

ISSN: 1043-3546

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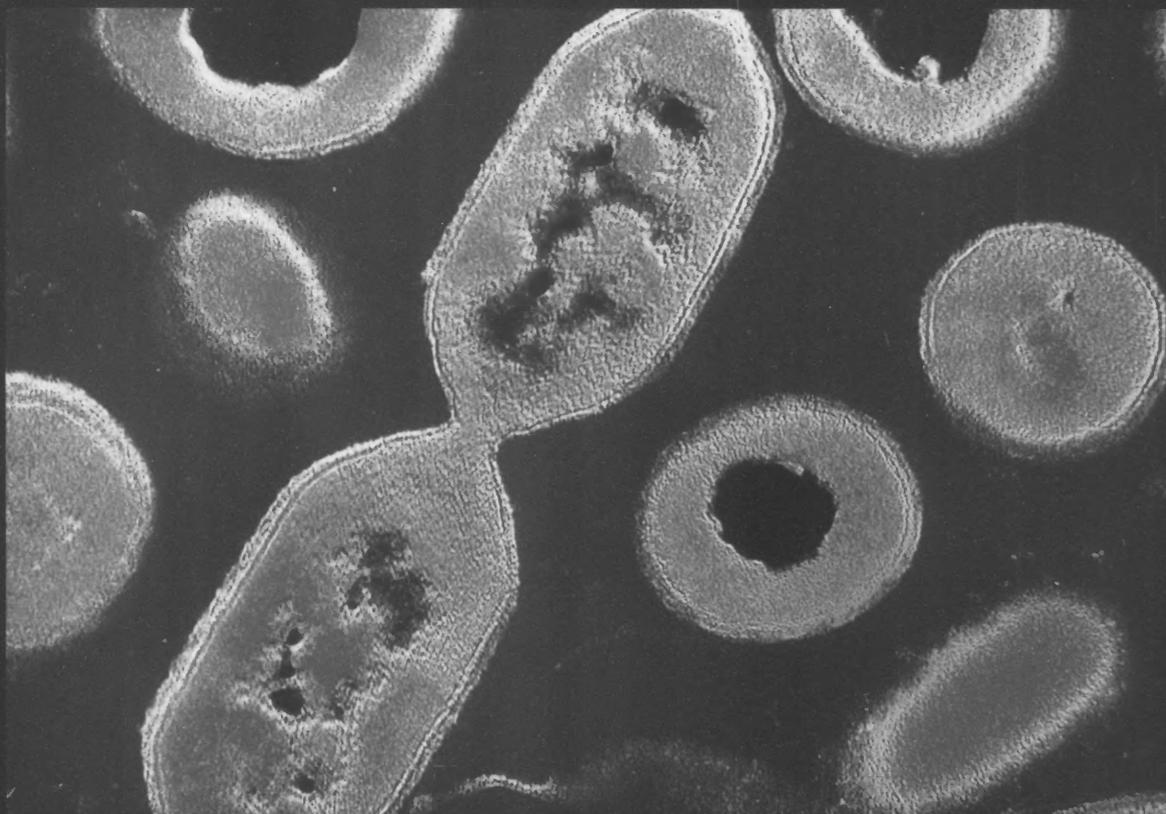
Vol • 13 • No. 6 • Pages 317-376

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DAIRY, FOOD AND ENVIRONMENTAL

SANITATION

JUNE 1993



FOODBORNE MICROBIAL PATHOGENS SYMPOSIUM

at the

80th IAMFES Annual Meeting

August 1-4, 1993
Stouffer Waverly Hotel
Atlanta, Georgia

Sponsored by the

International Life Sciences Institute (ILSI)

ILSI North America Committee on Food Microbiology

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Session One—8/2/93

***Listeria monocytogenes:* Current Issues and Concerns**

- * *Listeria monocytogenes*: State of the Science
- * U.S. Industry Perspectives on *Listeria monocytogenes* in Foods
- * *Listeria monocytogenes*: Current Issues and Concerns from the Perspective of U.S. Regulatory Agencies
- * *Listeria monocytogenes*: Current Issues and Concerns from the Perspective of the International Scientific Community
- * Epidemiology of Listeriosis in the United States

Session Two—8/2/93

Campylobacter Update

- * *Campylobacter jejuni*: State of the Science
- * *Campylobacter jejuni*: Perspectives from the International Scientific Community
- * *Campylobacter jejuni*: The U.S. Government Perspective

Session Three—8/2/93

International Perspectives on *Escherichia coli* O157:H7

- * *E. coli* O157:H7 Time Capsule: What Did We Know and When Did We Know It?
- * *Escherichia coli* O157:H7: Perspectives from the International Scientific Community
- * *E. coli* O157:H7 Outbreak in Western United States
- * *Escherichia coli* O157:H7: The U.S. Government Perspective

Session Four—8/3/93

Microbial Concerns of the International Community

- * Microbiological Safety of Foods in Europe of the Nineties: What Does That Imply?
- * Microbial Concerns of the North and South American Countries and Scientific Implications for Harmonizing Free Trade
- * Food Microbiological Criteria of the South American Countries
- * Microbial Concerns of the Pacific Rim Countries and Scientific Implications for Harmonizing Free Trade
- * Safety and Quality Management Through HACCP and ISO 9000

Session Five—8/4/93

ILSI-Sponsored Research Update

- * *Escherichia coli* O157:H7 Diarrhea in the United States: A Multicenter Surveillance Project
- * Establishment of a Bovine Surveillance Program for *E. coli* O157:H7 in Washington State
- * Insertion Sequence Fingerprinting: A New Subtyping System for *E. coli* O157:H7 Strains
- * Use of in vitro Primer-directed Enzymatic Amplification of DNA for Rapid Detection of *Listeria monocytogenes*: Studies with Food Samples
- * Development of DNA Probes Specific for Virulent *Listeria* by Amplification of Virulence-related Genes of *Listeria monocytogenes*
- * Microbial Ecology of *Listeria monocytogenes* Biofilms Associated with the Food Processing Plant Environment

