it will become available, when. The explanation for unavailable data will be considered by the Program Committee chairperson and/or technical reviewers selected by the Program Committee chairperson to ascertain if the presentation is acceptable without the data. Serious consideration should be given to withholding submissions and presentations until the data are available, as only those conclusions that might be reasonably drawn from the data may be presented. Claims of benefit and/or technical conclusions not supported by the presented data are prohibited.

2.3 Trade Names

Excessive use of brand names, product names, trade names, and/or trademarks is forbidden. A general guideline is to use proprietary names once and thereafter to use generic descriptors or neutral designations. Where this would make the submission or presentation significantly more difficult to understand, the Program Committee chairperson, technical reviewers selected by the Program Committee chairperson, session convenor, and/or staff, will judge whether the use of trade names, etc., is necessary and acceptable.

2.4 "Industry Practice" Statements

It may be useful to report the extent of application of technologies, products, or services; however, such statements should review the extent of application of all generically similar technologies, products, or services in the field. Specific commercial installations may be cited to the extent that their data are discussed in the submission or presentation.

2.5 Ranking

Although general comparisons of products and services are prohibited, specific generic comparisons that are substantiated by the reported data are allowed.

2.6 Proprietary Information (See also 2.2.)

Some information about products or services may not be publishable because it is proprietary to the author's agency or company or to the user. However, the scientific principles and validation of performance parameters must be described for such products or services. Conclusions and/or comparisons may be made only on the basis of reported data.

2.7 Capabilities

Discussion of corporate capabilities or experiences are prohibited unless they pertain to the specific presented data.

3. GRAPHICS

3.1 Purpose

Slides, photographs, videos, illustrations, art work, and any other type visual aids appearing with the printed text in submissions or used in presentations (hereafter referred to as graphics) should be included only to clarify technical points. Graphics which primarily promote a product or service will not be allowed. (See also 4.6.)

3.2 Source

Graphics should relate specifically to the technical presentation. General graphics regularly shown in, or intended for, sales presentations cannot be used.

3.3 Company Identification

Names or logos of agencies or companies supplying goods or services must not be the focal point of the slide. Names or logos may be shown on each slide so long as they are not distracting from the overall presentation.

3.4 Copies

Graphics that are not included in the preprint may be shown during the presentation only if they have been reviewed in advance by the Program Committee chairperson, session convenor, and/or staff, and have been determined to comply with this policy. Copies of these additional graphics must be available from the author on request by individual attendees. It is the responsibility of the session convenor to verify that all graphics to be shown have been cleared by Program Committee chairperson, session convenor, staff, or other reviewers designated by the Program Committee chairperson.

4. INTERPRETATION AND ENFORCEMENT

4.1 Distribution

This policy will be sent to all authors of submissions and presentations in the Association forums.

4.2 Assessment Process

Reviewers of submissions and presentations will accept only those that comply with this policy. Drafts of submissions and presentations will be reviewed for commercialism concurrently by both staff and technical reviewers selected by the Program Committee chairperson. All reviewer comments shall be sent to and coordinated by either the Program Committee chairperson or the designated staff. If any submissions are found to violate this policy, authors will be informed and invited to resubmit their materials in revised form before the designated deadline.

4.3 Author Awareness

In addition to receiving a printed copy of this policy, all authors presenting in a forum will be reminded of this policy by the Program Committee chairperson, their session convenor, or the staff, whichever is appropriate.

4.4 Monitoring

Session convenors are responsible for ensuring that presentations comply with this policy. If it is determined by the session convenor that a violation or violations have occurred or are occurring, he or she will publicly request that the author immediately discontinue any and all presentations (oral, visual, audio, etc.) and will notify the Program Committee chairperson and staff of the action taken.

4.5 Enforcement

While technical reviewers, session convenors, and/or staff may all check submissions and presentations for commercialism, ultimately it is the responsibility of the Program Committee chairperson to enforce this policy through the session convenors and staff.

4.6 Penalties

If the author of a submission or presentation violates this policy, the Program Committee chairperson will notify the author and the author's agency or company of the violation in writing. If an additional violation or violations occur after a written warning has been issued to an author and his agency or company, the Association reserves the right to ban the author and the author's agency or company from making presentations in the Association forums for a period of up to two (2) years following the violation or violations.

Call for Nominations 2008 Secretary

A representative from the government sector will be elected in March of 2008 to serve as IAFP Secretary for the year 2008–2009.

Send letters of nomination along with a biographical sketch to the Nominations Chairperson:

Carl S. Custer
c/o International Association for Food Protection
6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2864, USA

The Secretary-Elect is determined by a majority of votes cast through a vote taken in March of 2008. Official Secretary duties begin at the conclusion of IAFP 2008. The elected Secretary serves as a Member of the Executive Board for a total of five years, succeeding to President, then serving as Past President.

For information regarding requirements of the position, contact David Tharp, Executive Director, at 800.369.6337 or 515.276.3344; Fax: 515.276.8655; E-mail: dtharp@foodprotection.org.

Nominations Close November 1, 2007

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[1] IAFP 2006, Calgary, Alberta, Canada, Technical Symposium: Detection of *Salmonella* in Chicken Carcass Rinses Using a Chromogenic Agar Plating Medium, Julian Cox, The University of New South Wales, Sydney, Australia & Stan Bailey, ARS-USDA, Athens, GA.

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de Campinas
Campinas, São Paulo

Silvana M. Srebernich
Pontificia Universidade Catolica
de Campinas
Campinas, São Paulo

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Ecole Nationale Veterinaire De Lyon
Marcy L'Etoile

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Korea Food Research Institute
Sungnam, Kyunggi

Yujin Choi
Dong-guk University
Seoul

Hyang Sook Chun
Korea Food Research Institute
Sungnam, Kyunggi

Yun Hee Chung
Korea Consumer Protection Board
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Sun-Young Lee
Chung-Ang University
Anseong-si, Gyeonggi-do

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Kraft Foods
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National Food Institute of Thailand
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National Food Institute of Thailand
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Suwimon Suktuayart
Charoen Pokphand Food PLC
Dindaeng, Bangkok

Chuleeporn Suttivirivan
Charoen Pokphan Food PLC
Dindaeng, Bangkok

Hwei Choo Tay
Charoen Pokphand Food PLC
Dindaeng, Bangkok

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Nigel Cook
Central Science Laboratory
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Applied Biosystems
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Michael Jantschke
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AvidBiotics Corp.
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Salina

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Norwood, Massachusetts

Robert Burns
WTI, Inc.
Jefferson, Georgia

UPDATES

Marcie Van Wart Joins MATRIX MicroScience as Vice President of Sales for Matrix MicroScience Inc.

MATRIX MicroScience Ltd., (Newmarket, Cambs, UK) has announced that Marcie Van Wart has joined the company as vice president of sales. She comes to MATRIX with over 25 years food safety leadership experience in the industry. Prior to joining MATRIX Ms. Van Wart spent seven years as a senior bench microbiologist at DelMonte Food Corporation in Walnut Creek, CA; followed by fourteen years as senior sales specialist with bioMérieux.

More recently, Ms. Van Wart has worked in sales management and business development in the areas of life science research and specialty molecular biology reagents. She joins us with a solid track record in sales and sales management.

Ms. Van Wart comments that "I am extremely excited to bring my background and experience to the MATRIX Team. I believe my experience as a practicing food microbiologist as well as my successful sales career will help the industry embrace this terrific technology as an integral part of their overall pathogen testing programs."

Dr. Adrian Parton, C.E.O. of MATRIX MicroScience commented "We are delighted that someone of Marcie's integrity and experience has joined the MATRIX team. Her intimate knowledge of the food industry will provide Matrix with an added dimension to meet and exceed our customers' goals and requirements. We see this as another endorsement of our novel and exciting range of Pathatrix products."

Department of Food Science, Cornell University, Has New Department Chair

Professor Kathryn Boor was appointed chair of the department of food science at Cornell University, effective July 1, 2007. Two departments (food science on the Ithaca campus and food science and technology on the Geneva, NY campus) form the core of the Cornell Institute of Food Science. The current chair of the department of food science and technology, Professor Cy Lee, and Professor Boor will serve as co-directors of the Cornell Institute of Food Science. In addition to faculty members from these two departments, the Institute of Food Science also includes faculty members from a number of other departments, including the departments of biological and environmental engineering, applied economics and management, animal science, chemical engineering, horticulture, psychology, horticultural sciences, plant breeding, population medicine and diagnostic sciences, and the division of nutritional sciences.

