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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

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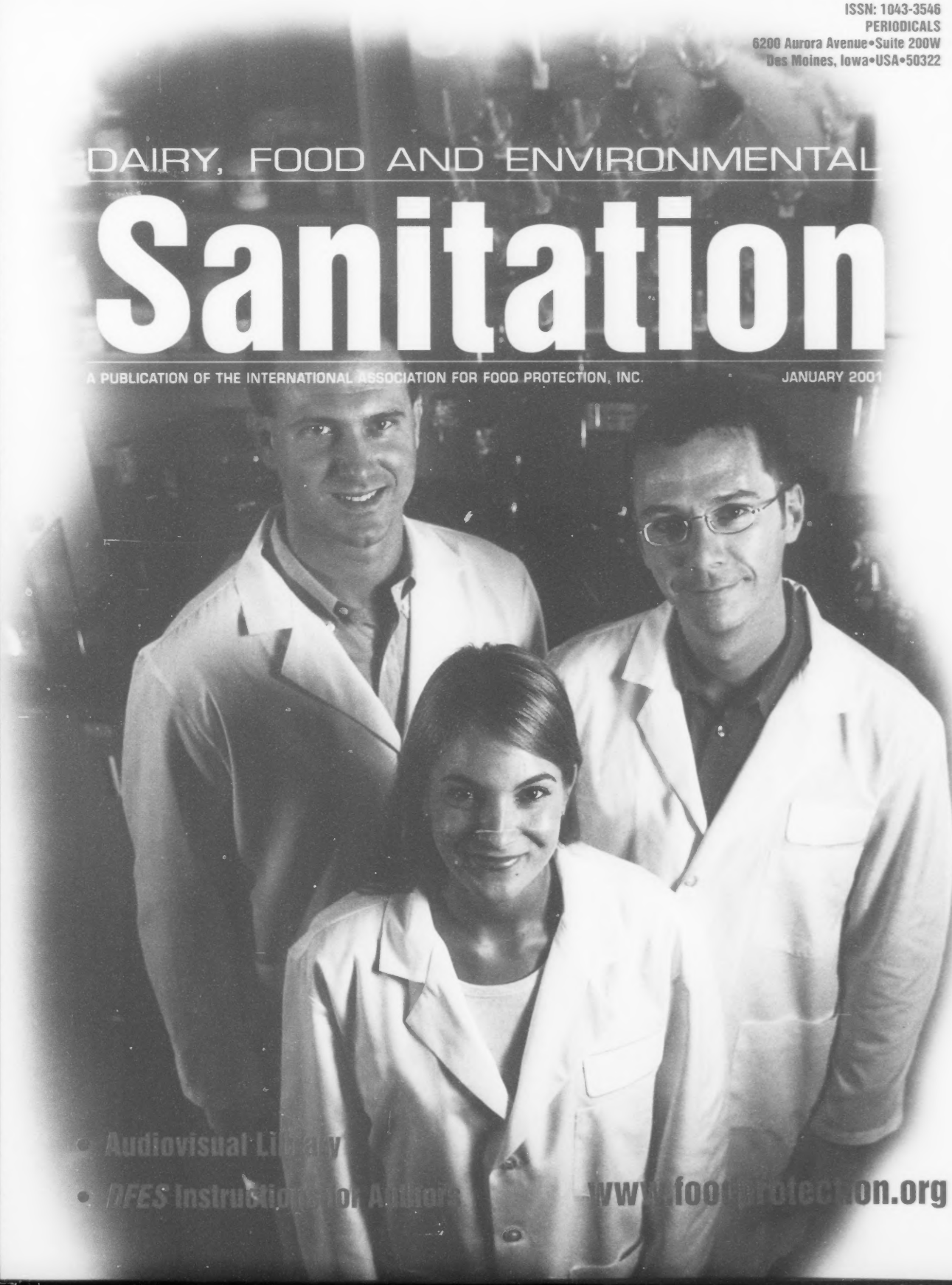

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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

International Association for Food Protection

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A Note from the Scientific Editor... Bill LaGrange

During this year (2000), seventeen (17) manuscripts were submitted for publication in *Dairy, Food and Environmental Sanitation*. Each manuscript is reviewed by two (2) individuals on the *DFES* Editorial Board to make sure they conform to the *DFES* manuscript guidelines. To date, four (4) have been rejected by the reviewers for good and sufficient reasons, eight (8) have been published in *DFES*, one (1) has not yet been returned by the authors after receiving reviewers' suggestions for improvement, two (2) manuscripts are still out for review, and two (2) are ready for publication.

The manuscripts submitted during this year is the least amount in recent years. During 1999, forty (40) were submitted, twenty-six (26) in 1998, forty-five (45) in 1997, and thirty-seven (37) in 1996. We encourage IAFP Members to share the results of their professional experience and/or their research results with the other 3,000+ Members.

One goal of the *DFES* Management Committee is for manuscript reviewers to be prompt but thorough with their reviews. Another goal is for Donna Bahun, *DFES* Production Editor, and I to update the Membership on the *DFES* Editorial Board.

Help support IAFP by preparing a manuscript and submitting it for publication in *Dairy, Food and Environmental Sanitation*.

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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

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Sanitation

International Association for Food Protection

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My Perspective

By JENNY SCOTT
President

"Resolve to be active in IAFP"

It's hard to believe that it's a new year – in fact, it's really a new millennium (although many tried to make us believe it was last year). This is a time to reflect back over the past year's accomplishments and to set goals for the upcoming year. It's also time for those NEW YEAR'S RESOLUTIONS.

First, last year's accomplishments. IAFP had a great year. Just to illustrate:

- First and foremost, we successfully implemented our new name, International Association for Food Protection (although I still hear a few slips – IAMFES was an acronym you could pronounce rather than spell).
- Secondly, we had our most successful meeting ever, with over 1,300 attendees (over 16% more than 1999) and a record number of Annual Meeting abstracts were submitted.
- Membership topped 3,000 for the first time since 1994.
- A record number of articles were submitted to the *Journal of Food Protection* (in fact, the number of submissions has led the *JFP* Management Committee to recommend adding a third editor).
- Three new Affiliates were given their charter at this year's Annual Meeting: Mexico, Quebec and the Capital Area (Washington, D.C.).
- The IAFP Web site (www.foodprotection.org) has been greatly enhanced, with an online membership directory and e-commerce capabilities. (Many thanks to Bev Corron for all her hard work here.)
- The History of the Association has been published. (Thanks to Jack Guzewich and several other Past Presidents, and, of course, to the IAFP staff.)
- IAFP held its first workshop outside the US and Canada, in Mexico. (Thanks to Alex Castillo, Bob Brackett and Donna Garren.)

With respect to goal setting, the IAFP Board actually sets goals for the Association in the spring. Many of the goals are long-term. Some of the goals we have set are as follows:

- Increase Membership 10% by August 31, 2003 (including a proportional increase in international Members).
- Increase attendance at our Annual Meeting.
- Implement a tiered Sustaining Membership program (more on this below).
- Conduct a journal readership survey to gain valuable insight to our readers' wants and needs and to assist advertisers in directing their ad dollars. (If you are contacted, PLEASE give us your opinions.)

IAFP has established a tiered Sustaining Membership program effective January 2001. Sustaining Membership provides organizations and corporations the opportunity to ally themselves with IAFP, with the goal of "Advancing Food Safety Worldwide." Our Sustaining Membership program is a partnership; Sustaining Members help support our activities, including the IAFP Foundation (which funds the Ivan Parkin Lecture, and the Developing Scientist Competition, supports meeting presenter travel and ships surplus journals to the Food and Agriculture Organization for developing countries). IAFP has provided a means for Sustaining Members to enhance their support for educational sessions through higher giving at the Gold

and Silver Sustaining Membership levels. (Contact Lisa Hovey for more information on the program.)

As you make your New Year's Resolutions for 2001, consider IAFP in those resolutions.

- Resolve to recruit new Members. Do you have co-workers or other contacts who would benefit from Membership? Provide them with an application. Tell them about your positive experiences with the Association. (If you've had negative experiences, tell a Board or Staff member – we want to fix problems that are within our power to fix.)
- Resolve to make a contribution to *Dairy, Food and Environmental Sanitation*. Yes, *DFES* is in search of articles. Many of you have knowledge that could be shared with others in the field to improve the safety and quality of our food supply. Consider submitting a paper to *DFES*.
- Resolve to nominate someone for an award – there's still time (nominations are due February 19, 2001).
- Resolve to contribute to the IAFP Foundation – either through a cash contribution, or donating an item for the silent auction, or bidding on an item at the silent auction.
- Resolve to attend this year's Annual Meeting in August in Minneapolis – you'll find lots of interesting presentations, you'll enjoy networking with colleagues, and you'll have fun at the various social events.
- Resolve to join a Professional Development Group (PDG) or volunteer to serve on a Committee. PDGs are open to all who have an interest. Committee members are appointed, but sometimes all it takes is for the Board or Committee Chairperson to know you are interested.
- Resolve to do your part to keep IAFP the leading organization in food safety. As many have said, an organization is only as good as its members make it. We need your input and participation. Resolve to provide it.

And finally, make a resolution that these will be New Year's resolutions that you won't break.

COMMENTARY

FROM THE EXECUTIVE DIRECTOR

By DAVID W. THARP, CAE
Executive Director

"Through Member comments and input, decisions are made that affect the direction of the Association"

I have some questions for you, but first I want to make note of our new look for *Dairy, Food and Environmental Sanitation*. This January 2001 issue is the first issue to be "perfect bound" (the glue binding holding the pages together). Prior to this, *DFES* has been "saddle stitched" or stapled together. The ever-increasing number of pages of *DFES* has caused the delay of printing of some information because there is a maximum number of pages that can be saddle stitched before pages tear away from the staple. So recently, a decision was made to change to the perfect binding method to allow for growth.

You may remember when the *Journal of Food Protection* was stapled. We changed to perfect binding beginning in 1995 to accommodate more pages per issue. In the five years ending 1994, we averaged 1,070 pages per volume or 89 pages per issue. In the six years just completed, there were 1,600 average pages printed per volume in *JFP*. This averages 133 pages per issue and is nearly a 50% increase in average number of pages over the previous five years! Volume 63 (2000) averaged 150 pages per issue and totaled 1,800 pages. Ten years earlier in 1990, we printed 1,092 pages in volume 53. That is a staggering 65% increase in number of pages.

Similar comparisons can be made with *Dairy, Food and Environmental Sanitation*. *DFES* began in 1981 with 536 pages for the first volume. Over the first ten years, volumes averaged just more than 600 pages or about 50 pages per issue. From 1991 to 1997, most volumes were between 750 to 850 pages. We printed 888 pages in 1998, 920 pages in 1999 and 1,016 pages in 2000! So, we have increased the number of pages by 25% since 1997 and have close to doubled the journal size since its inception.

We are excited by the shift to perfect binding for *DFES* and look forward to the versatility that this change provides. Certainly, we will continue to have issues with less than the maximum pages that would fit in a saddle stitched journal, but we also surely will have issues where more pages will now fit comfortably.

Now for the questions. What does your IAFP Membership mean to you? Do you feel it gives you the opportunity to read the latest peer reviewed, scientific based articles on applying safe food handling practices? Does your Membership mean networking at the Annual Meeting? Do you actively participate on Committees or Professional Development Groups?

Do you receive the *Journal of Food Protection*? Do you look forward each month to receiving cutting-edge scientific research presented in *JFP*? Do you share the IAFP Journals with other colleagues in your work location? How many?

These questions and more will be coming your way in the future to enable us to learn more about International Association for Food Protection Members. We want to learn more about

your use of our publications, *Dairy, Food and Environmental Sanitation* and the *Journal of Food Protection*. We encourage you to take time to complete the survey to help guide the Association, and our Journals, in to the future. Through Member comments and input, decisions are made that affect the direction of the Association. Why not have your voice heard?

From the earlier examples of our journal growth, you can see what effect input can have. Over the years, Members told us that they want and need the information provided in the *Journal of Food Protection* and *Dairy, Food and Environmental Sanitation*. Authors also want quicker processing and publication of their manuscripts. Due to increased submissions of articles for publication in *JFP*, the size of that journal has dramatically increased in recent years. Perfect binding allowed faster article publication to meet the demands of our authors.

Now, because of the need to print more information than ever before, *DFES* is also seeing increased page counts. We are proud of the increased attention that both journals command and are pleased with the demanded growth. We are pleased to receive Member input that drives our direction. Please continue to communicate your suggestions to the Executive Board, Committee Members and our staff to help make IAFP a better Association. Do your part to "Advance Food Safety Worldwide!"

Dairy, Food and Environmental Sanitation, Vol. 21, No. 1, Pages 14-19

Influence of Sampling Procedure, Handling and Storage on the Microbiological Status of Fresh Beef

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SUMMARY

This study evaluated sponging and excising as sampling procedures for microbiological analysis of 96 beef carcasses in a commercial plant. In addition, subprimal cuts (clod and top butt) were sampled by sponging the fat and lean surface (n=7 to 48 for each cut and tissue type) separately in the plant and when they reached their destination at the retail level, and retail cuts (steaks or roasts) were sampled by sponging the lean surface (n=14 to 18) immediately following cutting (0 h) and after 48 h of display at 4° to 5°C. The samples were analyzed for aerobic plate count (APC/25°C and APC/35°C), total coliform count (TCC) and *Escherichia coli* count (ECC), and for presence of *Salmonella* spp., *Listeria* spp., *Listeria monocytogenes,* and *Staphylococcus aureus* (retail cuts only). Carcass samples obtained by sponging had higher ($P \leq 0.05$) APC/35°C (4.4 log CFU/300 cm^2) than excised samples (3.9 log CFU/300 cm^2), whereas carcass APC/25°C were similar ($P > 0.05$) in sponged and in excised samples. Recovery of TCC (2.5 log CFU/300 cm^2) and ECC (2.5 log CFU/300 cm^2) was higher ($P \leq 0.05$) in excised samples than in samples obtained by sponging (1.7 and 1.6 log CFU/300 cm^2, respectively). The fat surface of the clod at the plant had higher ($P < 0.05$) APC/25°C than the lean, whereas differences between the two surfaces of the top butt were minor. At the plant, the lean top butt surface had higher APC/25°C, TCC and ECC than the lean clod surface. Although bacterial populations showed only minor changes during transportation of subprimals, retail cuts held for 48 h at 4° to 5°C had APC/25°C, TCC and ECC higher by 3.3 to 4.3, 0.7 to 1.4 and 1.1 log CFU/300 cm^2, respectively, than counts of comparable clod and top butt retail samples immediately after cutting. No samples were positive for *Salmonella* spp. or *S. aureus,* whereas *L. monocytogenes* was found on clods and top butts at the plant (2.0 to 8.3%) and on subprimal top butts at retail (28.6%), but not on steaks/roasts at retail.

A peer-reviewed article.

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Fax: 970.491.0278; E-mail: John. Sofos@colostate.edu.

INTRODUCTION

The Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture (USDA) from 1992 to 1994 conducted microbiological baseline studies for beef carcasses after slaughtering and chilling. Aerobic plate counts (APC) and incidence of pathogens on samples examined in those studies were in general agreement with historical data reported in 1985 by the National Research Council for freshly dressed beef carcasses in the United States, in which APC were found to range between 100 and 10,000 CFU/cm^2 (*11, 12, 18*). The FSIS-USDA studies also showed that pathogenic bacteria isolated from the surfaces of carcasses after slaughtering and dressing operations were at levels easily inactivated by recommended cooking temperatures (*11, 12*), provided that carcasses and meat were handled under sanitary conditions and kept refrigerated. Calicioglu et al. (*3*) found that, on carcasses inoculated with a slurry of cattle manure, *Escherichia coli* biotype 1 counts decreased dramatically within the first 24 h of storage at 4°C. They noted further declines after 7 and 10 days of storage at 4°C. Gill and Bryant (*14*) noted similar reductions in the numbers of *E. coli* in the first 24 h of chilling beef carcasses. These findings suggest that refrigerated storage of beef carcasses for more than three days may inactivate surface contaminating bacteria and improve safety (*3*).

Microbial contamination of beef, however, can increase following slaughtering and chilling, during fabrication and transportation, and at retail. Although at ambient temperatures, the most favored bacteria can cause many other organisms present initially to grow slowly or even fail to initiate growth (*15*), psychrotrophic bacteria should dominate under refrigeration, whereas carcass decontamination treatments may affect competitive inhibition as well as proliferation of bacteria (*21*). Dorsa et al. (*6*) demonstrated that the decontaminating effect of lactic acid on beef surfaces not only was immediate, but that it continued to be effective on carcasses held for 48 h and on meat that was fabricated from those carcasses, vacuum packaged, and stored at 4°C for up to 21 days. Lactic acid also appeared to have antimicrobial effects on beef surfaces when bacteria were introduced onto the surface after a lactic acid treatment (*6*); this treatment could therefore inhibit growth of certain pathogens on beef during transportation and distribution. In general, information on changes in bacterial contamination during transportation and retail of fresh beef is lacking.

Current processes applied in federally inspected establishments are generally unable to remove viable bacteria completely from beef carcasses during slaughtering and dressing operations. However, process controls such as implementation of Hazard Analysis and Critical Control Point (HACCP) systems, introduction of decontamination treatments, and maintenance of low temperatures can reduce or prevent proliferation of bacteria. Process control (e.g., HACCP systems) can be verified by taking samples (*13*) with either the sponge-swabbing or excision sampling method. Although, when applicable, sampling by excision has been considered more effective than swabbing at removing bacteria (*1, 4, 5, 7, 8, 20, 22*), the excising method may not be the most appropriate procedure for sampling subprimal and retail cuts, because it damages the integrity of the product. Furthermore, sponge-swabbing is a nondestructive sampling method that has been widely accepted for sanitation checks and carcass sampling (*5, 7*). This study determined microbiological populations and pathogen incidence on beef carcasses (after 48 h of chilling) sampled with two different methods (sponging and excising), on wholesale subprimal cuts sampled only by the sponging method prior to vacuum packaging at the packing plant and after arrival at the retail store, and on retail cuts (sampled only by sponging) prior to being placed in the display case and after 48 h of retail storage (4° to 5°C).

MATERIALS AND METHODS

Carcass evaluation

Beef carcasses were sampled, either by sponge-swabbing (Whirl-Pak™, Nasco, Modesto, CA) or excising, during each of four days following 48 h of storage in a cooler (0° to 2°C) at a commercial packing plant. Randomly selected carcasses were sampled at three sites (round, flank, and brisket) with the same sponge or cutting tool for each carcass side. Sampling was conducted according to the 1996 United States Meat and Poultry Inspection Regulation (*13*) procedures. At each site, an area of 100 cm^2 was sampled, using a sterile template (10 × 10 cm) as a marker. All samples were obtained in the cooler prior to the time the carcasses reached the fabrication room. Twenty-four carcasses were sampled by sponging or excising on each day, yielding a total of 96 samples taken during the four-day period. Samples were analyzed for aerobic plate count (APC/25°C, APC/35°C), total coliform count (TCC), and *Escherichia coli* count (ECC) and for presence of *Salmonella, Listeria* spp., and *Listeria monocytogenes.*

Subprimal evaluation

Two types of subprimals (clods and top butts) were evaluated at the beef packing plant prior to packaging and at the retail store before being cut into retail items. The subprimals were sponged (100 cm^2) (Whirl-Pak™) on the fat and lean sides, separately, while 12 samples of associated beef trimmings (110 to 120g of trimmings aseptically placed in a sterile plastic bag) were also taken for microbiological analyses. The sponging method was applied according to the procedures outlined in the U.S. Meat and Poultry Inspection Regulation (*13*). A total of 192 (48 clod/fat, 48 top butt/fat, 36 clod/lean, 36 top butt/lean, 12 clod/trimmings and 12 top butt/trimmings) samples were taken. Samples were analyzed for APC/25°C (APC/35°C only the fat surface), TCC, and ECC, and for the presence of *Salmonella, Listeria* spp., and *L. monocytogenes.*

TABLE 1. Means (log CFU/300 cm²) and standard deviations (SD) of aerobic plate counts at 25°C and 35°C (APC/25°C, APC/35°C), total coliform count (TCC) and *Escherichia coli* count (ECC) recovered from beef carcasses (by excising or sponging), subprimal (clod and top butt) cuts (by sponging) in a packing plant and at the retail store, trimmings at the packing plant, and retail cuts at 0 and 48 h of display (4° to 5°C)

				APC/25°C		APC/35°C		TCC		ECC	
Lacation	Sampling pracedure	Sample	Surfoce sampled	Mean	SD	Mean	SD	Meon	SD	Mean	SD
Plant	Spanging	Carcass	–	4.3^{a}	0.6	4.4^{a}	0.7	1.7^{b}	0.5	1.6^{b}	0.5
	Excisian	Carcass	–	4.3^{a}	0.5	3.9^{b}	0.4	2.5^{a}	0.1	2.5^{a}	0.2
	Sponging	Clad	Fat	5.0^{aA}	1.1	6.0^{a}	0.6	2.1^{bA}	0.5	2.8^{aA}	1.0
		Top butt	Fat	4.9^{aA}	0.8	4.5^{b}	0.5	3.8^{aA}	0.7	2.7^{aA}	0.8
		Clad	Lean	3.8^{bB}	0.6	ND	ND	2.3^{bA}	0.5	1.9^{bB}	0.2
		Top butt	Lean	4.5^{aA}	1.0	ND	ND	3.5^{aA}	0.6	2.8^{aA}	0.8
	Trimmings	Clad	–	6.1^{a}	0.5	6.0^{a}	0.6	ND	ND	3.9^{a}	0.8
		Top butt	–	4.9^{b}	0.6	4.3^{b}	0.3	ND	ND	2.9^{b}	0.1
Retail/ Subprimal	Spanging	Clad	Fat	5.6^{a}	1.1	ND	ND	2.7^{a}	0.4	2.6^{a}	0.5
			Lean	5.0^{a}	1.0	ND	ND	2.7^{a}	0.4	2.6^{a}	0.5
		Tap Butt	Fat	5.2^{a}	0.9	ND	ND	2.6^{b}	0.6	2.1^{b}	0.4
			Lean	5.0^{a}	0.7	ND	ND	3.2^{a}	0.5	2.6^{a}	0.5
Retoil/ steoks or roasts	Sponging	Clod	Lean/0 h	4.9^{b}	0.7	ND	ND	2.7^{b}	0.5	2.5^{b}	0.5
			Lean/48 h	8.2^{a}	1.2	ND	ND	3.4^{a}	1.3	3.6^{a}	1.2
		Top butt	Lean/0 h	4.0^{b}	0.5	ND	ND	2.0^{b}	0.4	2.0^{b}	0.4
			Lean/48 h	8.3^{a}	0.3	ND	ND	3.4^{a}	0.9	3.1^{a}	1.0

^{ab} Pairs of values within a column with different small superscript letters differ significantly ($P \leq 0.05$).

^{AC} Values far fot and leon of the some cut with different capital superscript letters that are within o column differ significantly ($P \leq 0.05$).

ND: nat done.

Number of samples analyzed: 7-96 far each mean.

Subprimals from the same lots were also sampled at the retail store where they were also sponged (Whirl-Pak™) on the fat and lean sides within 3 to 5 days after shipment from the packing plant. A total of 46 (16 clod/fat, 16 top butt/fat, 7 clod/lean and 7 top butt/lean) subprimal surfaces were evaluated at the retail store and were analyzed for APC/25°C, TCC, and ECC, and for presence of *Salmonella, Listeria* spp., and *L. monocytogenes*.

Retail cut evaluation

Retail cuts, in the form of steaks or roasts, that originated from subprimals generated on the same production dates and from the same lots, were sampled by sponging (100 cm²) immediately after cutting and as they were being placed in the retail case, and 48 h after storage (4° to 5°C) in simulated retail case conditions. A total of 64 retail cuts (18 clod/0 h, 18 clod/48 h, 14 top butt/0 h and 14 top butt/48 h) were

analyzed for APC/25°C, TCC, and ECC, and for presence of *Salmonella, Listeria* spp., *L. monocytogenes,* and *Staphylococcus aureus.*

Microbiological analyses

The sponges or excised samples were pummeled (Stomacher 400, Tekmar Inc., Cincinnati, OH) for 2 min and serially diluted in sterile Butterfield's phosphate buffer (Difco Laboratories, Detroit, MI). Diluted samples were plated on Standard Methods Agar (Difco) for aerobic plate counts (APC) and on Petrifilm™ E. coli count plates (3M Healthcare Products, St. Paul, MN) for TCC and ECC. Aerobic Plate Counts were determined following incubation of plates at 25°C or 35°C for 72 and 48 h, respectively, TCC following incubation of plates at 37°C for 24 h (red colonies associated with gas bubbles), and ECC following incubation of plates at 37°C for 24 h (blue colonies associated with gas bubbles). Detection of *Listeria* spp., *L. monocytogenes*, *Salmonella,* and *S. aureus* followed procedures described in the Bacteriological Analytical Manual (*9*).

Statistical analysis

Independent variables included product type (carcass, subprimals, retail cuts), surface sampled (fat, lean), storage time, and all possible combinations. The data were analyzed using the analysis of variance procedure of SAS and sample means were separated with the least significant difference procedure (*19*).

RESULTS AND DISCUSSION

Carcass evaluation

Carcass sampling procedure (sponging or excising) had a significant ($P \leq 0.05$) effect on APC/35°C, TCC, and ECC. The excision sampling procedure recovered significantly higher TCC and ECC from carcasses than the sponge-swabbing method, but the sponge-swabbing method yielded higher APC/35°C populations (Table 1). Therefore, the results obtained by each method of sampling should be compared with baseline results determined by the corresponding method (*22*).

Subprimal evaluation

Analysis of variance of bacterial counts (Table 1) obtained by the sponge-swabbing procedure indicated no significant ($P > 0.05$) differences in APC/25°C and ECC between clod and top butt fat surface samples, whereas differences in APC/35°C and TCC were significant ($P \leq 0.05$); clod fat samples had higher APC/35°C (6.0 log CFU/300 cm²) compared to top butt fat samples (4.5 log CFU/300 cm²). However, the top butt fat surface had higher ($P \leq 0.05$) TCC (3.8 log CFU/300 cm²) than the clod (2.1 log CFU/300 cm²). There was also a significant ($P \leq 0.05$) difference between bacterial counts recovered from the lean samples of the clod compared to the top butt. There were no statistical ($P > 0.05$) differences in APC/25°C, TCC and ECC recovered from the fat and lean surfaces of the top butt samples at the packing plant, but the fat surface of the clod had higher ($P \leq 0.05$) APC/25°C and ECC than the lean surface of the same cut. Bacterial counts (APC/25°C, APC/35°C and ECC) recovered from trimmings of the clod were higher than from the top butt, and as expected the trimmings had higher levels of contamination than the subprimals. When they reached retail (3-5 d later), populations on subprimals were not greatly different from those at the packing plant (Table 1). The top butt lean samples had counts that were significantly ($P \leq 0.05$) higher than counts of fat samples in TCC and ECC, but not APC/25°C, whereas the fat and lean surfaces of clods were not different ($P > 0.05$) in APC/25°C, TCC or ECC (Table 1). Because data on microbial changes during distribution of fresh beef are lacking, additional studies are needed to evaluate products of other types, from additional plants, and under different conditions of shipping.

Retail cut evaluation

Retail items were sampled immediately after cutting (before placing in the display case) and again 48 h after retail display. Counts (Table 1) of retail cuts following 48 h in the retail case (4° to 5°C) were higher ($P \leq 0.05$) than those at 0 time. The average increases were in the range of 3.3 to 4.3, 0.7 to 1.4, and 1.1 log CFU/300 cm² for APC, TCC, and ECC, respectively. Increases in counts during retail display were generally higher in top butt than in clod cuts.

Incidence of Pathogens

None of the samples tested were positive for *Salmonella* spp. and *S. aureus* (data not presented in tabular form), whereas no carcass samples were positive for *L. monocytogenes* (Table 2). However, sponge-swabbed carcasses yielded more *Listeria* spp. positive samples (8.3%) than excised carcass samples (2.1%). None of the clod fat samples were found positive for *L. monocytogenes*, whereas 20.8% yielded *Listeria* spp. The clod lean samples showed an 8.3% incidence of both *Listeria* spp. and *L. monocytogenes*. The clod fat samples showed a higher incidence of *Listeria* spp. than the top butt fat samples, but there was no difference in incidence of *Listeria* spp. between clod and top butt lean samples. The top butt fat samples had an incidence of *Listeria* spp. and *L. monocytogenes* of 2.0%, while the top butt lean samples had an incidence of *Listeria* spp. and of *L. monocytogenes* of 8.3%. The trimming samples from the top butt had an incidence of *Listeria* spp. of 33.3%, but no *Listeria* spp. was detected in the trimmings from the clod. Neither the clod nor the top butt trimmings had detectable *L. monocytogenes*. The incidence of *Listeria* in the subprimals sampled at the retail store is also presented in Table 2. Neither the fat nor lean samples from the clod had detectable *Listeria* spp. or *L. monocytogenes*, while the fat and lean samples from the top butt subprimals were highly (28.6%) contaminated with the pathogen. *Listeria monocytogenes* was not isolated from any of the steaks/roasts

TABLE 2. Incidence (%) of *Listeria* spp. and *Listeria monocytogenes* on beef carcasses (sampled by excising or sponging), subprimal (clod and top butt) cuts (sampled by sponging) in a packing plant and the retail store, trimmings at the packing plant and retail cuts (steak or roast) derived from such subprimals at a retail store and retail cuts displayed for 0 or 48 h (4° to 5°C)

Lacation	Sampling procedure	Sampling Sample	Samples surface	analyzed	Positive (%)	
					Listeria spp.	*Listeria manacytagenes*
Plant	Spanging	Carcass	–	96	8.3	0
	Excisian	Carcass	–	96	2.1	0
	Spanging	Clad	Fat	48	20.8	0
		Clad	Lean	24	8.3	8.3
		Tap butt	Fat	48	2.0	2.0
		Tap butt	Lean	24	8.3	8.3
	Trimmings	Clad	–	12	0	0
		Tap butt	–	12	33.3	0
Retail/Subprimal	Spanging	Clad	Fat	16	0	0
		Clad	Lean	16	0	0
		Tap butt	Fat	7	28.6	28.6
		Tap butt	Lean	7	57.1	28.6
Retail/Steaks ar raasts	Spanging	Clad /0 h	Fat	18	0	0
		Clad/48 h	Lean	18	5.6	0
		Tap butt/0 h	Fat	14	14.3	0
		Tap butt/48 h	Lean	14	7.1	0

tested, whereas *Listeria* spp. was detected in clod top butt (48 h) and retail cuts at 0 and 48 h. It appears that fresh meat handling increased incidence of *Listeria* spp. and *L. monocytogenes*, while exposure of new meat surfaces and good hygienic practices at retail may have been reasons for reduced incidence in retail cuts. Other researchers have reported incidence of *L. monocytogenes* in fresh meat in the range of 0 to 92% (*2, 16, 17*).

As indicated, sampling of beef carcasses with the excising procedure recovered, overall, higher (difference of < 1 log CFU/300 cm^2) TCC and ECC than sampling using the sponge-swabbing procedure, while differences in APC were minor. In addition, use of the excising procedure resulted in less variation in counts recovered, but it yielded fewer *Listeria* positive carcass samples than the swabbing procedure. This indicates that excising is not always more effective in microbial analysis than swabbing (*1, 4, 7, 10, 20, 22*).

In summary, at the packing plant, top butts had higher lean surface APC/25°C, TCC, and ECC, higher fat surface TCC, and lower trimmings APC/25°C and APC/35°C than clods. At retail, APC/25°C, TCC, and ECC were generally similar between clods and top butts. There was no significant increase ($P > 0.05$) in bacterial counts of subprimal samples taken at the packing plant and at the retail store, and differences in bacterial counts between fat and lean surfaces of subprimals were minor. There was a major increase in counts on steaks and roasts between 0 and 48 h of retail display (4° to 5°C). No positive samples of *Salmonella* spp. and *S. aureus* were detected, whereas *Listeria* spp. was detected in carcass, subprimal, and retail cut samples. At the packing plant, clod samples had a higher incidence of *Listeria* spp. than top butt samples, but the highest incidence of *Listeria* spp. was in top butt trimmings (33.3%) and on lean from subprimal top butts at retail (57.1%). At retail, incidence of *Listeria* spp. was higher in top butt samples than in clod samples. The results of this study should be of value in risk assessment studies.