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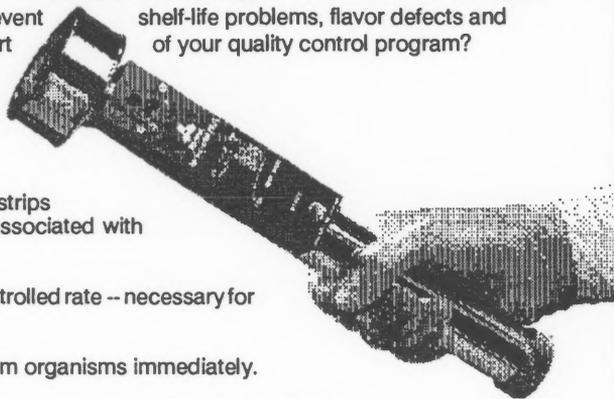


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Thoughts From the President . . .



By
Michael P. Doyle
IAMFES President

Dairy, Food and Environmental Sanitation — Who Wants It?

I hope the title has caught your attention because it is an important and serious question. DFES serves as the forum for disseminating association news and is intended to provide timely information to food safety professionals. However, with every benefit there is a cost. This year publishing DFES cost IAMFES \$55,000 more than was received for this purpose. Is it worth the cost?

In the near future you will receive a survey designed to assess the readership's interest in the magazine, and to identify what might be done to improve its content. It is important that you provide your thoughts. Your comments will be used in determining if the magazine will continue to be published, and to help tailor its content to address your needs.

Although IAMFES lost money publishing DFES this year, there will be no dues increase next year. Efforts will be made to increase advertising and membership to cover these costs. It is incumbent on each of us to actively recruit and sign up new members if we are to avoid or minimize a dues increase. I encourage all IAMFES members to help your association, yourself, and your colleagues who have an interest in food safety by introducing them to benefits of IAMFES. It's a win-win situation.

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Dairy, Food and Environmental Sanitation (ISSN-1043-3546) is published monthly beginning with the January number by the International Association of Milk, Food and Environmental Sanitarians, Inc. executive offices at 200W Merle Hay Centre, 6200 Aurora Avenue, Des Moines, IA 50322-2838 USA. Each volume comprises 12 numbers. Printed by Heuss Printing, Inc. 911 N. Second Street, Ames, IA 50010 USA. Second Class Postage paid at Des Moines, IA 50318 and additional entry offices.

Postmaster: Send address changes to Dairy, Food and Environmental Sanitation, 200W Merle Hay Centre, 6200 Aurora Avenue, Des Moines, IA 50322-2838 USA. **Manuscripts:** Correspondence regarding manuscripts and other reading materials should be addressed to Margaret Marble, 200W Merle Hay Centre, 6200 Aurora Ave., Des Moines, IA 50322. 515-276-3344. "Instructions to Contributors" can be obtained from the editor.

Orders for Reprints: All orders should be sent to DAIRY, FOOD AND ENVIRONMENTAL SANITATION, IAMFES, Inc., 200W Merle Hay Centre, 6200 Aurora Ave., Des

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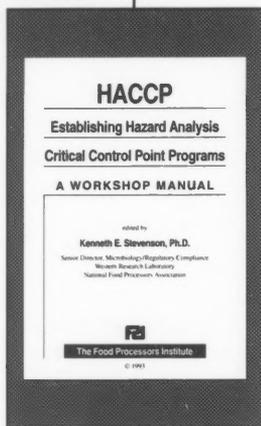
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Use of the Hazard Analysis Critical Control Point Approach by State, Provincial and Local Food Protection Agencies: Results of a Survey and Discussion

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A questionnaire on use of the hazard analysis critical control point (HACCP) approach was distributed in 1992 to local and state/provincial food protection authorities through the participation of IAMFES affiliates acting under the auspices of the IAMFES. The questionnaire was designed by the Committee on Communicable Diseases Affecting Man as a follow up to the publication of the manual, "Procedures to Implement the Hazard Analysis Critical Control Point System" (15). The following initial information was requested or questions were asked on the use of HACCP programs by these agencies:

Agency identification. Type of food industries regulated. Does your agency have a HACCP program? If so, what year did it begin? If not, do you plan to start one? When?

Further questions were asked of agencies that stated that they currently have a HACCP program; these were:

Are there special provisions in your law or regulations that require use of HACCP systems in all establishments or a special group of establishments under your jurisdiction?

Do you have an administrative policy procedure that relates to your HACCP program?

Have you developed special forms related to HACCP?

Do you use either "critical item" inspection approach or some sort of HACCP approach in place of routine inspections? Which? Please explain.

Do you have a HACCP program apart from inspections (e.g., as a special procedure)?

Do you follow any published HACCP guidelines (e.g., FDA, FMI, IAMFES, ICMSF, NRC, Shellfish)?

Do you provide HACCP training for your staff? Number of days/weeks. If not, do you plan to do so in the future?

How have your administrative staff and superiors reacted to your HACCP program?

How have field staff/sanitariums reacted to your HACCP program?

How have food industries under your jurisdiction reacted to your HACCP program?

What problems have you encountered with your HACCP program? How have they been overcome?

How did you inform food industries that you regulate your program and/or involve them in its development?

Do the food industries that you regulate have their own HACCP programs? State the approximate proportion.