On January 12, 2007, Cornell's Food Science program was reported by the Chronicle of Higher Education as the top food science program in the nation, based on faculty productivity.

Professor Boor earned her B.S. in food science from Cornell University, an M.S. in food science from the University of Wisconsin, and a Ph.D. in microbiology from the University of California at Davis. She joined the faculty of the Department of Food Science at Cornell as an assistant professor in 1994. Her research interests focus on microbial stress response systems in *Listeria monocytogenes* and on microbial spoilage of dairy products. In addition to her research programs, she also directs the Milk Quality Improvement Program. Research in her laboratory is currently funded by the National Institutes of Health and the USDA National Research Initiative. Professor Boor is a Fellow of the American Academy of Microbiology and has received numerous awards for her research and extension accomplishments, including the DeLaval Dairy Extension Award and the Foundation Scholar Award from the American Dairy Science Association, the Samuel Cate Prescott Award from the Institute of Food Technologists, and the William V. Hickey Award for outstanding service in the field of food sanitation from the New York State Association for Food Protection.

ABB Names Enrique Santacana as Region Manager, North America and Head of ABB US

ABB has appointed Enrique Santacana as region manager, ABB North America and president and CEO of ABB Inc. USA, effective July 1, 2007. He replaces Dinesh Paliwal, who left ABB at the end of June. Mr. Santacana will continue to be based in Norwalk, CT.

Most recently, Mr. Santacana was ABB's region division manager for Power Products in North America. The $2 billion USD business develops, manufactures and sells products and services used in the electrical power industry.

A member of the North American Executive Committee, Mr. Santacana has made a significant contribution to the turnaround in

ABB's business performance and culture change across the region. He first joined ABB in 1977 and has held a number of different positions in the USA.

Previously, Mr. Santacana served as head of ABB's Power Technologies Division in North America. Additional positions held with ABB include vice president and general manager, medium-voltage products, vice president and director of ABB Power T&D Company's Electric Systems Technology Institute and vice president and general manager of the ABB Power T&D Company's electric metering and control business unit.

Mr. Santacana holds a bachelor's of science degree in electrical engineering from the University of Puerto Rico, a master's of engineering degree in electric power engineering from Rensselaer Polytechnic Institute, and a master's of business administration degree from Duke University.

The Postharvest Technology Research and Information Center at the University of California, Davis, Selects Jim Gorny as Executive Director

The Postharvest Technology Research and Information Center at the University of California–Davis, has selected Dr. James R. Gorny, senior vice president of food safety and technology for the United Fresh Produce Association and former vice president of Technical and Regulatory Affairs for the International Fresh-cut Produce Association, to join the center in the new position of executive director.

"Dr. Gorny is one of the most respected technical leaders in the produce industry and postharvest academic community and we are fortunate to add him to our team to significantly expand the center's established outreach programs," said the center's faculty director Jim Thompson. Mr. Gorny will lead the center's internationally recognized efforts in providing technical information and knowledge to all sectors of the postharvest value chain regarding means of maintaining the quality, safety and marketability of fresh fruits, vegetables and ornamentals. Mr. Gorny and the center's scientists anticipate working collaboratively with the new Center for Produce Safety being established at UC Davis.

"Earlier this year, the Postharvest Technology Research and Information Center's faculty members all agreed that continued growth and success of the center would demand that we devote greater talent and resources to the center in the form of a full-time executive director and that's where Jim's leadership can take us," said Mr. Thompson, a cooperative extension postharvest specialist and faculty member in the Department of Biological and Agricultural Engineering at UC Davis.

Mr. Gorny will work directly with cooperative extension specialists and advisors and faculty members from the University of California and other leading academic institutions; international, national, and regional trade associations and boards; and retail and food service companies to assist them in improving postharvest handling practices throughout the distribution chain.

The center's goals are to (1) effectively and efficiently communicate information and knowledge, (2) foster collaboration among center members; the fruit, vegetable and ornamental industries; and other academic and government institutions, and (3) be internationally recognized as the primary resource for information on maintaining the quality, safety and marketability of produce and related commodities. The center is part of the College of Agricultural and Environmental Sciences at UC Davis and receives support from the UC Agriculture and Natural Resources division.

Mr. Gorny currently serves as senior vice president of food safety and technology for the United Fresh Produce Association. As the association's chief food safety officer, he has advocated the membership's interests before health and safety regulatory officials, the Bush administration, and Congress. Previously, he was a principal in Davis Fresh Technologies, serving in a consulting and advisory role to the produce industry in a wide range of postharvest technology applications. Mr. Gorny, a native of Buffalo, NY, received his Ph.D. in plant biology from the University of California–Davis, in 1995, and his master's and undergraduate degrees in food science from Louisiana State University. He began his new position August 1, 2007.

Nice-Pak Products, Inc. Appoints John Inwright as Executive Vice President, Commerical Division

Nice-Pak Products, Inc. is pleased to announce that John Inwright has joined the company as executive vice president for the commercial division. Mr. Inwright brings over 30 years of operational and supply chain experience in the foodservice and hospitality industries.

Mr. Inwright previously worked at US Foodservice as chief procurement officer for Monarch Foods. He held leadership positions at Unified Foodservice Purchasing Cooperative, LLC, the exclusive purchasing and supply chain organization for Yum! Brands and its franchisees, including KFC, Taco Bell, and Pizza Hut.

UPDATES

"John is well respected throughout the restaurant industry and we are very excited that he has joined the Nice-Pak team," says Zachary Julius, president of Nice-Pak Professional Group. "His background as a foodservice executive in the restaurant operations, and distribution environments makes him uniquely qualified to accelerate the growth of our commercial division."

"After many years as a Nice-Pak customer, I am very excited to join this organization. I look forward to working with the Nice-Pak team in their efforts to further their leadership position," Mr. Inwright states.

Gainco Appoints Joseph Cowman as New Vice President and General Manager

Gainco, Inc., a manufacturer of scales, automated sorting and other yield enhancement systems for the meat, poultry and food processing industries, announces that Joseph Cowman has joined the company as vice president and general manager. In this position, Mr. Cowman is responsible for all activities pertaining to day-to-day company management and P&L accountability, as well as being part of Gainco's strategic management team.

Mr. Cowman brings nearly 25 years of progressive technical and managerial experience to his new post. Prior to joining Gainco, he was director of operations at Ross Industries, a manufacturer of meat tenderizers and other food processing equipment, where he was responsible for all manufacturing operations including production and inventory control, purchasing, machining, fabrication, assembly and quality control. He was also a member of the company's executive committee. Earlier, Mr. Cowman held progressive managerial positions in engineering and manufacturing at National Instrument Company, a manufacturer of filling systems for the pharmaceutical, cosmetics, chemical and food processing industries.

Mr. Cowman holds bachelor and master degrees in mechanical engineering from Johns Hopkins University, as well as an M.B.A. degree from the University of Baltimore.

Dr. Gregory Siragusa Joins Agtech Products

Gregory Siragusa, Ph.D. has joined Agtech Products, Inc. as director of poultry research. His duties include leading and coordinating research to develop new direct-fed microbial supplements for poultry diets.

Dr. Siragusa brings to Agtech Products over 21 years of microbiological research experience. Dr. Siragusa was a research microbiologist and lead scientist with the Agricultural Research Service (ARS) of the USDA at the US Meat Animal Research Center in Clay Center, NE. Most recently, Dr. Siragusa worked at the Poultry Microbiological Safety Unit Russell Research Center in Athens, GA. His scientific experience includes intestinal microbial ecology of poultry as well as both pre and post harvest food safety research. Dr. Siragusa is an active member of the International Association for Food Protection (IAFP), the American Society of Microbiology (ASM), and the Society for Applied Microbiology (SFAM).

Grace Hall to Retire from the Florida Department of Agriculture and Consumer Services

Mrs. Grace Hall, biological administrator II for the Bureau of Food Laboratories, Division of Food Safety, Florida Department of Agriculture and Consumer Services, will be retiring after 21 years of hard work and dedication to food safety in the state of Florida. She joined FDACS after moving to the United States from Jamaica, where she began her career as a pharmacist, moving to the microbiology laboratory as scientific officer and head, then becoming head of the food science and agricultural commodities department, and going on to be director of trade intelligence. Grace was the USDA-AMS microbiological data program (MDP) technical program manager for the State of Florida Department of Agriculture, and served as chair for the technical advisory committee for MDP.