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HACCP Implementation and Validation in Small and Very Small Meat and Poultry Processing Plants in Nebraska

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SUMMARY

A team approach was developed to assist meat and poultry processors with HACCP implementation. Processors attended a 3-day workshop to learn principles of HACCP and how to implement them. Following training, the team consulted with the processors to assist them in writing and implementing HACCP plans. Because a number of challenges arose during this one-on-one assistance, we developed various methods to overcome those challenges. We collected microbial data in three beef processing facilities before and after the implementation to validate the overall effectiveness of HACCP implementation. Total aerobic bacteria decreased after HACCP implementation, but coliforms and generic *E. coli* counts did not. Following HACCP implementation, some processors needed to change critical limits on critical control points. Microbial data were collected to support changes in the pressure of a poultry carcass wash and were presented to the USDA inspector to support changes in the plan. The new plan was accepted and changed so as to enable the processors to process under the new conditions.

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INTRODUCTION

Hazard analysis and critical control point (HACCP) principles have been recognized as an important tool for assessing and managing health risks posed by foodborne pathogens *(1)*. In 1996, the Final Rule on Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP), which required all federally inspected meat and poultry processors to implement HACCP, was published by the USDA *(6)*. Small processors, having 10 to 500 employees, implemented in January of 1999, while very small processors, with less than 10 employees, implemented in January of 2000.

Implementation of HACCP can be daunting and, especially to the small and very small processor, overwhelming. The small processor often does not have the necessary technical expertise, staff size, equipment (e.g., a computer), skills or funds. According to 1999 statistics, Nebraska ranks first in beef slaughter *(4)*, and many communities rely upon the meat processing industry to sustain economic viability. Extension meat and food safety specialists at the University of Nebraska-Lincoln (UN) developed a team approach to assist the small and very small processors with HACCP implementation so they could continue processing under federal inspection.

Working with small Nebraska processors to write and implement HACCP has provided an opportunity to identify special challenges, failures, and successes that accompany implementation. Documentation of HACCP implementation has generated guidelines that can be utilized by other small processors and extension specialists.

Additionally, a need often arises for validation of the HACCP plan after it is implemented, either to provide evidence that the plan is effective in reducing hazards or to change critical control points (CCPs) in the process. As Nebraska processors implemented HACCP, these situations arose. We developed validation studies to assist processors in identifying and changing CCPs, and to validate the overall effectiveness of HACCP plans. These challenges are likely to be faced by processors across the country as HACCP plans develop and change. Our documented experiences can provide a framework for future in-plant HACCP validation studies.

The objectives of this study were to aid small and very small Nebraska meat processors in the writing and implementation of HACCP systems, in accordance with the Final Rule on Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems, and to provide scientific data to validate HACCP systems and CCPs in the process.

METHODS

HACCP plan development and implementation

Initial contacts with establishments were usually made through the company's participation in a three-day HACCP workshop conducted by UN extension specialists. The workshop curriculum met the requirements for "HACCP trained" individuals as described in the USDA regulations *(6)* and is accredited by the International HACCP Alliance. Following HACCP training, processors contacted University Extension Specialists to arrange for one-on-one assistance to develop HACCP plans.

During one-on-one assistance, emphasis was placed on identifying the special challenges these smaller operations face in implementing HACCP, and in designing guidelines to address these challenges. A customized approach was used to assist each processor. Challenges included a limited number of employees, lack of technical expertise, a large product list, and limited funding.

The HACCP regulatory requirements in the Final Rule states that a hazard analysis must be performed, a flow chart must be developed, intended use and consumers must be described, any potential hazards must be listed, CCPs must be listed, monitoring procedures and frequency must be listed, corrective actions must be listed, a record-keeping system must be maintained, verification procedures and frequencies must be listed, records must be signed and dated, and the plan must be developed by a "HACCP trained" individual *(6)*. To meet these requirements, extension meat and food safety specialists met one-on-one with the plant's HACCP team. The meetings began with a plant tour and completion of pre-HACCP requirements, which included a description of product, distribution, intended use, and consumers, in addition to the flow diagram. The amount of assistance given to the HACCP team varied depending on the expertise within the processing plant. In some cases, extension personnel met several times with the HACCP team to walk them through each step of the process. In other cases, we provided HACCP forms to the team for them to complete requirements and we reviewed the plans afterwards to make suggestions and changes. Forms were made available in hard copy "fill in the blank" format and electronically.

Additionally, we had one-day sessions in which plant personnel could bring in their HACCP plans in progress and we would assist them in completing the HACCP plans. Processors that had HACCP plans in place only consulted with UNL extension specialists to verify the plan.

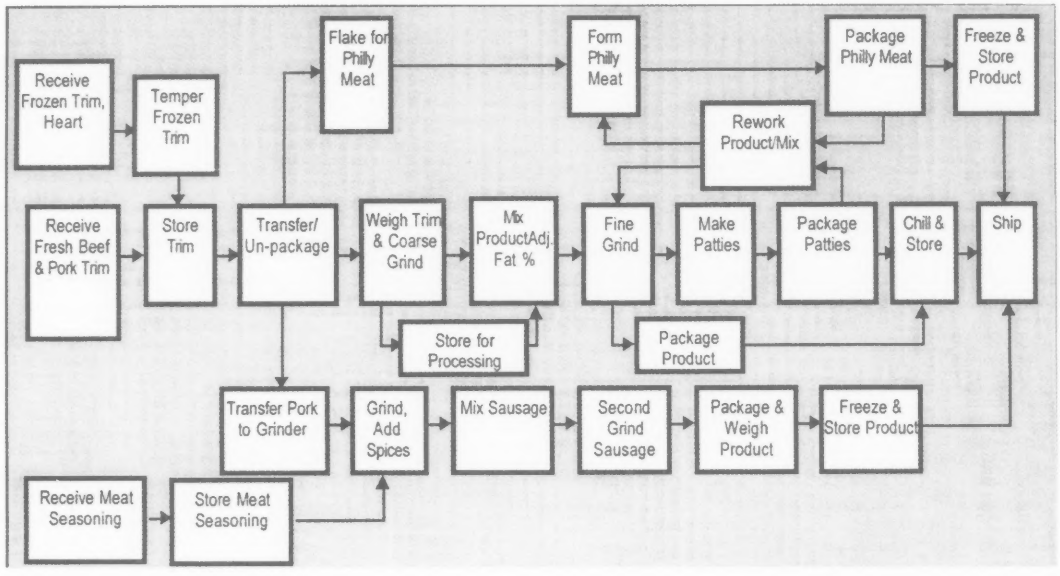
Overall HACCP plan validation

To determine if HACCP implementation had an overall impact on the microbial profile of meat products, we established baseline microbial counts in processing facilities before HACCP implementation. Following implementation, we collected the same data to determine if there were any differences.

Microbiological sampling

Three small meat processing establishments were included in this study. The first was a beef slaughter facility, the second a beef fabrication facility and the third a ground beef facility. To establish a carcass microbial profile, carcasses were sampled using the USDA/FSIS sponge method. The Final Rule describes the techniques in great detail *(6)*. Briefly, sterile sponges

Figure 1. Flow chart for a ground meats HACCP plan that addresses 7 different products produced in 1 processing facility



(Specisponge; Nasco, Fort Atkinson, WI) were hydrated with 25 mL of buffered peptone water (BPW; Difco Laboratories, Detroit, MI), residual moisture was expelled from the sponge inside a Whirlpak bag (Nasco), and the sponge was removed from the bag with sterile gloved hands. Using a sterile template, each of three 100 cm^2 areas was rubbed with the sponge 10 times in each (horizontal and vertical) direction. Each sampling area was sampled with a clean area on the sponge. Samples were collected from randomly selected carcasses after a 24-hour chill.

The sponge method was also used to sample fabricated beef primals and beef trim, as described above for carcasses. Each of three 100 cm^2 areas of the samples were rubbed with the sponge 10 times in each (horizontal and vertical) direction. Each sampling area was sampled with a clean area on the sponge. Ground beef samples were collected using the sampling procedures outlined in FDA's Bacteriological Analytical Manual *(8)* and USDA/FSIS Microbiological Lab Manual *(7)*. All samples were transported to the laboratory in coolers maintained at 4°C with ice packs and were processed the same day. Samples were held at 4°C until plated.

The number of samples collected was determined by use of the statistical methods described by Dormedy et al. *(2)*. A pre-implementation baseline was established by analyzing 90 samples during 4 visits over 3 seasons. The baseline was compared to data collected one, three, and six weeks after implementation of HACCP.

Microbiological analysis

Sponge samples were stomached for 2 min in a Stomacher Lab Blender 400 (Tekmar, Inc., Cincinnati, OH) and serially diluted in buffered peptone water (BPW). After plating for enumeration, all samples were incubated at 35°C for 18 to 24 hours to enrich for *Salmonella* spp. detection.

For determination of an aerobic plate count (APC), appropriate dilutions were plated in duplicate on 3M Petrifilm™ Aerobic Plate Count Plates (3M Inc., St. Paul, MN). For enumeration of total coliforms and generic *Escherichia coli* populations, 3M Petrifilm™ Coliform/*E. coli* Count Plates were used. All plates were incubated at 37°C and counted according to manufacturer directions. The APC and coliform counts were taken at 24 hours and the *E. coli* counts at 48 hours.

Following pre-enrichment samples were screened for the qualitative presence of *Salmonella* spp. by use of Tecra UNIQUE™ *Salmonella* (Tecra© Diagnostics, Roseville, NSW, Australia) according to manufacturer directions. Presumptive positive results obtained with Tecra UNIQUE were confirmed by streaking the suspect sample on xylose lysine desoxycholate (XLD) agar (Difco) and incubating at 37°C for 18 to 24 hours. Confirmation tests performed on suspect colonies included tests for catalase, cytochrome oxidase and API 20E (BioMerieux Vitek, Hazelwood, MO) as outlined in the U.S. Food and Drug Administration's *Bacteriological Analytical Manual (8)*.

Validation of CCP changes in poultry slaughter

Processing facilities also need data to support changes in their HACCP plans that occurred after initial HACCP implementation. A poultry processor was originally

TABLE 1. Challenges in implementing HACCP faced by the small and very small meat processor

HACCP Principle	Challenges	Solutions
1. Hazard Analysis	Lack of technical expertise, scientific data, knowledge of regulations, surveillance data, or understanding of the relationship between GMPs and SSOPs to HACCP.	Resources: other plant personnel (e.g. managers, maintenance), processors, extension or university personnel, private consultants, USDA-FSIS inspectors, and the USDA Technical Center (1-800-223-3935).
2. Determining CCPs	At least one CCP must control each significant hazard identified in hazard analysis. Too many CCPs make plan unmanageable.	Base on scientific literature and/or regulatory standards (if available), or documented plant experience. A "final" CCP (e.g., cooking) might control several significant hazards and might be used for more than one HACCP plan (room temperature). Limit CCP to 2-4 significance steps in process. Collection of scientific data to determine if process is safe and if it should be included as a CCP. No regulatory requirement and/Temperature data or lack of scientific data for unique/Microbial data unusual processes.
3. Critical Limits	What will be measured? (Room temperature? Product temperature? Time at certain temperature?) What is critical limit when there are no standards/ regulations (e.g., raw meat storage 40° or 45°F)?	Room temperatures: Should have data to correlate room temperatures to product temperature, use product temperature to verify, room temperature control ALL products. Product temperatures: only measure a sample (not all), direct measurement. If there are no Regulatory Limits: set at a level you can "live with" and still produce a safe product (set at 45° and try to maintain 40°), give yourself a margin to work with. Generate temperature and/or microbial data to validate limits if they differ from safe harbors. Usually only minimum or maximum, not both.
4. Monitoring	Deciding Who will monitor, what will be monitored, when monitoring will take place, and how measurement is to be taken? Enough personnel to accomplish monitoring.	Who: trained individual, line supervisor/worker, QC personnel. What: Surface/Internal Temperature, Which product? How Much? Use 1 CCP to control several plans (e.g. room temperature) When: continuous –ideal (all product is under control), Discontinuous (sampling interval, all product since last measurement is subject to corrective action, keep interval to a minimum). How: use calibrated device (pH meter, thermometer), train person responsible for monitoring to use equipment.
5. Corrective Actions	What are you going to do when there is a deviation from critical limit?	Can use wording directly from regulation. Pro-easy to satisfy inspector and many options for plant, Con – when critical limit is not met, no one knows what to do. Suggestion – Combine. State that you will meet regulation. Give examples (most common, these will be guidelines for employees to follow when limit exceeded). Be sure to consider ALL product since last sampling interval.

TABLE 1. (continued) Challenges in implementing HACCP faced by the small and very small meat processor

HACCP Principle	Challenges	Solutions
6. Verificotion	Deciding whot ond how to verify.	Alwoys Include: colibrotion of equipment, doily review of records, onnuol review of plon, employee oudits.
	Volidotion of processes thot differ from sofe horbors/regulotory requirements.	Optionol: microbiol testing, odditionol tests to be sure thot monitoring procedures ore occurote. Periodic review of records: HACCP plon functioning to prevent hozords, oll corrective octions token.
		Turn to university foculty to ossist in doto collection ond volidotion.
7. Recordkeeping	Monoging poperwork.	Creote records to meet your needs: one set of records for eoch CCP, one set of HACCP records for eoch product thot "trovels"

utilizing a 20 psi carcass wash as a CCP to meet USDA requirements for zero fecal contamination. They monitored the pressure of the wash and, if excess fecal contamination was observed, their corrective action was to turn up the pressure of the wash. The pressure had been increased to 42 psi, which resulted in quality problems in the final product and which appeared to create cross-contamination problems among the carcasses as the strong spray of water was carrying fecal contamination off one carcass and onto another one. The processor wanted to reduce the pressure to 30 psi to remove visible fecal contamination and to maintain the quality and safety of the birds. USDA/FSIS inspectors would not allow reduction of the wash pressure until a scientific study was conducted to validate that a 30 psi wash was not statistically different from a 42 psi wash.

The processor approached extension poultry and food safety specialists at UNL to collect this data. To validate the CCP, we collected a total of 1,350 samples. Because there is very little information published on visible fecal contamination of carcasses, the sample size was determined by statistical process control MIL-STD-105D tables *(10)* with the assistance of faculty with expertise in statistical process control. The sample size needed when 42,000 to 43,000 birds/day are processed was 1,250 birds. More samples were collected to increase the statistical soundness of the study.

To conduct the study, 150 carcasses were examined for visible fecal contamination prior to the carcass wash step. The amount of contamination was recorded as slight/moderate/or heavy. The type of contamination was recorded as fecal, ingesta, or both. After rinsing, the same observations were made on the same 150 carcasses. The water pressure was adjusted to 30 psi on the carcass wash and the experiment was repeated. All carcasses washed at 30 psi had to be re-washed at 42 psi following data collection to comply with the current HACCP plan (42 psi). The experiment was repeated until 1,350 samples were collected.

Statistical analysis

Results were analyzed using the (GLM) procedure of the Statistical Analysis System (SAS Institute, Inc., Cary, NC) with a statistical significance level of ($P < 0.05$). When significant differences were observed, separation of means were accomplished by using Duncan's multiple range test (SAS). Means from other sets of data were compared by Student's *t*-test.

RESULTS

HACCP plan development and implementation

A total of eleven 3-day HACCP workshops were conducted by UNL extension faculty from August 1997 to January 2000. A total of 426 food processing plant employees were trained. Workshop evaluations indicated that both an increase in knowledge and a change in behavior/attitude occurred among participants. 83% of the participants have returned to UNL for further HACCP assistance. Only 40% had begun writing HACCP plans prior to the workshops and 95% had begun after the workshop.

Thirty-three small and very small Nebraska processors were assisted on a one-on-one basis in developing and implementating individual HACCP plans. A total of 80 plans were written and an additional 68 plans were verified.

As several small and very small processors were assisted in HACCP implementation, a number of challenges arose (Table 1), one of which was to develop flow diagrams from a very large product list. To remain competitive with larger processors, who may produce a huge volume of 1 or 2 products, the smaller processor typically has a long product list. Even if a processor makes only a few pounds of a specific product a year,

a HACCP plan must be in place for that product. For companies with a long list of manufactured products, these categories can be used to group products into one HACCP plan, which is much easier to manage than seven. For example, one establishment developed a "Ground Meats" HACCP plan that included 7 products: ground beef, ground beef patties, ground pork, patty mix, ground pork sausage, beef patties, and philly steaks (Fig. 1).

All products within this category started at the same step, receiving, and ended with shipping. However, there were differences in the processing of the 7 products: Some products were stored before further processing; some ground beef was packaged whereas some was made into patties; some products were ground while others were flaked; some had spices added and others did not. The flow chart covers all options that might occur during processing of the 7 products. Ultimately, we developed one flow chart for each process category. The USDA technical services center in Omaha, Nebraska, was helpful in categorizing unusual products.

Because of the lack of technical expertise, companies needed the most assistance in the area of hazard analysis (Table 1). When conducting a Hazard Analysis, all process steps, as well as all possible hazards associated with each step, must be listed. Crucial to the success of a HACCP plan is to "brainstorm" and list all possible hazards, because a hazard not identified in the Hazard Analysis will never be addressed in the HACCP plan. Significant hazards likely to occur, hazards that represent risk significant enough for control to be essential for safe food are identified. Control measures for each significant hazard are identified. Hazards can be biological (e.g., bacteria, viruses, yeast, and molds), chemical (e.g., sanitizers, antibiotics) or physical (bone chips, metal or glass pieces).

In determining if a hazard is significant, the risk must be assessed. We used the method of determining risk taught in the Food Processors Institute's HACCP Train the Trainer Course *(5)*, in which risk is defined as the product of the level of severity represented by the hazard and the likelihood of its occurrence. Significance of a hazard is not absolute and will be based on plant experience, science, and some common sense. If a significant hazard is not controlled, the process must be modified and the step reevaluated; there are no absolute answers. In some cases, data must be collected to confirm that the process is controlled. Examples of data to be collected could include the temperature of a processing or storage room, product temperature at a certain point in the process, or the microbial quality of different ingredients or product at specific points in the process. When in doubt about whether a hazard should be included in the hazard analysis, we advised them to include it because if it is eliminated at this step, it will not be addressed and the hazard will not be controlled.

Once a comprehensive hazard analysis was conducted, processors had very little difficulty in establishing CCPs. Challenges did arise when there were no regulatory requirements or scientific literature available on which to base controls. Additionally, some processors wanted to put a CCP at practically every step while others did not see the need to put in any CCPs. In most cases, 2 to 3 CCPs were ultimately identified after the hazard analysis for each plan had been examined.

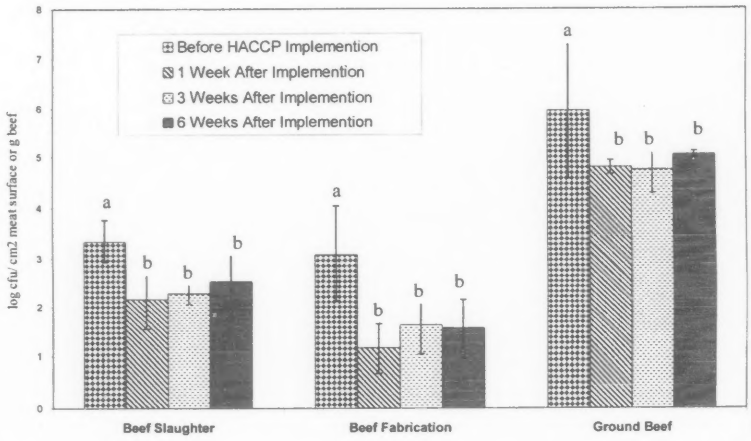
Another challenge arose when we established critical limits and monitoring procedures. Often there is no regulatory limit on which to base critical limits. A common issue was the temperature of the processing area during production of a fresh meat or poultry product. Most processors chose 50°F as a critical limit that was comfortable to work in and that still maintained product temperature at levels that minimized microbial growth. However, there is very little scientific information on this topic, and more research is needed to validate the soundness of this practice. Our concern was not about product temperature because the product stayed in the processing area for such a short time. We were concerned about growth of pathogens on the equipment that had come in contact with the raw products.

Additionally, some very small processors producing raw products did not process in a refrigerated room, and therefore monitored product temperatures but not monitor room temperatures. In these situations, validation studies were conducted by collecting temperature and microbial data to determine that the product would be safe.

One area that the USDA focused on when examining HACCP plans was corrective actions. Section 417.3 of the Final Rule states that (1) cause of deviation must be identified and eliminated, (2) the CCP must be under control after corrective action is taken, (3) measures to prevent recurrence must be established, (4) no product that is injurious to health or adulterated can enter commerce, and (5) all actions must be recorded *(6)*. In addressing these requirements, wording directly from regulation can be used and must be in the HACCP plan. This will make it easy to satisfy the inspector and provide many options for a plant in case of a deviation. However, these general guidelines made it difficult for employees to know exactly what to do when critical limits are not met. A practical solution we used with most processors was to combine the two approaches. The document can state that the regulation will be met and give examples using the most common causes of deviation. Although every situation cannot be anticipated, these examples can then serve as guidelines for employees to follow when the limit is exceeded. The most important thing to consider is that all product since the last sampling interval is subject to a corrective action.

In the initial phases of HACCP plan development, verification was not a major challenge to overcome with the processors. However, over time, this HACCP principle has become very important and frustrating to some processors. Verification of a HACCP plan can include validating that the critical limits of a CCP are satisfactory, verifying that the HACCP plan is functioning as

Figure 2. Total aerobic plate counts of beef products taken at 3 separate processing facilities before and after HACCP implementation. Counts with different alphabetical notations within each product are significantly different ($P<.05$)



intended, verification of initial plan and, the altered plan whenever changes to the process take place, and regulatory actions to ensure HACCP functioning. Verification procedures should always include calibration of equipment, daily review of records, annual review of plan, and employee audits. Optional verification activities can include microbial testing and additional tests to ensure that monitoring procedures are accurate.

The regulatory verification activities of FSIS include initial review of plan and compliance checklist, a periodic review of records, and verification that the HACCP plan is functioning to prevent hazards and that all corrective actions are taken. The regulatory verification activities of FSIS also include establishment of "Performance Criteria" through slaughter testing for generic *E. coli* and *Salmonella;* raw ground products are also subject to *Salmonella* testing. Validation, a part of verification, was an area of HACCP that required generation of scientific data to support initial CLs or to provide evidence that it was safe to change CLs after HACCP implementation.

The final HACCP principle, record keeping, proved to be challenging to most small processors. Several types of records must be maintained to have a successfully implemented HACCP system. Section 417.5 of the Final rule requires an establishment to maintain the following records: hazard analysis, HACCP plan, monitoring, prior shipment review, and FSIS review *(3).* We emphasized to processors that flexibility is present so that establishments can create records that meet individual needs. For example, some processors chose to use one set of records that could be kept for each CCP. Alternatively, one set of HACCP records for each product could be kept that "travels" with product through the process, an especially helpful method for small batch processes. Most processors were already operating under safe conditions but were not documenting what they were doing. Therefore, recordkeeping during the process daywas a significant change in operations.

Follow-up surveys of clients receiving one-on-one assistance were very positive. The processors reported that their knowledge of HACCP increased 75% during the one-on-one assistance sessions. There was a similar change in attitude towards HACCP. Prior to the assistance the processors viewed HACCP as a negative regulatory requirement; after the assistance, processors reported that they realized that HACCP resulted in safer food products and that it protected them from potential safety issues. They reported that they were more aware of the potential hazards and general food safety issues. This awareness has increased their effort to control the hazards.

All processors receiving one-on-one assistance also reported that HACCP has changed other practices of theirs. The biggest changes were diligent monitoring of critical control points, employee hygiene, record keeping, and handling of rework. They had all learned special skills from the HACCP assistance, including how to calibrate a thermometer, and had greater understanding of how pathogens grow, how to meet USDA expectations, and of the "tools" of HACCP. They all reported that the team's assistance made the transition into HACCP implementation very smooth. All of the processors were successful in meeting USDA requirements for HACCP implementation.

Overall HACCP plan validation

Figure 2 presents the mean $\log_{10}$ APCs on the surface of raw beef carcasses, the surface of raw beef subprimal cuts, and in ground beef before HACCP was implemented and at 1 week, 3 weeks and 6 weeks after HACCP implementation. The data shows an approximate 1 log reduction ($P < 0.05$) in total aerobic bacterial load 1 week after implementation of HACCP in the slaughter facility, compared with the pre-HACCP baseline. In the fabrication facility, there was a significant 1.5 log APC reduction ($P < 0.05$) after implementation of HACCP. At the ground beef facility, there was also a significant 1 log reduction ($P < 0.05$) observed 1 week after HACCP implementation. The reductions in all the facilities were maintained at 3 weeks and 6 weeks after implementation.

Figures 3 and 4 present the mean $\log_{10}$ total coliform counts and generic *E. coli* counts, respectively, on the surface of raw beef carcasses, on the surface of raw beef fabrication cuts, and in ground beef before and after HACCP implementation.

Figure 3. Total coliform counts of beef products taken at 3 separate processing facilities before and after HACCP implementation. Counts with different alphabetical notations within each product are significantly different ($P<.05$)

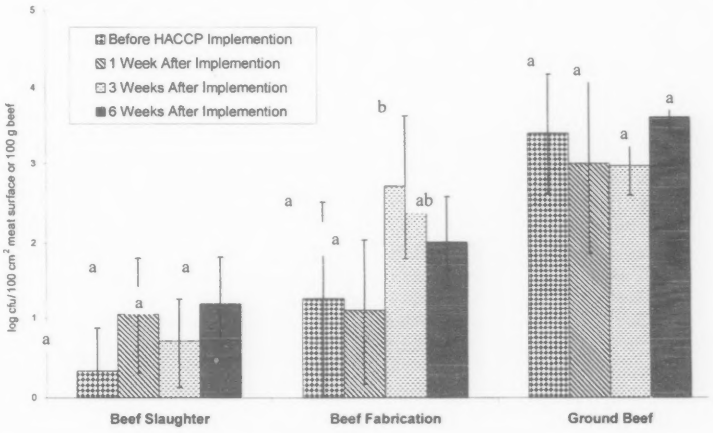
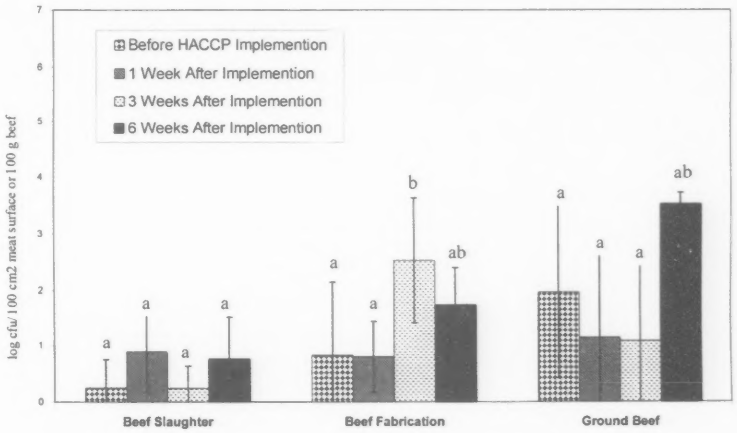


Figure 4. Total generic *E. coli* counts of beef products taken at 3 separate processing facilities before and after HACCP implementation. Counts with different alphabetical notations within each product are significantly different ($P<.05$)



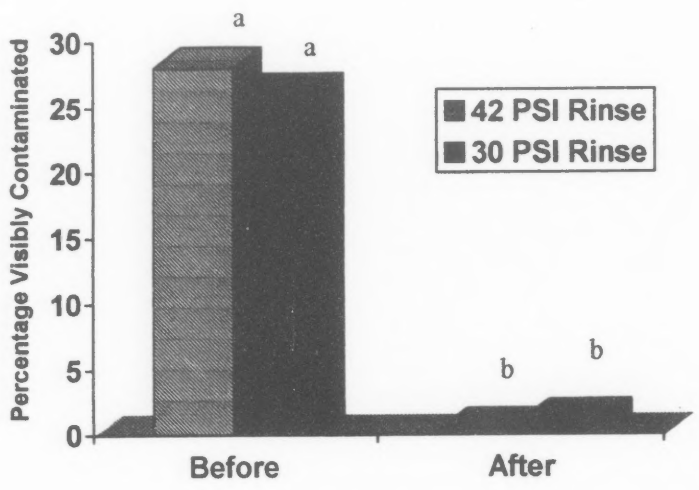
The average after-implementation count for coliforms and generic *E. coli* did not significantly increase or decrease ($P > 0.05$) at the beef slaughter facility at any sampling time after HACCP implementation. Although still very low, the average after-implementation count for coliforms and generic *E. coli* significantly ($P < 0.05$) increased at the beef fabrication facility 3 weeks after HACCP implementation. Six weeks after implementation the numbers decreased to a level similar to the pre-HACCP baseline data. At the ground beef processing facility, the coliform counts did not significantly ($P > 0.05$) change after HACCP implementation. Generic *E. coli* counts decreased at 1 week and 3 weeks after implementation in the ground beef facility, but increased significantly ($P < 0.5$) 6 weeks after implementation. Because numbers of coliforms and generic *E. coli* were so low in the baseline study, a slight significant increase does not necessarily indicate that a product is not safe.

At all three facilities, counts were well below the national baseline even when they increased after HACCP implementation *(9)*. The USDA regulations define the acceptable level of generic *E. coli* on beef carcasses as "negative" which corresponds to <500 CFU/ 100 cm^2 (2.7 $\log_{10}$ CFU), or the detection limit of the method of sampling used to collect the national baseline data. All of the slaughter samples collected in this study were well within the acceptable range for carcasses for generic *E. coli*. However, the numbers for coliforms and generic *E. coli* did not reflect a reduction after implementation of HACCP as had been observed in the aerobic plate count, although the numbers were low, indicating good process control. This observation may demonstrate that although generic *E. coli* enumeration is useful as an indication of process control and performance standards, the low numbers do not provide a useful means of verifying "before and after" type comparisons if the plant already has good process control before HACCP implementation.

The implementation of HACCP at the three facilities included in this study effectively decreased the total bacterial load on carcasses during slaughter, on fabrication primal and combos, and in ground beef. Generic *E. coli* and coliform counts, while useful as process control indicators, were not as effective for HACCP verification purposes. The low incidence of *Salmonella* in the samples tested in this study render the organism ineffective as a pathogen reduction indicator.

Additionally, we interviewed plant management after HACCP implementation. At all three processing facilities, they indicated that the main change in their process was the implementation of monitoring and recordkeeping on a regular basis to be sure that all CCPs were met. They did note that other food-safety related habits had also changed in their facility, including employee hygiene and more emphasis on

Figure 5. Amount of fecal contomination observed on poultry corcosses before ond ofter o 42 psi and 30 psi carcass wosh immediately following eviscerotion



overall plant sanitation. Although, we cannot directly attribute all of the microbial changes to HACCP implementation alone, it is important to document that some microbial profiles changed in conjunction with implementation and that microbial counts tended to increase over time after implementation. This may be due to a more relaxed attitude toward food safety and HACCP after the initial phases of HACCP implementation were complete.

One hundred eighty samples were tested for the presence of *Salmonella.* Although initial results indicated presumptive positives, no *Salmonella* bacteria were confirmed in any of the samples. With every batch of samples tested, positive and negative controls were run, using the Tecra UNIQUE™ *Salmonella* detection method.

Validation of CCP changes in poultry slaughter

To change the pressure of a poultry carcass wash, visible fecal contamination data was collected. Figure 5 illustrates that the 30 psi wash resulted in carcasses that were visually equivalent to carcasses rinsed in a 42 psi wash. Prior to the carcass washes, 28% of carcasses subjected to a 42 psi wash were visually contaminated with either fecal material or ingesta. Following the 42 psi wash, Only 0.4% remained contaminated. Similarly, 26% of the carcasses subjected to the 30 psi wash were initially contaminated, but only 1.0% of them were contaminated after the wash. There were not significant differences ($P > 0.05$) in the two wash pressures with regard to visible fecal/ingesta contamination. After review by the USDA regional inspector, the plant was allowed to adjust the CCP and to increase the quality of their product while still maintaining safety.