How would you characterize the success of your HACCP program to date?

What are your future plans regarding your HACCP program? What lessons have you learned that others could benefit from? Other comments.

Whenever applicable, the respondents were requested to enclose example guidelines, forms, programs, training agenda, brochures, etc. for review by the Committee. Answers to the questions and the supplemental materials were reviewed and summarized.

RESULTS

Data obtained from the survey are tabulated in Table 1. Replies came from 29 local departments in Canada, but all from the same Province. Replies also came from 27 local health departments and 13 state health, agricultural and/or other food-regulatory agencies in the United States.

Table 1. Results of 1992 survey on utilization of the hazard analysis critical control point concept in regulatory agencies that was conducted through IAMFES affiliates in Canada and the United States

Question and response	Canada Local	USA State	USA Local	Total Local
Type places regulated (yes/no or no response/total)				
Foodservice	24/ 5/29	10/ 3/13	27/ 0/27	51/ 5/56
Food stores	23/ 6/29	6/ 7/13	13/14/27	36/20/56
Processing plants	21/ 8/29	7/ 6/13	5/22/27	26/30/56
Warehouses	21/ 8/29	6/ 7/13	5/22/27	26/30/56
Dairy	18/11/29	3/10/13	3/24/27	21/36/56
"HACCP" programs				
yes	11	4	6	17
no	18	9	21	39
Year began				
1985-1989	5	4	2	7
1990-present	6		3	9
Planned, but not implemented	18	1	4	22
"HACCP" regulation				
yes	0	1	1	1
pending provincial law	29	0	0	29
no response	0	12	26	26
"HACCP" administrative policy				
yes	6	3	1	9
no	14	8	9	22
no response	9	2	17	26
HACCP forms available and used				
yes	12	8	2	14
no	8	5	25	33
no response	9	0	0	9
Critical item inspection				
yes	9	3	6	15
no	11	7	2	13
no response	9	3	19	28
"HACCP" program apart from inspections				
yes	8	4	5	13
no	9	2	5	14
no response	12	7	17	29
HACCP guidelines used				
IAMFES	4	2	4	8
State/provincial	5	1		5
FDA		4	2	2
Shellfish	1	1	1	2
Hospitality Institute	1		1	1
Published articles	1	2		1
Local	1			1
Multiple, but not specified			2	2
HACCP training				
yes	11	8	7	18
no/not specified	12	5	20	32
planned	6	0	4	10
Duration of training				
0-1 days		1	2	2
2-3 days	4	4	1	5
4 days - 1 week		1	1	1
<1 week			1	1
Unknown/unspecified	7	7	22	29
Administrative staff attitudes				
Supportive/favorable	13	4	5	18
Not concerned		1	2	2
Competitive with routine activities/resources		1	2	2
No resources	16	7	18	34

Field staff attitudes				
Positive/enthusiastic	7	4	6	13
Resist change/uncertain	6	2	2	8
Positive when trained	2		2	4
Too time-consuming/questioned practicality/too technical	2	2	1	3
Require/need training	1	1	1	2
Comprehensive	1			1
Easy to apply	1		1	1
Been doing it all the time			1	1
Limited experience in use		1		1
No response	15	5	17	32
Food industry attitudes				
Accepted/favorable	12	7	6	18
Resentment/reluctance	3	1		3
Lack of awareness	1		2	3
Time consuming			1	1
Ahead of us/or doing it without us			1	1
Not believe HACCP approach should be a regulation		1		
No response	13	5	19	32
Problems encountered when implementing "HACCP"				
Time to accomplish	5	5	3	8
Staff lack training	4		1	5
Motivating staff	3		1	4
Paper work/completion of forms	3			3
Fear of industry cooperation/resistance	1	2	2	3
Leadership delays or lack of leadership	1		1	2
Lack of resources/equipment/staff	1	1	1	2
Resistance to change	1	1	1	2
Staff turnover	1			1
Management/staff expectations differ	1			1
Lack of flexibility	1			1
No guidelines on how to break away from tradition		1		
No response	18	6	19	37
Solutions to problems				
Training	3	1	1	4
Solve in time	3			3
Shorten time			1	1
Improve communicating with industry		3		
Modify forms	1	2		1
Making it part of program/process	1			1
Establish priority for time	1	1		1
Need dedicated staff	1			1
Relate to specific problem in industry			1	1
Mandate changes (HACCP approach) by regulation		1		
No response	20	7	22	42
How industry was informed about HACCP program				
Discussions with operators/during inspections	4	2	3	7
Seminar/meeting	4	2	1	5
Newsletter	4			4
Letter to operator	3	2		3
Brochure	2			2
Food industry review board		1	1	1
Publish in State register		1		
None			3	3
No response	4	6	19	23
Does industry implement HACCP on own				
Yes	8	3	2	10
No	8	5	8	16
No response	11	6	17	28