Grace has been a nine-year member of IAFP, constantly contributing her expertise to the Applied Laboratory Methods Professional Development Group.

The Applied Laboratory Methods PDG is grateful for her commitment to the advancement of food safety and would like to recognize her efforts and wish her all the best for a rewarding retirement!

NEWS

Silliker Accredited to Certify Suppliers Under FMI's Safe Quality Food Program

Silliker Global Certification Services (SGCS), a food safety training and auditing company has been accredited as a certification body for the Safe Quality Food (SQF) Program of the Food Marketing Institute (FMI).

Silliker joins a handful of companies with the expertise and resources to audit suppliers and certify that they meet the rigorous standards of the SQF 1000 Code for growers, ranchers, and other primary producers of food and ingredients, and the SQF 2000 Code of processors.

The company can perform SQF audits throughout North America, Australia, China and New Zealand. Under its licensing agreement with SQF, Silliker will expand the countries covered in the near future. The SQF Program has issued more than 5,000 certificates to producers, manufacturers and processors in 20 countries.

"The SQF Program is making significant contributions to food safety and quality throughout the international retail supply chain," said Rena Pierami, Silliker division vice president of technical services. "We're very pleased to become a part of this highly respected and imporant program."

"Silliker brings extensive experience, food science knowledge and auditing discipline to the SQF Program at a critical time for the industry. More retailers worldwide are requiring their suppliers to be SQF-certified, and Silliker will enable us to meet this demand," said SQF Institute executive director Paul Ryan.

The Safe Quality Food Program is a fully integrated food safety and quality management program designed specifically for the food industry. SQF certification provides an independent and external validation that a product complies with international and regulatory standards, as well as specified criteria in SQF standards. Moreover, suppliers can provide further assurance that products have produced, prepared and handled according to the highest possible standards.

Owned and operated by the Food Marketing Institute, the SQF Program is managed by the Safe Quality Food Institute. Launced in 1994, the program is recognized by the Global Food Safety Initiative, a group of major international retailers committed to strengthening consumer confidence in the food sold by retail outlets.

3-A SSI Announces Accreditation Exam for Expanded Inspection Programs

Applications are now available from 3-A Sanitary Standards, Inc. (3-A SSI) for candidates interested in obtaining certification as a 3-A SSI Certified Conformance Evaluator (CCE). Individuals who meet application requirements will be eligible to sit for the accreditation exam on October 25, 2007 at the Worldwide Food Expo 2007 in Chicago, IL.

The CCE designation is required for those wishing to conduct Third Party Verification (TPV) inspections of dairy and food processing equipment covered by 3-A Sanitary Standards. Instituted in 2003, the TPV is required for equipment manufacturers or used equipment resellers to obtain or renew a 3-A Symbol. The TPV requirement was implemented to verify conformance to 3-A Sanitary Standards for sanitary equipment design, fabrication and construction materials. 3-A SSI anticipates expansion of the independent, third party inspection program later this year with the announcement of re-inspection requirements for 3-A Symbol holders, a new voluntary inspection program for most types of systems covered by a 3-A Accepted Practice, and the introduction of another new voluntary inspection certificate program for replacement parts.

The new CCE application form and complete details on 3-A SSI inspection program requirements can be obtained on the 3-A SSI Web site at www.3-a.org under News & Events, Current Press Releases, or follow link to: www.3-a.org/news/releases/6-29-07_expandinspect.htm>.

Complete CCE application packages must be received by 3-A SSI no later than Friday, September 7, 2007. Candidates meeting the application requirements will be eligible to sit for the accreditation exam scheduled for Thursday, October 25, 2007 at the Worldwide Food Expo 2007 in Chicago, IL.

Candidates passing the written exam will be eligible to become a CCE. For more details, contact Tim Rugh at 703.790.0295 or by E-mail at trugh@3-a.org.

EFSA and FDA Strengthen Cooperation in Food Safety Science

The European Food Safety Authority (EFSA) and the US Food and Drug Administra-

tion (FDA) have signed the first US/European agreement in the area of assessing food safety risk. This is the first formal international cooperation agreement EFSA has signed and the first formal step in cooperation between the two bodies.

"I am delighted to be signing this agreement with the FDA. Food safety knows no national boundaries and the food chain is today truly a global one. We need to work with the best scientific minds from across the world and extend scientific cooperation to assess food safety risks and protect consumers even more. Sharing data and knowledge across our two organizations is an important first step in achieving this goal," said Catherine Geslain-Lanéelle, EFSA's executive director.

"As a science-based and science-led agency, FDA recognizes that scientific cooperation is vital for the success of its mission, which is to provide the best possible health protection for the public," said Andrew C. von Eschenbach, M.D., commissioner, food and drugs. "I welcome this opportunity for scientific exchanges with our European colleagues – exchanges that will be focused on ensuring the safety and wholesomeness of food, a major area of responsibility of our agency."

The agreement is designed to facilitate the sharing of confidential scientific and other information between EFSA and the FDA, such as methodologies to ensure that food is safe. A formal agreement ensures appropriate protection of such confidential information under the applicable legal frameworks in both the United States and the European Union. Informal cooperation and dialogue have already been established between the two bodies; this agreement will enable these to be formalized and extended. The Authority will be looking to develop similar working arrangements with other authorities worldwide in the coming years.

More Inspections Won't Stop Food Contamination

Eliminating outbreaks of foodborne illness is possible but it won't happen by increasing inspections alone, say food safety experts in the latest Quarterly Quality Report from the American Society for Quality (ASQ). The answer, the report finds, is in prevention.

"The problem is that we can't inspect the defect out of the product," says Steve Wilson, chief quality officer for the US Commerce Department and ASQ board member. That's because more than half of reported foodborne outbreaks cannot be attributed to any specific microorganism by current diagnostic methods, according to the Centers for Disease Control (CDC). "Since we each can't have our own food tasters – like the medieval nobles did – our best option is to take more proactive steps in earlier stages of food production," notes Wilson. Other experts agree.

Key trends are pushing the industry toward a more preventative approach to food safety, according to John Surak, a food safety consultant and member of ASQ's Food, Drug and Cosmetic Division who works with major food manufacturers around the US.

"Consolidation of food processing to fewer plants with increased output has guaranteed that if you're going to have a glitch, it's going to be a big one," says Mr. Surak. "More health-conscious consumers demanding ready-to-eat fresh fruits and veggies year-round also increase pressure for the industry to look at new ways to grow, harvest and process safe produce."

What preventative steps can the industry take to reduce risks? Participating in good quality practices is one solution, according to Janet Raddatz, vice president of quality and food safety systems at Sargento Foods. Sargento uses good manufacturing practices (GMP) and HACCP (Hazard Analysis Critical Control Point), a quality system that controls potential physical, chemical and microbial hazards in food production.

"We've voluntarily applied these systems because they make good sense," says Raddatz. "FDA isn't requiring anyone to do it – we're policing ourselves."

ASQ's quality report identifies other high-impact actions that experts say can make a major difference including:

1. Reinforce Maintenance Procedures. Constant reinforcement of personnel training and hygiene practices, cleaning sanitation and maintenance, effective recall programs, provisions for safe water supply and product handling are all essential.
2. Emphasize Consumer Education. Improper food handling at home and at retail food establishments accounts for more reported cases of foodborne illness than does failure at the processing level.
3. Strengthen Regulatory Agencies in High Risk Areas. In today's world where deliberate contamination of food is a very real threat, it's important for our nation's regulatory agencies to increase protections against this type of potential disaster as well as accidental contamination.
4. Increased Diligence by Food Companies. The recent sickening of pets from toxic ingredients blended into pet foods was more a failure of corporate supplier quality programs than a failure of regulatory systems.

5. More effective inspection
   - not more inspection. Inspection resources are limited and need to be targeted where they are needed most. Food producers and processors
   - domestic and foreign
   - that don't comply with federal standards and those dealing with higher-risk food should receive closer evaluation.

Please visit http://www.asq.org/quality-report/reports/200706.html to view the complete Quality Report.

Codex Adopts New Food Safety and Quality Standards

The Codex Alimentarius Commission (CAC) has adopted 44 new and amended food standards and set up a comprehensive set of risk analysis principles to help governments establish their own standards, especially for food items that are not covered by Codex standards.

Codex food safety standards are developed using scientific advice from FAO/WHO expert committees that enables the rigorous standard setting procedures within Codex. According to Dr. Kazuaki Miyagishima, Secretary of the Codex Alimentarius Commission, "This is why Codex standards are so successful globally and the reason they hare recognized by the World Trade Organization (WTO) Sanitary and Phytosanitary Agreement."