CONCLUSIONS

The implementation of HACCP requires a great deal of technical expertise. HACCP requires a multidisciplinary approach to ensure that every hazard is addressed and controlled appropriately. Very few smaller meat processing facilities have personnel with the technical background necessary to complete a HACCP plan without training or assistance from outside sources. The processors helped in this study were assisted in writing and implementing HACCP plans and were provided training necessary to meet the regulatory requirements and to produce a safer product.

HACCP plans should be unique and customized to individual needs. It is important that all the necessary resources be available for making important decisions related to recognizing significant hazards, identifying CCPs, and setting effective critical limits for CCPs. In many instances, this will involve collecting in-plant data about a process to support these decisions.

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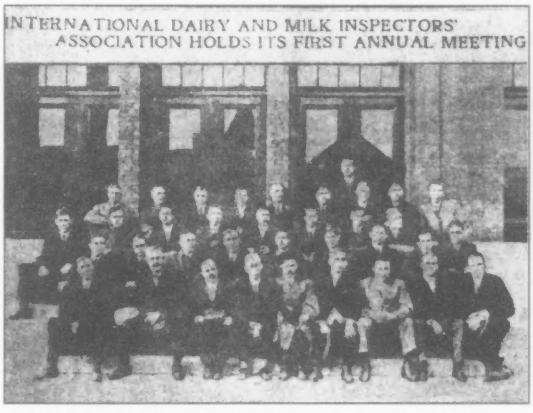
International Association for Food Protection

HISTORY

1911-2000



It was on October 16, 1911, that the International Association of Dairy and Milk Inspectors held its first meeting. Thirty-five men from Australia, Canada, and the United States met at Milwaukee, Wisconsin, and started an organization which has just completed it fortieth year of continuous operation. Reprinted from the *Journal of Milk and Food Technology, Volume 15, No. 1,* 1952.

Acknowledgments

At the 1999 Annual Meeting in Dearborn, Michigan, President Jack Guzewich issued a call for an Association History to be written. A history document was not available and he felt that the turn of the century was an excellent time to "take a look back" at the Association's roots. He asked for assistance from the Past Presidents and long-time Members.

Following Jack's call, four Past Presidents volunteered to help review early Journals and Annual Reports, to pull information from printed Presidential Addresses, to look at information and extract interesting details, and to write text that would capture the essence of the important contributions this Association made to enhance public health since 1911. As it turned out, two individuals, Harry Haverland and Earl Wright carried the bulk of the weight in seeing the project through to fruition. In addition to Harry and Earl's contributions, Jackie Runyan and David Tharp wrote sections to round out the history. Donna Bahun, Lucia Collison, Didi Loynachan, and Pam Wanninger from the Association office provided additional assistance. Helene Uhlman contributed a woman's perspective of her 30-plus years as Member. Harold Bengsch and William LaGrange also reviewed the draft manuscript and

IAFP History...

Over the next few months we will be printing sections from the book, the "International Association for Food Protection History 1911-2000." See page 33 to obtain your copy of this informative book.

provided meaningful guidance. To everyone who contributed time, effort and expertise to this document, we are grateful to you. Thanks also to the individual Members who devoted their time and effort to the Association from that first Meeting in Milwaukee to the present time.

The majority of information contained within this document was taken from written, Presidential Addresses presented at Association Annual Meetings. Because of relying heavily on these reports, some details of the Association history may have been overlooked.

To everyone who reads the History of the International Association for Food Protection, we hope you will enjoy it and we hope you will learn about the contributions the Association has made to improve the public's health for over 89 years.

The Early Years

Who we are today as an organization is largely a result of how we started and how we have adapted through the years to changes in the world. How and why we started was summed up in the first Presidental Address, read at the first annual convention of what was to become, after almost nine decades, the International Association for Food Protection. The following account of the early years draws heavily on that address of 1912, much of which is worth repeating because the statements in it were to hold true for so many years to come.

In 1911, a group of men engaged in advocating improved cleanliness in milk production – men whose purpose was "producing and marketing the products of the dairy cow" – banded together because of their conviction that improvements were needed in the nation's milk supply. The problem was not one of quantity; the supply of milk was ample for the needs of the population. Rather, the need was for better quality – bluntly, a more clean product.

The responsibility for improvement rested on producers and consumers alike, and both had fallen short: Although producers were responsible for setting a high standard of cleanliness, many had not done so, and although consumers should have been willing to pay more for clean milk than for dirty milk, most were not.

In many cities and states, laws had been passed requiring that dairies be maintained in reasonably sanitary condition and that milk meet certain minimum requirements before it could be sold in those areas. Such laws were not intended simply to prevent consumer deception by practices such as the sale of watered-down milk or adulteration of butter with cheaper substitutes. The laws were, rather, often a matter of life and death. Diseases rampant at that time – typhoid fever, diphtheria, scarlet fever, pneumonia, tuberculosis – were known to be spread via the milk supply. Further, it had been shown that if a city efficiently supervised the production and sale of milk, this alone could greatly reduce its infant mortality rate. Conservation of human life and prevention of disease, then, were the goals of those early pioneers in milk sanitation.

Why then, was milk inspection still so ineffective in many parts of the United States and other parts of the world that an organization such as the Inter-national Association of Milk and Dairy Inspectors was seen as a pressing need?

Both milk producers and milk inspectors had to bear some of the responsibility. Milk inspectors included some men who had been appointed to the office purely as a reward for loyalty to the political party currently in power; some had obtained their positions despite having "absolutely no practical or theoretical knowledge of the fundamental principles of milk production, transportation or distribution." In some areas, veterinarians had attempted to monopolize the dairy inspection field, claiming unique qualifications for this line of work despite the fact that neither their training nor their experience fitted them for it. Understandably, milk producers often refused to listen to such men: Why should a dairy producer be taught by "inspectors whose knowledge of the dairy industry is less than that of the men whose business and premises they are appointed to inspect?"

Clearly, what was needed was a cadre of specially trained and experienced inspectors, perhaps coming out of the nation's agricultural colleges or perhaps resulting from the less formal but often no less valuable process of supervised on-the-job experience. Such inspectors could offer instruction on cattle feeding and care; on improvements in barns for housing cattle; on construction and care of dairy equipment; and on the best methods of milking and then of handling the milk between the time it left the cow and the time it was bought by the consumer. Most important, the advice offered by such well-informed inspectors would very likely be accepted and put into practice by dairy farmers, because it would be "more likely to secure the confidence and cooperation of the men on the farms who are daily engaged in this work" than "the more sensational wielding of the 'big stick' could ever be."

A 1912 document (see Appendix A) listed 35 Members, two of whom were from outside the United States (one from Canada and one from Australia). Nineteen of them held positions in the central United States. By 1913 (the time of the second

Charles J. Steffen, Milwaukee, Wisconsin. Elected first President of the Association at a meeting in Milwaukee in 1911. Reprinted from the *Twenty-fourth Annual Report of the International Association of Dairy and Milk Inspectors,* 1935.

annual convention) the organization had a constitution, which it duly published; this document sets forth qualification for Membership as "any person who now is or who has been actively engaged in dairy or milk inspection," announced the annual dues of five dollars, and decreed the object of the Association: To develop "uniform and efficient inspection of dairy farms, milk establishments, milk and milk products" by "men who have a thorough knowledge of dairy work."

In 1913, the International Association of Dairy and Milk Inspectors published its First Annual Report, (see Appendix B) which included papers read at the annual convention held in 1912.

The time was right for the formation of such a group. The nation's first Pure Food and Drug law had recently been passed, and interest in infant and child welfare had undergone a recent upsurge.

The name "International Association of Dairy and Milk Inspectors" might almost seem a misnomer in view of the nationalities of the original 35 Members, only two of whom were from outside the United States. In addition, it was not until 1927 that the first Annual Meeting was held outside the United States in Canada.

Nevertheless, the organization has always been true to the spirit of the "international" part of its name. By communicating with representatives of many nations who sought the Association's assistance, it served a vital role in the development of public health programs throughout the world, even though the majority of its Membership was drawn from the United States.

Although it was women who had primary responsibility for the rearing of infants and children, and women made up a large proportion of milk consumers; the International Association of Dairy and Milk Inspectors was an all-male group in its early years. The first statement on membership, published in 1913, declared that the Membership "shall be composed of men who are or who have been actively engaged in dairy or milk inspection." Even if the word "men" in that statement had been replaced by a term such as "individuals" or "workers," few women would have been able to meet the experience requirements. Like other professional organizations of its time, the Association saw work outside the home as a man's sphere of interest and a man's role.

The importance of women as purchasers of milk and nurturers of children was recognized; the President of the Association pointed out in 1914 that, although disease traceable to milk had become less common than formerly, such diseases were still greatly feared and "mothers are continually warned about feeding their children impure milk." The economic impact of such fears on the dairy industry are obvious.

The close relationship between the Association and the Department of Labor's Children's Bureau (under the leadership of a woman identified in Association documents only as "Miss Lathrop") was pointed out in the Welcoming Address at the 1915 convention. That same year, the Presidential Address identified the principal object of milk inspection as the providing of "a substitute which approaches, as near as possible, breast milk for infant feeding" and went so far as to suggest that "the visiting nurse in the home of the newborn babe is surely as essential in educating the consumer to the proper handling of milk" as was the milk inspector's work in milk production.

The '20s

Nevertheless, early records show little or no active participation in the Association by women. Not until 1920 did a woman, a Milk Utilization Specialist with the U.S. Department of Agriculture, first address the Association Membership at the Annual Meeting.

In 1921, the Presidential Address stressed that the progress achieved in milk and dairy sanitation in California was largely because of the influence of "the 60,000 women club members who have the right of suffrage." Thus, although women were still not welcomed into the profession of milk and dairy inspection, they were exerting increasing influence outside the home through their own organizations, which worked for laws requiring, for example, tuberculin testing of dairy cows and pasteurization of dairy products.

It was in 1924 that an actual research paper was given at the Annual Meeting by a woman, who presented results of her observations on school children served "milk lunches." The following year, a woman speaker gave a report in her capacity as chairperson of the Committee on Securing a Satisfactory Supply of Raw Milk for Pasteurization, and in 1928, a woman first gave a presentation on a technical subject, on improvement of pasteurization plants.

Some of the social aspects of the Association attracted large numbers of women, however, as seen in remarks such as those delivered by the dinner

Ivan C. Weld, Secretary-Treasurer and Annual Report Editor of the Association from its beginning to his death, March 15, 1929. Reprinted from the *Eighteenth Annual Report of the International Association of Dairy and Milk Inspectors*, 1929.

speaker at the 1936 meeting: "We are pleased to have so many ladies present. As my speech was prepared for gentlemen only, much of it must be deleted."

The increasing participation of women in the workforce during the late 1930s, and even more so during World War II, was reflected in greater participation of women in Association activities. After the *Journal of Milk Technology* replaced the annual yearbook as the official publication of the Association in 1937, a woman was a member of its staff of editors by 1942, and among new Association Members listed for 1943 was the first full-fledged female Member – a woman serving as chief microbiologist in the Department of Health in Hartford, Connecticut.

For the most part, presentations given at the Annual Meetings were thoughtful and informative. However, not all were equally accurate. Some, in fact, had more of the flavor of cheerleading than of instructing. An example is seen in the Address of Welcome at the 1920 Meeting, delivered by the Dean of the University Farm School in Davis, California, and President of the National Dairy Council: "When we teach the mother of a pale-faced, bow-legged, anemic child that all he needs is a quart of milk a day to make him healthy, we are rendering a real service to that mother and society...". A statement such as this may have had a commendable purpose (it was an attempt to increase milk consumption by youngsters), but it contained more enthusiasm than accuracy. As we know today, "pale-faced," "anemic" children need iron, of which milk is a naturally poor source; and bow legs, if caused by rickets, can be prevented by vitamin D, which in 1920 was not yet being added to milk as a fortification measure.

In his response to the welcoming address and his presentation to the Membership, the International Association of Dairy and Milk Inspectors President thoughtfully analyzed some of the problems inherent in milk inspection programs of the time. Inspectors cannot, he stated, allow sympathy for the industry's problems to eclipse the necessary duty of safeguarding the industry's products. At the same time, a fuller understanding of the dairy industry's problems – including, and perhaps especially, its economic problems – might make the inspector more effective in the long run: "...we may have the privilege of helping spread the gospel of more and better milk throughout the country" because when a dairyman is better off economically, "we will get much better results from him from a sanitary standpoint." In short, successful dairymen can better afford the time and money required to produce more milk and better quality milk.

Economic factors continued to be important throughout the following years. When the 1921 Meeting was held in New York City, that city was in the midst of a strike by the milk deliverymen. Nevertheless, the Annual Meetings continued to emphasize the healthfulness of dairy products, their importance as foods for adults as well as for children and infants, and the need for laws providing for pasteurization of all milk and cream unless it was known to be from a certifiably safe source.

The inadequacy and multiplicity of laws and regulations resulted in much confusion, as was pointed out at the 1922 Meeting. For example, a Massachusetts law provided that a license could be given to any milk dealer who could be shown to be a "suitable person." Someone with no knowledge of sanitary methods, who did not consider cleanliness a necessity or even very important, and who thought of inspectors as pests to be outwitted could nevertheless become a licensed milk dealer if only he could persuade the licensing authorities that he was a "suitable person." Pasteurization, with its pipes, pumps, and other apparatus, provided additional necessary inspection points, with their accompanying legal requirements. It had been established by that time that bovine tuberculosis, once considered a serious threat to cattle but only a negligible danger to humans, was indeed transmissible to humans via milk, milk products, and meats from infected animals. Laws to protect the public from transmission of such a serious disease were therefore imperative.

In 1923, the Association defined pasteurization in terms of the conditions necessary for its proper performance and endorsed the procedure as "the only adequate safeguard for milk supplies." Within the previous decade, opposition to pasteurization had lessened somewhat as the public had become increasingly aware of the importance of milk to health as well as the importance of proper milk handling in preventing diseases that milk might otherwise have caused.

By 1924, the Membership was approximately 200, representing four countries outside the United States and Canada, as well as 32 states and the District of Columbia within the United States. The "international" character of the Association was evident

in the list of countries requesting copies of the annual reports in which the proceedings of the Annual Meetings were published. With Members and other interested parties so widely scattered, many who might have wished to attend the conventions could not do so, and the published reports were especially valuable for keeping those individuals informed and making them feel a part of the organization.

A major topic at the 1925 Annual Meeting was the lack of uniformity in milk-related ordinances. A producer or dealer might find it impossible to sell in more than one municipality because different areas sometimes had regulations that were not only different, but sometimes in direct conflict. Attempts to prevent fraud (for example, by watering down milk) and to insure the sanitary condition of milk supplies were sometimes so complex that they had negative effects on the ease with which this desirable product could be supplied. The Presidential Address at the 1926 Meeting dealt at length on the need for "adaptation of existing regulatory mechanisms to prevailing conditions" so that "more thorough control is exercised over the fundamental requirements and less effort expended on obsolete and unenforceable non-essentials." The fact that the country was in the midst of Prohibition might have contributed to the questioning of "unenforceable non-essentials" that were undoubtedly seen as not confined to laws on milk alone.

The "international" aspect of the Association received additional emphasis in 1927 when the Annual Meeting was held in Toronto, Canada, the first Meeting to be held outside the United States.

"The average American food supply has been one-sided through liberal if not excessive use of meats and sweets and insufficient use of milk, fruits and vegetables in the diet." This statement might have appeared in any one of a number of American newspapers today. In fact, it was in the President's Address at the 1928 Meeting. Then as now, persuading consumers to increase their intakes of more-healthful foods was as important – and sometimes as difficult – as persuading producers to ensure the safety of the foods they produced.

THE BLACK PEARL AWARD

RECOGNITION FOR CORPORATE EXCELLENCE IN FOOD SAFETY AND QUALITY

NOMINATE TODAY!

The Black Pearl Award is presented annually at the International Association for Food Protection Annual Meeting.

The Black Pearl Award, sponsored by Wilbur Feagan and F&H Food Equipment Company, was first presented in 1994. The Black Pearl Award was established to recognize a company for outstanding commitment to and achievement in corporate excellence in food protection. For more information and to receive nomination criteria, contact the International Association for Food Protection office at 800.369.6337 or 515.276.3344; Fax: 515.276.8655; E-mail: info@foodprotection.org.

Visit our Web site at www.foodprotection.org

Highlights of the Executive Board Meeting
November 12-13, 2000
Des Moines, Iowa

Following is an unofficial summary of actions from the Executive Board Meeting held November 12-13, 2000 in Des Moines, Iowa:

Approved the following:

- Minutes of August 4-10, 2000 Executive Board Meeting
- E-mail votes taken since the August 10, 2000 Executive Board Meeting
- Contribution to employees' retirement plan
- Affiliate Guidelines as approved by the Affiliate Council, August 6, 2000
- Revision to Commercialism Policy section 3.3
- Minimum payment to Minnesota for their support with IAFP 2001

Discussed the following:

- Minutes from the August 8, 2000 IAFP Business Meeting
- Communication Update: Reports on *DFES, JFP* and the Web site were accepted
- Membership Update: Membership increased at 2.5% over one year ago and is up 10% over 1997
- Advertising / Exhibits Update: Ad sales strong. Exhibit Hall reservations for IAFP 2001 stand at approximately 28% of capacity
- Financial Update: FYE August 31, 2000 Audit report presented by Auditors. Year end results $22,000 net gain versus budget of $8,000
- Fall Affiliate Newsletter mailed in October
- Prospective new Affiliate organizations in United Kingdom, Brazil, Philippines, Portugal, Manitoba, Singapore, Japan and The Netherlands
- IAFP Officer presentations to four Affiliate organizations this past fall. Five scheduled for spring meetings
- Budget allotment for travel to Affiliate meetings
- Certificate of Merit requirements
- Committee Recommendations (see page 36 for complete listing)
- *JFP* Editor selection committee and time line for new Editor
- Retail Food Safety and Quality PDG development of technical guidelines for retail operations
- Guidelines for Committee and PDG use of the IAFP Web site
- IAFP 2000's financial results
- IAFP 2000's evaluation results
- Hotel space usage for IAFP 2001
- Pricing for tours and social events to be held at IAFP 2001
- Planning for 2001 and 2002 Annual Meetings
- Future Annual Meeting sites and site selection issues
- Proposed symposium and workshop ideas
- Workshop evaluations from IAFP 2000
- Produce Safety Workshop, November 12, 2000 in Guadalajara, Mexico
- Results of IAFP on the Road – NSF Food Safety Conference, October 2000
- IAFP on the Road – United Fresh Fruit & Vegetable Association March 17, Food Safety Summit April 17
- Updated sections for the IAFP Policy and Procedures Manual
- President's voting privilege
- Randall Chloupek to serve on the 3-A Administrative Symbol Council
- Opportunity to print an article in *DFES* on *Listeria monocytogenes* control in Spanish
- World Health Organization – meeting on process to become a non-governmental organization designee of WHO
- World Association of Veterinary Food Hygienists meeting to discuss joint efforts
- International Council of Professionals in Food Safety changed name from International Association for Food Safety Professionals – who are they?
- Development of an "International Award" to be given at IAFP 2002
- United States AID proposal from Indonesian Member
- Secretary Candidates for 2001-2002
- Tanya Wheeler Memorial contribution
- Mail list – required Member notification
- Alliance for Food Safety

Next Executive Board meeting: January 21-22, 2001 Minneapolis, Minnesota

Committee, Professional Development Group, Task Force and Support Group

Recommendations to the Executive Board as Taken from Committee Minutes of Meetings Held in Atlanta, Georgia August 6 – 9, 2000

Executive Board Response as Discussed at the Executive Board Meeting Des Moines, Iowa November 12 – 13, 2000

STANDING COMMITTEES

Dairy, Food and Environmental Sanitation Management Committee

1. Table of contents for *JFP* added to *DFES* on a monthly basis.
   Board Response: Agreed. Implemented October 2000.
2. In next revision of the history, it should be noted that John Bruhn was the *DFES* editor from 1993 through 1996.
   Board Response: Agreed.
3. It was moved and seconded that the IAFP staff be allowed to change binding style (to "Perfect binding") and paper quality after they have considered the issues of opacity.
   Board Response: Agreed. Both changes implemented January 2001.

Journal of Food Protection Management Committee

1. To consider whether we should continue to invite review articles with no page charges.
   Board Response: The Scientific Editors may make invitations to authors to submit review articles on specific topics of interest to *JFP* readers without incurring page charges. The Board further agrees to include 100 article reprints at no charge to the author.
2. To continue assessing the costs/benefits of putting the journals online – explore other suppliers of online publishing.
   Board Response: Directed staff to continue reviewing costs and to keep the Board and Committee informed.
3. To move to having three Scientific Co-editors and to start recruiting one for Jan. 2001, and to seek a replacement for L. Beuchat.
   Board Response: Agree with recommendations subject to budget constraints. Not able to do by January 2001.

Program Committee

No recommendations were submitted.

SPECIAL COMMITTEES

Audiovisual Library Committee

1. To approve proposed budget, an increase of $1,700 (from $10,500 to $12,200) to cover increase salary costs and increased postage for shipping to International Members.
   Board Response: Included in FYE 8/01 Budget. Approved at the April 2000 Board Meeting.
2. To have staff identify high frequency users from monthly usage reports, and report to Committee so that those individuals may be considered for participation on AVL Committee.
   Board Response: Directed staff to forward list to Chairperson.
3. To profile need for new Committee members in Affiliate Newsletter.
   Board Response: Agreed. Done in Fall 2000 Affiliate Newsletter.
4. To highlight to Members the need to obtain (preferably donated) multi-lingual AV materials. Particularly noted were Spanish, French, Chinese (Cantonese and Mandarin), and non-verbal/closed-captioned materials.
   Board Response: Agreed. Done in *DFES* and Fall 2000 Affiliate Newsletter.
5. To include on the AV Lending request form a statement asking for users to identify potential AVL materials.
   Board Response: Agreed. Implemented October 2000.

6. That staff be authorized to make decisions about and act on obtaining more copies of high usage materials.
   Board Response: Agreed. Authorized staff.
7. Staff will spell out "reviewed" in future AVL listings rather than use "rev" which can be generally interpreted as "revised."
   Board Response: Agreed. Implemented October 2000.

Awards Committee

No recommendations were submitted.

Black Pearl Selection Committee

No recommendations were submitted.

Committee on Communicable Diseases Affecting Man

1. Whereas the Committee recognizes the tremendous contribution that Dr. Frank Bryan has made as a Committee member for 40 years, and the Chairperson for 30 years, as a leader in the development of four procedures manuals, and writing articles on communicable diseases, it is moved that there should be public recognition of his contribution by the Board in *DFES*.
   Board Response: Dr. Bryan's contributions were recognized at the Business Meeting and reflected in minutes printed in November 2000 *DFES*.
2. The Committee requests that the manuals should be put on electronic format to facilitate updates and revisions, especially the tables and diagrams.
   Board Response: PDF forms (tables and diagrams) from Foodborne and Waterborne Disease manuals to be made available on Web site. Other pages to be scanned by staff and provided at a later date.
3. The Committee requests that all data relative to existing manuals be obtained by the Board from the resigning Chairperson, including hard copies and electronic formats.
   Board Response: Committee Chairperson should make requests to the resigning Chairperson for specific items needed.
4. The Committee requests that electronic marketing or distribution of the manuals be explored by the Board and continue dialogue with the Committee on this issue. One suggestion is that manuals could be downloadable in components, e.g., text, tables forms, references, appendices, for convenience of the user.
   Board Response: Will research further as to cost. Will provide forms at no charge.
5. The Committee requests from the Board a decision on whether to update Procedures to Investigate Arthropod-borne and Rodent-borne Illnesses, and if so, what should be included.
   Board Response: It is recommended that the Committee focus its efforts on a new project to write a guide for "Management of Employees with Diseases Communicable through Foods" incorporating hand washing and personal hygiene tips for workers.
6. The Committee requests that one meeting each year, not during the Annual Meeting, be budgeted for to allow updates of manuals and drafting of articles.
   Board Response: Committees may meet at times other than Annual Meeting. Committee Chairpersons need to submit cost estimate to obtain prior Board approval for Committee travel support paid for through Association funds.
7. The Committee requests that the article of the Association's history of the Committee prepared by Dr. Frank Bryan be published on the Web site, and that the Board consider appointing an historian or archivist to collect and retain archival documents relating to the history of the organization and its committees.
   Board Response: The Board requests the Committee obtain Dr. Bryan's approval to place this article on the Association's Web site. The Board will accept a volunteer to serve as historian.

Constitution and Bylaws Committee

No recommendations were submitted.

Developing Scientist Awards Committee

No minutes submitted.

Fellows Selection Committee

No minutes submitted.

Foundation Fund Committee

1. That the Board instruct the Executive Director to evaluate potential ways to increase the Foundation Fund including the use of a fundraising consultant.
   Board Response: Board will develop a "Corporate Challenge" to increase the Foundation Fund. Other fundraising methods are under consideration.
2. That the IAFP office develop promotional materials for the Foundation Fund to include for example, table tents, posters, slides, and/or brochures.
   Board Response: Agreed. Encouraged use of promotional items at the Opening Session and other appropriate times.
3. That the proposed budget for 2000-2001 year be approved. The budget includes an increase of $1,700 for the Audiovisual Library.

Board Response: Included in FYE 8/01 Budget. Approved at the April 2000 Board Meeting.

4. Extend our thanks to the IAFP office staff.
Board Response: Agreed.

Nominating Committee

No recommendations were submitted.

Past Presidents' Committee

1. The key focus of *DFES* should continue. The key word "Sanitation" is very important in the title and should continue.
Board Response: Board will convey these recommendations to the *DFES* Management Committee.
2. The Executive Board should review the liability insurance coverage of the Association in order to protect the financial health of the Association and its Membership.
Board Response: This is being done on an annual basis by the Executive Director and staff.

Committee on Sanitary Procedures

1. Recommend approval of committee appointment nominations for renewed terms.
Board Response: Names not received but IAFP Membership is required to serve on this Committee
2. Recommend that the committee name be change to "3-A Committee on Sanitary Procedures."
Board Response: Approved at August 2000 Board Meeting. Bylaws change will be voted on in August 2001.
3. Recommend that the Board investigate forming a PDG on "Food Equipment Design and Construction Standards and Practices."
Board Response: Board supports concept and invites Members to come forward to start a PDG with this interest.

PROFESSIONAL DEVELOPMENT GROUPS

Applied Laboratory Methods Professional Development Group

1. A series of workshops focused on the critical control points associated with microbiological analysis of foods. The first workshop developed for 2001 will focus on *Listeria* detection.
Board Response: Workshops are submitted through the Program Committee. The Board expresses concern over use of "Critical Control Points" in this context. (Note: this proposed workshop is under consideration by the Program Committee).

Dairy Quality and Safety Professional Development Group

No recommendations were submitted.

Food Safety Network Professional Development Group

1. To include a question on the Membership application/renewal form inquiring whether Members are interested in receiving E-mail in specific categories.
Board Response: The Board finds this an interesting recommendation and requests an expanded proposal by March 30.
2. For the 2001 Annual Meeting, that the Food Safety Network PDG, in collaboration with the Staff Liaison (Bev Corron) and the Student PDG, organize part of a kiosque for hands-on demonstration of electronic tools of interest to food safety professionals.
Board Response: Provide details of what will be displayed to the Board by March 30 for Board approval.

Food Sanitation Professional Development Group

1. Because there appear to be several PDGs that could be working on similar projects, the group recommends that each PDG develop a brief mission statement to more clearly communicate to new Members their purpose and function.
Board Response: Board agrees. A letter requesting a draft by March 30 for Board approval will be sent in December.

Fruit and Vegetable Safety and Quality Professional Development Group

No minutes submitted.

Meat and Poultry Safety and Quality Professional Development Group

1. The PDG would like to host a meeting between regulatory, industry and academic personnel to discuss internship programs in each other's disciplines to encourage understanding of the issues each faces. This could be held at ILSI headquarters. Volunteers are ready to help if the Board approves.
Board Response: Approved August 2000. Awaiting further communication.
2. There is a concern that IAFP have a more visible role in presenting safety issues to Congress, consumers, and news media.
Board Response: This is not a part of our Mission. Individual members are welcome to, and encouraged to, communicate their personal views to Congress, consumers and media.

3. There is a need to improve the image of food safety professionals by promoting national food safety month and a registering exam for food safety professionals.
Board Response: National Food Safety Month promoted in *DFES*. Registration is available through other sources.

Microbial Food Safety Risk Assessment Professional Development Group

1. Support the PDG name change to "Microbial Risk Analysis."
Board Response: Approved at August 2000 Board Meeting. Bylaws change will be voted on in August 2001.
2. Grant our request for a "Microbial Risk Analysis" PDG Web page on IAFP Web site.
Board Response: Approved. Guidelines for Web use are in the development stage.

Retail Food Safety and Quality Professional Development Group

1. Questions: Do the retail guidelines need to be IAFP copyrighted?
Board Response: All IAFP documents are copyrighted after approval by the Executive Board.

Seafood Safety and Quality Professional Development Group

1. Symposium for next year IAFP–Seafood Safety & Quality PDG on Microbial and Chemical Concerns in Seafood.
Board Response: Direct to Program Committee. (Note: This proposed symposium is under consideration by the Program Committee.)

Student Professional Development Group

1. Continue to have a Student PDG luncheon.
Board Response: Agreed.
2. Add a Student PDG mixer later in the meeting to accommodate those students that do not arrive until then.
Board Response: Submit a formal proposal to the Executive Board. This event would need to be funded by sponsorship funds.
3. Continue to develop the Student PDG, through creation of the electronic newsletter, and additional functions.
Board Response: The Executive Board supports and encourages students to continue development of the Student PDG.
4. Elaborate upon the career board and add other opportunities for students to interact with companies, and vice versa in interview situations, perhaps by reserving a room that would be dedicated for this purpose.
Board Response: The Board asks the Student PDG to provide operational guidelines by January 12 for consideration at the next Board Meeting.
5. Develop ideas for a symposium topic for Student PDG sponsorship at 2001 Annual Meeting.
Board Response: The Board encourages continued student involvement.

Viral and Parasitic Foodborne Disease Professional Development Group

No recommendations were submitted.

TASK FORCES

HACCP Task Force

1. That at the approval of the Executive Board, this Task Force will prepare an outline for the content of a model retail HACCP (TQM) policy, procedures and standards manual.
Board Response: Agreed. Approved at the August 2000 Board Meeting.

SUPPORT GROUPS

Affiliate Council

1. Reconsider Toronto as an Annual Meeting site in the future.
Board Response: Agreed. Toronto will continue to be considered.
2. The time of the Affiliate Education Symposium be changed to Saturday evening and combined with a dinner reception.
Board Response: Approve Saturday Evening time. Sponsorship monies and registration fees must cover expenses.
3. That sponsorships be solicited to help off set the costs of this dinner reception.
Board Response: Request Affiliate assistance in obtaining sponsorship monies.
4. The IAFP staff explore the possibility of expanding their liability insurance coverage as an umbrella for the Affiliates.
Board Response: Agreed. The Board directed staff to research this issue and report to the Board at the November Board meeting.

Note: Upon investigation, it is not feasible for the Association to offer this type of insurance coverage to Affiliate organizations due to the diversity of insurance laws from one geographic area to another. The Association encourages each Affiliate to review their insurance coverage and keep insurance policies in force to reduce their liability exposure(s).

International Association for
Food Protection

Award Nominations

The International Association for Food Protection welcomes your nominations for our Association Awards. Nominate your colleagues for one of the Awards listed below. You do not have to be an IAFP Member to nominate a deserving professional. To request nomination criteria, contact:

IAFP
6200 Aurora Ave., Suite 200W
Des Moines, Iowa 50322-2863
Phone: 800.369.6337; 515.276.3344
Fax: 515.276.8655
Web site: www.foodprotection.org
E-mail: info@foodprotection.org

Nominations deadline is February 19, 2001. You may make multiple nominations. All nominations must be received at the IAFP office by February 19, 2001.

- Persons nominated for individual awards must be current IAFP Members. Black Pearl Award nominees must be a company employing current IAFP Members. NFPA Food Safety Award nominees do not have to be IAFP Members.
- Previous award winners are not eligible for the same award.
- Executive Board Members and Awards Committee Members are not eligible for nomination.
- Presentation of awards will be during the Awards Banquet at the IAFP Annual Meeting in Minneapolis, Minnesota on August 8, 2001.