Estimated proportion									
1-5%	2	1	2	4	Become aware of time-temperature problems	1			1
6-10%	4		1	5	Improves communications		1		1
11-20%	1			1	Take time to show staff/trainees "how to"		1		
<20%	1			1	Use team approach		1		
?	2			2	No response	23	6	22	45
Relative success of HACCP program					Future plans				
Successful/successful where used	4	2	2	6	Institute/implement/expand HACCP program	5	1	5	10
Favorable response from industry	3		1	4	Train staff	5	3	1	6
Critical items given more attention	1	2	1	2	Adopt Provincial protocol	4			4
In pilot phase, too early to evaluate	2		1	3	Train industry	1		3	4
Frustration due to lack of resources	2			2	Emphasize concept during inspections			3	3
Successful, but too early to evaluate	1		1	2	Use collected data to improve program	1	1	1	2
Good training for operators		1			Cover all establishments by HACCP program	2			2
Favorable responses from staff	1				Develop HACCP team	1			1
Improved communications from industry		1			Begin with high risk establishments	1			1
Document time-temperature problems			1	1	Use in restaurants			1	1
Undetermined/difficult to judge	1			1	Seek law to require HACCP			1	1
So-so			1	1	Expand to retail foods		1		
Successful with supervisors but not field staff		1		1	Incorporate HACCP approach into regulations governing food processing			1	
Unsuccessful due to staff turnover and lack of training			1	1	Uncertain				
No response	16	6	17	33	No response	13	6	16	29
Lessons learned that others can benefit					Other comments				
Need to train staff	4		1	5	Want results of survey	1	1	1	2
Increased awareness of potential problems		2		2	Use hazard analyses in outbreak investigations	1			1
Industry receptive	1	1	1	2	HACCP changes attitudes	1			1
Industry learn from data collected		1	1	1	HACCP designed to reduce foodborne illness	1			1
Ensure operators are aware of program before begin	1			1	HACCP valuable to determine problem area	1			1
Extend hazards analyses to include all operations	1			1	All inspectors have HACCP manuals	1			1
Organize schedule of field staff to include time foods of concern are being prepared	1			1	Want HACCP manual	1			1
Routine inspections fail to detect errors		1	1	1	All staff carry electric thermometers and/or thermocouple-potentiometer sets		1		1
Consider sanitation as well as time and temperature		1			Sanitarians fearful or embarrassed to admit how little they know about food science - barrier to learning			1	
Need commitment from top management			1	1	Sanitarians often ill prepared to evaluate food safety		1		
Emphasize critical items			1	1	Physical deficiencies easier to make decisions about than those relating to food safety		1		
You just have to do it			1	1	Time-temperature data loggers and lap-top computers have helped considerably			1	1
Must find approaches that use less time		1			HACCP must be industry program			1	1
Equipment needed	1			1	HACCP not considered because of lack of demand from industry and willingness to pay			1	1
Staff acceptance	1			1	HACCP articles in journals are useful			1	1
Involve staff in development of program	1			1	HACCP excellent teaching tool			1	1
As staff become involved and efficient in HACCP morale improves	1			1	We need to modify inspections			1	1
Not every inspector can do HACCP because of knowledge required	1			1	Need to certify managers, revamp inspection and improve surveillance first			1	1
Need administrative support	1			1	Would like to begin HACCP program			1	1
Works in small units	1			1	Do not have HACCP but use principles			1	1
Learn by doing	1			1					

Eleven Canadian local food regulatory agencies, six U.S. local health departments (17 subtotal), and four State regulatory agencies responded to having an activity that they considered as coming under the category of being HACCP based. Eight of these were described as originating between

1985 and 1989, and nine originated between 1990 and the time of the survey (1st quarter of 1992). Twenty-two others responded that they planned to implement a HACCP-based program. Hence, 62 percent of state/provincial and local food regulatory agencies either had or planned to initiate what they considered to be HACCP-based activities.

One U.S. state agency and one local health department replied that they had a "HACCP" regulation. Canadian local authorities in Ontario, stated that such regulations were pending provincial adoption process.

Ten agencies stated that they had "HACCP" administrative policies. These were not always clearly described and the agencies' definitions of HACCP were not always the same as stated in the IAMFES's HACCP manual (15).

Twenty-four (43%) of 56 local and 8 (58%) of 13 state regulatory agencies that responded use some sort of HACCP forms in their activities. Some examples that appeared particularly useful, and of which similar forms were submitted by other agencies, are illustrated in Figures 1-3. Some other forms that were submitted as being HACCP-based, however, were typical of traditional sanitation inspection forms (e.g. USFDA [28]) and not what was sought by the Committee.

Fifteen agencies stated that they carried out critical-item inspections. (See discussion for a description of this type of inspection.)

Multiple HACCP guidelines were used, including those published by IAMFES, states or provinces, local health departments, FDA, shellfish control programs, Hospitality Institute, and published articles by several agencies. The IAMFES HACCP manual (15) was stated as being used more often than other documents, but the replies came mostly from agencies that were members of IAMFES affiliates which would be aware of this manual.

Nineteen agencies stated that they either had staff training on HACCP or sent members of their staff to training courses on this subject; others stated that such training was in their plans. The Ontario responses suggest that about half the agencies have trained their staff or plan to do so. The same is the case for U.S. State agencies, but this is not the case for U.S. local health departments. Duration of the training was usually 2-3 days but varied from less than a day to more than a week.

Administrators' attitudes were reported by 19 agencies to be either supportive or favorable. There were two reports that administrators were not concerned and two reports that they felt that HACCP activities were competitive with other activities or resources. These and other responses are tabulated in Table 1.

Field staffs' (sanitarians') attitudes were quite variable (Table 1). The largest number, approximately half, of respondents replying stated that these attitudes were positive and/or enthusiastic or they became positive after training. Approximately a quarter, however, suggested that staff resisted change or were uncertain about using the HACCP approach. Others (~15%) stated that the approach was too time-consuming or too technical, or they felt a need for training.

The regulatory agencies' opinions of the food industries' attitudes about the agencies' employment of HACCP-based programs were also variable, but over two thirds of those responding suggested that reactions were favorable or that the HACCP approach was accepted. (See Table 1 for a complete listing of responses.)

Many of those attempting to implement HACCP-based program, or whatever their understanding of what HACCP was, stated that problems were encountered. Insufficient time to accomplish their HACCP-related activities was the most frequent concern. The next most frequent reported

problem was that staff lacked either training or motivation. Comments about solutions to the listed problems varied, but the need for training and expectations that problems would be solved in time (which also has training implications) were the most frequent responses (Table 1).