"Because governments often adopt Codex Standards into their national legislation and sometimes even see the need for additional measures in areas not covered by Codex guidance, it is important that the extra safety measures are taken using the same rigorous and internationally recognized principles, not only to protect consumers, but to ensure they are consistent with multilateral trade rules" explained Dr. Miyagishima.

FAO and WHO welcomed the move of the Codex Commission to look for methods to prevent antimicrobial resistance in bacteria in food. FAO and WHO are ready to support Codex in areas such as the use of nanotechnology and the risk-benefit assessment of fish consumption.

To raise the necessary funding to conduct this new work the two Organizations launched the Global Initiative for Food related Scientific Advice (GIFSA) in an effort to encourage donors and civil society to support such international scientific investigations.

The Codex meeting decided to develop additional guidelines to lower the frequency of *Salmonella* and *Campylobacter* in chicken. Together these two bacteria cause a significant proportion of foodborne diseases all over the world. Finding efficient ways of dealing with this problem from farm to table could result in the prevention of hundreds of thousands of foodborne disease cases every year.

This year's Codex gathering was attended by 133 countries, the highest number ever to attend an annual Commission meeting.

This year for the first time, two emerging developing countries, Brazil and Malaysia said they intend to contribute to the Codex Trust fund, which assists developing countries to participate in Codex meetings. Currently, around 250 participants from developing countries receive assistance to attend a broad variety of Codex meetings. Brazil and Malaysia's contribution is the first example of countries with developing economies pledging development support to other countries in the food safety area.

"Hopefully this example will lead several more major emerging economies to follow suit enabling a more efficient global food safety system," said Dr. Jorgen Schlundt of WHO.

Many developing countries, particularly countries in Africa, have asked FAO, WHO and donor countries to step up technical assistance programs for them. These countries need help to improve their food production, processing and distribution systems in order to meet Codex requirements and to help them develop their capacity to participate more regularly and effectively in Codex work.

This year's Codex meeting adopted several important new codes and standards, including:

A code that would prevent or reduce Ochratoxin A contamination in wines across the production chain (Ochratoxin A is a mycotoxin known to be toxic to the kidneys);

A revised standard for infant formula and formulas for special medical purposes that is expected to help save many infant lives worldwide; and a revised code of hygienic practice for eggs and egg products that will protect consumers from disease-causing bacteria such as *Salmonella* Enteritidis and make international trade in eggs and egg products safer.

Next year the Codex Alimentarius Commission will convene on 30 June in Geneva, Switzerland.

FSIS Publishes Final Rule Prohibiting Processing of "Downer" Cattle

The US Department of Agriculture's Food Safety and Inspection Service (FSIS) has announced a permanent prohibition on the slaughter of cattle that are unable to stand or walk ("downer" cattle) when presented for pre-slaughter inspection. The inability

to stand or walk can be a clinical sign of Bovine Spongiform Encephalopathy (BSE).

Under the rule, cattle that are injured after they pass pre-slaughter inspection will be re-evaluated to determine their eligibility for slaughter. Veal calves that cannot stand because they are tired or cold may be set apart and held for treatment and re-inspection.

The rule published in the July 13 Federal Register makes permanent what had been an interim final rule prohibiting slaughter of non-ambulatory cattle in the United States. The final rule becomes effective October 1, 2007.

"This final rule further strengthens our public health controls at slaughter plants across the United States," said USDA Under Secretary for Food Safety Dr. Richard Raymond. "Less than three weeks after the December 2003 BSE detection in an imported cow, USDA moved quickly and decisively to put in place interim rules that greatly reduced the risk of human exposure. Experience has borne-out that these interim steps were correct and should be made permanent."

On Jan. 12, 2004, FSIS issued a series of three interim final rules in response to the first BSE diagnosis on Dec. 23, 2003. Those rules had prohibited for human consumption non-ambulatory "downer" cattle and cattle tissue identified as specified risk materials (SRMs); banned the use of high pressure stunning devices that could drive SRM tissue into the meat; and established requirements for Advanced Meat Recovery systems.

The rule requires that spinal cord must be removed from cattle 30 months of age and older at the place of slaughter. It also mandates that records must be maintained when beef products containing SRMs are moved from one federally inspected establishment to another for further processing.

Countries that have received the internationally recognized BSE status of "negligible risk" are not required to remove SRMs because their system controls prevent the introduction and spread of BSE.

FSIS will conduct outreach sessions with industry to ensure that the provisions of the final rule are fully understood by all affected establishments.

Salmonella Control Consultation Announced

Defra has launched a consultation on the implementation of a National Control Program for *Salmonella* in poultry laying flocks.

Salmonella is a common cause of food poisoning and can cause serious illness in humans. The aim of the program is to reduce the levels of the two most important types of *Salmonella* for human health, *Salmonella* Enteritidis (SE) and *Salmonella* Typhimurium (ST).

Current UK levels are among the lowest in Europe, with *Salmonella* Enteritidis or *Salmonella* Typhimurium present on 8% of holdings with laying flocks.

The UK has been set a target to reduce these two types of *Salmonella* by 10% each year for the next three years. The program sets out how this will be achieved and includes mandatory sampling and testing requirements to demonstrate progress towards this target.

In 2009, additional measures will also come into force for premises where either type of *Salmonella* has been found. Eggs from flocks confirmed to be infected will not be permitted to be sent for human consumption unless they have been heat-treated to guarantee the elimination of *Salmonella* of human health significance.

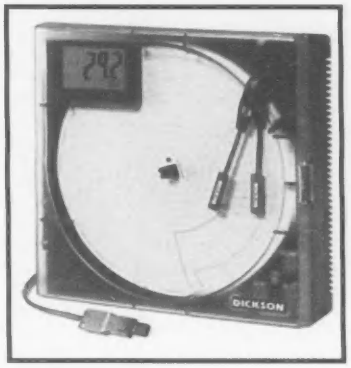
The launched consultation seeks views on how this National Control Program should be implemented.

The UK's chief veterinary officer, Debby Reynolds, said: "*Salmonella* in flocks is already low in the UK and our national control. Program will be a key step forward in achieving even greater reductions, with the support of the poultry industry which has already made excellent progress reducing *Salmonella* through voluntary programs."

The consultation documents can be viewed at www.defra.gov.uk/corporate/consult/ncp-laying-flocks/index.htm.

www.foodprotection.org

INDUSTRY PRODUCTS



Dickson Instruments

Next Time You Recalibrate Your Dickson Instrument Why Not Get a "Before" Reading with the N550

A drug your company manufactures is suspected of causing a rash of untimely deaths. A recall is initiated, an FDA investigation is launched, and personal injury attorneys start readying their suits. Every aspect of your operation goes under the microscope, so to speak, and that's when you learn that your plant's 'rigorous' quality control protocols for compliance (FDA GMP and 21 CFR Part 11) were not that 'rigorous' after all.

A glaring example is in the case of instrument calibrations, and in understanding why "before" data is needed to make your company not only FDA-compliant but also relatively immune from negligence suits.

The crux of the issue is whether you can demonstrate that the instruments you use for pharmaceutical processing are accurate, a requirement of FDA 21 CFR Part 11, and GMP guidelines. As most know, temperature and humidity data loggers and chart recorders need to be recalibrated periodically to ensure this accuracy, and competent quality managers need to establish schedules for recalibrations that reflect due diligence to monitor that temperatures and humidity are kept within acceptable and pre-defined tolerances.

But "recalibration" can mean different things, and what could be termed "recalibration on the cheap" does NOT demonstrate the accuracy of your recorded data (instruments).

Dickson Instruments
Addison, IL
800.323.2448
www.DicksonData.com

Bio-Rad's RAPID'*Salmonella* Agar Granted Performance-tested Method Status by AOAC Research Institute

RAPID'*Salmonella* agar, manufactured by Bio-Rad Laboratories, was granted Performance Tested Method status by the AOAC Research Institute (certificate # 050701). RAPID'*Salmonella* is a medium for isolation and identification of *Salmonella* spp. in selected foods. It is a rapid method producing accurate and easy-to-read results. A shortened enrichment time (30 h) was validated against standard reference methods (48 h).