Black Pearl Award – Award Showcasing the Black Pearl

Presented in recognition of a company's outstanding achievement in corporate excellence in food safety and quality.

Sponsored by Wilbur Feagan and F&H Food Equipment Company.

Fellows Award – Distinguished Plaque

Presented to individuals for their contribution to the Association and its Affiliates with quiet distinction over a prolonged period of time.

Sponsored by the International Association for Food Protection.

Honorary Life Membership Award – Plaque and Lifetime Membership in IAFP

Presented to Member(s) for their devotion to the high ideals and objectives of IAFP and for their service to the Association.

Harry Haverland Citation Award – Plaque and $1,000 Honorarium

Presented to an individual for years of devotion to the ideals and objectives of IAFP.

Sponsored by DiverseyLever/U.S. Food Group.

Harold Barnum Industry Award – Plaque and $1,000 Honorarium

Presented to an individual for outstanding service to the public, IAFP and the food industry.

Sponsored by NASCO International, Inc.

Educator Award – Plaque and $1,000 Honorarium

Presented to an individual for outstanding service to the public, IAFP and the arena of education in food safety and food protection.

Sponsored by Nelson-Jameson, Inc.

Sanitarian Award – Plaque and $1,000 Honorarium

Presented to an individual for outstanding service to the public, IAFP and the profession of the Sanitarian.

Sponsored by Ecolab, Inc., Food and Beverage Division.

Maurice Weber Laboratorian Award – Plaque and $1,000 Honorarium

Presented to an individual for outstanding contributions in the laboratory, recognizing a commitment to the development of innovative and practical analytical approches in support of food safety.

Sponsored by Weber Scientific

NFPA Food Safety Award – Plaque and $3,000 Honorarium

Presented to an individual, group, or organization in recognition of a long history of outstanding contribution to food safety research and education.

Sponsored by National Food Processors Association.

Past Awardees

BLACK PEARL AWARD

Sponsored by Wilbur Feagan and F & H Food Equipment Company, Springfield, Missouri

1994–HEB, Co., San Antonio, Texas
1995–Albertson's Inc., Boise, Idaho
1996–Silliker Laboratories Group, Inc., Homewood, Illinois
1997–Papetti's of Iowa Food Products, Inc., Lenox, Iowa
1998–Kraft Foods, Inc., Northfield, Illinois
1999–Caravelle Foods, Brampton, Ontario, Canada
2000–Zep Manufacturing Company, Atlanta, Georgia

FELLOWS AWARD

1998–Larry Beuchat, Lloyd Bullerman, Frank L. Bryan Michael P. Doyle, Harry Haverland, Elmer M. Marth, and Edmund A. Zottola
1999–A. Richard Brazis, Michael H. Brodsky, James M. Jay, Robert T. Marshall, Lawrence A. Roth, and Earl O. Wright
2000–John C. Bruhn, Cameron R. Hackney, Bruce E. Langlois, and Lloyd O. Luedecke

HONORARY LIFE MEMBERSHIP AWARD

1957–J. H. Shrader
1958–H. Clifford Goslee
1959–William H. Price
1960–None Given
1961–Sarah Vance Dugan
1962–None Given
1963–C. K. Johns and Harold Macy
1964–C. B. and A. L. Shogren
1965–Fred Basselt and Ivan Parkin
1966–M. R. Fisher
1967–C. A. Abele and L. A. Black
1968–M. P. Baker and W. C. Frazier
1969–John Faulkner
1970–Harold J. Barnum
1971–Wiliam V. Hickey
1972–C. W. Dromgold and E. Wallenfeldt
1973–Fred E. Uetz
1974–H. L. Thomasson and K. G. Weckel
1975–A. E. Parker
1976–A. Bender Luce
1977–Harold Heiskell
1978–Karl K. Jones
1979–Joseph C. Olson, Jr.
1980–Alvin E. Tesdal and Laurence G. Harmon
1981–Robert M. Parker
1982–None Given
1983–Orlowe Osten
1984–Paul Elliker
1985–Patrick J. Dolan, Franklin W. Barber, and Clarence K. Luchterhand
1986–John G. Collier
1987–Elmer Marth and James Jezeski
1988–Kenneth Whaley and Paul J. Pace
1989–Earl Wright and Vernon Cupps
1990–Joseph E. Edmondson
1991–Leon Townsend and Dick B. Whitehead
1992–A. Richard Brazis and Harry Haverland
1993–None Given
1994–Ken Kirby
1995–Lloyd B. Bullerman and Robert T. Marshall
1996–Richard C. Swanson
1997–Frank L. Bryan
1998–H. V. Atherton and David D. Fry
1999–Sidney E. Barnard, Michael H. Brodsky, Charles W. Felix, and James L. Smith
2000–William L. Arledge and Robert L. Sanders

HARRY HAVERLAND CITATION AWARD

Sponsored by DiverseyLever/U.S. Food Group, Cincinnati, Ohio

1951–J. H. Shrader and William B. Palmer (posthumously)
1952–C. A. Abele
1953–Clarence Weber
1954–C. K. Johns
1955–R. G. Ross
1956–K. G. Weckel
1957–Fred C. Baselt
1958–Milton R. Fisher
1959–John D. Faulkner
1960–Luther A. Black
1961–Harold S. Adams
1962–Franklin W. Barber
1963–Merle P. Baker
1964–W. K. Moseley
1965–H. L. Thomasson
1966–J. C. Olson, Jr.
1967–William V. Hickey
1968–A. Kelley Saunders
1969–Karl K. Jones
1970–Ivan E. Parkin
1971–L. Wayne Brown
1972–Ben Luce
1973–Samuel O. Noles
1974–John C. Schilling
1975–A. Richard Brazis
1976–James Meany
1977–None Given
1978–Raymond A. Belknap
1979–Harold E. Thompson, Jr.
1980–Don Raffel
1981–Henry V. Atherton
1982–None Given
1983–William B. Hasting
1984–Elmer H. Marth
1985–Ralston B. Read, Jr.
1986–Cecil E. White
1987–None Given
1988–Carl Vanderzant
1989–Clem Honer

1990–None Given
1991–Frank Bryan
1992–Ewen C. D. Todd
1993–Robert C. Tiffin
1994–Sidney E. Barnard
1995–Charles W. Felix
1996–Joseph J. Disch
1997–Earl O. Wright
1998–Anna M. Lammerding
1999–John C. Bruhn
2000–Ann Draughon

EDUCATOR-INDUSTRY AWARD

1973–Walter A. Krienke
1974–Richard P. March
1975–K. G. Weckel
1976–Burdet H. Heinemann
1977–Elmer H. Marth
1978–James B. Smathers
1979–Joseph Edmondson
1980–James R. Welch
1981–Francis F. Busta

In 1982, this award was split into the Educator Award and the Harold Barnum Industry Award.

HAROLD BARNUM INDUSTRY AWARD

Sponsored by Nasco International, Fort Atkinson, Wisconsin

1982–Howard Ferreira
1983–C. Dee Clingman
1984–Omer Majerus
1985–William L. Arledge
1986–Hugh C. Munns
1987–J. H. Silliker
1988–Kenneth Kirby
1989–Lowell Allen
1990–Roy Ginn
1991–Thomas C. Everson
1992–Ronald Case
1993–David D. Fry
1994–R. Bruce Tompkin
1995–Damien A. Gabis
1996–Dane T. Bernard
1997–John G. Cerveny
1998–None Given
1999–Russell S. Flowers
2000–Kenneth Anderson

EDUCATOR AWARD

Sponsored by Nelson-Jameson, Inc. Marshfield, Wisconsin

1982–Floyd Bodyfelt
1983–John Bruhn
1984–R. Burt Maxcy
1985–Lloyd B. Bullerman
1986–Robert T. Marshall
1987–David K. Bandler
1988–Edmund A. Zottola
1989–Vernal Packard
1990–Michael Stiles
1991–William E. Sandine
1992–William S. LaGrange
1993–Irving J. Pflug
1994–Kenneth R. Swartzel
1995–Robert B. Gravani
1996–Cameron R. Hackney
1997–Purnendu C. Vasavada
1998–Ronald H. Schmidt
1999–Eric A. Johnson
2000–Susan S. Sumner

SANITARIAN AWARD

Sponsored by Ecolab Inc., Food and Beverage Division, St. Paul, Minnesota

1952–Paul Corash
1953–E. F. Meyers
1954–Kelley G. Vester
1955–B. G. Tennent
1956–John H. Fritz
1957–Harold J. Barnum
1958–Karl A. Mohr
1959–William Kempa
1960–James C. Barringer
1961–Martin C. Donovan
1962–Larry Gordon
1963–R. L. Cooper
1964–None Given
1965–Harold R. Irvin
1966–Paris B. Boles
1967–Roger L. Stephens
1968–Roy T. Olson
1969–W. R. McLean
1970–None Given
1971–Shelby Johnson
1972–Ambrose P. Bell
1973–None Given
1974–Clarence K. Luchterhand
1975–Samuel C. Rich
1976–M. W. Jefferson
1977–Harold Bengsch
1978–Orlowe Osten
1979–Bailus Walker, Jr.
1980–John A. Baghott
1981–Paul Pace
1982–Edwin L. Ruppert
1983–None Given
1984–Harold Wainess
1985–Harry Haverland
1986–Jay Boosinger
1987–Erwin P. Gadd
1988–Kirmon Smith
1989–Robert Gales
1990–Leon Townsend
1991–James I. Kennedy
1992–Dick B. Whitehead
1993–Lawrence Roth
1994–Charles Price
1995–Everett E. Johnson
1996–Leon H. Jensen
1997–Randall A. Daggs
1998–Terry B. Musson
1999–Gloria I. Swick
2000–Norris A. Robertson, Jr.

DEVELOPING SCIENTISTS AWARDS

Sponsored by the Foundation Fund, Des Moines, Iowa

1986–	1st	Christine Bruhn
	2nd	Elliott T. Ryser
	3rd	Eileen M. Rosenow
	4th	Lisa M. Flores
	5th	Kamal M. Kamaly

1987-	1st	R. K. Lindenthal
	2nd	Elliott T. Ryser
	3rd	Kathleen M. Knutson
	4th	A. A. Airoldi
	5th	Michelle M. Schaack
1988-	1st	A. A. Airoldi
	2nd	Stephen Ingham
	3rd	Douglas Marshall
	4th	B. J. Overdahl
	5th	P. K. Cassiday
1989-	1st	Nancy Nannen
	2nd	Diane West
	3rd	David Baker
	4th	Karl Eckner
	5th	Hassan Gourama
1990-	1st	Bob Roberts
	2nd	Anna Lammerding
	3rd	Hassan Gourama
	4th	Anna Lambert
	5th	Mona Wahby
1991-	1st	Andrea O. Baloga
	2nd	Elaine D. Berry
	3rd	J. Eric Line
	4th	Donna Williamson
	5th	Keith R. Schneider
1992-	1st	Gary J. Leyer
	2nd	Janice M. Baker
	3rd	Kyle Sashara
	4th	Lynn McIntyre
	5th	Kwang Yup Kim
1993-	1st	Randall K. Phebus
	2nd	J. Eric Line
	3rd	David H. Toop
	4th	Lee-Ann Jaykus
	5th	Tom Yezzi
1994-Oral	1st	J. David Monk
	2nd	Charles Powell
	3rd	Nandini Natraja
Poster	1st	Ratih Dewanti
	2nd	Jitu R. Patel
	3rd	Chen-Jang Liu
1995-Oral	1st	Maria Nazarowec-White
	2nd	Peter Bodnaruk
	3rd	Tina S. Schwach
Poster	1st	James D. Schuman
	2nd	Willie Taylor
	3rd	Wei Tan
1996-Oral	1st	Abbey Nutsch
	2nd	M. Rocelle S. Clavero
	3rd	Robert Williams
Poster	1st	Rod Worobo
	2nd	John Czajka
	3rd	Sherri Kochevar
1997-Oral	1st	Doris D'Souza
	2nd	Paris Leggitt
	3rd	Kunho Seo
Poster	1st	Lisa Lucore
	2nd	Soraya Rosenfield
	3rd	Jeffrey Semanchek
1998-Oral	1st	Peter J. Taormina
	2nd	Brian Shofran
	3rd	Amanda E. Whitfield
Poster	1st	Aysegul Eyigor
	2nd	Ronald D. Smiley
	3rd	Jianming Ye
1999-Oral	1st	Susan Abraham
	2nd	Peter J. Taormina
	3rd	Robert L. Sudler, Jr.
Poster	1st	Ziad W. Jaradat
	2nd	Kazue Takeuchi
	3rd	Yongsoo Jung
2000-Oral	1st	Peter Taormina
	2nd	Nathanon Trachoo
	3rd	Madonna Cate
Poster	1st	William Weissinger
	2nd	Marlene Janes
	3rd	Robert Williams

FOOD SAFETY AWARD

Sponsored by The National Food Processors Association, Washington, District of Columbia

1998 Food Research Institute at the University of Wisconsin-Madison, Madison, Wisconsin

1999 Michael P. Doyle

2000 Elmer H. Marth

SAMUEL J. CRUMBINE AWARD

Sponsored by the Conference for Food Protection in cooperation with American Academy of Sanitarians; Association of Food and Drug Officials; Foodservice & Packaging Institute, Inc.; International Association for Food Protection; International Food Safety Council; National Association of County and City Health Officials; National Environmental Health Association; NSF International; and Underwriters Laboratories, Inc.

From 1955 to 1966 two awards were given: the first for general environmental health, the second for food protection. From 1968 to 1973, the award was suspended due to a general lack of innovation in food protection programs during that period.

1955 Cowlitz-Wahkiakum County Department of Public Health, Washington
New York City Department of Public Health, New York City, New York

1956 Tulsa City-County Department of Public Health, Tulsa, Oklahoma
Macon-Bibb-Jones County Department of Public Health, Georgia

1957 San Jose Department of Public Health, San Jose, California
San Diego County Department of Public Health, San Diego, California

1958 Spokane County Department of Public Health, Spokane, Washington
Los Angeles County Department of Public Health, Los Angeles, California

1959 San Diego County Department of Public Health, San Diego, California
Salt Lake City Department of Public Health, Salt Lake City, Utah

1960 Marion County Department of Public Health, Salem, Illinois
San Bernardino County Department of Public Health, San Bernardino, California

1961 Albuquerque Environmental Health Department, Albuquerque, New Mexico
Philadelphia County Department of Public Health, Philadelphia, Pennsylvania
1962 Rocky Mount Department of Public Health, Rocky Mount, North Carolina
Seattle-King County Department of Public Health, Seattle, Washington
1963 Hamilton County Department of Public Health, Cincinnati, Ohio
Lake County County Department of Public Health, Waukegon, Illinois
1964 Orange County Department of Public Health, Santa Ana, California
1965 Spokane County Department of Public Health, Spokane, Washington
Albuquerque Environmental Health Department, Albuquerque, New Mexico
1966 Imperial County Department of Public Health, El Centro, California
Jefferson County Department of Public Health, Birmington, Alabama
1967 Salt Lake City Department of Public Health, Salt Lake City, Utah
1974 Lexington-Fayette County Department of Public Health, Lexington, Kentucky
1975 None given
1976 Region VI Department of Public Health, Roswell, New Mexico
1977 Los Angeles County Department of Public Health, Los Angeles, California
1978 Arlington County Department of Public Health, Arlington, Virginia
1979 Suffolk County Department of Public Health, Riverhead, Virginia
1980 Allegheny County Department of Public Health, Pittsburgh, Pennsylvania
1981 Nassau County Department of Public Health, Mineola, New York
1982 Winnebago County Department of Public Health, Rockford, Illinois
1983 Pima County Department of Public Health, Tucson, Arizona
1984 Southeastern District Department of Public Health, Idaho
1985 Montgomery County Department of Public Health, Dayton, Ohio
1986 Tri-County Department of Public Health, Colorado
1987 Snohomish Health District, Everett, Washington
1988 San Bernardino County Department of Public Health, San Bernardino, California
1989 Albuquerque Environmental Health Department, Albuquerque, New Mexico
1990 San Joaquin County Environmental Health Division, Stockton, California
1991 Tacoma-Pierce County Health Department, Tacoma, Washington
1992 Boulder County Health Department, Boulder, Colorado
1993 Allegheny County Pennsylvania Health Department, Pittsburgh, Pennsylvania
1994 Du Page County Health Department, Wheaton, Illinois
1995 None given
1996 Snohomish Health District, Everett, Washington
1997 Madison Department of Public Health, Madison, Wisconsin
1998 Clark County Health District, Las Vegas, Nevada
1999 Lake County Health Department, Waukegan, Illinois
2000 Olmsted County Public Health Services Rochester, Minnesota

C. B. SHOGREN MEMORIAL AWARD

1972–Iowa Affiliate
1973–Kentucky Affiliate
1974–Washington Affiliate
1975–Illinois Affiliate
1976–Wisconsin Affiliate
1977–Minnesota Affiliate
1978–None Given
1979–New York Affiliate
1980–Pennsylvania Affiliate
1981–Missouri Affiliate
1982–South Dakota Affiliate
1983–Washington Affiliate
1984–None Given
1985–Pennsylvania Affiliate
1986–None Given
1987–New York Affiliate
1988–Wisconsin Affiliate
1989–Georgia Affiliate
1990–Texas Affiliate
1991–Georgia Affiliate
1992–Georgia Affiliate
1993–New York Affiliate
1994–Illinois Affiliate
1995–Wisconsin Affiliate
1996–Wisconsin Affiliate
1997–Florida Affiliate
1998–Ontario Affiliate
1999–Wisconsin Affiliate
2000–Michigan Affiliate

MEMBERSHIP ACHIEVEMENT AWARDS

HIGHEST PERCENTAGE INCREASE

1998–Alabama Affiliate
1999–Kansas Affiliate
2000–Alberta Affiliate
Kansas Affiliate

HIGHEST NUMBER INCREASE

1986–Iowa Affiliate
1987–Florida Affiliate
1988–Florida Affiliate
1989–California Affiliate
1990–California Affiliate
1991–Illinois Affiliate
1992–California Affiliate
Illinois Affiliate
1993–California Affiliate
1994–California Affiliate
1995–Texas Affiliate
1996–California Affiliate
1997–California Affiliate
1998–California Affiliate
1999–California Affiliate
2000–California Affiliate

New Members

CANADA

Dennis Chu
Capital Health
Edmonton, Alberta

Miriam Fransan
Jersey Farm
Delta, British Columbia

Trish C. Lequier
Nestlé, Edmonton, Alberta

David F. McEwen
McEwen Agri-Consulting Inc.
Guelph, Ontario

Carmen F. Van Der Nest
MacGregors Meat & Seafood
Toronto, Ontario

Brenda Daly Wheeler
Canadian Food Inspection Agency
St. John's, Newfoundland

KOREA

Yong Ha Park
College of Veterinary Medicine,
Seoul National University
Sywon, Kyungg

MEXICO

Pedro Villegas Alvarez
Normex S.C.
Tlalnepantla, State of Mexico

Monica Maria Rocha Gutierrez
Hyt Gastronomica
Mexico, D.F.

Salvador de Jesus Velazquez Hdez
Guadalajara, Jalisco

Jaime Maya-Flares
Inst. Tech. Celaya
Celaya, Guanajuato

Mauricio F. Rousselon
McDonald's Mexico
Monterrey, Nuevo Leon

THE NETHERLANDS

J. Hoekstra
Friesland Coberco Dairy Foods
Ma, Leeuwarden

PORTUGAL

Francisco Malcata
Escola Superior Biotecnologia
Porto

SAUDI ARABIA

Said Hamdy Abd El-Maeety
The National Agricultural Dev.
Co., Al-Hassa

UNITED STATES

Alabama

Henry E. Randolph
Randolph Associates, Inc.
Birmingham

California

Martha Dorado
Calexico

Margan C. Margan
California Dept. of Food, & Agric.
/Milk & Dairy Foods Control
West Covina

Florida

Paul M. Minshew
Dept. of Health
Daytona Beach

Amarat H. Simanne
University of Florida
Gainesville

Illinois

Everett L. Graeschel
Illinois Dept. of Public Health
Rockford

Trish K. Welch
Southern Illinois University
Carbondale

Indiana

Michael H. Wiesen
F & M Meats Inc.
Indianapolis

Iowa

John Just
Anderson-Erickson Dairy
Des Moines

Maryland

Al Mayer
Ecolab, Baltimore

Michigan

John R. Insel
Food Smart LLC
DeWitt

Alissa M. Wesche
Michigan State University
East Lansing

Minnesota

Paul Brown
Brown Engineering Inc.
Eden Prairie

Kathleen A. Lang
Pillsbury
St. Paul

Michael R. Polzin
Pillsbury
St. Paul

New Members

Nevada

Alan Dreher
Washoe County District Health Dept., Reno

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Minden

New York

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Brooklyn

North Carolina

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Raleigh

Ohio

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Donatos
Columbus

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Heartland Processing
Union City

Oregon

Gregory P. Parks
Gray & Company
Forest Grove

Dari M. Terrebonne
GW International
Portland

Pennsylvania

Darrell Bayles
USDA-ARS-ERRC
Wyndmoor

Yvette M. Henry
Molecular Country, Inc.
King of Prussia

Elias E. Marinos
Wegmans Food Markets
Bethlehem

Gregory A. McLucas
Fresh Express
Greencastle

Vermont

Renita K. Rodriguez
Rhino Foods, Burlington

Washington

Frederic Bonnord
Bunge Foods, Seattle

Dong-Hyun Kang
Washington State University
Pullman

Wisconsin

Thomas J. Jenny
Specialty Cheese Co.
Lowell

Kathleen Mannor
Wisconsin Dept. of Agriculture
Madison

Steven McWilliams
Walker Stainless
New Lisbon

Scott Sprangers
Copesan, Brookfield

New Members

CANADA

Dennis Chu
Capital Health
Edmonton, Alberta

Miriam Franson
Jersey Farm
Delta, British Columbia

Trish C. Lequier
Nestlé, Edmonton, Alberta

David F. McEwen
McEwen Agri-Consulting Inc.
Guelph, Ontario

Carmen F. Van Der Nest
MacGregors Meat & Seafood
Toronto, Ontario

Brenda Daly Wheeler
Canadian Food Inspection Agency
St. John's, Newfoundland

KOREA

Yong Ho Park
College of Veterinary Medicine,
Seoul National University
Sywon, Kyungg

MEXICO

Pedro Villegas Alvarez
Normex S.C.
Tlalnepantla, State of Mexico

Monica Maria Rocha Gutierrez
Hyt Gastronomica
Mexico, D.F.

Salvador de Jesus Velazquez Hdez
Guadalajara, Jalisco

Jaime Maya-Flores
Inst. Tech. Celaya
Celaya, Guanajuato

Mauricio F. Rousselon
McDonald's Mexico
Monterrey, Nuevo Leon

THE NETHERLANDS

J. Hoekstra
Friesland Coberco Dairy Foods
Ma, Leeuwarden

PORTUGAL

Francisco Malcata
Escola Superior Biotecnologia
Porto

SAUDI ARABIA

Said Hamdy Abd El-Moeety
The National Agricultural Dev.
Co., Al-Hassa

UNITED STATES

Alabama

Henry E. Randolph
Randolph Associates, Inc.
Birmingham

California

Martha Dorado
Calexico

Morgan C. Morgan
California Dept. of Food, & Agric.
/Milk & Dairy Foods Control
West Covina

Florida

Paul M. Minshew
Dept. of Health
Daytona Beach

Amarat H. Simonne
University of Florida
Gainesville

Illinois

Everett L. Groeschel
Illinois Dept. of Public Health
Rockford

Trish K. Welch
Southern Illinois University
Carbondale

Indiana

Michael H. Wiesen
F & M Meats Inc.
Indianapolis

Iowa

John Just
Anderson-Erickson Dairy
Des Moines

Maryland

Al Moyer
Ecolab, Baltimore

Michigan

John R. Insel
Food Smart LLC
DeWitt

Alissa M. Wesche
Michigan State University
East Lansing

Minnesota

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Pillsbury
St. Paul

Michael R. Polzin
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New York

Rubens A. Valerio
Brooklyn

North Carolina

Laura D. Reina
North Carolina State University
Raleigh

Ohio

Thomas Bell
Donatos
Columbus

Jina Hill
Heartland Processing
Union City

Oregon

Gregory P. Parks
Gray & Company
Forest Grove

Dari M. Terrebonne
GW International
Portland

Pennsylvania

Darrell Bayles
USDA-ARS-ERRC
Wyndmoor

Yvette M. Henry
Molecular Country, Inc.
King of Prussia

Elias E. Marinos
Wegmans Food Markets
Bethlehem

Gregory A. McLucas
Fresh Express
Greencastle

Vermont

Renita K. Rodriguez
Rhino Foods, Burlington

Washington

Frederic Bonnord
Bunge Foods, Seattle

Dong-Hyun Kang
Washington State University
Pullman

Wisconsin

Thomas J. Jenny
Specialty Cheese Co.
Lowell

Kathleen Mannor
Wisconsin Dept. of Agriculture
Madison

Steven McWilliams
Walker Stainless
New Lisbon

Scott Sprangers
Copesan, Brookfield

United States Consideration of EU Compensation for Hormone Ban is Pointless, AMI Says

Any further United States consideration of European Union (EU) compensation offers for lost trade costs resulting from the 1985 Hormone Directive are pointless given the EU's plan to severely limit the duration of the compensation, American Meat Institute (AMI) said in a letter to the United States Trade Representative (USTR) special trade negotiator for agriculture and food policy, Greg Frazier. AMI took this position in a letter cosigned by three other organizations after news reports indicated that the EU intended to re-legislate its Hormone Directive, which has been found scientifically insupportable, in order to claim compliance with (World Trade Organization) WTO rules. Once compliance is claimed, the EU would end compensation, according to news reports.

AMI and cosignors also noted that although the EU has offered limited access for beef from non-hormone treated cattle as "compensation" for lost trade, animals must be tracked from birth to slaughter to ensure that they meet program requirements. Since the industry does not have a ready supply of untreated beef that can be shipped to Europe, the United States beef industry would not be able to benefit from new access for 18 to 24 months, the period of time it typically takes to grow animals to slaughter weight. By the time beef from these animals would ready for export, the EU presumably will have re-legislated its directive and terminated the new access.

AMI also said that re-legislating the directive to claim that it complies with WTO Sanitary and Phytosanitary (SPS) Agreement "not only represents a blatant abuse of the precautionary principle, but would also place the amended directive squarely in conflict with other key SPS provisions."

Finally, AMI restated its strong support for "carousel" retaliation and urged the Administration to take immediate action to implement the carousel retaliation law, which should have gone into effect in June 2000. Letter cosignors included the American Farm Bureau Federation, the National Cattlemen's Beef Association and the US Meat Export Federation.

International Association for Food Protection

IBA Food Safety Division Supports FDA Petition for Improved Seafood Safety in the United States

IBA's Food Safety Division announced that it fully supports the petition submitted to the FDA by the National Fisheries Institute (NFI) which aims to allow the choice of irradiation treatment for crustacean seafood products.

IBA Food Safety, together with MDS Nordion Inc. and the Louisiana Department of Agriculture and Forestry, joins with the NFI to work towards achieving this organization's objective: to provide shrimp, crab, lobster and crawfish producers with the best technological means to ensure effective seafood safety. "We believe that producers of crustacean food should be able to choose the best technology available and that consumers should be able to opt for the safest seafood product," said Chip Colonna, vice president of perishable foods, IBA food safety division. "IBA irradiation technology, whether this be electron beam, X-ray or gamma, can help reduce the risk of contamination in seafood and we are pleased that the NFI is taking the lead to extend irradiation technology to these types of products."

In the United States, irradiation technology has already been approved by the FDA to treat poultry, red meat, vegetables and more recently eggs, and has been shown to be an extremely powerful weapon against disease-provoking bacteria such as *Listeria* and *Salmonella*.

Food Law from Farm to Table — Creating a European Food Authority

On Nov. 8, 2000, the European Commission adopted a proposal for a Regulation of the Parliament and Council, to be adopted by co-decision, laying down fundamental principles and requirements of food law and establishing a European Food Authority (EFA).

The proposal presented by Health and Consumer Commissioner David Byrne together with the Enterprise Commissioner Erkki Liikanen is the centerpiece of the Commission's strategy for a proactive food policy covering the entire food chain, from the farm to the fork.

Its primary objective is to provide the basis for the assurance of a high level of protection of human life while ensuring the effective functioning of the internal market. The package will not only contribute to a high level of consumer health protection in the area of food safety, but also to the restoration and maintenance of consumer confidence in food.

The Commission decided that the necessary staffing and resources would have to be

devoted to the EFA to ensure its success. Within 3 years it is expected to have about 250 staff and a budget of some 40 million Eus. A review of ultimate staffing and budgetary requirements will be made at this time so as to ensure that the authority has the resources necessary for its full operation. Preliminary figures would indicate a staff size of around 330.

The Commission will subsequently come forward with its proposal for the location of the EFA. "Safety is the most important ingredient in our food. Europe must have the capacity to ensure that we can deliver this to our consumers. This legislative package is designed to overcome the weaknesses of the past and put food safety firmly on top of our agenda. The substantive food law and the creation of the European Food Authority are the building blocks, the very foundations upon which our new food safety policy will rest," health and consumer commissioner David Byrne said when presenting the proposal.

Byrne went on to emphasize, "We have to re-gain public confidence in the capacity of the food industry and in public authorities to ensure that food is safe. The new food law provides the basic principles and requirements for the marketing of food and for the assurance of a safe food supply to consumers. It will also address the safety of animal feeds particularly where these may have a direct or indirect effect on food safety. A well-resourced food authority underpins this approach with top class, up-to-date scientific advice to consumers, industry, member states, the Commission and the European Parliament. A key element of the authority is the closest involvement of the food safety authorities of the member states to facilitate the early identification of emerging risks and to avoid confusing and conflicting messages to consumers."

The proposal lays down common overarching principles and requirements for EU food law, harmonizing divergent approaches both at European and national level. The guiding principles as presented will form the basis for any future revision of existing and for any new proposals for food legislation.

The main provisions of the law are the following: Definition of the term "food": Food means any substance or product intended to be, or expected to be ingested by humans. Establishments of general principles: Food law shall pursue the protection of human life, taking into account the precautionary principle, the protection of the consumers' interest, the traceability of food and feed and clearly establish responsibilities for food and feed business operators and public authorities. Requirements of food and feed safety: Only safe food may be placed on the market and food shall be considered unsafe if it is potentially injurious to health or unfit for human consumption or contaminated. Similarly no feed shall be placed on the market or fed to any food-producing animal unless it satisfies the feed safety requirements. Food and feed business operators shall ensure that at all stages of production and distribution under their control this principle is respected.

Titan SureBeam Awarded New Patent, Further Advancing Its Technological Leadership in Electronic Pasteurization

The Titan Corporation has announced that SureBeam has been awarded a United States patent for novel SureBeam® system enhancements that improve equipment life, reduce facility construction costs, and increase productivity. This is the ninth patent award that SureBeam has added to its US and foreign patent portfolio. Another 12 patent applications are still pending in the United States and abroad. "Our high-speed technology – coupled with these system design innovations – gives SureBeam the ability to install the system more quickly and more efficiently," says Larry A. Oberkfell, SureBeam's President and CEO.

Similar to a microwave oven, the SureBeam® system uses ordinary electricity as its energy source to pasteurize food after it has been processed and packaged. The patented SureBeam® technology eliminates in seconds the threat of harmful foodborne pathogens such as *E. coli* O157:H7, *Listeria*, *Campylobacter* and *Salmonella* without compromising its texture or taste. Over 5,000 people die each year from such foodborne bacteria.

SureBeam Corporation and the Minnesota-based Huisken Meats launched the nation's first supermarket hamburger product to be electronically pasteurized with the patented SureBeam® technology in 84 stores last May.

Today it's estimated that over 1,000 stores are carrying the SureBeam processed product. Schwan's, a distributor of premium frozen foods through home delivery – also distributes the product nationwide. In addition to Huisken Meats, SureBeam has entered into multiyear agreements with many of the nation's major food producers to use its patented technology, including IBP, Cargill, Emmpak Foods, United Food Group, Tyson Foods, Del Monte Foods, American Foodservice, and Hawaii Pride.