When food regulatory agencies did attempt what they considered to be a HACCP-based program, they informed industry several ways. These included discussions with operators during inspections, seminars or meetings, newsletters, direct mailings, brochures and an announcement in a State register.

Eleven (41%) of 27 agencies that responded to the question on whether the food industry under their supervision had their own HACCP programs suggested that some did. The proportion estimated was usually 10% or less.

Responses to the question about relative success of "HACCP" programs varied (Table 1). The most frequent answers were that they were successful where used and that favorable responses came from the food industry.

Although there were varied and many no responses to the question about what was learned that could be shared, the answers received can be useful to those using or planning to develop HACCP-based activities. The most frequent response was the need to train staff. (See Table 1 for a listing of the responses.)

When asked about future plans, eleven agencies responded that they planned to begin or expand HACCP programs; six stated that they planned to train staff about the HACCP approach, four each responded that they would either adopt the Provincial protocol or train industry, three stated that the collected data would be used to improve their food protection programs, two stated that they would cover all establishments by a HACCP program, and two stated that a HACCP team would be established. (These and single responses are listed in Table 1.)

Other comments made by the respondents are listed in Table 1. These represent a sampling of the current state of affairs and typical concerns about HACCP-based activities.

Some agencies enclosed materials to supplement the questionnaire. For example, one agency presented manuals on (a) a rationale for risk assessment, (b) HACCP pilot study proposal, phases and evaluation, (c) a HACCP education proposal, (d) an operator's guide to HACCP, and (e) forms (20). Some agencies submitted examples of HACCP evaluations of establishments (i.e. hazard analyses and flow charts) for review; others sent copies of HACCP guidelines that they had developed and were using for training staff and demonstrating the HACCP concept to industry. A variety of food safety fact sheets, procedural guidelines and informational brochures were submitted.

Some teachers, consultants, and representatives of quality control departments of food industries also completed questionnaires. These, however, have not been included in the summary, but they showed interest and demonstrated activities related to the HACCP approach.

DISCUSSION

This survey is incomplete and must not be regarded as typical practices in either Canada or the United States of America, but it shows exemplary practices by some state, provincial and local food protection agencies. Replies were

sometimes contracted from sentences to short phrases and so may have lost some of the respondents' intent. The questionnaires were distributed through IAMFES affiliates, hence, responses came primarily from members of the Association. Persons interested in and supportive of an issue (HACCP in this case) tend to respond more often than persons who are either not interested or negative to an issue. Hence, the survey approach may have resulted in some degree of bias.

Since most of the agencies that responded were local health departments, food service was the industry most commonly regulated. The significance of this is that: (a) It is the largest industry in terms of numbers of establishments which requires considerable effort to verify the validity and effectiveness of each HACCP system. (b) It is an industry with varied cuisines and multiple menu items requiring the development of several HACCP systems. (c) It is the industry that would find the record keeping component of HACCP most difficult to carry out. (d) It generally has less technically-sophisticated operators as compared to the food processing industry which produces one or a few items and which has a greater likelihood of professional quality assurance staff. Hence, foodservice operators will often need help from consultants or official agencies to develop their HACCP systems.

Judging from the responses and the supplemental materials submitted and allowing for confusion over what was asked or interpretation of brief answers, it appears that "HACCP"-based programs have begun to be implemented. They, however, have not yet developed to a high degree of sophistication. There appears to be a slow steady rate of implementation. If the responses to having a "HACCP" program and planning to implement one are combined, there is evidence of either program or attitudinal change in the direction of adopting HACCP-based activities within regulatory agencies. Furthermore, some agencies submitted materials that showed that they have managed to overcome typical problems of inertia, tradition and bureaucracy to implement HACCP-based programs.

There is a wide variance in either applying HACCP principles or in understanding the HACCP concept. Some respondents, apparently, considered HACCP to be equivalent to a critical-item inspection. Others gave indication that it was the production of flow diagrams of operations. There was also identity of the HACCP concept with time-temperature measurements or studies (e.g. references 11-14). Such studies give examples of hazard analyses that often lead to selection of critical control points, but they are not complete HACCP systems. Confusion about and misunderstanding of HACCP systems by persons within health and food protection agencies has been described previously (8). Comments under the heading of HACCP programs apart from inspections and supplemental materials showed that some respondents distinguish between types of inspections and HACCP activity. In some cases, however, sanitarians may have given more attention to food temperatures; in others, they may have been doing in-depth evaluations approaching critical control point monitoring validation.

Apparently, to some of the respondents, critical-item inspection means using the FDA weighted inspection form with emphasis on the items marked with an asterisk (28).

This is, however, neither the HACCP approach nor a critical-item inspection; it's the traditional inspection approach.

Three features separate the critical item approach from traditional inspection technique. Most importantly, the critical-item inspection approach puts emphasis during inspections on operations that epidemiological data have shown to contribute frequently to outbreaks of foodborne illness (3, 9, 25). Critical-item inspections, however, only relate to the HACCP approach in that the critical items are often the same as critical control points for some foods. Secondly, the critical item approach is weighted much more heavily towards time-temperature controls. (In Washington State, for example, critical items are given approximately 2.5 times more value than those of the foodservice sanitation manual. Thirdly, all serious violations (critical items) must be corrected before the sanitarian leaves the establishment under investigation. Further discussion of the critical-item approach to inspection and example forms are published (2, 4), and illustrated in Red/Blue Inspection Forms used by the States of Washington and New York (24, 29, 30). When correctly done critical item inspections are much better at emphasizing health-related matters than traditional inspections such as presented in the Food Service Sanitation Manual [28]).