RAPID'*Salmonella* is a selective and differential medium for both the isolation and the presumptive identification of *Salmonella* species, including lactose-positive *Salmonella*, *S. typhi* and *S. paratyphi* serotypes, from other members of the family *Enterobacteriaceae*. The cultural properties of the medium are a balance of carefully selected growth-promoting nutrients and classical selective ingredients (citrate, surfactants). The presumptive chromogenic identification system relies on a proprietary chromogenic substrate that allows the detection of the *Salmonella* C8-esterase activity. The color of the uninoculated agar is clear to whitish. All the presumptive *Salmonella* positive colonies are magenta on a clear-white agar background. A second chromogenic substrate, targeting activity of many interfering bacteria, yield blue-colored colonies. Background flora, if not inhibited by the mixture of selective agents, can produce violet to green or colorless colonies.

RAPID'*Salmonella* is available in two formats, dehydrated media (Item # 356-4705) or prepared plates (Item # 356-3961).

Bio-Rad Laboratories, Inc.
800.4BIORAD
Hercules, CA
www.foodscience.biorad.com

Redefine Spring Cleaning with Nilfisk-Advance America's 08 Series Vacuums: The Ultimate Workhorse

When it comes to the food industry, hygiene and sanitation are of paramount importance. QA and plant managers need a dependable solution for keeping contaminants out of their plants and product, and in 2005 Nilfisk-Advance America gave food manufacturers the ultimate workhorse—the 08 Series vacuum, a high-performance,

durable, easy-to-maintain vacuum, engineered to make the food manufacturing process more productive.

The three-phase 08 series, which includes the CFM 3308, CFM 3508, CFM 3508W, and CFM 3558, gives users the cleaning muscle they need for continuous duty applications, effectively collecting and retaining contaminants such as dust, bacteria, food scraps, and more. Designed to meet customers' needs, the 08 vacs are ideal for process-integration systems, central systems or for general maintenance, and are more accessible, adaptable, transportable and comfortable to operate, with the following features:

Nilfisk's efficient graduated filtration system with HEPA and optional ULPA filters that trap up to 99.999% of all ultra-fine particles, preventing cross contamination and improving employee health concerns. Optional downstream (after the motor) HEPA/ULPA filters can also be strategically positioned in the exhaust chamber preventing dust and debris from being released back into the environment. An ergonomic filter shaker that allows the user to safely purge filters to prevent clogging and downtime. Reverse purge and electric filter shakers are also available.

Despite being the ultimate workhorse, all of the 08 vacs have a portable design; equipped with extra-large wheels and a wrap-around handle; users can push, pull, or maneuver the vacuum with ease. The 08 series is quieter than ever, with a sound suppressor that reduces the speed of the exhaust air and muffles the sounds for increased worker comfort and safety.

In addition, the modular CFM 08 Series vacuums can be customized based on the type of materials being collected (i.e., fine dust/powders, debris, toxic materials, liquids, etc.) using hundreds of interchangeable CFM accessories, hoses, and filters—including those for overhead cleaning. The modular attachments are compatible with all CFM vacuums, allowing users to swap in what they need without searching for the attachments that match a particular vacuum – or investing in multiple sets of tools.

Nilfisk-Advance America, Inc.
610.232.5469
Malvern, PA
www.pa.nilfisk-advance.com

Agion Technologies and Agpolymer Introduce Antimicrobial Cheese Coating Polymers

Although some types of cheese feature mold as part of their appeal, for the most part people don't want cheese covered with mold. When microbes compromise dairy products, your nose is the first to know. Opening a refrigerator that contains moldy cheese products can be a traumatic experience. This is precisely why Agion Technologies Inc., a provider of silver-based antimicrobial solutions, announced that it has partnered with AgPOLYMER to incorporate its natural, antimicrobial technology into cheese coatings to inhibit the growth of mold and bacteria in the waxy case. Agion offers the only naturally safe antimicrobial approved for food processing and food service on the market today. Cheese lovers can now rejoice as Agion's antimicrobial technology has effectively created self-cleaning surfaces for cheese coatings to make sure microbes are controlled, thus avoiding any traumatic smell experiences your nose could encounter.

"Our partnership with Agion is allowing us to transform the way in which dairy products can be better protected utilizing antimicrobial technology," said Vittorio Capra, president of AgPOLYMER. "Our experience in creating cheese coating polymers coupled with Agion's unique technology gives us the platform we need to introduce the first antimicrobial cheese coating to the market."

There is a growing demand from consumers for manufactures to introduce new ways to protect food products packages that are highly susceptible to the growth of microbes. AgPOLYMER is striving to offer the latest in antimicrobial technology in its products to prevent the growth of bacteria and mold, by protecting the cheese coating surface. The silver-ion zeolite is directly incorporated into the polymer and then the coating is applied to the cheese.

"Agion continues to deliver advanced antimicrobial solutions for industries where the introduction of antimicrobial technology can be used to enhance product quality" stated Ginger Merritt, vice president of sales and marketing for Agion Technologies. "We were able to partner with AgPOLYMER to address specific needs that will allow them to market a unique product to the European dairy industry."

Agion antimicrobials are registered with the EPA for use in food processing facilities and approved by the EPA and FDA for food contact

Be sure to mention, "I read about it in *Food Protection Trends*!"

surfaces. The antimicrobials are also EFSA-registered and approved under the European Biocidal Products Directive (BPD). Agion's antimicrobial is included on the USDA list of non-food compounds for food processing plants, as maintained by NSF. The Agion products have NSF 51 Certification for food processing and food service equipment as well as NSF Standard 42 approval for the incorporation of the technology into carbon block water filter systems.

Agion Technologies, Inc.
508.366.2099
Wakefield, MA
www.agion-tech.com

Accufill™ Quad-Batching System from Gainco Provides High-speed Operation, Superior Accuracy, and Labor Savings

The new AccuFill™ Quad-Batching System from Gainco, Inc. provides the most efficient, high-speed way to collect and group meat, poultry and other food items for downstream handling such as bagging or boxing. The system combines superior weighing accuracy with efficiency improvements, resulting in significant labor reductions and a more streamlined process.

Suitable for processing whole muscle meat as well as further processed products, the AccuFill™ Quad-Batching System collects, weighs, batches and, optionally, counts four separate streams of incoming product. The finished batches are then indexed to any one of several downstream processes such as bulk packaging or bagging to a vertical form-fill-and-seal system.

Gainco's AccuFill™ Quad-Batching System offers many benefits to food processors. Logistics and process efficiencies are improved, while labor savings of six to eight full-time employees in a double-shift operation are attainable. The labor savings alone enables the system to deliver an ROI of less than 12 months.

The AccuFill™ Quad-Batching System features Gainco's own Infiniti™ Plus programmable controller which identifies, prioritizes, batches, indexes and confirms the type, weight and count of products being batched at any given moment. The Infiniti™ weight indicator provides protection against washdown water and condensation due to a highly durable polymeric housing that protects the weighing apparatus equally well in cold work environments and during hot washdowns and high-pressure washing. Likewise, the housing is impervious to the harsh chemicals typically used in washdown procedures in meat, poultry and seafood processing environments, and third-party tests demonstrate that the unit's performance meets the stringent IP69K washdown standard.

AccuFill™ Quad-Batching Systems from Gainco carry a one-year limited warranty covering the weighing components, while the Infiniti™ Plus programmable controller carries a two-year warranty on parts. Through its Blue Ribbon Service subsidiary, Gainco offers expert 24-hour, 7-day service on batching systems, weighing equipment, distribution systems, and software support. Service is conducted by Blue Ribbon Service's certified, factory-trained technicians, and all service work is guaranteed.

Gainco, Inc.
770.534.0703
Gainesville, GA
www.gainco.com

PEF Pasteurization Laboratory Unit for Process Development and Microbiological Trials

A new Pulsed Electric Field (PEF) laboratory unit for performing process development testing with liquefied food products is being introduced by Diversified Technologies, Inc. of Bedford, Massachusetts.

Diversified Technologies' PEF Pasteurization Lab Unit is a non-thermal, all solid-state system which passes juices and liquefied dairy products through a chamber and subjects them to brief pulses of very high voltage, resulting in >5 log kill. Unlike heat processing, PEF pasteurization does not alter their flavor.

Featuring a 300 l/h capacity, with 25 kV, 25 kW power levels, Diversified Technologies' PEF Pasteurization Lab Unit lets research laboratories conduct a wide range of process development studies. Scalable to production environments with up 10,000 l/h throughput, PEF systems require much less energy to operate than heat processing.