Approved by the FDA and USDA, many of the nation's most prominent health and medical organizations support the use of electronic pasteurization technology including the American Medical Association, the American Dietetic Association, The World Health Organization, and the Centers for Disease Control.

Food Safety and Inspection Services (FSIS) Publishes Performance Standards for HACCP-based Inspection Models Project

The United States Department of Agriculture's Food Safety and Inspection Service has published performance standards for food safety and non-food safety conditions that slaughter plants participating in the HACCP-based Inspection Models Project must meet. The performance standards for young chickens, which account for the majority of participating plants, were previously released at a public meeting held in March; the standards for young hogs and turkeys have not been released previously.

"This project raises the bar for food safety and other consumer protection concerns and so far the participating plants have been rising to the challenge," said Thomas J. Billy, administrator of USDA's Food Safety and Inspection Service.

Under the pilot project, which began in 1999, volunteer plants extend Hazard Analysis and Critical Control Point (HACCP) systems to slaughter line activities, which are not now covered under HACCP. Plants sort carcasses to remove food safety and non-food safety conditions and must meet performance standards established by FSIS for these defects. FSIS inspectors conduct online carcass inspection and verification inspection to ensure that plants are meeting the standards. Only plants that slaughter young, healthy chickens, hogs, and turkeys are eligible to participate in the pilot project. Up to 30 plants that slaughter young chickens and hogs are currently participating, although fewer than this number are actually testing models at this time. No turkey plants are currently testing the models.

No food safety or non-food safety defects are acceptable to FSIS. While no system is perfect, the models project is an effort to reduce and eliminate defects that pass through traditional inspection. Under the models project, performance standards are based on improving what is achieved under the current, traditional method of inspection. When plants enter the project, they must improve their process in order to meet the new, tougher standards.

Preliminary data from both an independent third party and FSIS in-plant checks indicate that the new system dramatically improves the safety of products and increases overall consumer protection.

The performance standards were published in the Nov. 2 Federal Register. There is no formal comment period for this notice; however, comments are welcomed and should be submitted to FSIS Docket Clerk, Docket #00-042N, U.S. Department of Agriculture, Food Safety and Inspection Service, Room 102 Cotton Annex Building, 300 – 12th St., S.W., Washington, D.C. 20250-3700.

State of California Honors Jack in the Box Inc.

Jack in the Box Inc. recently received the state of California's inaugural award for "outstanding leadership in food safety," bestowed by the Food and Drug Branch of the California Department of Health Services.

The award, presented Oct. 17 in Sacramento, salutes Jack in the Box Inc. for its efforts to help the state of California adopt the uniform food-safety standards put forth by the federal Food and Drug Administration (FDA). The award also recognizes the company for helping the state draft a 1997 law requiring all restaurants to cook meat and eggs at specified temperatures to ensure safety.

The Department of Health Services said Jack in the Box Inc. goes beyond having its own top-notch systems for food safety: The company shares its food-safety systems with regulatory agencies and others in the industry so they can understand how it's done.

Lisa Wright, manager of regulatory affairs at Jack in the Box Inc., explained that the company works closely with health officials in all states where Jack in the Box® restaurants operate. The goal is to help those states adopt food-safety standards that are consistent with the FDA Food Code, a manual incorporating the latest scientific findings on food and food service.

"Regulatory agencies in the past have looked at us as being in the way, because our role as food-safety advocates is often to ask people to do things differently," Wright said. "This award from the state of California is important because it validates our efforts. Jack in the Box is stepping up to the plate for retail food safety, and it's an honor to be recognized."

In 1993, Jack in the Box Inc. implemented the fast-food industry's first comprehensive food-safety system, patterned after a NASA program intended to prevent astronauts in space from becoming ill. The program, called Hazard Analysis and Critical Control Points (HACCP), was considered too complicated to install in a fast-food environment, until Jack in the Box achieved it.

Since then, the FDA and the United States Department of Agriculture have lauded Jack in the Box as a model for the industry. "When it comes to food safety, we have been trying to raise the bar for the entire fast-food industry, not just Jack in the Box restau-

rants. We look forward to continuing to lead our industry and partnering with the regulatory community, moving toward the ultimate goal of giving safer products to fast-food consumers" said Dave Theno, Ph.D., vice president of technical services who implemented the company's HACCP systems.

FSIS Action Will Increase Microbiological Sampling of Ready-to-Eat Meat and Poultry Products

In order to encourage producers of ready-to-eat meat and poultry products to incorporate microbiological sampling into their food safety plans, the USDA's Food Safety and Inspection Service's (FSIS) new directive focuses federal testing on companies that do not have such sampling as part of their plans. Ready-to-eat products, such as hot dogs, luncheon meats, and certain kinds of sausage, are required to be free of illness-causing microbial hazards.

FSIS will maintain at least its current level of sample collection and analysis nationwide each year to ensure that companies are creating ready-to-eat products without harmful microbial hazards. The sampling program is one way the agency verifies that a company's science-based preventive food-safety plan, known as the Hazard Analysis and Critical Control Point plan, and their Standard Sanitation Operating Procedures are effective.

"By following a strategy that encourages industry to test, there will be much more product testing overall – as well as environmental sampling – than FSIS could ever do on its own," said FSIS administrator Thomas J. Billy.

Ready-to eat products are subjected to FSIS testing for *Listeria monocytogenes* and *Salmonella*, and some, such as certain kinds of pepperoni, are analyzed for *E. coli* O157:H7 and staphylococcal enterotoxin as well.

To encourage plants to test their products, FSIS inspectors will not carry out routine scheduled sampling in a plant that incorporates a testing protocol into its HACCP plan or SSOP, as appropriate, and tests its products at least monthly, or conducts regular testing of non-food contact and food-contact surfaces in addition to testing product every three months.

Positive findings from these industry testing programs must be addressed by plants in accordance with the corrective and preventive action requirements found in the HACCP and SSOP regulations. FSIS inspectors will verify these requirements are being met, including choosing to sample at any time at the agency's discretion.

If a sample of product taken by FSIS indicates the presence of a disease-causing microbial hazard, FSIS inspectors verify that the plant has taken the appropriate corrective and preventive measures as set out in the HACCP and SSOP regulations. During any corrective and preventive actions, the plant or FSIS may need to take additional samples. Also, the Directive provides inspectors the opportunity to take follow-up samples once the corrective and preventive actions have been implemented to verify the continued effectiveness of the plant's actions.

Regardless of whether the testing is done by the company or by FSIS, if product testing positive has been distributed, FSIS will request that the company conduct a recall. FSIS does not have the legal authority to mandate recalls.

"This Directive is another step in clearly defining the respective responsibilities of industry and FSIS. Industry is responsible for producing safe food, while federal inspectors are in processing plants daily to verify that this responsibility is being met," Billy said. FSIS has undertaken substantial changes in meat and poultry inspection since 1996 with the implementation of HACCP, resulting in dramatic decreases in foodborne illnesses attributed to meat and poultry.

Fourth International Symposium and Workshop on Shiga Toxin (Vero Cytotoxin) Producing *Escherichia coli* Infections in Japan

Epidemiological data presented at the fourth international symposium and workshop on Shiga toxin (Vero cytotoxin) producing *Escherichia coli* infections show that these are a major public health problem in many parts of the world. The meeting in Kyoto, Japan, between October 29 and November 2, 2000 reviewed progress in the epidemiology of Shiga toxin producing *E. coli* (STEC), STEC virulence factors and pathogenic mechanisms, the pathophysiology of human disease, treatment and prevention of human disease, STEC in the food chain, and the evolution and genomics of STEC.

E. coli O157 remains the most commonly reported serogroup in most of the countries from which data were presented, but other serogroups, particularly O26 and O111, have also caused outbreaks and sporadic cases and are an important cause of haemolytic uraemic syndrome (HUS) in South America, Europe, and Australia.

A large outbreak of *E. coli* O157 and *Campylobacter* infection in Ontario, Canada, in May 2000 was described showing how ground waters supplying the town of Walkerton became contaminated with pathogens derived from local cattle farms. Water treatment

failures subsequently resulted in the town receiving contaminated drinking water, leading to over 1400 people becoming infected, and nine deaths.

Clinical management of cases of STEC infection can be difficult because of variation in presentation. The role of antibiotics in the treatment of STEC infection remains controversial.

Workers from The Netherlands demonstrated the binding of Shiga toxin (Stx) to human polymorphonuclear leucocytes and not to other components of blood. Several workers described progress towards educating the mechanisms that determine virulence in STEC. James Kaper from the United States described a mechanism in bacteria in which signals from the bacterial environment, such as bacterial population density, can control gene expression. This 'quorum sensing' mechanism regulates the activation of genes in the pathogenicity island known as the locus of enterocyte effacement. He postulated that quorum sensing could explain the low infectious dose of STEC, through the influence of factors deriving from non STEC *E. coli* strains that are also present in the human gut.

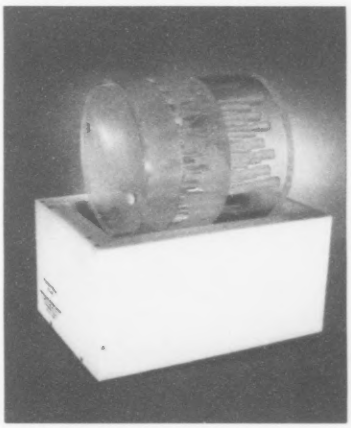
Progress has also been made in both Japan and the United States towards describing the genome of *E. coli* O157 and how it differs from other *E. coli* strains. The complete genome sequence of STEC O157 will be published in the near future.

It is becoming clear from recent veterinary surveillance and surveys that the carriage of STEC in livestock is much commoner than was previously appreciated. A study of cattle in Scotland showed a group level prevalence of 23.7%, which means that this percentage of groups of animals in the sampling frame had at least one animal shedding the pathogen. Dr. Prado from Chile, reported that STEC O157 were found more frequently in pigs than in cattle in some parts of South America, but this has not been observed in other parts of the world so far. Patricia Desmarchelier from Australia reported that studies have found up to 40% of cattle and 70% of sheep on farms were excreting non-O157 STEC.

Clinical management practices were reviewed and advice will be published by a working group.

A novel approach for possible treatment of STEC infection was presented by James Paton. His group in Adelaide had constructed a recombinant *E. coli* strain that produced the Stx receptor, and results in animals challenged with STEC strains looked promising.

Industry Products



Nuclear Associates

Nuclear Associates Medicine Phantom Mixer

The Nuclear Medicine Phantom Mixer (model 76-445) from Nuclear Associates allows you to achieve a uniform distribution of activity in a cylindrical phantom. You can: perform QC requirements faster, reduce radiation exposure in accordance with ALARA, save time, use with virtually all cylindrical phantoms, and simplify filling phantom.

The Nuclear Medicine Phantom Mixer has a small footprint of 10" × 14.85" and can accommodate any cylindrical phantom up to 11 inches in length and 12 inches in diameter.

Just lay the phantom lengthwise on the rollers of the Nuclear Medicine Phantom Mixer and turn the toggle-switch on. A standard tank phantom will require approximately 10 minutes mixing time. Some types of SPECT, coincidence performance phantoms require a lengthy 15 to 20 minutes mixing time. After the phantom has been mixed, simply turn the mixer off. This handy device features a single-switch operation for extra added convenience.

Nuclear Associates, Carle Place, NY

Reader Service No. 226

Spraying Systems Co.'s New, Unique Compact Rokon™ Nozzle Offers Long Life and Consistent Rotational Speed

The new Compact Rokon rotary tank washing nozzle from Spraying Systems Co. features a unique design that provides controlled rotational speed for higher impact cleaning efficiency. There are no internal beatings, gears, or impeliers that may prematurely wear or bind.

Effective impact force is maximized by maintaining rotational speed of the cleaning head at 5 to 25 rpm for pressures from 30 to 230 psig (2.0 to 16 bar). As a result, the nozzle provides up to four times the impact of uncontrolled fluid driven nozzles to effectively clean tanks, totes, bottles, and bins up to 20' (6.0 m) in diameter.

The nozzle is constructed of 303 or 316L stainless steel with a maximum operating temperature of 300°F (150°C) – making the nozzle well suited for high-temperature cleaning and sanitizing applications. Designed to fit in openings as small as 1-1/4" (32 mm), the nozzle is available in two capacity sizes – 9.9 and 13.6 – with a 360° spray angle. The nozzle has a 3/8" NPT or BSPT (F) inlet connection, or 3/4" I. D. (19.2 mm) sanitary inlet connection.

Spraying Systems Co.'s Wheaton, IL

Reader Service No. 227

New Seat and Stem Design Adds to the Flexibility of Tri-Clover Valves

Tri-Clover, Inc. has announced technological breakthroughs in its seat and stem designs. The new designs bring added flexibility to food processors by accommodating elevated process and CIP temperatures, and by responding to other changing process requirements.

Teflon® TR2 Valve Seat – A new Teflon seat has been introduced by the company to handle higher temperatures to 230°F. Called the TR2, the new seat is designed for Tri-Clover's 700 Series valves. It is available for valve sizes ranging from 1-1/2 to 4 inches. Existing valve systems can be retrofitted with the new seat using a replacement stem and seat.

Low Profile Valve Stem – Tri-Clover has taken steps to accommodate demanding applications requiring elastomer-molded germs; through the addition of new low profile stem. The low profile design reduces the amount of elastomer that comes in contact with the product by 60-70% (depending on size). The low

profile design is available in EPDM and SFY materials for valve sizes ranging from two to four inches and can be retrofitted to existing valve systems. BUNA-N material and 1 1/2 inch size will be available in early 2000.

Tri-Clover, Kenosha, WI

Reader Service No. 228

Ecolab Pest Elimination Division Introduces Barcode-Based Data Collection System

Ecolab's Pest Elimination Division has unveiled ProScan™, a barcode-based data collection system that helps food and beverage processors take a proactive approach to pest prevention, make better decisions about their pest elimination program and earn higher scores from industry auditors.

"ProScan is a proactive tool that helps prevent pests from infesting food and beverage processing facilities," said Jim Brown, vice president, food and beverage market development. "It allows customers to document improvements in pest control and validate the absence of pest activity. This is the kind of information today's auditors want to see. With ProScan, our food and beverage processing customers can ensure top scores on every pest audit."

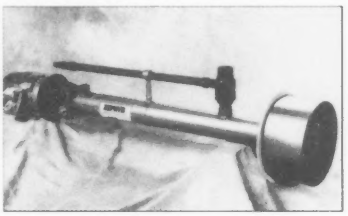
With the ProScan system, Ecolab service specialists use Symbol® Palm scanners to read barcodes affixed to Ecolab equipment in customers' facilities. The scanners instantly recognize the type of equipment, the customer's name and the facility's location.

Using customized drop-down menus, Ecolab service specialists enter site specific data, including types and numbers of pests, evidence of activity, conditions observed, applications made and actions taken. After the service visit, this information is sent via modem to a host computer for storage.

The ProScan-captured data is used to generate custom-designed reports within 24 hours of service. Ecolab also uses the data to generate trend reports, which are automatically sent to customers every quarter. This detailed historical record helps customers identify trends and fine-tune pest prevention strategies for better overall results.

Ecolab Inc., St. Paul, MN

Reader Service No. 229



Aeromix Systems, Inc.

Size and Volume of Air with the Zephyr Induced Air Flotation System

The "Dial-a-Bubble," the latest improvement to the Zephyr, improves equipment performance by allowing the user to adjust the size and volume of air bubbles produced. A separate "flow stopper" chamber reduces mixing to allow the unit to be used in the same tank as the skimmer.

The new Zephyr from Aeromix Systems, Inc. is a high-efficiency induced air flotation system. The system creates microfine bubbles that adhere to various solids, lifting them to the surface for eventual skimming or disposal. It precisely separates liquid phases, making it ideally suited for oil and grease removal. The Zephyr has proven ideal for the removal of fine particulates from liquids such as oil, fat, or water and has a multitude of applications in the chemical, petroleum and food processing industries. In addition to flotation, the ultra fine bubbles created by the Zephyr are an ideal method for gas injection.

Aeromix Systems, Inc., Minneapolis, MN

Reader Service No. 230

Introducing Dickson's NIST Traceable High Temperature Stainless Steel Data Loggers

Dickson introduces the High Temperature Stainless Steel Data Loggers, models HT100 and HT120 (with piercing tip), to their current line of instrumentation.

Dickson's HT100 and HT120 Data Loggers feature a waterproof stainless steel case, which can monitor and withstand temperatures from -40° to 125°C (40° to 257°F). These data loggers are ideal for tracking sterilization, pasteurization, autoclave and oven temperatures. Also, with their small size, 0.688" wide by 3.69" long (HT100), and stainless steel casing, they can easily be incorporated into your entire food process from testing and manufacturing to bottling, packaging and shipping.

The HT100 and HT120 Data Loggers create a paperless solution by allowing users to easily download all data to their PC for viewing, graphing, or printing with DicksonWare™ software. DicksonWare™ software is also capable of real time monitoring and graphing.

Dickson Company, Addison, IL

Reader Service No. 231

New Balston® SMD Membrane Air Dryer Available from Parker Hannifin Corporation

The new Balston® SMD Membrane Air Dryer will provide pure, dry compressed air and offer an economical, efficient alternative to refrigerant dryer technology.

The Balston SMD Membrane AV Dryer will dry compressed air to dewpoints as low as 35°F at flow rates of up to 1200 SCFM. As the Balston® SMD Membrane Air Dryer has no moving parts, it operates reliably and efficiently without operator attention.

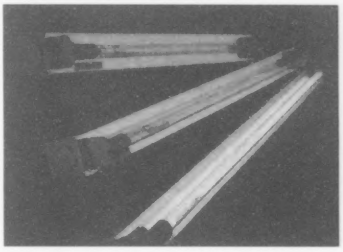
Dry air is achieved by returning a small portion of the dry product air to sweep out moisture, which preferentially passes through the membranes. The degree of drying is controlled by varying the compressed air throughput the system. The moisture laden sweep gas is vented to the atmosphere, eliminating potential liquid-handling and freezing problems.

Since the Balston SMD Membrane Air Dryer is compact and lightweight, it can be easily mounted in an existing pipeline. Coalescing prefiltration is employed immediately upstream of the membranes to protect them from pipe scale, other particulate, and liquids. The Balston SMD Membrane AV Dryer requires no electrical connections, which makes it ideal for remote and point-of-use installations or for flammable and explosive applications.

Applications for the Balston SMD Membrane Air Dryer include: Low dewpoint instrument air, pneumatic equipment, pressurizing electronic cabinets, analytical instrumentation, dry air for hazardous areas, pneumatic autosamplers, and general laboratory air supply.

Parker Hannifin Corporation, Tewksbury, MA

Reader Service No. 232



Steril-Aire, Inc.

Steril-Aire's "UVC Emitter™" Keeps A/C Coils Clean, Kills Mold and Microbes, and Improves IAQ

Steril-Aire, Inc. has introduced a new extended length "UVC Emitter™" designed to keep coil and drain pans clean and kill the microbes that grow in and circulate through HVAC systems and processing equipment. With a 30" tube length, the new "DE 301" UVC Emitter is the longest-length "high output" device available and is ideally suited to a wide range of commercial, industrial, health care and food processing applications. The longer tube generates greater output per fixture and can therefore reduce the total number of fixtures needed per application, meaning lower costs and faster installation.

Steril-Aire's multi-patented UVC lights and applications are the first to be designed specifically for use in cold and/or moving air. Though originally developed for IAQ control, the high output device also returns or maintains coil heat exchange efficiency for substantial energy savings, while greatly reducing coil and drain pan maintenance. It may also be used in almost any food manufacturing application – from packaging and processing lines to air conditioning systems – to eradicate the microbes that contaminate food and beverage products and sometimes shorten their shelf life.

Used for infection control, the UVC Emitter provides effective and efficient sterilization of a broad range of microorganisms, from cold and flu viruses to deadly microbes such as those that cause tuberculosis and Legionnaire's Disease. It is especially effective in eradicating mold and mold products, the most common allergens.

Steril-Aire, Inc., Cerritos, CA

Reader Service No. 233

Amplified Pressure Transducer for High Volume Applications from Sensotech, Inc.

Sensotec's new Model HV is a high performance sensor which has been configured specifically for high volume applications. The unit is offered in ten pressure ranges from 0-25 to 0-10,000 psig, and provides a high level 4-20 mA or 1-5VDC output. Four electrical connections and optional pressure port adaptors are available for exceptional flexibility and application-specific functionality.

This rugged Model HV combines small size and minimal weight, making it ideal for industrial and commercial applications where reliability and stability are key requirements. The unit endures overpressures up to 2× (F.S.) and has a rated operating temperature from -40° to 185°F. On-board electronics minimize signal degradation over distance, and are CE approved and EMI/RFI protected.

The sensor and housing are an integral, hermetic assembly, manufactured from a single piece of stainless steel to ensure reliable operation in adverse environmental conditions. The stainless steel wetted diaphragm is compatible with most corrosive media.

Sensotec, Inc., Columbus, OH

Reader Service No. 234

Dairy, Food and Environmental Sanitation Instructions for Authors

NATURE OF THE MAGAZINE

Dairy, Food and Environmental Sanitation (*DFES*) is a monthly publication of the International Association for Food Protection. It is targeted for persons working in industry, regulatory agencies or teaching in milk, food and environmental protection.

The major emphases include:

- practical articles in milk, food and environmental protection;
- new product information;
- news from activities and individuals in the field;
- news of the Association affiliate groups and their members;
- 3-A Dairy and Egg Sanitary Standards, amendments and lists of symbol holders;
- excerpts of articles and information from other publications of interest to the readership.

Anyone with questions about the suitability of material for publication should contact the editor.

SUBMITTING ARTICLES AND OTHER MATERIALS

All manuscripts including, "Letters to the Editor" should be submitted in triplicate (original and two copies), in flat form (*not folded*), and by First Class mail to Donna Bahun, Production Editor, *DFES*, c/o International Association for Food Protection, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863, USA.

When possible, authors are encouraged to submit a fourth copy of their manuscript on computer disk. Manuscripts submitted on disk should be saved as an ASCI or RTF, or text formats.

All reading matter dealing with affairs of the Association or with news and events of interest to Members of the Association is published in *DFES*, and should be mailed to the above address. Correspondence dealing with advertising should also be sent to the address given above.

Correspondence regarding subscriptions or membership in the International Association for Food Protection should be sent to Julie Cattanach, Membership Coordinator, (address above).

PUBLICATION OF MANUSCRIPTS

Manuscripts are accepted for publication only after they are reviewed by two members of the Editorial Board. Occasionally, when the subject of the paper is outside of the specialties of members of the Editorial Board, other specialists may be asked to review manuscripts. After review, a manuscript will be returned to the author by the Scientific Editor for revision in accordance with reviewers' suggestions. Three clean copies of the revised paper and a disk copy are to be returned to the editor as soon as possible. Authors can hasten publication of their papers by submitting well-written manuscripts conforming to the journal's style and by revising and returning manuscripts promptly. If, after review of a manuscript is completed, an author chooses to withdraw rather than revise the paper, the editor should be notified promptly. If an author does not respond in *four months* after a reviewed paper is returned, the paper will be considered as withdrawn. With authors' cooperation, articles are usually published within three to six months after they are received and may appear sooner.

When a manuscript is received, it is numbered, and the author is notified by mail that the manuscript has been received. The manuscript number will be given on the letter and should be used on all future correspondence and revised manuscripts. Authors will be notified when a manuscript has been accepted for publication.

Membership in the Association is not a prerequisite for acceptance of a manuscript.

Manuscripts, when accepted, become the copyrighted property of *DFES* and the International Association for Food Protection. Reprinting of any material from *DFES* or republishing of any papers or portions thereof is prohibited unless written permission to do so is granted by Donna Bahun, Production Editor.

Submission of a manuscript implies that all authors and their institutions have agreed to its publication. It is also implied that the paper is not being considered for publication in another domestic or foreign magazine or journal.

Authors are responsible for the accuracy of their papers. Neither *DFES* nor the Association assume responsibility for errors made by the authors. Furthermore, *DFES* and the International Association for Food Protection assume no responsibility for conclusions reached by authors, especially when products are evaluated.

Page proofs will be sent to authors prior to publication.

POLICY ON COMMERCIALISM

Manuscripts submitted for consideration for publication in *Dairy, Food and Environmental Sanitation* are not to be used as a platform for commercialism or the promotion of branded products or services. References to branded products or services except as may be warranted by scientific merit and research data or as are necessary for the understanding, evaluation and replication of the work described are to be avoided. However, scientific merit should not be diluted by proprietary

secrecy. The excessive use of brand names, product names, logos or trade names, failure to substantiate performance claims, and the failure to objectively discuss alternative methods, processes, products and equipment may be considered indicators of commercialism. Disclosure and acknowledgment of both funding sources and any conflicts of interest by the authors is encouraged. In general, the spirit and principles of the International Association for Food Protection Policy on Commercialism also apply to manuscripts submitted for consideration of publication in *Dairy, Food and Environmental Sanitation*. Restricting commercialism benefits the authors and the audience of *Dairy, Food and Environmental Sanitation*. The Scientific Editor shall in his or her sole discretion, determine whether a submitted manuscript violates this policy on commercialism.

TYPES OF ARTICLES

Readers of *DFES* include persons working in industry, regulatory agencies or teaching food safety. *DFES* publishes a variety of papers of interest to food safety professionals. The following types of articles and information are acceptable for publication in *DFES*.

General Interest

DFES regularly publishes nontechnical articles as a service to those readers who are not involved in the technical aspects of food safety. These articles include such topics as the organization and application of food control programs or quality control programs, ways of solving a particular problem in the field, organization and application of an educational program, management skills, use of visual aids and similar subjects. Often talks and presentations given at meetings of affiliate groups and other gatherings can be modified sufficiently to make them appropriate for publication. Authors planning to prepare general interest/nontechnical articles are invited to correspond with the Scientific Editor if they have questions about the suitabilityof their material.

Book Reviews

Authors and publishers of books relating to food safety are invited to submit their books to the Production Editor. Books will then be reviewed by a specialist in the field covered by the book, and the review will be published in an issue of *DFES*.

PREPARATION OF ARTICLES

The Scientific Editor assumes that the senior author has received proper clearance from his/her organization and from coauthors for publication of the manuscript.

All manuscripts should be typed double-spaced on 8-1/2 by 11 inch white bond paper. *Lines on each page should be numbered to facilitate review of the manuscripts. Manuscripts submitted on paper without numbered lines will be returned to authors.* Margins on all sides should be at least one-inch wide and pages of the original manuscript should not be stapled together.

A manuscript should be read critically by someone other than the author before it is submitted. If English is not the author's first language, the manuscript should be reviewed by a colleague of the author who is fluent in written English to ensure that correct English is used throughout the paper. *The editor and editorial staff will not rewrite papers when the English is inadequate.*

Authors are encouraged to consult previously published issues of *DFES* to obtain a clear understanding of the style of papers published.

Manuscripts should not be commercial in nature nor contain excessive use of brand names.

Revised manuscripts that do not require a second review should be printed on plain white bond paper *without* numbered lines or box outlines, etc. A copy of the revised manuscript should be included on a disk saved as an ASCI or RTF, or text formats.

ORGANIZATION OF ARTICLES

The title of the manuscript should appear at the top of the first page. It should be as brief as possible and contain no abbreviations. The title should be indicative of the subject of the manuscript. Avoid expressions such as "Effects of," "Influence of," "Studies on," etc.

Names of each author, and the name and address of the institution(s) where the work was done should appear on the title page. Footnotes can be used to give the current addresses of authors who are no longer at the institution(s) where the work was done. An *asterisk* should be placed after the name of the author to whom correspondence about the paper and proofs should be sent. The telephone and facsimile numbers of this author should be given at the bottom of the page. No text of the manuscript should appear on the title page.

The Abstract should appear on a separate piece of paper directly following the title page, and should not exceed 200 words. It should summarize the contents of the manuscript, and be meaningful without having to read remaining pages. The Abstract should *not* contain references, diagrams, tables or unusual abbreviations.

The references should be arranged in alphabetical order, by last name of first author and numbered consecutively. Only the first author's name and initial should be inverted. *Cite each reference in the text by number.* All references given in the list must be cited in the text. List references according to the style of the following examples.

Paper in journal

Alberman, G. G. and E. H. Marth. 1974. Experimental production of aflatoxin in citrus juice and peel. J. Milk Food Technol. 37:308-313.

Paper in book

Marth, E. H. 1974. Fermentations. p. 771-882. *In* B. H. Webb, A. H. Johnson and J. A. Alford. (eds.). Fundamentals of dairy chemistry. 2nd ed. AVI Publishing Co., Westport, CT.

Book by author(s)

Minor, T. E. and E. H. Marth. 1976. Staphylococci and their significance in foods. Elsevier Scientific Publishing Co., Amsterdam.

Book by editor(s)

Vanderzant, C. and D. F. Splittstoesser. (eds.). 1992. Compendium of methods for the microbiological examination of foods. 3rd ed. American Public Health Association, Washington, D.C.

Patent

Hussong, R. V., E. H. Marth and D. G. Vakaleris. 1964. Manufacture of cottage cheese. U.S. Pat. 3,117,870. Jan. 14.

Publication with no identifiable author or editor

Anonymous. 1977. Thermally processed low-acid foods in hermetically sealed containers. Code of Federal Regulations No. 21, U.S. Government Printing Office, Washington, D.C.

References citing "personal communication" or "unpublished data" are discouraged, although it is recognized that sometimes it is unavoidable. An author may be asked to provide evidence of such references.

References consisting of papers that are "accepted for publication" or "in press" are acceptable, but the author may be asked to provide copies of such papers if needed to evaluate the manuscript in question.

Figures and tables should appear on separate pages and not within the text of the manuscript. Placement of tables and figures should be indicated in the text.

ILLUSTRATIONS, PHOTOGRAPHS, FIGURES

Submission of photographs, graphics or drawings to illustrate the article will help the article. The nature of *DFES* allows liberal use of such illustrations, and interesting photographs and drawings often increase the number of persons who read the article.

Photographs. Photographs which are submitted should have sharp images, with good contrast. Photographs can be printed in color, but the additional cost of doing so must be borne by the author. Authors wishing to publish color photographs should contact Donna Bahun, Production Editor for cost estimates.

The editor encourages the submission of four-color photographs to be used on the cover of *DFES*. Photographs should depict a scene relative to food safety. Please submit your photograph in the form of a negative or slide. Cover photographs will be returned only upon request.

Line drawings. All line drawings (graphs, charts, diagrams, etc.) should be submitted as black and white glossy or matte finish photographs. Use a lettering set or other suitable device for all labeling. If graphs are computer generated, printed copies of the graphs must be produced by a good quality laser printer, with sufficiently dark printing or appropriate size letters and numerals. Graphs produced by dot matrix printers *are not* acceptable. Figures are commonly reduced to a 1-column width (85 mm). Lettering should be of sufficient size to allow for reduction. If symbols are used, they must be identified on the Figure and not in the legend. Data that are presented in Figures should not be repeated in Tables. A well-prepared Figure should be understandable without reference to the text of the paper.

Labeling of figures. All Figures should be labeled lightly on back, using a soft pencil or a typed adhesive label. Labeling should include:

- figure number,
- last name of author(s),
- title of manuscript,
- the manuscript number (on revised copies),
- identification of the top of the figure.

COMMON ABBREVIATIONS

Frequently used acceptable abbreviations may be used (i.e., using *wt* for the word *weight*, or *s* for the word *second*). For further details on abbreviations see the current edition of the *CBE Style Manual* or *ASM Manual of Style*. Note that a period is used with some but not all abbreviations.

Authors may also contact the Production Editor if they are not sure about acceptable abbreviations.

REPRINTS

Reprints of an article may be ordered by the author. An order form for reprints will be sent to the corresponding author. Reprints may be ordered with or without covers, in multiples of 100. Reprint costs vary according to the number of printed pages in the article.

Reprints cannot be provided free of charge. Reprints are ordered through the International Association for Food Protection, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863, USA.

How the Audiovisual Library Serves IAFP Members

Purpose ...

The Audiovisual Library offers International Association for Food Protection Members an educational service through a wide variety of quality training videos dealing with various food safety issues. This benefit allows Members free use of these videos.

How It Works ...

1) Members simply fill out an order form (see page 71) and fax or mail it to the IAFP office. Members may also find a Library listing and an order form online at the IAFP Web site at www.foodprotection.org.