The HACCP system is quite different from the critical-item inspection approach and traditional inspections. The HACCP system is a series of interrelated actions that include (a) analyzing hazards associated with the food in question and the operations (processes/preparation steps/practices/procedures) employed; (b) assessing the severity of the outcome (e.g., illness, spoilage) if preventive/control measures are either not employed or fail; (c) assessing the relative risks of each hazard and effectiveness of presently-used control measures; (d) selecting critical control points; (e) instituting control measures and establishing criteria for control, (f) monitoring critical control points during or just before or after operations and recording results, as applicable; (g) applying prompt corrective actions; and (h) verifying that the HACCP system has been implemented and is being maintained and that monitoring is being done effectively and timely with appropriate and calibrated devices (1, 15, 21-23, 25, 26). It estimates the likelihood of contamination of all sorts and survival and growth of microorganisms at all processing and preparation steps that foods undergo. Monitoring is done by employees in the food establishment, and prompt corrective actions are taken whenever criteria are not met. The functioning of the system and effectiveness of monitoring is verified by quality control staff and food regulatory authorities.

Regulatory agencies' role in the HACCP concept include (a) stimulating the use of the system at all places that process, store or prepare foods that have been shown to be vehicles of foodborne illness or that scientific studies show the feasibility of this event; (b) detecting hazards from epidemiological investigations and abstracting them from scientific studies; (c) pointing out hazards within operations during visits to establishments; (d) pointing out that certain operations call for critical control points; (e) setting minimum criteria for food safety measures and corrective actions; (f) either modifying hazardous processes when de-

tected during hazard analyses or verification activities to make operations safer or prohibiting the operation, (g) advising of effective monitoring procedures; (h) verifying implementation and maintenance of HACCP systems; (i) approving HACCP plans; (j) developing general or typical HACCP systems and guidelines of ways to implement HACCP systems; (k) maintaining a file of typical hazards, critical control points, monitoring procedures, and HACCP systems; and (l) training and educating personnel in the food industry and in health agencies of smaller political subdivisions. Suggestions for employing HACCP approaches by regulatory agencies have been described in the literature (7, 16, 18, 19). Another function is to update guidelines and train industry personnel when epidemiological investigations or scientific data detect new hazards or new technologies become available for control measures or monitoring.

Verification which is a primary function of regulatory agencies includes (a) reviewing HACCP plans (including HACCP systems, flow diagrams, designated critical control points); (b) determining whether the HACCP systems have been implemented and are being maintained; (c) scanning monitoring records on site for deviations from criteria or control measures; (d) observing and/or measuring whether criteria are being met at critical control points during operations; (e) observing and testing whether monitoring procedures are used and whether they are effective; (f) collecting samples at processes considered to be critical control points or, if deemed useful, finished products; (g) identifying corrective actions taken for products that did not meet the criteria and the adequacy of these actions and the disposition of such products. These activities will require development of verification protocol (guidelines), priorities and schedules. Verification also includes detecting the processing of preparation of foods of concern that are not covered by HACCP systems and determining whether formulations, processes, procedures or processing equipment on which the systems were based have changed. (See references 15, 16, and 23 for expansion of these items and explanations.)

Few agencies have developed either regulations that require implementation of HACCP systems in all food establishments or procedural HACCP-activity policies. An exception is Ontario which is developing a protocol and perhaps a regulation in this regard. Additionally, one State, Maryland, has a HACCP-related code (17). Efforts need to be taken to pass regulations that require the food industry to develop, implement and maintain HACCP systems for all foods produced, processed and prepared within their establishments (26). Approval of regulations, however, is a difficult process often of long duration. Guidance on procedures to write a HACCP regulation for foodservice establishments and retail food stores is needed before rapid progress in this direction can be expected. It appears that some agencies in the United States are implementing HACCP-based programs without either regulations or written policies. This suggests a weakness in administration and that such programs will not be uniform between jurisdictions and possibly be confusing to personnel within the food industry. The IAMFES's HACCP manual (15) provides guidance for developing and implementing HACCP systems, but it does

not provide much information about health department administrative policies and procedures.

Some food safety and regulatory agencies that are using a HACCP-based program have developed innovative activities and aids for conducting hazard analyses, monitoring and/or verification. Examples are shown in Figures 1-3. Figure 1 illustrates a hazard analysis form that is used by the County of San Diego. Notice that it follows the general flow of food preparation in foodservice operations and lists common critical control points. Conditions causing contamination, survival and growth are indicated. Space is provided to record temperatures and times of processes. A similar approach for hazard analysis of foodservice operations is described in the literature (5, 6). Figure 2a,b illustrates the hazard analysis critical control point monitoring procedure report developed by the New York Department of Health that is used throughout the State. It lists food preparation steps that are often critical control points, gives criteria for control, specifies monitoring procedures, and states actions to take when criteria are not met. This is an excellent example of a form having space to enter information about several components of the HACCP system into a form. Figure 3 illustrates a HACCP audit report recommended for use by the Ministry of Health, Ontario; it is in English and French. It also follows general operational flow of foodservice operations and likely critical control points. It specifies criteria and provides boxes to check during monitoring or for verifying compliance to criteria.

All the example forms are superior to traditional sanitation inspection forms as aids in hazard analyses, monitoring and/or verification. Several agencies from both the United States and Canada modeled their forms after those either previously or presently used in New York State. Forms in the IAMFES manual (15) cover most activities that are necessary to conduct hazard analyses, to monitor and to verify. They do not, however, cover criteria for control which would vary from country to country if not from jurisdiction to jurisdiction, but space is provided to specify criteria.