Diversified Technologies, Inc.
781.275.9444
Bedford, MA
www.divtecs.com

OEMs and Panel Builders Buy Only What They Need Via ABB's Expanded ACS800-U4 Drive Modules Introduction

Via ABB's expanded ACS800-U4 drive modules line, panel builders, system integrators and OEMs can buy exactly the parts they need to build motor-control units for end users. The drive module line has been expanded to include R2 – R6 frame sizes, which include a range of 1 – 200 horsepower. R7 and R8

frame sizes, already introduced to the market, expand the total module range to 600 hp. All modules are offered in 480Vac, and also available in 230Vac and 690Vac configurations.

The modules, built with IP20 protection, are ideal for installation into enclosures. "These modules are based on the ACS800-U1 standard drives that ABB offers," noted Michael Vallier, product line manager – ABB LV Drives, "but these exclude the drive cover, conduit box, keypad, keypad mounting, and documentation. This allows the OEM and system integrator to buy only what they need – and no more."

The modules also are tremendously compact. The R6, 200Hp unit, with a 254A rating, "is the smallest 200 Hp drive on the market, bar none," said Vallier. ABB offers the module drives exclusively in the IP20 package, with a standard IP54 power structure in support of flange mounting.

Flange mounting kits for the drive modules, frame size R2 – R6, are available, too. This allows the power structure (heat sink) of the drives to be installed outside the enclosure – with the drive's electronics protected inside the enclosure.

"This entire line focuses on providing volume machine and panel builders, and system integrators, tremendous efficiencies," said Vallier. "These are the critical motor-control components needed, without any extras to add cost or waste. The module drives can be incorporated very easily into a host of their machine designs."

ABB
262.785.3590
New Berlin, WI
www.us.abb.com

Consumer Safety At-risk Contamination Issues Raise Security Questions from KURZ Transfer Products, L.P.

Product tampering at the retail level is growing at more than 13 percent each year, and consumers are at risk. With the recent buzz surrounding contaminated goods, including over-the-counter medications, pet foods and toothpaste, the question of consumer safety looms large. In response to this burgeoning problem, KURZ Transfer Products, L.P. (KTP) offers distinctive solutions utilizing its proprietary TRUSTSEAL® technology.

TRUSTSEAL is a robust and versatile non-holographic optically variable device (OVD) featuring overt, covert and forensic solutions. Through the use of TRUSTSEAL, consumers are assured they are purchasing genuine products, virtually eliminating the risk of inadvertently buying a fraudulent copy.

Alex Lewis, area sales manager for KURZ said, "Directly related to product security is consumer safety as fraudulent and tampered-with goods can create serious issues. In the worst cases, health and lives are put at risk; at the very least, it erodes consumer confidence and tarnishes manufacturers' reputations."

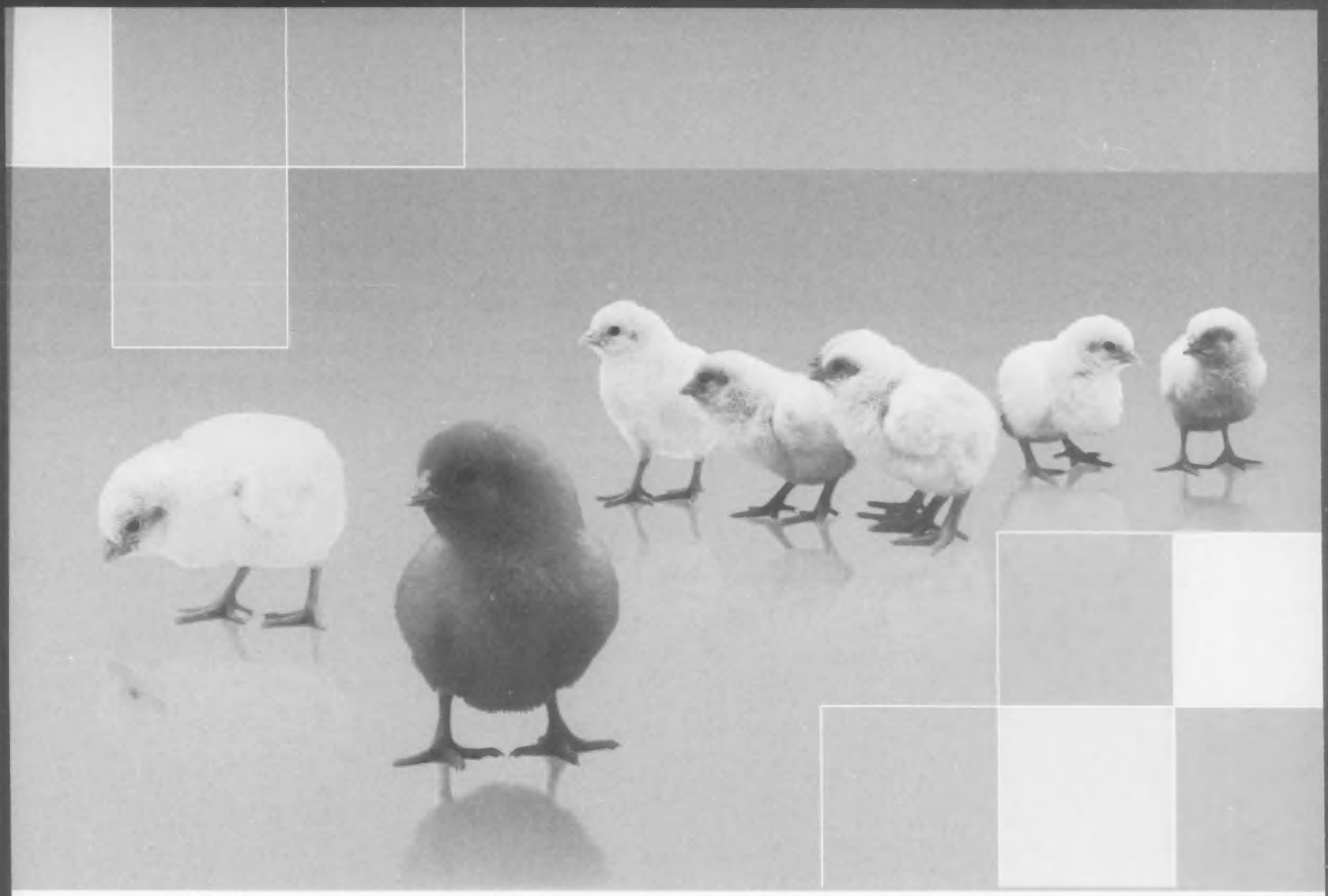
To combat the problem, corporations must acknowledge that any product can be counterfeited, imitated, or altered if no security measures are in place to protect them. The best security initiatives employ features that are difficult to reproduce yet are easily recognizable to the consumer.

Thanks to proprietary equipment, materials and technology, KURZ's TRUSTSEAL is virtually impossible to reproduce. Sophisticated optical techniques are incorporated into computer-controlled graphic elements integrated into KURZ foils.

"It is one of the most effective solutions on the market today for maintaining the integrity of a product," Lewis concluded.

The TRUSTSEAL technology can be applied directly onto a product or its packaging via hot and cold transfer foil, or as a tamper-evident closure or tamper-proof seal. It incorporates overt, covert and/or forensic security levels and can include hidden images and/or nanotext, serial numbers, tamper indicators, machine readability and more.

KURZ Transfer Products, L.P.
800.950.3645
Charlotte, NC
www.kurzusa.com



The Difference Is Clear

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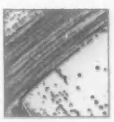
Whether you are testing for *Listeria* spp., *Listeria monocytogenes,* generic *E. coli*/other coliforms, *Staphylococcus aureus*, *Salmonella,* or *E. coli* O157:H7, Bio-Rad has a RAPID'chromogenic medium to fit your needs.

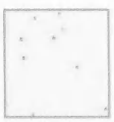
- Rapid protocols offer decreased time to results over standard methods
- Differentiation with easy-to-read color change reactions
- High sensitivity and specificity validated by AOAC-RI*
- Complete solutions for all your food safety testing needs
- Rapid method at a traditional price

* Some validations are pending. To check validation status, visit us on the Web.