2) Material from the Audiovisual Library is checked out for a maximum of two weeks (three weeks outside of North America) so that all Members can benefit from its use.

3) Requests are limited to five videos at a time.

How to Contribute to the Audiovisual Library ...

1) As the IAFP Membership continues to grow, so does the need for additional committee members and materials for the Library. The Audiovisual Committee meets at the IAFP Annual Meeting to discuss the status of the Audiovisual Library and ways to improve the service. New Members are sought to add fresh insight and ideas.

2) Donations of audiovisual materials are always needed and appreciated. Tapes in foreign languages (including, but not limited to Spanish, French, Chinese [Manderin/Cantonese]), are especially desired for International Members who wish to view tapes in their native language.

3) Members may also make a financial contribution to the Foundation Fund. The Foundation Fund sponsors worthy causes that enrich the Association. Revenue from the Foundation Fund supports the IAFP Audiovisual Library. Call Lisa Hovey, Assistant Director or Lucia Collison, Association Services at 800.369.6337 or 515.276.3344 if you wish to make a donation.

Audiovisual Library

(A Member Benefit of IAFP)

DAIRY

D1170 **3-A Symbol Council**–(8 minute videotape). A video which was developed to make people in the dairy and food industries aware of the 3-A program and its objectives.

D1180 **10 Points to Dairy Quality**–(10 minute videotape). Provides in-depth explanation of a critical control point in the residue prevention protocol. Illustrated with on-farm, packing plant, and milk-receiving plant scenes as well as interviews of producers, practicing veterinarians, regulatory officials and others. (Dairy Quality Assurance–1992) (Reviewed 1998)

D1010 **The Bulk Milk Hauler: Protocol & Procedures**–(8 minute videotape). Teaches bulk milk haulers how they contribute to quality milk production. Special emphasis is given to the hauler's role in proper milk sampling, sample care procedures, and understanding test results. (Iowa State University Extension–1990). (Reviewed 1998)

D1020 **Causes of Milkfat Test Variations & Depressions**–(30 minute–140 slides–tape–script). This set illustrates the many factors involved in causing milkfat test variations or depressions in your herd, including feeding, management, stage of lactation, age of samples, handling of samples, and testing procedures. The script was reviewed by field staff, nutritionists, laboratory personnel and county extension staff. It is directed to farmers, youth and allied industry. (Penn State–1982)

D1030 **Cold Hard Facts**–This video is recommended for training personnel associated with processing, transporting, warehousing, wholesaling and retailing frozen foods. It contains pertinent information related to good management practices necessary to ensure high quality frozen foods. (National Frozen Food Association–1993) (Reviewed 1998)

D1040 **Ether Extraction Method for Determination of Raw Milk**–(26 minute videotape). Describes the ether extraction procedure to measure milkfat in dairy products. Included is an explanation of the chemical reagents used in each step of the process. (CA–1988) (Reviewed 1998)

D1050 **The Farm Bulk Milk Hauler**–(30 minute–135 slides–tape–script). This set covers the complete procedure for sampling and collecting milk from farms. Each step is shown as it starts with the hauler entering the farm lane and ends when he leaves the milk house. Emphasis is on universal sampling and automated testing. Funds to develop this set were provided by The Federal Order #36 Milk Market Administrator. (Penn State–1982) (Reviewed 1998)

D1060 **Frozen Dairy Products**–(27 minute videotape). Developed by the California Department of Food and Agriculture. Although it mentions the importance of frozen desserts, safety and checking ingredients; emphasis is on what to look for in a plant inspection. Everything from receiving, through processing and cleaning and sanitizing is outlined, concluded with a quality control program. Directed to plant workers and supervisors, it shows you what should be done. (CA–1987) (Reviewed 1997)

D1070 **The Gerber Butterfat Test**–(7 minute videotape). Describes the Gerber milkfat test procedure for dairy products and compares it to the Babcock test procedure. (CA–1990) (Reviewed 1998)

D1080 **High-Temperature, Short-Time Pasteurizer**–(59 minute videotape). Provided by the Dairy Division of Borden, Inc. It was developed to train pasteurizer operators and is well done. There are seven sections with the first covering the twelve components of a pasteurizer and the purpose and operation of each. The tape provides the opportunity for discussion after each section or continuous running of the videotape. Flow diagrams, processing and cleaning are covered. (Borden, Inc.–1986) (Reviewed 1997)

D1090 **Managing Milking Quality**–(33 minute videotape). This training video is designed to help dairy farmers develop a quality management process and is consistent with ISO 9000 certification and HACCP processes. The first step is to evaluate the strengths and weaknesses of a dairy operation. The video will help you find ways to improve the weaknesses that are identified on your farm.

D1100 **Mastitis Prevention and Control**–(2-45 minute videotapes). This video is ideal for one-on-one or small group presentations. Sec-

tion titles include: Mastitis Pathogens, Host Defense, Monitoring Mastitis, Mastitis Therapy, Recommended Milking Procedures, Postmilking Teat Dip Protocols, Milk Quality, Milking Systems. (Nasco–1993)

D1110 **Milk Plant Sanitation: Chemical Solution**–(13 minute videotape). This explains the proper procedure required of laboratory or plant personnel when performing chemical titration in a dairy plant. Five major titrations are reviewed... alkaline wash, presence of chlorine and iodophor, and caustic wash and an acid wash in a HTST system. Emphasis is also placed on record keeping and employee safety. (1989)

D1120 **Milk Processing Plant Inspection Procedures**–(15 minute videotape). Developed by the California Department of Food and Agriculture. It covers pre- and post-inspection meeting with management, but emphasis is on inspection of all manual and cleaned in place equipment in the receiving, processing and filling rooms. CIP systems are checked along with recording charts and employee locker and restrooms. Recommended for showing to plant workers and supervisors. (CA–1986)

D1130 **Pasteurizer – Design and Regulation**–(16 minute videotape). This tape provides a summary of the public health reasons for pasteurization and a nonlegal definition of pasteurization. The components of an HTST pasteurizer, elements of design, flow-through diagram and legal controls are discussed. (Kraft General Foods–1990) (Reviewed 1998)

D1140 **Pasteurizer – Operation**–(11 minute videotape). This tape provides a summary of the operation of an HTST pasteurizer from start-up with hot water sanitization to product pasteurization and shut-down. There is an emphasis on the legal documentation required. (Kraft General Foods–1990) (Reviewed 1998)

D1150 **Processing Fluid Milk**–(30 minute–140 slides–script–tape). It was developed to train processing plant personnel on preventing food poisoning and spoilage bacteria in fluid dairy products. Emphasis is on processing procedures to meet federal regulations and standards. Processing procedures, pasteurization times and temperatures, purposes of equipment, composition standards, and cleaning and sanitizing are covered. Primary emphasis is on facilities such as drains and floors, and filling equipment to prevent post-pasteurization contamination with spoilage or food poisoning bacteria. It was reviewed by many industry plant operators and regulatory agents and is directed to plant workers and management. (Penn State–1987) (Reviewed 1998)

ENVIRONMENTAL

E3010 **The ABCs of Clean–A Handwashing & Cleanliness Program for Early Childhood Programs**–For early childhood program employees. This tape illustrates how proper handwashing and clean hands can contribute to the infection control program in daycare centers and other early childhood programs. (The Soap & Detergent Association–1991)

E3020 **Acceptable Risks?**–(16 minute videotape). Accidents, deliberate misinformation, and the rapid proliferation of nuclear power plants have created increased fears of improper nuclear waste disposal, accidents during the transportation of waste, and the release of radioactive effluents from plants. The program shows the occurrence of statistically anomalous leukemia clusters; governmental testing of marine organisms and how they absorb radiation; charts the kinds and amounts of natural and man-made radiation to which man is subject; and suggests there is no easy solution to balancing our fears to nuclear power and our need for it. (Films for the Humanities & Sciences, Inc.–1993) (Reviewed 1998)

E3030 **Air Pollution: Indoor**–(26 minute videotape). Indoor air pollution is in many ways a self-induced problem...which makes it no easier to solve. Painting and other home improvements have introduced pollutants, thermal insulation and other energy-saving and water-proofing devices have trapped the pollutants inside. The result is that air pollution inside a modern home can be worse than inside a chemical plant. (Films for the Humanities & Sciences, Inc.) (Reviewed 1998)

E3040 **Asbestos Awareness**–(20 minute videotape). This videotape discusses the major types of asbestos and their current and past uses. Emphasis is given to the health risks associated with asbestos exposure and approved asbestos removal abatement techniques. (Industrial Training, Inc.–1988) (Reviewed 1998)

E3055 **Effective Handwashing–Preventing Cross-Contamination in the Food Service Industry**–(3 1/2 minute videotape). It is critical that all food service workers wash their hands often and correctly. This video discusses the double wash method and the single wash method and when to use each method. (Zep Manufacturing Company–1993)

E3060 **EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Ceriodaphnia)**–(22 minute videotape). Demonstrates the Ceriodaphnia 7-Day Survival and Reproduction Toxicity Test and how it is used to moni-

tor and evaluate effluents for their toxicity to biota and their impact on receiving waters and the establishment of NPDES permit limitations for toxicity. The tape covers the general procedures for the test including how it is set up, started, monitored, renewed and terminated. (1989) (Reviewed 1998)

E3070 **EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Fathead Minnow Larva)**–(15 minute videotape). A training tape that teaches environmental professionals about the Fathead Minnow Larval Survival and Growth Toxicity Test. The method described is found in an EPA document entitled, "Short Term Methods for Estimating the Chronic Toxicity of Effluents & Receiving Waters to Freshwater Organisms." The tape demonstrates how fathead minnow toxicity tests can be used to monitor and evaluate effluents for their toxicity to biota and their impact on receiving waters and the establishment of NPDES permit limitations for toxicity. (1989) (Reviewed 1998)

E3075 **EPA: This is Super Fund**–(12 minute videotape). Produced by the United States Environmental Protection Agency (EPA) in Washington, D.C., this videotape focuses on reporting and handling hazardous waste sites in our environment. The agency emphasizes community involvement in identifying chemical waste sites and reporting contaminated areas to the authorities. The primary goal of the "Super Fund Site Process" is to protect human health and to prevent and eliminate hazardous chemicals in communities. The film outlines how to identify and report abondoned waste sites and how communities can participate in the process of cleaning up hazardous sites. The program also explains how federal, state and local governments, industry and residents can work together to develop and implement local emergency preparedness/response plans in case chemical waste is discovered in a community.

E3080 **Fit to Drink**–(20 minute videotape). This program traces the water cycle, beginning with the collection of rain-water in rivers and lakes, in great detail through a water treatment plant, to some of the places where water is used, and finally back into the atmosphere. Treatment of the water begins with the use of chlorine to destroy organisms; the water is then filtered through various sedimentation tanks to remove solid matter. Other treatments employ ozone, which oxidizes contaminants and makes them easier to remove; hydrated lime, which reduces the acidity of the water; sulfur dioxide, which removes any excess chlorine; and floculation, a process in which aluminum sulfate causes small particles to clump together and precipitate out. Throughout various stages of purification, the water is continuously tested for smell, taste, titration, and by fish. The treatment plant also monitors less common contaminants with the use of up-to-date techniques like flame spectrometers and gas liquefaction. (Films for the Humanities & Sciences, Inc.–1987)

E3110 **Garbage: The Movie**–(25 minute videotape). A fascinating look at the solid waste problem and its impact on the environment. Viewers are introduced to landfills, incinerators, recycling plants and composting operations as solid waste management solutions. Problems associated with modern landfills are identified and low-impact alternatives such as recycling, reuse, and source reduction are examined. (Churchill Films) (Reviewed 1998)

E3120 **Global Warming: Hot Times Ahead**–(23 minute videotape). An informative videotape program that explores the global warming phenomenon and some of the devastating changes it may cause. This program identifies greenhouse gases and how they are produced by human activities. Considered are: energy use in transportation, industry and home; effects of deforestation, planting of trees and recycling as means of slowing the build-up of greenhouse gases. (Churchill Films–1995)

E3130 **Kentucky Public Swimming Pool & Bathing Facilities**–(38 minute videotape). Developed by the Lincoln Trail District Health Department in Kentucky and includes all of their state regulations which may be different from other states, provinces and countries. This tape can be used to train those responsible for operating pools and waterfront bath facilities. All aspects are included of which we are aware, including checking water conditions and filtration methods. (1987). (Reviewed 1998)

E3135 **Plastics Recycling Today: A Growing Resource**–(11:35 minute videotape). Recycling is a growing segment of our nation's solid waste management program. This video shows how plastics are handled from curbside pickup through the recycling process to end-use by consumers. This video provides a basic understanding of recycling programs and how communities, companies and others can benefit from recycling. (The Society of the Plastics Industry, Inc.–1988)

E3140 **Putting Aside Pesticides**–(26 minute videotape). This program probes the long-term effects of pesticides and explores alternative pest-control efforts; biological pesticides, genetically-engineered microbes that kill objectionable insects, the use of natural insect predators, and the cross-breeding and genetic engineering of new plant strains that produce their own anti-pest toxins. (Films for the Humanities & Sciences, Inc.) (Reviewed 1999)

E3150 **Radon**–(26 minute videotape). This program looks at the possible health implications of radon pollution, methods homeowners can use to detect radon gas in their homes, and what can be done to minimize hazards once they are found.

E3160 **RCRA–Hazardous Waste**–(19 minute videotape). This videotape explains the dangers associated with hazardous chemical handling and discusses the major hazardous waste handling requirements presented in the Resource Conservation and Recovery Act. (Industrial Training, Inc.)

The New Superfund. What It is & How It Works–A six-hour national video conference sponsored by the EPA. Target audiences include the general public, private industry, emergency responders and public interest groups. The series features six videotapes that review and highlight the following issues:

E3170 **Tape 1–Changes in the Remedial Process: Clean-up Standards and State Involvement Requirements**–(62 minute videotape). A general overview of the Superfund Amendments and Reauthorization Act (SARA) of 1986 and the challenge of its implementation. The remedy process – long-term and permanent cleanup-is illustrated step-by-step, with emphasis on the new mandatory clean-up schedules, preliminary site assessment petition procedures and the hazard ranking system/National Priority List revisions. The major role of state and local government involvement and responsibility is stressed.

E3180 **Tape 2–Changes in the Removal Process: Removal and Additional Program Requirements**–(48 minute videotape). The removal process is a short-term action and usually an immediate response to accidents, fires and illegal dumped hazardous substances. This program explains the changes that expand removal authority and require procedures consistent with the goals of remedial action.

E3190 **Tape 3–Enforcement & Federal Facilities**–(52 minute videotape). Who is responsible for SARA clean-up costs? Principles of responsible party liability; the difference between strict, joint and several liability; and the issue of the innocent land owner are discussed. Superfund enforcement tools-mixed funding, De Minimis settlements and the new non-binding preliminary allocations of responsibility (NBARs) are explained.

E3210 **Tape 4–Emergency Preparedness & Community Right-to-Know**–(48 minute videotape). A major part of SARA is a free-standing act known as Title III: The Emergency Planning and Community Right-to-Know Act of 1986, requiring federal, state, and local governments and industry to work together in developing local emergency preparedness/response plans. This program discusses local emergency planning committee requirements, emergency notification procedures, and specifications on community right-to-know reporting requirements such as using OSHA Material Safety Data Sheets, the emergency & hazardous chemical inventory and the toxic chemical release inventory.

E3220 **Tape 5–Underground Storage Tank Trust Fund & Response Program**–(21 minute videotape). Another addition to SARA is the Leaking Underground Storage Tank (LUST) Trust Fund. One half of the US population depends on ground water for drinking-and EPA estimates that as many as 200,000 underground storage tanks are corroding and leaking into our ground water. This program discusses how the LUST Trust Fund will be used by EPA and the states in responding quickly to contain and clean-up LUST releases. Also covered is state enforcement and action requirements, and owner/operator responsibility.

E3230 **Tape 6–Research & Development/ Closing Remarks**–(33 minute videotape). An important new mandate of the new Superfund is the technical provisions for research and development to create more permanent methods in handling and disposing of hazardous wastes and managing hazardous substances. This segment discusses the SITE (Superfund Innovative Technology Evaluation) program, the University Hazardous Substance Research Centers, hazardous substance health research and the DOD research, development and demonstration management of DOD wastes.

E3240 **Sink A Germ**–(10 minute videotape). A presentation on the rationale and techniques for effective handwashing in health care institutions. Uses strong imagery to educate hospital personnel that handwashing is the single most important means of preventing the spread of infection. (The Brevis Corp.–1986). (Reviewed 1998)

E3245 **Wash Your Hands**–(5 minute videotape). Handwashing is the single most important means of preventing the spread of infection. This video presents why handwashing is important and the correct way to wash your hands. (LWB Company–1995)

E3250 **Waste Not: Reducing Hazardous Waste**–(35 minute videotape). This tape looks at the progress and promise of efforts to reduce the generation of hazardous waste at the source. In a series of company profiles, it shows activities and programs within industry to minimize hazardous waste in the production process. Waste Not also looks at the obstacles to waste reduction, both within and outside of industry, and considers how society might further encourage the adoption of pollution prevention, rather than pollution control, as the primary approach to the problems posed by hazardous waste. (Umbrella films)

FOOD

F2260 **100 Degrees of Doom... The Time & Temperature Caper**–(14 minute videotape). Video portraying a private eye tracking down the cause of a *Salmonella* poisoning. Temperature control is emphasized as a key factor in preventing foodborne illness. (Educational Communications, Inc.–1987) (Reviewed 1998)

F2450 **A Guide to Making Safe Smoked Fish**–(21 minute videotape). Smoked fish can be a profitable product for aquaculturalists, but it can be lethal if not done correctly. This video guides you through the steps necessary to make safe smoked fish. It provides directions for brining, smoking, cooling, packaging and labeling, and cold storage to ensure safety. The video features footage of fish smoking being done using both traditional and modern equipment. (University of Wisconsin-Madison–Spring, 1999)

F2005 **A Lot on the Line**–(25 minute videotape). Through a riveting dramatization, "A Lot on the Line" is a powerful training tool for food manufacturing and food service employees. In the video, a food plant supervisor and his pregnant wife are eagerly awaiting the birth of their first child. Across town, a deli manager is taking his wife and young daughter away for a relaxing weekend. Both families, in a devastating twist of fate, will experience the pain, fear, and disruption caused by foodborne illness. This emotionally charged video will enthrall new and old employees alike and strongly reinforce the importance of incorporating GMPs into everyday work routines. Without question, "A Lot on the Line" will become an indispensable part of your company's training efforts. (Silliker Laboratories–2000)

F2440 **Cleaning & Sanitizing in Vegetables Processing Plants: Do It Well, Do It Safely!**–(16 minute videotape) This training video shows how to safely and effectively clean and sanitize in a vegetable processing plant. It teaches how it is the same for processing plant as it is for washing dishes at home. (University of Wisconsin Extension–1996) (Available in Spanish)

F2010 **Close Encounters of the Bird Kind**–(18 minute videotape). A humorous but in-depth look at *Salmonella* bacteria, their sources, and their role in foodborne disease. A modern poultry processing plant is visited, and the primary processing steps and equipment are examined. Potential sources of *Salmonella* contamination are identified at the different stages of production along with the control techniques that are employed to insure safe poultry products. (Topek Products, Inc.) (Reviewed 1998)

F2015 **Controlling *Listeria*: A Team Approach**–(16 minute videotape). In this video, a small food company voluntarily shuts down following the implication of one of its products in devastating outbreak of *Listeria monocytogenes*. This recall dramatization is followed by actual in-plant footage highlighted key practices in controlling *Listeria*. This video provides workers with an overview of the organism, as well as practical steps that can be taken to control its growth in plant environments. Finally, the video leaves plant personnel with a powerful, resounding message: Teamwork and commitment are crucial in the production of safe, quality foods. (Silliker Laboratories–2000)

F2037 **Cooking and Cooling of Meat and Poultry Products**–(2 videotapes - 176 minutes). (See Part 1 Tape F2035 and Part 2 Tape F2036). This is session 3 of a 3-part Meat and Poultry Teleconference cosponsored by AFDO and the USDA Food Safety Inspection Service. Upon completion of viewing these videotapes, the viewer will be able to (1) recognize inadequate processes associated with the cooking and cooling of meat and poultry at the retail level; (2) Discuss the hazards associated with foods and the cooking and cooling processes with management at the retail level; (3) Determine the adequacy of control methods to prevent microbiological hazards in cooking and cooling at the retail level, and (4) Understand the principle for determining temperature with various temperature measuring devices. (AFDO/USDA–1999)

F2030 **"Egg Games" Foodservice Egg Handling and Safety**–(18 minute videotape). Develop an effective egg handling and safety program that is right for your operation. Ideal for manager training and foodservice educational programs, this video provides step-by-step information in an entertaining, visually-exciting format. (American Egg Board–1999)

F2020 **Egg Handling & Safety**-(11 minute videotape). Provides basic guidelines for handling fresh eggs which could be useful in training regulatory and industry personnel. (American Egg Board-1997)

F2036 **Emerging Pathogens and Grinding and Cooking Comminuted Beef**-(2 videotapes - 165 minutes.) (See Part 1 Tape F2035 and Part 3 Tape F2037.) This is session 2 of a 3-part Meat and Poultry Teleconference co-sponsored by AFDO and the USDA Food Safety Inspection Service. These videotapes present an action plan for federal, state, local authorities, industry, and trade associations in a foodborne outbreak. (AFDO/USDA-1998)

F2035 **Fabrication and Curing of Meat and Poultry Products**-(2 videotapes - 145 minutes). (See Part 2 Tape F2036 and Part 3 Tape F2037). This is session 1 of a 3-part Meat and Poultry Teleconference cosponsored by AFDO and the USDA Food Safety Inspection Service. Upon viewing, the sanitarian will be able to (1) Identify typical equipment used for meat and poultry fabrication at retail and understand their uses; (2) Define specific terms used in fabrication of meat and poultry products in retail establishments, and (3) Identify specific food safety hazards associated with fabrication and their controls. (AFDO/USDA-1997)

F2040 **Food Irradiation**-(30 minute videotape). Introduces viewers to food irradiation as a new preservation technique. Illustrates how food irradiation can be used to prevent spoilage by microorganisms, destruction by insects, overripening, and to reduce the need for chemical food additives. The food irradiation process is explained and benefits of the process are highlighted. (Turnelle Productions, Inc.) (Reviewed 1998)

F2045 **Food Microbiological Control**-(6-videotapes - appoximate time 12 hours). Designed to provide information and demonstrate the application of basic microbiology, the Good Manufacturing Practices (GMPs), retail Food Code, and sanitation practices when conducting food inspections at the processing and retail levels. Viewers will enhance their ability to identify potential food hazards and evaluate the adequacy of proper control methods for these hazards. (FDA-1998)

F2050 **Food Safe-Food Smart-HACCP & Its Application to the Food Industry**-(2-16 minute videotapes). (1)-Introduces the seven principles of HACCP and their application to the food industry. Viewers will learn about the HACCP system and how it is used in the food industry to provide a safe food supply. (2)-Provides guidance on how to design and implement a HACCP system. It is intended for individuals with the responsibility of setting up a HACCP system. (Alberta Agriculture, Food and Rural Development) (Reviewed 1998)

F2060 **Food Safe-Series I**-(4-10 minute videotapes). (1) "Receiving & Storing Food Safely," details for food-service workers the procedures for performing sight inspections for the general conditions of food, including a discussion of food labeling and government approval stamps. (2) "Food-service Facilities and Equipment," outlines the requirements for the proper cleaning and sanitizing of equipment used in food preparation areas. Describes the type of materials, design, and proper maintenance of this equipment. (3) "Microbiology for Food-service Workers," provides a basic understanding of the microorganisms which cause food spoilage and foodborne illness. This program describes bacteria, viruses, protozoa, and parasites and the conditions which support their growth. (4) "Food-service Housekeeping and Pest Control," emphasizes cleanliness as the basis for all pest control. Viewers learn the habits and life cycles of flies, cockroaches, rats, and mice. (Perennial Education-1991) (Reviewed 1998)

F2070 **Food Safe-Series II**-(4-10 minute videotapes). Presents case histories of foodborne disease involving (1) *Staphylococcus aureus,* (sauces) (2) *Salmonella,* (eggs) (3) *Campylobacter,* and (4) *Clostridium botulinum.* Each tape demonstrates errors in preparation, holding or serving food; describes the consequences of those actions; reviews the procedures to reveal the cause of the illness; and illustrates the correct practices in a step-by-step demonstration. These are excellent tapes to use in conjunction with hazard analysis critical control point training programs. (Perennial Education-1991) (Reviewed 1998)

F2080 **Food Safe-Series III**-(4-10 minute videotapes). More case histories of foodborne disease. This set includes (1) Hepatitis "A", (2) *Staphylococcus aureus* (meats), (3) *Bacillus cereus*, and (4) *Salmonella* (meat). Viewers will learn typical errors in the preparation, holding and serving of food. Also included are examples of correct procedures which will reduce the risk of food contamination. (Perennial Education-1991) (Reviewed 1998)

F2133 **Food Safety First**-(50 minute videotape). This food safety training video presents causes of foodborne illness in foodservice and ways to prevent foodborne illness. Individual segments include personal hygiene and handwashing, cleaning and sanitizing, preventing cross contamination and avoiding time and temperature abuse. Foodhandling principles are presented through scenarios in a restaurant kitchen. (Glo-Germ 1998)

F2090 **Food Safety: An Educational Video for Institutional Food-Service Workers**-(10 minute videotape). Provides a general discussion on food safety principles with special emphasis on pathogen reductions in an institutional setting from child care centers to nursing homes. (U.S. Department of Health & Human Services-1997)

F2120 **Food Safety: For Goodness Sake, Keep Food Safe**–(15 minute videotape). Teaches foodhandlers the fundamentals of safe food handling. The tape features the key elements of cleanliness and sanitation, including: good personal hygiene, maintaining proper food product temperature, preventing time abuse, and potential sources of food contamination. (Iowa State University Extension–1990) (Reviewed 1998)

F2110 **Food Safety is No Mystery**–(34 minute videotape). This is an excellent training visual for food-service workers. It shows the proper ways to prepare, handle, serve and store food in actual restaurant, school and hospital situations. A policeman sick from food poisoning, a health department sanitarian, and a food-service worker with all the bad habits are featured. The latest recommendations on personal hygiene, temperatures, cross-contamination, and storage of foods are included. (USDA–1987). Also available in Spanish. –(Reviewed 1998)

F2130 **Food Safety: You Make the Difference**–(28 minute videotape). Through five food workers from differing backgrounds, this engaging and inspirational documentary style video illustrates the four basic food safety concepts: handwashing, preventing cross-contamination, moving foods quickly through the danger zone, and hot/cold holding (Seattle-King County Health Department–1995)

F2135 **Get with a Safe Food Attitude**–(40 minute videotape). Consisting of nine short segments which can be viewed individually or as a group, this video presents safe food handling for moms-to-be. Any illness a pregnant woman contracts can affect her unborn child whose immune system is too immature to fight back. The video follows four pregnant women as they learn about food safety and preventing foodborne illness. (US Department of Agriculture–1999)

F2140 **GMP Basics – Employee Hygiene Practices**–(20 minute videotape). Through real-life examples and dramatization, this video demonstrates good manufacturing practices that relate to employee hygiene, particularly hand washing. This video includes a unique test section to help assess participants' understanding of common GMP violations. (Silliker Laboratories–1997)

F2143 **GMP Basics: Guidelines for Maintenance Personnel**–(21 minute videotape). Developed specifically for maintenance personnel working in a food processing environment, this video depicts a plant-wide training initiative following a product recall announcment. Maintenance personnel will learn how GMPs relate to their daily activities and how important their roles are in the production of safe food products. (Silliker Laboratories–1999)

F2148 **GMP–GSP Employee**–(38 minute videotape). This video was developed to teach food plant employees the importance of "Good Manufacturing Practices" and "Good Sanitation Practices." Law dictates that food must be clean and safe to eat. This video emphasizes the significance of each employee's role in protecting food against contamination. Tips on personal cleanliness and hygiene are also presented. (L.J. Bianco & Associates)

F2150 **GMP: Personal Hygiene & Practices in Food Manufacturing**–(14 minute videotape). This video focuses on the personal hygiene of food-manufacturing workers, and explores how poor hygiene habits can be responsible for the contamination of food in the manufacturing process. This is an instructional tool for new food-manufacturing line employees and supervisors. It was produced with "real" people in actual plant situations, with only one line of text included in the videotape. (Penn State–1993)–(Available in Spanish and Vietnamese)

F2147 **GMP Basics: Process Control Practices**–(16 minute videotape). In actual food processing environments, an on-camera host takes employees through a typical food plant as they learn the importance of monitoring and controlling key points in the manufacturing process. Beginning with receiving and storing, through production, and ending with packaging and distribution, control measures are introduced, demonstrated, and reviewed. Employees will see how their everyday activities in the plant have an impact on product safety. (Silliker Laboratories–1999)

F2160 **GMP: Sources & Control of Contamination during Processing**–(20 minute videotape). This program, designed as an instructional tool for new employees and for refresher training for current or reassigned workers, focuses on the sources and control of contamination in the food-manufacturing process. It was produced in actual food plant situations. A concise description of microbial contamination and growth and cross-contamination, a demonstration of food storage, and a review of aerosol contaminants are also included. (Penn State–1995)

F2180 **HACCP: Safe Food Handling Techniques**–(22 minute videotape). The video highlights the primary causes of food poisoning and emphasizes the importance of self-inspection. An explanation of potentially hazardous foods, cross-contamination, and temperature control is provided. The main focus is a detailed description of how to implement a Hazard Analysis Critical Control Point (HACCP) program in a foodservice operation. A leader's guide is provided as an adjunct to the tape. (The Canadian Restaurant & Foodservices Association–1990) (Reviewed 1998)

F2172 **HACCP: Training for Managers**-(17 minute videotape). Through industry-specific examples and case studies, this video addresses the seven HACCP steps, identifying critical control points, recordkeeping and documentation, auditing, and monitoring. It also explains how HACCP relates to other programs such as Good Manufacturing Practices and plant sanitation. (J. J. Keller & Associates, Inc.-2000)

F2170 **The Heart of HACCP**-(22 minute videotape). A training video designed to give plant personnel a clear understanding of the seven HACCP principles and practical guidance on how to apply these principles to their own work environment. This video emphasizes the principles of primary concern to plant personnel such as critical limits, monitoring systems, and corrective actions that are vital to the success of a HACCP plan. (Silliker Laboratories Group-1994)

F2175 **Inspecting For Food Safety-Kentucky's Food Code**-(100 minute videotape). Kentucky's Food Code is patterned after the Federal Food Code. The concepts, definitions, procedures, and regulatory standards included in the code are based on the most current information about how to prevent foodborne diseases. This video is designed to prepare food safety inspectors to effectively use the new food code in the performance of their duties. (Department of Public Health Commonwealth of Kentucky-1997) (Reviewed 1999)

F2190 **Is What You Order What You Get? Seafood Integrity**-(18 minute videotape). Teaches seafood department employees about seafood safety and how they can help insure the integrity of seafood sold by retail food markets. Key points of interest are cross-contamination control, methods and criteria for receiving seafood and determining product quality, and knowing how to identify fish and seafood when unapproved substitutions have been made. (The Food Marketing Institute) (Reviewed 1998)

F2210 **Northern Delight-From Canada to the World**-(13 minute videotape). A promotional video that explores the wide variety of foods and beverages produced by the Canadian food industry. General in nature, this tape presents an overview of Canada's food industry and its contribution to the world's food supply. (Ternelle Production, Ltd.) (Reviewed 1998)

F2240 **On the Front Line**-(18 minute videotape). A training video pertaining to sanitation fundamentals for vending service personnel. Standard cleaning and serving procedures for cold food, hot beverage and cup drink vending machines are presented. The video emphasizes specific cleaning and serving practices which are important to food and beverage vending operations. (National Automatic Merchandising Association-1993) (Reviewed 1998)

F2250 **On the Line**-(30 minute videotape). This was developed by the Food Processors Institute for training food processing plant employees. It creates an awareness of quality control and regulations. Emphasis is on personal hygiene, equipment cleanliness and good housekeeping in a food plant. It is recommended for showing to both new and experienced workers. (Available in Spanish) The Food Processors Institute. 1993. (Reviewed 1998)

F2270 **Pest Control in Seafood Processing Plants**-(26 minute videotape). Videotape which covers procedures to control flies, roaches, mice, rats and other common pests associated with food processing operations. The tape will familiarize plant personnel with the basic characteristics of these pests and the potential hazards associated with their presence in food operations. (Reviewed 1998)

F2280 **Principles of Warehouse Sanitation**-(33 minute videotape). This videotape gives a clear, concise and complete illustration of the principles set down in the Food, Drug and Cosmetic Act and in the Good Manufacturing Practices, as well as supporting legislation by individual states. (American Institute of Baking-1993)

F2290 **Product Safety & Shelf Life**-(40 minute videotape). Developed by Borden Inc., this videotape was done in three sections with opportunity for review. Emphasis is on providing consumers with good products. One section covers off-flavors, another product problems caused by plant conditions, and a third the need to keep products cold and fresh. Procedures to assure this are outlined, as shown in a plant. Well done and directed to plant workers and supervisors. (Borden-1987) - (Reviewed 1997)

F2220 **Proper Handling of Peracidic Acid**-(15 minute videotape). Introduces paracidic acid as a chemical sanitizer and features the various precautions needed to use the product safely in the food industry.