Responses about attitudes of different groups are difficult to state, summarize and objectively characterize. Administrators were stated as being generally supportive of HACCP activities. They usually appreciated the scientific justification that is offered by the HACCP approach, but they are often strapped for resources. Furthermore, they also are confronted by many competing priorities such as safe drinking water and toxic waste dump programs which demand their attention and sometimes alter priorities. Hence, implementation of HACCP programs often have to be delayed or abbreviated. Field staff tended to be positive and resisted change less when trained in the HACCP concept. Responses about the food industries' attitudes tended to be favorable or at least to accept HACCP-based programs used by the regulatory agencies.

SUMMARY

Actions have to be taken by both the food industry and food regulatory agencies to acquire the high degree of assurance of food safety that HACCP systems offer. The food industry either needs to develop and implement HACCP

Figure 1

Ministry of Health
Ontario
Ministère de la Santé
Publique

HACCP Audit Report
de vérification du ARMPIC

Public Health Branch
Bureau de Santé Publique

Health Unit/Bureau de Santé
Establishment no./No d'établissement
Operator's name/Nom de l'exploitant/e

Address/Adresse _____

Food/Aliment _____

Operator's Name _____

Address _____

(T)(C)(V) _____ County _____

THIS FORM CONSISTS OF TWO PAGES AND BOTH MUST BE COMPLETED.

Condition at Onset / État au moment de la livraison	Critical Control Point/Point de contrôle critique	Monitoring procedure/procédure de surveillance	Name or title of responsible person/Nom ou fonction de la personne responsable	Temperature check less than 5°C / Vérification de la température/moins de 5°C	Shellfish tag complete / Etiquette de coquillage complétée
Storage / Entreposer	Refrigeration / Product temperature less than 5°C / Réfrigération / température du produit - inférieure à 5°C	None/rien	None/rien	None/rien	None/rien
Defrost / Dégeler	Running water less than 21°C / Eau courante inférieure à 21°C	None/rien	None/rien	None/rien	None/rien
Cook/Cuire	Boiling water less than 74°C / Eau bouillante inférieure à 74°C	None/rien	None/rien	None/rien	None/rien
Hot Hold / Tenir au chaud	Product greater than or equal to 60°C / Produit plus grand que ou égal à 60°C	None/rien	None/rien	None/rien	None/rien
Cool / Refroidir	Product less than or equal to 5°C / Produit plus petit que ou égal à 5°C	None/rien	None/rien	None/rien	None/rien
Prepare and Serve / Préparer et servir	Hand wash and sanitizer / Nettoyage des mains et désinfectant	None/rien	None/rien	None/rien	None/rien
Slice, Debone, Mix, etc. / Trancher, déosser, mélanger, etc.	Use gloves, utensils, clean dishes / Porter des gants, utiliser des ustensiles, plats propres	None/rien	None/rien	None/rien	None/rien
Reheat / Réchauffer	Reheat to 74°C / Réchauffer jusqu'à 74°C	None/rien	None/rien	None/rien	None/rien
Hold for Service / Rétention des aliments avant le service	Hold product less than or equal to 60°C / Produit moins que ou égal à 60°C	None/rien	None/rien	None/rien	None/rien

Comments/Remarques _____

Date _____ Signature of Public Health Inspector/Signature de l'inspecteur/inspectrice de la santé publique _____

1162-44 (8/01)

7530-4800

Figure 2a

Hazard Analysis Critical Control Point
Monitoring Procedure Report

NEW YORK STATE DEPARTMENT OF HEALTH
Bureau of Community Sanitation and Food Protection

HACCP Page 1

COUNTY _____ DIST _____ EST. NO. _____ MONTH _____ DAY _____ YEAR _____

THIS FORM CONSISTS OF TWO PAGES AND BOTH MUST BE COMPLETED.

Establishment Name _____ Operator's Name _____

Address _____

(T)(C)(V) _____ County _____

PROCESS (STEP) / CIRCLE / CCPs	CRITERIA FOR CONTROL	MONITORING PROCEDURE OR WHAT TO LOOK FOR	ACTIONS TO TAKE WHEN CRITERIA NOT MET
RECEIVING / STORING	<input type="checkbox"/> Approved source (inspected) <input type="checkbox"/> Shellfish tag <input type="checkbox"/> Raw/Cooked Separated in storage <input type="checkbox"/> Refrigerate at less than or equal to 45°F	<input type="checkbox"/> Shellfish tags available <input type="checkbox"/> Shellfish tags complete <input type="checkbox"/> Measure food temperature <input type="checkbox"/> No raw foods stored above cooked or ready to eat foods	<input type="checkbox"/> Discard food <input type="checkbox"/> Return food <input type="checkbox"/> Separate raw and cooked food <input type="checkbox"/> Discard cooked food <input type="checkbox"/> Food contaminated by raw food More than 45°F more than 2 hours, discard food More than 70°F, discard food
THAWING	<input type="checkbox"/> Under refrigeration <input type="checkbox"/> 70°F <input type="checkbox"/> Microwave <input type="checkbox"/> Less than 3 lbs., cooked frozen until thawed	Observe method Measure food temperature	Food temperature: More than or equal to 70°F, discard More than 45°F more than 2 hours, discard
PROCESSING PRIOR TO COOKING	Food temperature less than or equal to 45°F	Observe quantity of food at room temperature Observe time food held at room temperature	Food temperature: More than 45°F more than 2 hours, discard food More than 70°F, discard food
COOKING	Temperature to kill pathogens Food temperature at thickest part more than or equal to _____°F	Measure food temperature at thickest part	Continue cooking until food temperature at thickest part is more than or equal to _____°F
HOT HOLDING	Food temperature at thickest part more than or equal to _____°F	Measure food temperature at thickest part during hot holding every _____ minutes	Food temperature: 140°F - 120°F: More than or equal to 2 hours, discard food and hold at 140°F 120°F - 45°F: More than or equal to 2 hours, discard, less than 2 hours, reheat to 165°F and hold at 140°F