RAPID'*L.mono*


RAPID'*Salmonella*


RAPID'*Listeria* spp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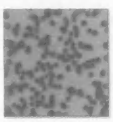
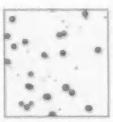

RAPID'*E.coli* O157:H7


RAPID'*E.coli* 2

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Call toll free at 1-800-4BIORAD (1-800-424-6723)
Outside the US, contact your local sales office

BIO-RAD

COMING EVENTS

SEPTEMBER

- **11–12, GMA/FPA Advanced HACCP: Verification and Validation Workshop,** GMA/FPA Conference Center, Washington, D.C. For more information, contact Jenny Scott at 202.639.5985 or go to http://www.fpa-food.org/content/FSW.asp.
- **11–12, Meat & Poultry HACCP Accredited Workshop,** University of Georgia Food Science, UGA Campus, Athens, GA. For more information, contact Marian at 706.542.2574; E-mail: marianw@uga.edu.
- **12, Ohio Association for Food and Environmental Sanitarians Annual Meeting,** Ohio Dept. of Agriculture, Reynoldsburg, OH. For more information, contact Gloria Swick-Brown at 614.466.7760; E-mail: gloria.swick-brown@odh.ohio.gov.
- **12–13, China International Food Safety and Quality Conference and Expo,** The Landmark Tower Hotel, Beijing, China. *Program assistance provided by IAFP.* For more information, go to www.chinafoodsafety.com.
- **16–20, 121st AOAC Annual Meeting and Exposition,** Anaheim, CA. For more information, call 301.924.7077 ext 112, 124, and 146 or go to www.aoac.org/meetings.
- **18–20, New York State Association for Food Protection 84th Annual Conference,** E. Syracuse, NY. For more information, contact Janene Lucia at 607.255.2892; E-mail: jgg3@cornell.edu.
- **19–21, Washington Association for Food Protection Annual Meeting,** Campbell's Resort and Conference Center, Lake Chelan, WA. For more information, contact Stephanie Olmsted at 206.660.4594; E-mail: Stephanie.Olmsted@safeway.com.
- **24–26, Indiana Environmental Health Association Fall Conference,** Radisson Hotel, Merrillville, IN. For more information, contact Pat Minnick at 765.483.4458; E-mail: pminnick@co.boone.in.us.
- **24–27, Dairy Technology Workshop,** Randolph Associates, Inc., Birmingham, AL. For more information, call 205.595.6455; E-mail: Henry.Randolph@raiconsult.com.
- **25–27, Wyoming Environmental Health Association Annual Educational Conference,** Little America Hotel & Resort, Cheyenne, WY. For more information, contact Doug Evans at 307.686.8036; E-mail: devans2@state.wy.us.

OCTOBER

- **2–5, Association of State and Territorial Health Officials,** St. Louis, MO. For more information, call 202.371.9090; E-mail: pjarris@astho.org.
- **3–4, Advanced HACCP for Meat & Poultry Processors Workshop,** University of Georgia Food Science, UGA Campus, Athens, GA. For more information, call 706.542.2574; E-mail: marianw@uga.edu.
- **3–4, Symposium on Current and Innovative Approaches to Microbiological Food Safety Management,** Holiday Inn Atrium Hotel, Singapore. Organized by International Commission on Microbiological Specifications for Foods (ICMSF); co-organized by International Life Sciences Institute (ILSI). For more information, go to www.icmsf-ilsi-symposium2007.com.
- **3–5, Kansas Environmental Health Association 78th Annual Fall Conference,** Hutchinson, KS. For more information, contact Scott Selee at 620.272.0831; E-mail: lepg@sbcglobal.net.
- **7–10, Annual Meeting of the American Association of Cereal Chemists,** San Antonio Convention Center, San Antonio, TX. For more information, go to http://meeting.aaccnet.org.
- **9–11, North Dakota Environmental Health Association Educational Conference,** Bismarck, ND. For more information, contact Debra Larson at 701.328.1291; E-mail: djlarson@state.nd.us.
- **10–11, Associated Illinois Milk, Food and Environmental Sanitarians Annual Meeting,** Stoney Creek Inn, East Peoria, IL. For more information, contact Steve DiVincenzo at 217.785.2439; E-mail: steve.divincenzo@illinois.gov.
- **11, HACCP: Verification and Record Keeping – An Introduction and Review,** Randolph Associates, Inc., Birmingham, AL. For more information, call 205.595.6455; E-mail: Henry.Randolph@raiconsult.com.
- **11–12, GMA/FPA HACCP for Juice and Other Beverages Workshop,** GMA/FPA Conference Center, Washington, D.C. For more information, contact Jenny Scott at 202.639.5985 or go to http://www.fpa-food.org/content/FSW.asp.
- **15–17, 2nd Food Processing Suppliers Association,** Las Vegas Convention Center, Las Vegas, NV. For more information, call 703.761.2600 or go to www.fpsa.com.
- **15–17, GMA/FPA Prerequisite Programs and Sanitary Design Workshop,** Cornell University's Statler Hotel, Ithaca, NY. A workshop to formalize your HACCP foundation. For more information, contact Bob Gravani at 607.255.3262; or go to http://www.fpa-food.org/content/FSW.asp.
- **18, British Columbia Food Protection Association, *Preparing for the Future* Conference,** River Rock Conference Center, Richmond, British Columbia. For more information, contact Terry Peters at 604.666.1080; E-mail: terry_peters@telus.net.
- **18–19, HACCP Essentials Course,** Mississauga, Ontario, Canada. For more information, call 800.247.0802; or go to www.qmi.com.
- **18–19, IAFP 3rd European Symposium,** Sheraton Roma Hotel & Conference Center, Rome, Italy. For more information, call 800.369.6337 or go to www.foodprotection.org.

IAFP UPCOMING MEETINGS

AUGUST 3-6, 2008
Columbus, Ohio

JULY 12-15, 2009
Grapevine, Texas

COMING EVENTS

- **21–24, UWRF 27th Food Microbiology Symposium and Workshop,** *Current Concepts in Foodborne Pathogens and Rapid and Automated Methods in Food Microbiology,* University of Wisconsin-River Falls, River Falls, WI. For more information, call 715.425.3704 or go to www.uwrf.edu/food-science, click on workshops, then the link to the food microbiology symposium.
- **24–27, Worldwide Food Expo,** McCormick Place, Chicago, IL. For more information, call 703.934.5514 or go to www.worldwidefoodexpo.com.

NOVEMBER

- **1–2, Detection Technologies 2007, New Developments in Identification of Microorganisms and Chemicals,** Hilton San Diego Resort, San Diego, CA. For more information, go to www.knowledgepress.com/events/6151420.htm.
- **3–7, APHA 135th Annual Meeting and Expo,** Washington, D.C. For more information, call 202.777.APHA (2742) or go to www.apha.org.
- **6–7, 2nd Annual International Conference for Food Safety/Quality,** San Francisco, CA. For more information, go to www.foodhaccp.com.
- **7–9, The Dairy Practices Council® Annual Conference,** Four Points Sheraton Hotel, Harrisburg, PA. For more information, call 732.203.1947; E-mail: dairypc@dairypc.org.
- **7–9, 2nd SQF International Conference on Food Safety Certification,** Renaissance Nashville Hotel, Nashville, TN. For more information, contact Amanda Bond-Thorley at 202.220.0606 or go to www.fmi.org.
- **8, Ontario Food Protection Association 49th Annual Meeting,** Mississauga Convention Centre, Mississauga, Ontario. For more information, contact Gail Seed at 519.463.5674; E-mail: seed@golden.net.
- **20–21, Scientific Forum "From Safe Food to Healthy Diets,"** EC Charlemagne Building, Brussels. For more information, go to www.efsa.europa.eu.
- **22–23, ISO 22000 Food Safety Essentials,** Mississauga, Ontario, Canada. For more information, call 800.247.0802; or go to www.qmi.com.
- **29–30, ISO 22000 Food Safety Internal Auditor,** Mississauga, Ontario, Canada. For more information, call 800.247.0802; or go to www.qmi.com.

DECEMBER

- **3–5, HTST Workshop, Randolph Associates, Inc.,** Mufreesboro, TN. For more information, call 205.595.6455; E-mail: Henry.Randolph@raiconsult.com.
- **4, British Columbia Food Protection Association Annual Meeting,** River Rock Conference Center, Richmond, British Columbia. For more information, contact Terry Peters at 604.666.1080; E-mail: terry_peters@telus.net.

JANUARY

- **23–25, International Poultry Expo,** Georgia World Congress Center, Atlanta, GA. For more information, call 770.493.9401 or go to www.ipe08.org.

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THOUGHTS
ON TODAY'S FOOD SAFETY...