F2230 **Purely Coincidental**-(20 minute videotape). A parody that shows how foodborne illness can adversely affect the lives of families that are involved. The movie compares improper handling of dog food in a manufacturing plant that causes the death of a family pet with improper handling of human food in a manufacturing plant that causes a child to become ill. Both cases illustrate how handling errors in food production can produce devastating outcomes. (The Quaker Oats Company-1993.) (Reviewed 1998)

F2310 **Safe Food: You Can Make a Difference**-(25 minute videotape). A training video for food-service workers which covers the fundamentals of food safety. An explanation of proper food temperature, food storage, cross-contamination control, cleaning and sanitizing, and handwashing as methods of foodborne illness control is provided. The video provides an orientation to food safety for professional foodhandlers. (Tacoma-Pierce County Health Department-1990). (Reviewed 1998)

F2320 **Safe Handwashing**-(15 minute videotape). Twenty-five percent of all foodborne illnesses are traced to improper handwashing. The problem is not just that handwashing is not done, the problem is that it's not done properly. This training video demonstrates the "double wash" technique developed by Dr. O. Peter Snyder of the Hospitality Institute for Technology and Management. Dr. Snyder demonstrates the procedure while reinforcing the microbiological reasons for keeping hands clean. (Hospitality Institute for Technology and Management-1991) (Reviewed 1998)

F2325 **Safe Practices for Sausage Production**-(3 hour videotape). This videotape is based on a series of educational broadcasts on meat and poultry inspections at retail food establishments produced by the Association of Food and Drug Officicals (AFDO) and USDA's Food Safety and Inspection Service (FSIS), along with FDA's Center for Food Safety and Applied Nutrition. The purpose of the broadcast was to provide training to state, local, and tribal sanitarians on processes and procedures that are being utilized by retail stores and restaurants, especially those that were usually seen in USDA-inspected facilities. The program will cover the main production steps of sausage products, such as the processes of grinding, stuffing, and smoking, and typical equipment used will be depicted. Characteristics of different types of sausage (fresh, cooked and smoked, and dry/semi-dry) will be explained. Pathogens of concern and outbreaks associated with sausage will be discussed. The written manual for the program is available at www.fsis.usda.gov/ofo/hrds/STATE/RETAIL/manual.htm. (1999)

F2460 **Safer Processing of Sprouts**-(1 hour and 22 minute videotape). Sprouts are enjoyed by many consumers for their taste and nutritional value. However, recent outbreaks of illnesses associated with sprouts have demonstrated a potentially serious human health risk posed by this food. FDA and other public health officials are working with industry to identify and implement production practices that will assure that seed and sprouted seed are produced under safe conditions. This training video covers safe processing practices of sprouts including growing, harvesting, milling, transportation, storage, seed treatment, cleaning and sanitizing, sampling and microbiological testing. (CA Dept. of Health Services, Food and Drug Branch; U.S. Food and Drug Adminstration, and the Centers for Disease Control and Prevention - 2000)

F2330 **Sanitation for Seafood Processing Personnel**-(20 minute videotape). A training video suited for professional foodhandlers working in any type of food manufacturing plant. The film highlights Good Manufacturing Practices and their role in assuring food safety. The professional foodhandler is introduced to a variety of sanitation topics including: (1) foodhandlers as a source of food contamination, (2) personal hygiene as a means of preventing food contamination, (3) approved food storage techniques including safe storage temperatures, (4) sources of cross-contamination, (5) contamination of food by insects and rodents, (6) garbage handling and pest control, and (7) design and location of equipment and physical facilities to facilitate cleaning. (Reviewed 1998)

F2340 **Sanitizing for Safety**-(17 minute videotape). Provides an introduction to basic food safety for professional foodhandlers. A training pamphlet and quiz accompany the tape. Although produced by a chemical supplier, the tape contains minimal commercialism and may be a valuable tool for training new employees in the food industry. (Clorox-1990) (Reviewed 1998)

F2350 **SERVSAFE® Serving Safe Food**-(4-20 minute videotapes). This video series illustrates and reinforces important food safety practices in an informative and entertaining manner. The material is presented in an easy to understand format, making it simpler for employees to learn and remember this essential information. Each video includes a leader's guide that provides all the information managers need to direct a productive training session. (Educational Foundation of the National Restaurant Association-1993) (Reviewed 1998)

F2360 **SERVSAFE® Serving Safe Food Second Edition**-(6-10 minute videotapes). The program still covers all the major areas of food safety training, but there is an added emphasis on training employees to follow HACCP procedures. The second edition program includes an Employee Guide, Leader's Guide and six instructional videos. (Educational Foundation of the National Restaurant Association-1993)

F2430 **Smart Sanitation: Principles & Practices for Effectively Cleaning Your Food Plant**-(20 minute videotape) A practical training tool for new sanitation employees or as a refresher for veterans. Employees will understand the food safety impact of their day-to-day cleaning and sanitation activities and recognize the importance of their role in your company's food safety program. (Silliker Laboratories Group-1996)

F2370 **Supermarket Sanitation Program–"Cleaning & Sanitizing"**–(13 minute videotape). Contains a full range of cleaning and sanitizing information with minimal emphasis on product. Designed as a basic training program for supermarket managers and employees. (1989) (Reviewed 1998)

F2380 **Supermarket Sanitation Program–"Food Safety"**–(11 minute videotape). Contains a full range of basic sanitation information with minimal emphasis on product. Filmed in a supermarket, the video is designed as a basic program for manager training and a program to be used by managers to train employees. (1989) (Reviewed 1998)

F2390 **Take Aim at Sanitation**–(8 minute videotape). This video features tips on food safety and proper disposal of single service items. Also presented is an emphasis on food contact surfaces as well as the manufacture, storage and proper handling of these items. (Foodservice and Packaging Institute, Inc.–1995). (Available in Spanish)

F2410 **Wide World of Food-Service Brushes**–(18 minute videotape). Discusses the importance of cleaning and sanitizing as a means to prevent and control foodborne illness. Special emphasis is given to proper cleaning and sanitizing procedures and the importance of having properly designed and constructed equipment (brushes) for food preparation and equipment cleaning operations. (1989) (Reviewed 1998)

F2420 **Your Health in Our Hands–Our Health in Yours**–(8 minute videotape). For professional foodhandlers, the tape covers the do's and don'ts of foodhandling as they relate to personal hygiene, temperature control, safe storage and proper sanitation. (Jupiter Video Production–1993). (Reviewed 1998)

OTHER

M4010 **Diet, Nutrition & Cancer**–(20 minute videotape). Investigates the relationship between a person's diet and the risk of developing cancer. The film describes the cancer development process and identifies various types of food believed to promote and/or inhibit cancer. The film also provides recommended dietary guidelines to prevent or greatly reduce the risk of certain types of cancer.

M4020 **Eating Defensively: Food Safety Advice for Persons with Aids**–(15 minute videotape). While HIV infection and AIDS are not acquired by eating foods or drinking liquids, persons infected with the AIDS virus need to be concerned about what they eat. Foods can transmit bacteria and viruses capable of causing life-threatening illness to persons infected with AIDS. This video provides information for persons with AIDS on what foods to avoid and how to better handle and prepare foods. (FDA/CDC–1989)

M4030 **Ice: The Forgotten Food**–(14 minute videotape). This training video describes how ice is made and where the critical control points are in its manufacture, both in ice plants and in on-premises locations (convenience stores, etc.); it documents the potential for illness from contaminated ice and calls on government to enforce good manufacturing practices, especially in on-premises operations where sanitation deficiencies are common. (Packaged Ice Association–1993)

M4040 **Legal Aspects of the Tampering Case**–(25 minute videotape). This was presented by Mr. James T. O'Reilly, University of Cincinnati School of Law at the fall 1986 Central States Association of Food and Drug Officials Conference. He emphasizes three factors from his police and legal experience–know your case, nail your case on the perpetrator, and spread the word. He outlines specifics under each factor. This should be of the greatest interest to regulatory sanitarians, in federal, state and local agencies. (1987)

M4050 **Personal Hygiene & Sanitation for Food Processing Employees**–(15 minute videotape). Illustrates and describes the importance of good personal hygiene and sanitary practices for people working in a food processing plant. (Iowa State–1993)

M4060 **Psychiatric Aspects of Product Tampering**–(25 minute videotape). This was presented by Emanuel Tanay, M.D. from Detroit, at the fall 1986 conference of CSAFDA. He reviewed a few cases and then indicated that abnormal behavior is like a contagious disease. Media stories lead to up to 1,000 similar alleged cases, nearly all of which are false. Tamper-proof packaging and recalls are essential. Tampering and poisoning are characterized by variable motivation, fraud and greed. Law enforcement agencies have the final responsibilities. Tamper proof containers are not the ultimate answer. (1987)

M4070 **Tampering: The Issue Examined**–(37 minute videotape). Developed by Culbro Machine Systems, this videotape is well done. It is directed to food processors and not regulatory sanitarians or consumers. A number of industry and regulatory agency management explain why food and drug containers should be made tamper evident. (Culbro–1987)

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- ❒ D1180 10 Points to Dairy Quality
- ❒ D1010 The Bulk Milk Hauler: Protocol & Procedures
- ❒ D1020 Causes of Milkfat Test Variations & Depressions
- ❒ D1030 Cold Hard Facts
- ❒ D1040 Ether Extraction Method for Determination of Raw Milk
- ❒ D1050 The Farm Bulk Milk Hauler
- ❒ D1060 Frozen Dairy Products
- ❒ D1070 The Gerber Butterfat Test
- ❒ D1080 High-Temperature, Short-Time Pasteurizer
- ❒ D1090 Managing Milking Quality
- ❒ D1100 Mastitis Prevention and Control
- ❒ D1110 Milk Plant Sanitation: Chemical Solution
- ❒ D1120 Milk Processing Plant Inspection Procedures
- ❒ D1130 Pasteurizer - Design and Regulation
- ❒ D1140 Pasteurizer - Operation
- ❒ D1150 Processing Fluid Milk

ENVIRONMENTAL

- ❒ E3010 The ABCs of Clean - A Handwashing & Cleanliness Program for Early Childhood Programs
- ❒ E3020 Acceptable Risks?
- ❒ E3030 Air Pollution: Indoor
- ❒ E3040 Asbestos Awareness
- ❒ E3055 Effective Handwashing-Preventing Cross-Contamination in the Food Service Industry
- ❒ E3060 EPA - Test Methods for Freshwater Effluent Toxicity Tests (Using Ceriodaphnia)
- ❒ E3070 EPA - Test Methods for Freshwater Effluent Toxicity Tests (Using Fathead Minnow Larva)
- ❒ E3075 EPA: This is Super Fund
- ❒ E3080 Fit to Drink
- ❒ E3110 Garbage: The Movie
- ❒ E3120 Global Warming: Hot Times Ahead
- ❒ E3130 Kentucky Public Swimming Pool & Bathing Facilities
- ❒ E3135 Plastic Recycling Today: A Growing Resource
- ❒ E3140 Putting Aside Pesticides
- ❒ E3150 Radon
- ❒ E3160 RCRA - Hazardous Waste
- ❒ E3170 The New Superfund: What It is & How It Works-(1) Changes in the Remedial Process: Clean-up Standards & State Involvement Requirements
- ❒ E3180 The New Superfund: What It is & How It Works-(2) Changes in the Removal Process: Removal & Additional Program Requirements
- ❒ E3190 The New Superfund: What It is & How It Works - (3) Enforcement and Federal Facilities
- ❒ E3210 The New Superfund: What It is & How It Works - (4) Emergency Preparedness & Community Right-to-Know
- ❒ E3220 The New Superfund: What It is & How It Works - (5) Underground Storage Tank Trust Fund & Response Program
- ❒ E3230 The New Superfund: What It is & How It Works - (6) Research & Development/Closing Remarks
- ❒ E3240 Sink a Germ
- ❒ E3245 Wash Your Hands
- ❒ E3250 Waste Not: Reducing Hazardous Waste

FOOD

- ❒ F2260 100 Degrees of Doom...The Time & Temperature Caper
- ❒ F2450 A Guide to Making Safe Smoked Fish
- ❒ F2005 A Lot on the Line
- ❒ F2440 Cleaning & Sanitizing in Vegetable Processing Plants: Do It Well, Do It Safely!
- ❒ F2010 Close Encounters of the Bird Kind
- ❒ F2015 Controlling *Listeria*: A Team Approach
- ❒ F2037 Cooking and Cooling Meat and Poultry Products
- ❒ F2030 "Egg Games" Foodservice Egg Handling and Safety
- ❒ F2020 Egg Handling & Safety
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- ❒ F2050 Food Safe - Food Smart - HACCP & Its Application to the Food Industry (Part I&2)
- ❒ F2060 Food Safe - Series I (4 Videos)
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- ❒ F2080 Food Safe - Series III (4 Videos)
- ❒ F2133 Food Safety First
- ❒ F2090 Food Safety: An Educational Video for Institutional Food-Service Workers
- ❒ F2120 Food Safety: For Goodness Sake, Keep Food Safe
- ❒ F2110 Food Safety is No Mystery
- ❒ F2130 Food Safety: You Make the Difference
- ❒ F2135 Get with a Safe Food Attitude
- ❒ F2140 GMP Basics: Employee Hygiene Practices
- ❒ F2143 GMP Basics: Guidelines for Maintenance Personnel
- ❒ F2148 GMP - GSP Employee
- ❒ F2150 GMP: Personal Hygiene and Practices in Food Manufacturing
- ❒ F2147 GMP Basics: Process Control Practices
- ❒ F2160 GMP: Sources & Control of Contamination during Processing
- ❒ F2180 HACCP: Safe Food Handling Techniques
- ❒ F2172 HACCP:Training for Managers
- ❒ F2170 The Heart of HACCP
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- ❒ F2210 Northern Delight - From Canada to the World
- ❒ F2240 On the Front Line
- ❒ F2250 On the Line
- ❒ F2270 Pest Control in Seafood Processing Plants
- ❒ F2280 Principles of Warehouse Sanitation
- ❒ F2290 Product Safety & Shelf Life
- ❒ F2220 Proper Handling of Peracidic Acid
- ❒ F2230 Purely Coincidental - English
- ❒ F2310 Safe Food: You Can Make a Difference
- ❒ F2320 Safe Handwashing
- ❒ F2325 Safe Practices for Sausage Production
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- ❒ F2380 Supermarket Sanitation Program - "Food Safety"
- ❒ F2390 Take Aim at Sanitation
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- ❒ F2420 Your Health in Our Hands - Our Health in Yours

OTHER

- ❒ M4010 Diet, Nutrition & Cancer
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- ❒ M4060 Psychiatric Aspects of Product Tampering
- ❒ M4070 Tampering: The Issue Examined

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3-A® Sanitary Standards for Air Eliminators, Number 29-02

Formulated by
International Association of Food Industry Suppliers (IAFIS)
International Association for Food Protection (IAFP)
United States Public Health Service (USPHS)
The Dairy Industry Committee (DIC)
United States Department of Agriculture – Dairy Programs (USDA)

It is the purpose of the IAFIS, IAFP, USPHS, DIC, and USDA in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Air eliminator specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAFIS, IAFP, USPHS, DIC, and USDA at any time. The 3-A Sanitary Standards and 3-A Accepted Practices provide hygienic criteria applicable to equipment and systems used to produce, process, and package milk, milk products, and other perishable foods or comestible products. Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

A **SCOPE**

A1 These standards cover the sanitary aspects of air eliminators. These standards do not apply to air eliminators using vacuum to remove air.

A2 In order to conform to these 3-A Sanitary Standards, air eliminators shall comply with the following design, material, and fabrication criteria[1].

B **DEFINITIONS**

B1 *Product:* Shall mean milk and fluid milk products or other comestibles.

B2 **Surfaces**

B2.1 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop, or be drawn into the product.

B2.2 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

B3 **Cleaning**

B3.1 *Mechanical Cleaning or Mechanically Cleaned:* Shall denote cleaning solely by impingement, circulation and/or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned, by mechanical means.

B3.2 *Manual (COP) Cleaning:* Shall mean soil removal when the equipment is partially or totally disassembled. Soil removal is effected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and scrapers, high or low pressure hoses and tank(s) which may be fitted with recirculating pump(s), and with all cleaning aids manipulated by hand.

[1] Use current revisions or editions of all referenced documents cited herein.

B4 *Easily or Readily Removable:* Shall mean quickly separated from the equipment with the use of simple hand tools if necessary.

B5 *Easily or Readily Accessible:* Shall mean a location which can be safely reached by personnel from a floor, platform, or other permanent work area.

B6 *Inspectable:* Shall mean all product contact surfaces can be made available for close visual observation.

B7 *Simple Hand Tools:* Shall mean implements normally used by operating and cleaning personnel such as a screwdriver, wrench, or mallet.

B8 *Nontoxic Materials:* Shall mean those substances which under the conditions of their use are in compliance with applicable requirements of the Food, Drug, and Cosmetic Act of 1938, as amended.

B9 *Corrosion Resistant:* Shall mean the surface has the property to maintain its original surface characteristics for its predicted service period when exposed to the conditions encountered in the environment of intended use, including expected contact with product and cleaning, sanitizing, or sterilization compounds or solutions.

B10 *Bond:* Shall mean the adhesive or cohesive forces holding materials together. This definition excludes press and shrink fits.

C **MATERIALS**

C1 **Metals**

C1.1 All product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[2] (except 301 and 302) or corresponding Alloy Cast Institute (ACI) types[3] or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent. (See Appendix, Section E.)

C2 **Nonmetals**

C2.1 Rubber and rubber-like materials may be used for O-rings, gaskets, seals, protective caps for openings, valve parts, and parts having the same functional purposes.

C2.1.1 Rubber and rubber-like materials, when used for the above-specified applications, shall comply with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C2.2 Plastic materials may be used for valve parts, gaskets, seals, O-rings, protective caps for openings, and parts having the same functional purposes.

C2.2.1 Plastic materials, when used for the above-specified applications, shall comply with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C2.3 Rubber and rubber-like materials and plastic materials having product contact surfaces shall be of such a composition as to retain their surface and conformational characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C2.4 The adhesive, if used, on bonded rubber and rubber-like materials and bonded plastic materials shall be nontoxic[4].

C3 **Nonproduct Contact Surfaces**

C3.1 All nonproduct contact surfaces shall be of corrosion-resistant material or material that is rendered corrosion resistant. If coated, the coating used shall adhere. Nonproduct contact surfaces shall be relatively nonabsorbent, durable, and cleanable. Parts removable for cleaning having both product contact and nonproduct contact surfaces shall not be painted.

[2]The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, Table 2-1. Available from the American Iron and Steel Society, 186 Thorn Hill Road, Warrendale, PA 15086 (724) 776-1535.

[3]Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.

[4]Adhesives shall comply with 21 CFR 175 - Indirect Food Additives: Adhesives and Components of Coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 512-1800.

D FABRICATION

D1 Surface Texture

D1.1 All product contact surfaces shall have a finish at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds, and crevices in the final fabricated form. (See Appendix, Section F.)

D2 Permanent Joints

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded[5].

D2.1.1 Welded areas on product contact surfaces shall be at least as smooth as a No. 4 ground finish on stainless steel sheets, and be free of imperfections such as pits, folds, and crevices.

D3 Bonded Materials

D3.1 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be bonded in a manner that the bond is continuous and mechanically sound, so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment, the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D4 Cleaning and Inspectability

D4.1 Air eliminators that are to be mechanically cleaned shall be designed so that the product contact surfaces of the air eliminator and all nonremoved appurtenances thereto can be mechanically cleaned and are easily accessible, readily removable, and inspectable.

D4.2 Product contact surfaces not designed to be mechanically cleaned shall be easily accessible for cleaning and inspection either when in an installed position or when removed. Demountable parts shall be readily removable.

D5 Draining

D5.1 All product contact surfaces shall be self-draining except for normal adherence.

D6 Gaskets

D6.1 Gaskets and seals having a product contact surface shall be removable or bonded.

D6.2 Grooves in gaskets shall be no deeper than their width, unless the gasket is readily removable and reversible for cleaning.

D6.3 Gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm), and those provided for in D9.1.

D7 Radii

D7.1 All internal angles of less than 135° on product contact surfaces shall have radii of not less than 1/4 in. (6.35 mm) except that:

D7.1.1 Smaller radii may be used when they are required for essential functional reasons, such as those in vent seal parts. In no case shall such radii be less than 1/32 in. (0.794 mm).

D7.1.2 The radii in grooves in gaskets or gasket retaining grooves shall be not less than 1/8 in. (3.18 mm), except for those for standard 1/4 in. (6.35 mm) and smaller O-rings, and those provided for in Section D9.1.

D7.1.3 Radii in standard O-ring grooves shall be as specified in Appendix, Section G.

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[5] Criteria for hygienic welds may be found in AWS/ANSI D18.1 – *Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications*. Available from the American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126, phone: (305) 443-9353, fax: (305) 443-7559, e-mail: info@amweld.org; and EHEDG Doc. 9 – Welding Stainless Steel to Meet Hygienic Requirements. Available from the European Hygienic Equipment Design Group, Ellen Moens, Avenue Grand Champ 148, 1150 Brussels, Belgium, phone: +32 2 761 7408, fax: +32 2 763 0013, e-mail: moens@nsf.org.

D7.1.4 Radii in nonstandard O-ring grooves shall be those radii closest to a standard O-ring as specified in Appendix, Section G.

D7.1.5 The minimum radii for fillets of welds in product contact surfaces shall be not less than 1/4 in. (6.35 mm) except that:

D7.1.5.1 When the thickness of one or both parts joined is less than 3/16 in. (4.76 mm), the minimum radii for fillets of welds on product contact surfaces shall be not less than 1/8 in. (3.18 mm).

D8 **Threads**

D8.1 There shall be no threads on product contact surfaces.

D9 **Fittings and Valves**

D9.1 All sanitary fittings and connections shall conform to the applicable provisions of the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-, except that the materials conforming to C2.1.1 or C2.2.1 may be used for caps of sanitary design for the protection of terminal ends of sanitary tubing, fittings, or vents.

D9.2 Valves shall conform to the applicable 3-A Sanitary Standards for Valves.

D10 **Sanitary Tubing**

D10.1 All metal tubing shall conform to 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33-.

D11 **Vents**

D11.1 Air vents shall be designed or protected to prevent foreign material from entering the air eliminator through the air vent.

D12 **Instrument Connections**

D12.1 All instrument connections having product contact surfaces shall conform to the applicable provisions of the 3-A Sanitary Standards for Sensors and Sensor Fittings and Connections Used on Fluid Milk and Milk Products Equipment, Number 74-.

D13 **Supports**

D13.1 The means of supporting an air eliminator shall be by legs. Legs shall be smooth with rounded ends and no exposed threads. Legs made of hollow stock shall be sealed. The clearance between the lowest part of the air eliminator (excluding legs) and the floor shall be one of the following:

D13.2 Not less than 4 in. (101.6 mm) if the horizontal area of the air eliminator is more than 1 sq. ft. (929 cm^2).

D13.3 Not less than 2 in. (50.8 mm) if the horizontal area of the air eliminator is not more than 1 sq. ft. (929 cm^2) and the air eliminator is designed to be portable and easily movable.

D14 **Nonproduct Contact Surfaces**

D14.1 Nonproduct contact surfaces shall have a smooth finish, shall be free of pockets and crevices, and shall be readily cleanable. Those surfaces to be coated shall be effectively prepared for coating.

APPENDIX

E **STAINLESS STEEL MATERIALS**

Stainless steel conforming to the applicable chemical composition ranges established by AISI[2] for wrought products (Table 1), or by ACI[3] for cast products (Table 2), should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08%.

TABLE 1

WROUGHT PRODUCTS TYPICALLY USED			
UNS #	**ASTM[6]**	**AISI/SAE[2]**	**Properties**
S30300	A-582	303	Free-Machining S.S.; Austenitic
S30400	A-276 A-666	304	Austenitic S.S.
S30403	A-276 A-666	304L	Low Carbon Austenitic S.S.
S31600	A-276 A-666	316	Austenitic S.S. plus Mo*
S31603	A-276 A-666	316L	Low Carbon Austenitic S.S. plus Mo*

*Molybdenum

[6]Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Phone: (610) 832-9500.

TABLE 2

CAST PRODUCTS TYPICALLY USED			
UNS #	ASTM[6]	ACI[3]	Common Names
J92500	A-351 A-743 A-744	CF-3	Cast 304L
J92800	A-351 A-743 A-744	CF-3M	Cast 316L
J92600	A-351 A-743 A-744	CF-8	Cast 304
J92900	A-351 A-743 A-744	CF-8M	Cast 316
J92180	A-747	CB7 Cu – 1	Cast 17-4 PH
J92110	A-747	CB7 Cu –2	Cast 15-5 PH
N26055	A-494	CY5Sn BiM	Alloy 88
J92701	A-743	CF-16F	Free Machining Austeniiic S.S.

F **PRODUCT CONTACT SURFACE FINISH**

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum R_a of 32 µin. (0.80 µm), when measured according to the recommendations in American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)[7] B46.1 - Surface Texture, is considered to be equivalent to a No. 4 finish.

G **O-RING GROOVE RADII**

TABLE 3

Groove Radii Dimensions for Standard O-Rings			
O-Ring Cross Section, Nominal (AS 568[8])	O-Ring Cross Section, Actual (AS 568)	O-Ring Cross Section, Actual (ISO 3601-1[9])	Minimum Groove Radius
1/16 in.	0.070 in.	1.80 mm	0.016 in. (0.406 mm)
3/32 in.	0.103 in.	2.65 mm	0.031 in. (0.787 mm)
1/8 in.	0.139 in.	3.55 mm	0.031 in. (0.787 mm)
3/16 in.	0.210 in.	5.30 mm	0.062 in. (1.575 mm)
1/4 in.	0.275 in.	7.00 mm	0.094 in. (2.388 mm)

H **ENGINEERING DESIGN AND TECHNICAL CONSTRUCTION FILE**

The following is an example of an engineering design and technical construction file (EDTCF) to be maintained by the fabricator as evidence of complying with 3-A Sanitary Standards or 3-A Accepted Practices. (The file may contain more or less information as applicable to the equipment or system.)

H1 **Purpose**

H1.1 To establish and document the material, fabrication, and installation (where appropriate) requirements for the engineering design and technical construction files for all products, assemblies, and sub-assemblies supplied by the manufacturer thereof to be in compliance with the sanitary criteria found in 3-A Sanitary Standards or 3-A Accepted Practices. It is recommended that the engineering and construction file or files be submitted with applications for 3-A Symbol use authorization.

H2 **Scope**

H2.1 This EDTCF applies to equipment specified by:

H2.1.1 3-A Sanitary Standards for Air Eliminators for Milk and Fluid Milk Products, Number 29-.

H3 **Responsibilities**

H3.1 This EDTCF is maintained by: The Engineering Manager (or other company official) {name and title of responsible official} is responsible for maintaining, publishing, and distributing this EDTCF.

H3.2 Implementation: All divisions, specifically development engineering, standards engineering, sales engineering, and product departments are responsible for implementing this EDTCF.

H4 **Applicability**

H4.1 The 3-A Sanitary Standards and 3-A Accepted Practices are voluntarily applied as suitable sanitary criteria for dairy and food processing equipment. 3-A Sanitary Standards are

[7]Available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392 (212) 705-7722.

[8]The document establishing these standard dimensions is Aerospace Standard (AS) 568, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15086 (412-776-4970).

[9]The document establishing these standard dimensions is ISO 3601-1: 1988 (E), published by the International Organization for Standardization (ISO), 1 Rue de Varembe, Case Postale 58, CH 1 1211, Geneva, Switzerland (41-22-734-1240).

referenced in the Grade A Pasteurized Milk Ordinance: "Equipment manufactured in conformity with 3-A Sanitary Standards complies with the sanitary design and construction standards of this Ordinance."

H5 **References**

H5.1 List any additional regulations that apply to the equipment or system covered by this EDTCF.

H5.2 Date of conformity or 3-A Symbol Authorization and certificate number, if authorized.

H6 **Design and Technical Construction File**

H6.1 The Engineering Design and Technical Construction File may consist of the following:

a. an overall drawing of the subject equipment;
b. full detailed drawings, accompanied by any calculations, notes, test results, etc. required to check the conformity of the equipment with the 3-A Standards or 3-A Practices;
c. a list of:
   (1) the essential requirements of the standards or practices;
   (2) other technical specifications, which were used when the equipment was designed;
d. a description of methods adopted;
e. if essential, any technical report or certificate obtained from a competent testing body or laboratory;
f. any technical report giving the results of tests carried out internally by Engineering or others;
g. documentation and test reports on any research or tests on components, assemblies and/or the complete product to determine and demonstrate that by its design and construction the product is capable of being installed, put into service, and operated in a sanitary manner (optional);
h. a determination of the foreseeable lifetime of the product (optional);
i. a copy of the instructions for the product (Instruction Manuals/ Instruction Books);
j. for serial manufacturing, the internal measures that will be implemented to insure that the equipment will continue to be manufactured in conformity with the provisions of the 3-A Sanitary Standards or 3-A Accepted Practices;
k. engineering reports;
l. laboratory reports;
m. bills of material;
n. wiring diagrams, if applicable;
o. sales order engineering files;
p. hazard evaluation committee reports, if executed;
q change records;
r. customer specifications;
s. any notified body technical reports and certification tests;
t. copy of the 3-A Symbol authorization, if applicable.

H6.2 The file does not have to include detailed plans or any other specific information regarding the sub-assemblies, tooling, or fixtures used for the manufacture of the product unless a knowledge of them is essential for verification of conformity with the basic sanitary requirements found in 3-A documents.

H6.3 The documentation referred to in H6.1 above need not permanently exist in a material manner in the EDTCF, but it must be possible to assemble them and make them available within a period of time commensurate with its importance (one week is considered reasonable time). As a minimum, each product EDTCF must physically contain an index of the applicable documents of H6.1 above.

H6.4 The EDTCF may be in hard copy or software form.

H7 **Confidentiality**

H7.1 The EDTCF is the property of the manufacturer and is shown at their discretion, except that all or part of this file will be available to the 3-A Symbol Council or a regulatory agency for cause and upon request.

H8 **File Location**

H8.1 The EDTCF shall be maintained at {address}.

H9 **File Retention**

H9.1 The EDTCF (including all documentation referred to in H6.1) shall be retained and kept available for 12 years following the date of placing the product in use or from the last unit produced in the case of series manufacture.

These standards had editorial changes and are effective November 12, 2000.

Dairy, Food and Environmental Sanitation, Vol. 21, No. 1, Pages 78-85

3-A Sanitary Standards for Scraped Surface Heat Exchangers, Number 31-03

Formulated By
International Association of Food Industry Suppliers (IAFIS)
International Association for Food Protection (IAFP)
United States Public Health Service (USPHS)
The Dairy Industry Committee (DIC)
United States Department of Agriculture – Dairy Programs (USDA)

It is the purpose of the IAFIS, IAFP, USPHS, DIC, and USDA in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Scraped surface heat exchangers specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following standards but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAFIS, IAFP, USPHS, DIC, and USDA at any time. The 3-A Sanitary Standards and 3-A Accepted Practices provide hygienic criteria applicable to equipment and systems used to produce, process, and package milk, milk products, and other perishable foods or comestible products. Standard English is the official language of 3-A Sanitary Standards and 3-A Accepted Practices.

A **SCOPE**

A1 These standards cover the sanitary aspects of scraped surface heat exchangers for adding heat to, or removing heat from products. These standards do not pertain to freezers for ice cream, ices and similarly frozen dairy foods[1] nor to batch processors.

A2 In order to conform to these 3-A Sanitary Standards, scraped surface heat exchangers shall comply with the following design, material and fabrication criteria[2].

B **DEFINITIONS**

B1 *Scraped Surface Heat Exchanger:* (Referred to as SSHE throughout these 3-A Sanitary Standards) shall mean cylinder(s) with closed ends, means for heating or cooling, having a precise wiping or scraping blade(s) for removing the heated or cooled product from the cylinder wall(s), and through which the product flows continuously.

B2 *Product:* Shall mean milk and milk products or other comestibles.

B3 **Surfaces**

B3.1 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product and surfaces from which liquids may drain, drop or be drawn into the product.

B3.2 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

B4 **Cleaning**

B4.1 *Mechanical Cleaning or Mechanically Cleaned:* Shall mean soil removal by impingement, circulation, or flowing chemical detergent solutions and water rinses onto and over the surfaces to be cleaned by mechanical means in equipment or systems specifically designed for this purpose.

B4.2 *Manual (COP) Cleaning:* Shall mean soil removal when the equipment is partially or totally disassembled. Soil removal is effected with chemical solutions and water rinses with the assistance of one or a combination of brushes, nonmetallic scouring pads and

[1]Sanitary criteria for freezers will be found in the 3-A Sanitary Standards for Batch and Continuous Freezers for Ice Cream, Ices and Similarly Frozen Dairy Foods, Number 19-.

[2]Use current revisions or editions of all referenced documents cited herein.

scrapers, high or low pressure hoses and tank(s) which may be fitted with recirculating pump(s), and with all cleaning aids manipulated by hand.

B5 **Surface Modification**[3]

B5.1 *Surface Treatments:* Shall mean a process whereby chemical compositions or mechanical properties of the existing surface are altered. There is no appreciable (typically less than 1µm) build-up of new material.

B5.1.1 Surface treatments include:
1. Mechanical (shot peening[4], polishing)
2. Thermal (surface hardening laser, electron beam)
3. Diffusion (carbonizing, nitriding)
4. Chemical (etching, oxidation)
5. Ion Implantation
6. Electropolishing

B5.2 *Coatings:* Shall mean the results of a process where a different material is deposited to create a new surface. There is appreciable (typically more than 1 µm) build-up of new material. The coating material does not alter the physical properties of the substrate.

B5.2.1 Coating processes include:
1. Chemical (conversion coatings)
2. Engineering plating (e.g. electrodeposition[5], gold)
3. Spraying (pneumatic, flame, plasma, arc spray)
4. Physical Vapor Deposition
5. Chemical Vapor Deposition
6. Overlays and Encapsulation

B6 *Bond:* Shall mean the adhesive or cohesive forces holding materials together. This definition excludes press and shrink fits.

B7 *Easily or Readily Removable:* Shall mean quickly separated from the equipment with the use of simple hand tools if necessary.

B8 *Easily or Readily Accessible:* Shall mean a location which can be safely reached by personnel from the floor, platform, or other permanent work area.

B9 *Inspectable:* Shall mean all product contact surfaces can be made available for close visual observation.

B10 *Simple Hand Tools:* Shall mean implements normally used by operating and cleaning personnel such as a screwdriver, wrench, or mallet.

B11 *Nontoxic Materials:* Shall mean those substances which under the conditions of their use are in compliance with applicable requirements of the Food, Drug, and Cosmetic Act of 1938, as amended.

B12 *Corrosion Resistant:* Shall mean the surface has the property to maintain its original surface characteristics for its predicted service period when exposed to the conditions encountered in the environment of intended use, including expected contact with product and cleaning, sanitizing, or sterilization compounds or solutions.

C **MATERIALS**

C1 **Metals**

C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 (except 301 & 302) Series[6] or corresponding Alloy Cast Institute (ACI) types[7] (See Appendix, Section E), or metal that is nontoxic and nonabsorbent, and which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, except that:

[3]Additional information on surface modification is contained in *Advanced Materials and Processes*, Volume 137(1), January 1990; "Coatings and Coating Practices" by H. Herman, p. 59; "Surface Modification" by F. A. Smidt, p. 61. ASM International, Materials Park, OH 44073 (216) 338-5151.

[4]MIL-S-13165C (1), November 1991, *Military Specification: Shot Peening of Metal Parts.* Available from Standardization Document Order Desk (Department of Navy), 700 Robbins Avenue, Building 4, Section D, Philadelphia, PA 1911-5494 (215)697-7279.

[5]Federal Specification #QQ-C-320B for Chromium Plating (Electrodeposited), June 1954 with Amendment 4 on April 10, 1987. Federal Specification #QQ-N-290A for Nickel Plating (Electrodeposited), November 12, 1971. Available from the General Services Administration, Federal Supply Services Bureau, Specification Section, 470 East L'Enfant Plaza, Suite 8100, Washington, D.C. 20407 (202) 755-0325.

[6]The data for this series are contained in the *AISI Steel Products Manual, Stainless & Heat Resisting Steels*, Table 2-1, Available from the American Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086 (412) 776-1535.

[7]Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.

C1.2 Cylinder liners (tubes) made of the materials provided for in C1.1 may have their product contact surfaces modified by surface treatment or coating(s).

C1.3 Cylinder liners (tubes) may also be made of other nontoxic structurally suitable metal(s) that have their product contact surfaces modified by coating(s).

C1.4 Bearings, drive and mounting pins, seals, and scraping parts may also be made of stainless steel of the AISI 400 Series or made of nontoxic, nonabsorbent metal that is as corrosion-resistant, under the conditions of intended use, as stainless steel of the AISI 400 Series, or is made as corrosion-resistant by surface treatment or coatings.

C2 **Nonmetals**

C2.1 Rubber and rubber-like materials may be used for O-rings, gaskets, seals, and parts having the same functional purposes.

C2.1.1 Rubber and rubber-like materials when used for the above-specified applications shall comply with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces for Dairy Equipment, Number 18-.

C2.2 Plastic materials may be used for bearings, scraping parts, O-rings, gaskets, seals, coatings, and parts having the same functional purposes.

C2.2.1 Plastic materials when used for the above-specified applications shall comply with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces in Dairy Equipment, Number 20-.

C2.3 Where materials having certain inherent functional properties are required for specific applications, such as seal parts, carbon, ceramic, or tungsten carbide may be used. These materials shall be inert, nonporous, nontoxic, nonabsorbent, insoluble, and resistant to scratching, scoring, and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

C3 **Sterilizability**

C3.1 In a processing system to be sterilized by heat and operated at a temperature of 250°F (121°C) or higher, all materials having product contact surface(s) used in the construction of SSHE and nonmetallic component parts shall be such that they can be (1) sterilized by saturated steam or water under pressure (at least 15.3 psig or 106 kPa) at a temperature of at least 250°F (121°C) and (2) operated at the temperature required for processing.

C4 **Nonproduct Contact Surfaces**

C4.1 All nonproduct contact surfaces shall be of corrosion-resistant materials or material that is rendered corrosion resistant. If coated, the coating used shall adhere. All nonproduct contact surfaces shall be relatively nonabsorbent, durable and cleanable. Parts removable for cleaning having both product and nonproduct contact surfaces shall not be painted.

D **FABRICATION**

D1 **Surface Texture**

D1.1 All product contact surfaces shall have a finish at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds, and crevices in the final fabricated form. (See Appendix, Section F.)

D2 **Permanent Joints**

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded[8], except that:

[8]Criteria for hygienic welds may be found in AWS/ANSI D18.1 – *Specification for Welding of Austenitic Stainless Steel Tube and Pipe Systems in Sanitary (Hygienic) Applications*. Available from the American Welding Society, 550 N.W. LeJeune Rd., Miami, FL 33126, phone: (305) 443-9353, fax: (305) 443-7559, e-mail: info@amweld.org; and EHEDG Doc. 9 – Welding Stainless Steel to Meet Hygienic Requirements. Available from the European Hygienic Equipment Design Group, Ellen Moens, Avenue Grand Champ 148, 1150 Brussels, Belgium, phone: +32 2 761 7408, fax: +32 2 763 0013, e-mail: moens@nsf.org.

D2.1.1 In such cases where welding is impractical, press-fitting or shrink-fitting may be employed where necessary for essential functional reasons such as mechanical seals, bushings or internal bearings (see Appendix, Section G).

D2.1.2 Welding, press-fitting, or shrink-fitting shall produce product contact surfaces which are at least as smooth as a No. 4 ground finish on stainless steel sheets and which are free of imperfections such as pits, folds, and crevices. See Appendix, Section G for press-fitting and shrink-fitting restrictions and limitations.

D3 **Bonded Materials**

D3.1 Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be bonded in a manner that the bond is continuous and mechanically sound, so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization, the rubber and rubber-like material or the plastic material does not separate from the base material to which it is bonded.

D4 **Coatings**

D4.1 Coatings, if used, shall be free from surface delamination, pitting, flaking, spalling, blistering, and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

D4.2 The minimum thickness of electrodeposited coatings shall not be less than 0.0002 in. (0.005 mm) for all product contact surfaces when used on stainless steel. When these surfaces are other than stainless steel, the minimum thickness of electrodeposited coatings shall not be less than 0.002 in. (0.05 mm).

D4.3 Ceramic materials used as coatings shall be at least 0.003 in. (0.08 mm) thick.

D4.4 Plastic materials, when used as a coating, shall be at least 0.005 in. (0.125 mm) thick.

D5 **Cleaning and Inspectability**

D5.1 A SSHE that is to be mechanically cleaned shall be designed so that all product contact surfaces of the SSHE and all nonremoved appurtenances thereto can be mechanically cleaned and are easily accessible, readily removable, and inspectable.

D5.2 Product contact surfaces not designed to be mechanically cleaned shall be easily accessible for cleaning and inspection either when in an assembled position or when removed. Demountable parts shall be readily removable.

D6 **Gaskets**

D6.1 Gaskets having a product contact surface shall be removable.

D6.2 Grooves in gaskets shall be no deeper than their width, unless the gasket is readily removable and reversible for cleaning.

D6.3 Gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6.35 mm) in depth or be less than 1/4 in. (6.35 mm) wide except those for standard O-rings smaller than 1/4 in. (6.35 mm) and those provided for in Section D9.1 and D10.1.

D7 **Radii**

D7.1 All internal angles of less than 135° on product contact surfaces shall have radii of not less than 1/4 in. (6.35 mm), except that:

D7.1.1 Smaller radii may be used when they are required for essential functional reasons, such as those in scraper blade mounting pins and parts used in similar applications. In no case shall such radii be less than 1/32 in. (0.794 mm).

D7.1.2 The radii in grooves in gaskets or gasket retaining grooves shall be not less than 1/8 in. (3.18 mm); except for those for standard 1/4 in. (6.35 mm) and smaller O-rings and those provided for in Section D9.1.

D7.1.3 Radii in standard O-ring grooves shall be as specified in Appendix, Section H.

D7.1.4 Radii in nonstandard O-ring grooves shall be those radii closest to a standard O-ring as specified in Appendix, Section H.

D7.1.5 When the thickness of one or both parts joined is less than 3/16 in. (4.76 mm), the minimum radii for fillets of welds on product contact surfaces shall be not less than 1/8 in. (3.18 mm).

D8 **Tubing**

D8.1 All sanitary tubing shall conform to the applicable provisions of the 3-A Sanitary Standards for Polished Metal Tubing, Number 33-.

D9 **Fittings**

D9.1 All sanitary fittings and connections shall conform to the applicable provisions of the 3-A Sanitary Standards for Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products, Number 63-.

D9.2 All product connections to the SSHE shall be in a processing area.

D10 **Instrument Connections**

D10.1 All instrument connections having product contact surfaces shall conform to the 3-A Sanitary Standards for Sensors and Sensor Fittings and Connections Used on Fluid Milk and Milk Products Equipment, Number 74-.

D11 **Threads**

D11.1 There shall be no threads on product contact surfaces.

D12 **Springs**

D12.1 All coil springs having product contact surfaces shall have at least 3/32 in. (2.38 mm) openings between coils including the ends when the spring is in a free position.

D13 **Sterilization Systems**

D13.1 A SSHE used in a processing system to be sterilized by heat and operated at a temperature of 250°F (121°C) or higher shall comply with the following additional criteria:

D13.2 The construction shall be such that all product contact surfaces can be (1) sterilized by saturated steam or water under pressure (at least 15.3 psig or 106 kPa) at a temperature of at least 250°F (121°C) and (2) operated at the temperature required for processing.

D13.3 SSHE that have a product contact surface(s) to be used in such a processing system, not designed so that the system is automatically shut down if the product pressure in the system becomes less than that of the atmosphere and cannot be restarted until the system is re-sterilized, shall have a steam or other sterilizing medium chamber surrounding the shaft(s) adjacent to the seal required by D13.5. The SSHE shall be constructed so that the steam chamber or other sterilizing medium chamber may be exposed for inspection.

D13.4 Where steam or other sterilizing medium is used, the connection(s) on the SSHE shall be such that the steam lines or other sterilizing medium lines can be securely fastened to the SSHE.

D13.5 The seal(s) in a SSHE designed to be used in a processing system to be sterilized by heat and operated at a temperature of 250°F (121°C) or higher shall be between the product contact surface and the steam or other sterilizing chamber.

D14 **Shafts and Bearings**

D14.1 Shafts of SSHEs shall have a seal that is of a packless type, and is sanitary in design and shall be readily accessible and inspectable.

D14.2 Where a shaft passes through a product contact surface, the portion of the opening surrounding the shaft shall be protected to prevent the entrance of contaminants.

D14.3 Bearings having a product contact surface shall be of a nonlubricated type.

D14.4 Lubricated bearings, including the permanently sealed type, shall be located outside the product contact surface with at least 1 in. (25.4 mm) clearance open for inspection between the bearing and any product contact surface.

D15 **SSHE SUPPORTS**

D15.1 The means of supporting a SSHE shall be one of the following:

D15.1.1 If legs are used they shall be smooth with rounded ends or with a flat, load-bearing foot suitable for sealing to the floor, and have no exposed threads. Legs made of hollow stock shall be sealed. Legs shall provide a minimum clearance between the lowest part of the base and the floor of not less than 6 in. (152.4 mm).

D15.1.2 If mounted on a wall or column, the point of attachment of a SSHE to its mounting shall be designed for sealing. The mounting, if supplied by the SSHE manufacturer, shall be designed for sealing to the wall or column. The design of a SSHE to be mounted on a wall or column shall be such that there will be at

least a 4 in. (101.6 mm) clearance between the outside of the cylinder and the wall or column.

D15.1.3 A SSHE designed to be installed with the drive mechanism outside a processing area shall be provided with a plate or other suitable member to close the opening in the processing room wall or ceiling and shall be such that it can be sealed to the wall or ceiling.

D15.1.4 The SSHE shall be designed so that there is at least a 4 in. (101.6 mm) space between the driving mechanism and the cylinder(s) when parts normally removed during cleaning have been removed.

D16 **Guards**

D16.1 Any guard(s) required by a safety standard that will not permit accessibility for cleaning and inspection shall be designed so that it can be removed with the use of simple hand tools.

D17 **Nonproduct Contact Surfaces**

D17.1 Nonproduct contact surfaces shall have a smooth finish, free of pockets and crevices, and be cleanable and those surfaces to be coated shall be effectively prepared for coating. Exposed threads shall be minimized. Exposed braided coverings of cable or hose shall not be used. No continuous or piano-type hinges shall be used on the equipment or its control cabinets. Electrical and utility connections shall be as remote as practical from the product areas. Riveted nameplates or appendages shall not be used. Socket head cap screws shall not be used. Knurled surfaces shall not be used. Nameplates shall be welded or effectively sealed to the equipment. External lap joints for sheathing over insulated areas shall be overlapped downward. Overlapped joints shall be sealed between the mating surfaces with a suitable sealant. Supporting structures, braces, catwalks, stairs, handrails and guards are not considered as nonproduct contact surfaces of the equipment and are considered as part of the building structure. Panels or doors shall be provided to allow easy access to the interior of the equipment. They shall be constructed in a manner that will prevent air entrance. Use of hinges, wing nuts, latches, and similar easy-opening fastening devices are recommended to allow easy access without special tools.

D18 **Information Plates**

D18.1 A SSHE shall have an information plate in juxtaposition to the nameplate giving the following information or the information shall appear on the nameplate:

(1) Maximum temperature and pressure at which the SSHE can be operated.

(2) A statement that, to prevent corrosion, the recommendations of the SSHE manufacturer should be followed with respect to time, temperature, and the concentration of specific cleaning solutions and chemical bactericides.

D18.2 The information plate shall also provide the following information: "This SSHE [Insert one of the following] designed for steam sterilization."

(a) is

(b) is not

D18.3 All identification or information plates affixed to a SSHE shall be attached to the exterior of the SSHE in such a way as to be effectively sealed.

APPENDIX

E **STAINLESS STEEL MATERIALS**

Stainless steel conforming to the applicable chemical composition ranges established by AISI for wrought products, or by ACI for cast products, should be considered in compliance with the requirements of Section C1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08%.

F **PRODUCT CONTACT SURFACE FINISH**

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1 herein. A maximum R_a of 32 µin. (0.80 µm), when measured according to the recommendations in American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)[9] B46.1 - Surface Texture, is considered to be equivalent to a No. 4 finish.

G **PRESS-FITS AND SHRINK-FITS**

Press-fits or shrink-fits may be used to produce crevice-free permanent joints in metallic product contact surfaces when neither welding nor soldering is practical. Joints of these types may only be used to assemble parts having circular cross sections, free of shoulders or relieved areas. For example: they may be used to assemble round pins or round bushings into round holes. In both types of fits, the outside

diameter of the part being inserted is greater than the inside diameter of the hole. In the case of the press-fit, the parts are forced together by applying pressure. The pressure required is dependent upon the diameter of the parts, the amount of interference, and the distance the inner member is forced in.

In shrink-fits, the diameter of the inner member is reduced by chilling it to a low temperature. Dry ice is commonly used to shrink the inner member. Heat may also be applied to the outer member of the press-fit. Less assembly force is required for this type of fit.

The design of these fits depends on a variety of factors. The designer should follow recommended practices to assure that a crevice-free joint is produced. A recognized authoritative reference is *Machinery's Handbook*, published by Industrial Press Inc., 200 Madison Avenue, New York, NY 10157.

H O-RING GROOVE RADII

TABLE 1

Groove Radii Dimensions for Standard O-Rings			
O-Ring Cross Section, Nominal (AS 568[10])	O-Ring Cross Section, Actual (AS 568)	O-Ring Cross Section, Actual (ISO 3601-1[11])	Minimum Groove Radius
1/16 in.	0.070 in.	1.80 mm	0.016 in. (0.406 mm)
3/32 in.	0.103 in.	2.65 mm	0.031 in. (0.787 mm)
1/8 in.	0.139 in.	3.55 mm	0.031 in. (0.787 mm)
3/16 in.	0.210 in.	5.30 mm	0.062 in. (1.575 mm)
1/4 in.	0.275 in.	7.00 mm	0.094 in. (2.388 mm)

I ENGINEERING DESIGN AND TECHNICAL CONSTRUCTION FILE

The following is an example of an engineering design and technical construction file (EDTCF) to be maintained by the fabricator as evidence of complying with 3-A Sanitary Standards or 3-A Accepted Practices. (The file may contain more or less information as applicable to the equipment or system.)

I1 Purpose

I1.1 To establish and document the material, fabrication, and installation (where appropriate) requirements for the engineering design and technical construction files for all products, assemblies, and sub-assemblies supplied by the manufacturer thereof to be in compliance with the sanitary criteria found in 3-A Sanitary Standards or 3-A Accepted Practices. It is recommended that the engineering and construction file or files be submitted with applications for 3-A Symbol use authorization.

I2 Scope

I2.1 This EDTCF applies to equipment specified by:

I2.1.1 3-A Sanitary Standards for Scraped Surface Heat Exchangers, Number 31-.

I2.1.2 List all applicable 3-A Sanitary Standards and 3-A Accepted Practices.

I3 Responsibilities

I3.1 This EDTCF is maintained by: The Engineering Manager (or other company official) {name and title of responsible official} is responsible for maintaining, publishing, and distributing this EDTCF.

I3.2 Implementation: All divisions, specifically development engineering, standards engineering, sales engineering, and product departments are responsible for implementing this EDTCF.

I4 Applicability

I4.1 The 3-A Sanitary Standards and 3-A Accepted Practices are voluntarily applied as suitable sanitary criteria for dairy and food processing equipment. 3-A Sanitary Standards are referenced in the Grade A Pasteurized Milk Ordinance: "Equipment manufactured in conformity with 3-A Sanitary Standards complies with the sanitary design and construction standards of this Ordinance."

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[9]Available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392 (212) 705-7722.

[10]The document establishing these standard dimensions is Aerospace Standard (AS) 568, published by SAE, 400 Commonwealth Drive, Warrendale, PA 15086 (412-776-4970).

[11]The document establishing these standard dimensions is ISO 3601-1: 1988 (E), published by the International Organization for Standardization (ISO), 1 Rue de Varembe, Case Postale 58, CH 1 1211, Geneva, Switzerland (41-22-734-1240).

I5 **References**

I5.1 List any additional regulations that apply to the equipment or system covered by this EDTCF.

I5.2 Date of conformity or 3-A Symbol Authorization and certificate number, if authorized.

I6 **Design and Technical Construction File**

I6.1 The Engineering Design and Technical Construction File may consist of the following:

a. an overall drawing of the subject equipment;
b. full detailed drawings, accompanied by any calculations, notes, test results, etc. required to check the conformity of the equipment with the 3-A Standards or 3-A Practices;
c. a list of:
(1) the essential requirements of the standards or practices;
(2) other technical specifications, which were used when the equipment was designed;
d. a description of methods adopted;
e. if essential, any technical report or certificate obtained from a competent testing body or laboratory;
f. any technical report giving the results of tests carried out internally by Engineering or others;
g. documentation and test reports on any research or tests on components, assemblies and/or the complete product to determine and demonstrate that by its design and construction the product is capable of being installed, put into service, and operated in a sanitary manner (optional);
h. a determination of the foreseeable lifetime of the product (optional);
i. a copy of the instructions for the product (Instruction Manuals/Instruction Books);
j. for serial manufacturing, the internal measures that will be implemented to insure that the equipment will continue to be manufactured in conformity with the provisions of the 3-A Sanitary Standards or 3-A Accepted Practices;
k. engineering reports;
l. laboratory reports;
m. bills of material;
n. wiring diagrams, if applicable;
o. sales order engineering files;
p. hazard evaluation committee reports, if executed;
q change records;
r. customer specifications;
s. any notified body technical reports and certification tests;
t. copy of the 3-A Symbol authorization, if applicable.

I6.2 The file does not have to include detailed plans or any other specific information regarding the sub-assemblies, tooling, or fixtures used for the manufacture of the product unless a knowledge of them is essential for verification of conformity with the basic sanitary requirements found in 3-A documents.

I6.3 The documentation referred to in I 6.1 above need not permanently exist in a material manner in the EDTCF, but it must be possible to assemble them and make them available within a period of time commensurate with its importance (one week is considered reasonable time). As a minimum, each product EDTCF must physically contain an index of the applicable document of I6.1 above.

I6.4 The EDTCF may be in hard copy or software form.

I7 **Confidentiality**

I7.1 The EDTCF is the property of the manufacturer and is shown at their discretion, except that all or part of this file will be available to the 3-A Symbol Council or a regulatory agency for cause and upon request.

I8 **File Location**

I8.1 The EDTCF shall be maintained at {location}.

I9 **File Retention**

I9.1 The EDTCF (including all documentation referred to in I6.1) shall be retained and kept available for 12 years following the date of placing the product in use or from the last unit produced in the case of series manufacture.

These standards had editorial changes and are effective November 12, 2000.

Coming Events

FEBRUARY

·**6-8, Food Safety Microbiology,** Rutgers University, New Brunswick, NJ. This course offers information on the microbiology of food, organisms that commonly cause foodborne illness, and how to minimize the risks of having these pathogens in your product. For additional information, contact Rutgers University, phone: 732.932.9271; fax: 732.932.1187; E-mail: ocpe@aesop.rutgers.edu.

·**11-14, National Mastitis Council 40th Annual Meeting,** Reno, Nevada. For additional information, contact NMC, phone: 608.224.0622; fax: 608.224.0644; E-mail: nmc@nmconline.org.

·**13, Georgia Association of Food and Environmental Sanitarians Meeting,** held at Salvation Army Temple, Atlanta, GA. For more information, contact Sid Camp at 770.938.3823.

·**13-14, Introduction to Microbiological Criteria and Sampling Plans,** Las Vegas, NV. This course is designed to help food industry professionals develop cost-effective and statistically valid microbiological sampling plans. For additional information, contact Silliker Laboratories Group, Inc., at 800.829.7879 or fax 708.957.8405.

·**13-16, 26th Annual Better Process Control School,** on the UC-Davis campus, Davis, CA. The school is designed for low-acid food cannery employees, retort operators and seam closure operators. Personnel from agencies regulating the food processing industry, as well as canning industry management personnel who need certification or a technical update are encouraged to attend. For more information, call 800.752.0881.

·**20-22, Kentucky Association of Dairy, Food and Environmental Specialists,** Executive West, Louisville, KY. For additional information, contact Tim Wright at 606.873.4541, or Kenny Ratliff at 502.255.7701.

·**21-22, California Association of Dairy and Milk Sanitarians Industry Conference,** Sheraton FairPlex, Pomona, CA. For further information, contact John Bruhn at 530.752.2192.

·**26-27, Principles of Warehouse Sanitation,** Manhattan, KS. Helping sanitarians and managers meet customer expections and comply with federal laws and regulations. For additional information, contact AIB, phone: 785.537.4750; fax: 785.537.1493.

·**26-28, Food Irradiation 2001 Conference,** Washington, D.C. This conference on food safety will be directed at food safety managers and executives, import/export firms, growers, ranchers, and food processors wishing to integrate this technology into an overall food safety program for meats, poultry, produce, spices, eggs and/or processed foods. For further information, contact Janine Scheld, Intertech, phone: 207.781.9617; fax: 207.781.2150; E-mail: jscheld@ intertechusa.com.

MARCH

·**13-14, Juice Processing, Quality and Safety Workshop,** University of California-Davis campus, Davis, CA. For more information, call 800.752.0881.

·**14-16, Idaho Environmental Health Association Annual Spring Conference,** Owyhee Plaza Hotel, Boise, ID. For further information, contact Angela Markham at 208.233.9080 ext. 231.

·**14-16, Michigan Environmental Health Association's 57th Annual Educational Conference,** Holiday Inn West, Lansing, MI. For further information, contact Keith Krinn at 248.424.7099.

·**16, Controlling *Listeria* in Your Plant,** Oak Brook, IL. Designed to assist quality assurance, sanitation, and operations personnel in understanding how *Listeria* grows in food plants. For additional information, contact Silliker Laboratories Group, Inc., at 800.829.7879 or fax 708.957.8405.

·**17-19, United Fresh Fruit and Vegetable Association International Convention,** Tampa, FL. For additional information, phone 703.836.3410.

·**21, 3-A Third Party Accreditation Meeting,** Disney's Yacht & Beach Club Resort, Orlando, FL. Contact Philomena Short at 703.761.2600.

·**22, Ontario Food Protection Association Spring Meeting,** Delta Meadowvale, Mississauga, Ontario, Canada. For further information, contact Glenna Haller at 519.823.8015.

·**22-25, International Association of Food Industry Suppliers Annual Conference,** Disney's Yacht & Beach Club Resort, Orlando, FL. Contact Dorothy Brady at 703.761.2600.

APRIL

·**4-6, Missouri Milk, Food and Environmental Health Association Annual Educational Conference,** Ramada Inn, Columbia, MO. For additional information, contact Steve St. Clair at 573.221.1166.

·**5-7, International Fresh-cut Produce Association 14th Annual Conference,** Hyatt Regency Phoenix, Phoenix, AZ. For more information, call Stephanie Grunenfelder at 703.299.6282 or fax: 703.299.6288.

·**16, 3-A Sanitary Standards Committee Annual Meeting,** Sheraton Four Points Hotel, Milwaukee Airport. For more information, contact Tom Gilmore at 703.761.2600; E-mail: tgilmore@iafis.org or Philomena Short at 703.761.2600; E-mail: pshort@iafis.org.

·**17, Upper Midwest Dairy Industry Association Meeting,** Best Western Hotel, North Mankato, MN. For further information, contact Paul Nierman at 612.785.0484.

·**17-18, Food Safety Summit and Expo,** Marriott Wardman Park, Washington, D.C. For additional information, call 800.746.9646; Web site: www.foodsafetysummit.com.

·18, Upper Midwest Dairy Industry Association Meeting Holiday Inn Alexandria, Alexandria, MN. For further information, contact Paul Nierman at 612.785.0484.

·19, Indiana Environmental Health Association, Inc. Spring Conference, Valle Vista, Greenwood, IN. Contact Helene Uhlman at 219.853.6358 for further information.

·24-30, 16th International Trade Fair for Packaging Machinery, Packaging and Confectionery Machinery, Düsseldorf, Germany. For more information, contact Messe Düsseldorf North America, phone: 312.781.5180; Fax: 312.781.5188.

·26, Guelph Food Technology Centre Trade Show — Innovation & Change in the Food Industry. For further information, contact Cliona Reeves at phone: 519.821.1246; fax: 519.836.1281; E-mail: gftc@uoguelph.ca.

MAY

·14-16, Practical HACCP for Food Processors, Oak Brook, IL. Designed for food processors of all types. For additional information, contact Silliker Laboratories Group, Inc., at 800.829.7879 or fax 708. 957.8405.

·15-16, Pennsylvania Association of Milk, Food and Environmental Sanitarians Annual Conference, Nittany Lion Inn, University Park, PA. For further information contact, Gene Frey at 717. 397.0719.

·15-17, Penn State Food Microbiology Short Course, Detection and Control of Foodborne Pathogens, University Park, PA. For more information, contact Dr. Hassan Gourama at 610.396. 6121; E-mail: hxg7@psu.edu or Dr. Catherine Cutter at 814.865. 8862; E-mail: cnc3@psu.edu.

JUNE

·4-6, Texas Association of Milk, Food and Environmental Sanitarians Annual Meeting, Holiday Inn South, Austin, TX. For further information, contact Ron Richter at 979.845.4409.

·10-14, Values in Decisions on Risk Symposium, held in Stockholm. The symposium will address the role of experts, media and regulators in complex decisions. For further information, contact Kjell Andersson, phone: 46.8. 510.14755; fax: 46.8.510.14756; E-mail: kjell.andersson@karintakonsult.se.

·13-15, Expo Dairy Show, Lacteo's 2001, Expo Guadalajara, Guadalajara, Mexico. For further information, phone 564.70.40/ 564.70.68; fax: 52.5.564.03.29; E-mail: gefemani@iwm.com.mx.

·13-15, NIZO Dairy Conference on Food Microbes 2001, Ede, The Netherlands. For more information, contact Jane Macmillan at phone 44.1865.245685.

·14-17, Seafood China Expo 2001, Dalian Xinghai Convention and Exhibition Centre, Dalian, China. For additional information, contact Ms. Ling Chan at 852. 2865.2633; Fax: 852.2866.1770; 2865.5513; or E-mail: enquiry@bitf.com.hk.

JULY

·6-13, International Workshop and Mini-Symposium on Rapid Methods and Automation in Microbiology XXI, Kansas State University, Manhattan, KS. For further information, contact Daniel Y. C. Fung at 785.532.5654; Fax: 785. 532.5681; E-mail: dfung@oznet.ksu.net.

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ERRATUM

In the article "Improved Detection of Nontyphoid and Typhoid Salmonellae with Balanced Agar Formulations," *Journal of Food Protection* 63(10):1443±1446, the last sentence in the section "Comparison with typhoid salmonellae" on p. 1444 appeared incorrectly. It should read: All streak plates were incubated at 35 C and evaluated for the development of black colonies for 24 and 40 2 h.

* Asterisk indicates author for correspondence.

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