The Scapegoat for Vegetable Safety

Jeffrey T. LeJeune, D.V.M., Ph.D.
Dept. of Veterinary Preventive Medicine
The Ohio State University
Wooster, OH

In the Judeo-Christian tradition, Aaron, the high priest of Israel, symbolically laid the sins of the people on the head of a goat that was then sent away into the wilderness, thus far removing the transgression of the people from their own hands and transferring the burden of their wrongdoing onto a small ruminant animal.

When it comes to the modern plagues and pestilences caused by the consumption of microbiologically contaminated fresh fruits and vegetables, we frequently are provided a 180 degree change in the perceptive: No longer are problems being carried away on the head of an animal, but rather the genesis of the trouble is all too frequently attributed (correctly or not) to the distal end of the digestive tract of all sorts of animals, including larger domesticated ruminants and even other wild animals such as pigs and birds.

Livestock manure can contain pathogens such as *E. coli* O157, *Salmonella* and *Campylobacter*. Wild birds and other animals can also harbor these pathogens, often without signs of illness or disease. Once deposited into the environment these human pathogens can contaminate waterways and soils. Outbreaks of disease associated with these organisms have, and continue, to occur. The protracted survival of these organisms and the geographic juxtaposition of animal- and plant- agriculture in the US probably exacerbate the potential for such deleterious ramifications. Concerted efforts by poultry and livestock production industries and researchers are being made to reduce the prevalence of pathogens in live animals and their wastes. Engineers are identifying the most effective composting methods. Control of foodborne pathogen carriage and the exclusion of wild animals from fields where foods for human consumption are cultivated pose an even more complex challenge.

The Centers for Disease Control and Prevention estimates 50–66% of foodborne outbreaks, and 23 million illnesses each year in the US are attributed to Norovirus infections. Over half of these infections are considered to be acquired from eating salads, sandwiches or produce. Additionally, numerous outbreaks of Hepatitis A (HAV) have been traced to food handlers and specifically contamination of produce at the time of growing, harvest and processing (Fiore, Hepatitis A transmitted by Food. CID, 2004;38:705-715). Humans alone are responsible for the estimated 18,000 cases of shigellosis each year in the US. Noroviruses, HAV, and *Shigella* spp. are obligate human pathogens. They are never found in food-producing animal nor wildlife. *Cyclospora* is not known to have any alternate host besides humans. Albeit *Shigella* spp. and HAV may also infect non-human primates in addition to people, there are few reports of monkeys and gorillas wandering freely around and working in food-producing centers of the US. These numbers provide clear evidence that human waste is not an uncommon contaminate of foodstuffs in the US and other developed countries.

Given the frequency of human fecal contamination of fruits and vegetables as evidenced by viral contamination, a portion (but unknown amount) of the *E. coli* O157, *Campylobacter* and *Salmonella* that contaminates produce is undoubtedly of human origin. Bacterial contamination of foodborne pathogens should not all be attributed to "animal" contamination.

Although we may not fully understand the underlying mechanisms governing host range of viral pathogens, goats, cows and other animals are not the primary factors responsible for defiling our food supply, but rather the hands of the humans. Until such time that someone develops an expression micro-array that rapidly and non-invasively measures and predicts the potential for individuals to repress or down regulate such phenotypes as ignorance, aversion to hand washing and the use of other proper hygienic practices.

Work such as that presented by Jackson et al. in this publication and by others looking at the adoption of Good Agricultural Practices (GAPs), specifically areas centering around worker hygiene and sanitation is imperative to direct effective research and education strategies. Efforts must be made along the entire farm-to-fork continuum to prevent foodborne disease. Because of effective culture-based methods for detection of bacterial pathogens and the ease at which fecal specimens can be acquired from animals and the environment, a biased number of additional outbreaks of disease will likely continue to be traced to these sources. However, an undue burden of blame should not be placed on these convenient scapegoats. In the context of modern pop-psychology, when one points a finger at a problem, there are three fingers pointing back at oneself – and there is epidemiological data to link these human fingers to the cause of disease.

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Viruses: They're in Your Hands

Foodborne Viruses: Know the Facts

Foodborne illnesses due to viruses are increasing. Norovirus and hepatitis A are the two most common viruses that cause foodborne illness.

Norovirus

Norovirus is a very contagious virus that is found in the feces or vomit of people who are sick with the virus. Minimize bare-hand contact with ready-to-eat food by using gloves, tongs, or other utensils.

Hepatitis A Virus

Hepatitis A is primarily found in feces of people infected with the virus. It is transferred to food when infected foodhandlers touch food or equipment with fingers containing feces.

Preventing the Spread: Handwashing

Washing hands properly is the most important thing to do to prevent the spread of Norovirus and hepatitis A.

Preventing the Spread: Employee Illness

Foodhandlers must report vomiting, diarrhea and jaundice to their manager before working.

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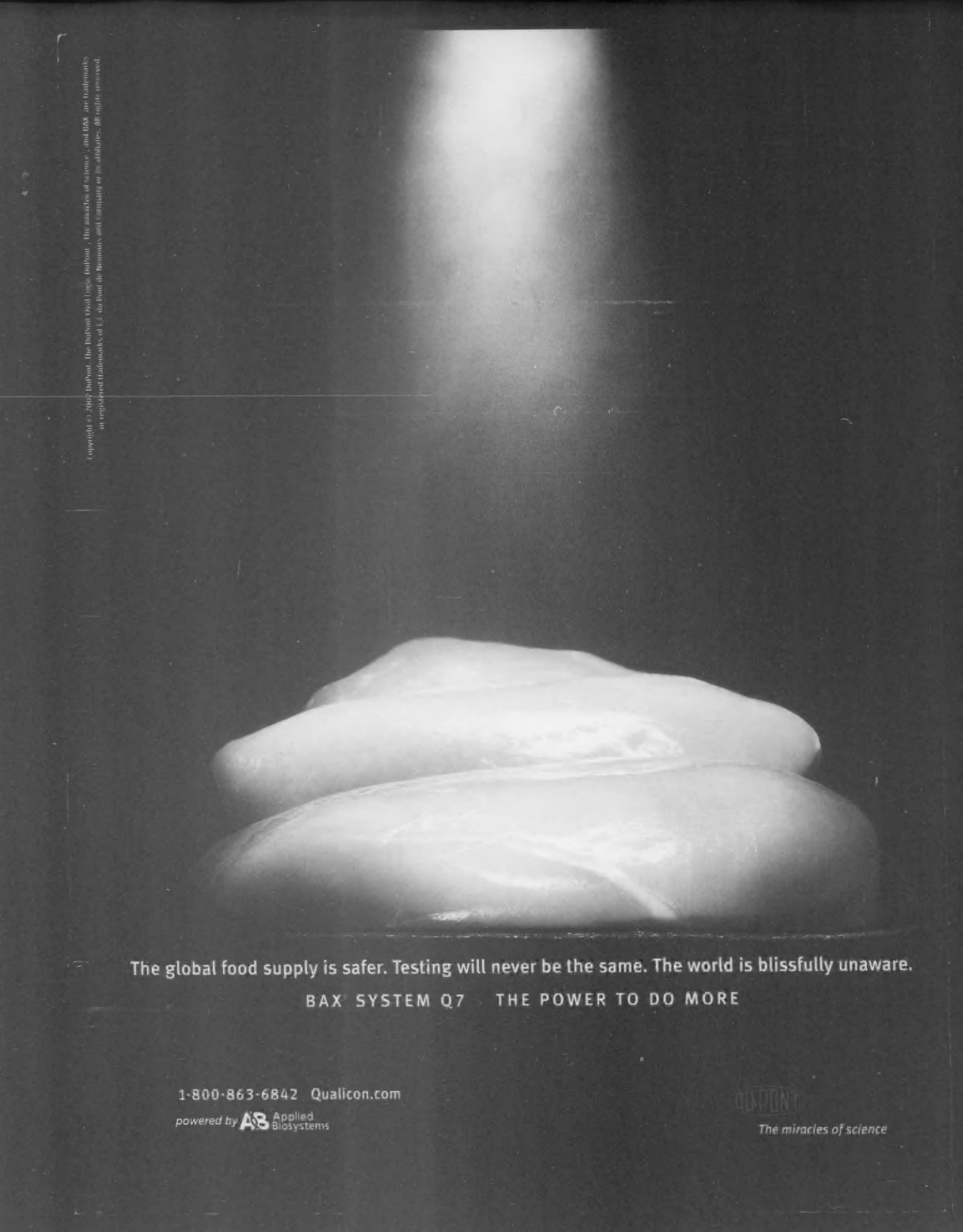
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