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White copy (pg. 1) - operator

Carney copy (pg. 1) - file

Figure 2b

HACCP Monitoring Procedure Report (Page 2)

NEW YORK STATE DEPARTMENT OF HEALTH
 61 W. ST. Community Sanitation and Food Protection

Food	Establishment Name	Date	ACTIONS TO TAKE WHEN CRITERIA NOT MET
PROCESS (STEP) CIRCLE CCP#	MONITORING PROCEDURE or What To Look For		
COOLING	<p>Food 120°F to 70°F in 2 hours; 70°F to 45°F in 4 additional hours by the following methods: (check all that apply)</p> <p><input type="checkbox"/> Product depth less than or equal to 4"</p> <p><input type="checkbox"/> Ice water bath and stirring</p> <p><input type="checkbox"/> Solid piece less than or equal to 6 lbs.</p> <p><input type="checkbox"/> Rapid chill refrigeration</p> <p><input type="checkbox"/> No covers until cold</p>	<p>Measure temperature during cooling every _____ minutes</p> <p><input type="checkbox"/> Food depth</p> <p><input type="checkbox"/> Food bed</p> <p><input type="checkbox"/> Food stirred</p> <p><input type="checkbox"/> Food size</p> <p><input type="checkbox"/> Food placed in rapid chill refrigeration unit</p> <p><input type="checkbox"/> Food uncovered</p>	<p>Food temperature: 120°F - 70°F more than 2 hours, discard food</p> <p>70°F - 45°F more than 4 hours, discard food</p> <p>45°F or less but cooled too slowly, discard food</p>
PROCESsing SLICING DEBONING MIXING DICING LABELING SERVING	<p>Prevent contamination by: ill workers or workers touching ready to eat foods</p> <p>Worker hands washed & utensils</p> <p>Cold potentially hazardous food at temperature less than or equal to 45°F</p> <p>Hot potentially hazardous food at temperature more than or equal to 140°F</p> <p>Equipment and utensils clean and sanitized</p>	<p>Observe: health of workers working</p> <p>Use of gloves, utensils</p> <p>Handwashing technique</p> <p>Wash & sanitize equipment & utensils</p> <p>Use prechilled ingredients for cold foods</p> <p>Minimize quantity of food at room temperature</p> <p>Measure food temperature</p>	<p>If yes to following, discard: ill worker in contact with ready to eat food observed</p> <p>Cold potentially hazardous food: More than 45°F more than or equal to 2 hours, discard; More than 70°F, discard</p> <p>Hot potentially hazardous food: 140°F - 120°F More than or equal to 2 hours, discard; less than 2 hours, reheat to 165°F and hold at 140°F to 165°F - 45°F</p> <p>More than or equal to 2 hours, discard; less than 2 hours, reheat to 165°F and hold at 140°F to 165°F</p> <p>If yes to following, discard or reheat to 165°F: Raw food contaminated other foods</p> <p>Equipment/utensils are contaminated</p>
REHEATING	<p>Food temperature at thickest part more than or equal to 165°F</p>	<p>Measure food temperature during reheating</p>	<p>Food temperature less than 165°F, continue reheating</p>
HOLDING FOOD, HOT/COLD	<p>Food temperature More than or equal to 140°F at thickest part</p> <p>Less than or equal to 45°F at thickest part</p>	<p>Measure food temperature during holding every _____ minutes</p>	<p><input type="checkbox"/> Hot holding potentially hazardous food: 140°F - 120°F More than or equal to 2 hours, reheat; less than 2 hours, reheat to 165°F and hold at 140°F</p> <p>120°F - 45°F More than or equal to 2 hours, reheat; less than 2 hours, reheat to 165°F and hold at 140°F</p>
TRANSPORTING FOOD			<p><input type="checkbox"/> Cold holding potentially hazardous food temperature: 45°F - 70°F More than or equal to 2 hours, discard; less than 2 hours, serve or refrigerate</p> <p>More than or equal to 70°F, discard</p>

I have read the above food preparation procedures and agree to follow and monitor the critical control points and to take appropriate corrective action when needed. If I want to make any changes, I will notify the Health Department prior to such a change.

Signature of person in charge _____
 Signature of inspector _____
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White copy (pg. 2) - operator
 Green copy (pg. 2) - file

Figure 3

COUNTY OF SAN DIEGO DEPARTMENT OF HEALTH SERVICES
 COMMUNITY HEALTH SERVICES
 (619) 338-2222
 HAZARD ANALYSIS REPORT

ESTABLISHMENT NAME AND ADDRESS: _____
 PERSON IN CHARGE DURING ANALYSIS (GIVE TITLE): _____
 EST. NO.: _____ TYPE: _____
 DATE: _____

NAME OF FOODS OR BEVERAGES UNDER ANALYSIS:	DATE CONSUMED: NO. OF SERVINGS:
PREPARATION FLOW OF EACH FOOD (INDICATE TEMPERATURES AND TIME OF PROCESSES)	INDICATE CRITICAL CONTROL POINTS OBSERVED DURING HAZARD ANALYSIS:
NAME OF FOOD OR BEVERAGE	CONDITIONS CAUSING FOOD CONTAMINATION:
RAW MATERIALS (source, storage conditions, etc.)	<ul style="list-style-type: none"> FOOD FROM UNAPPROVED SOURCES IMPROPER STORAGE OF FOOD AND UTENSILS CROSS CONTAMINATION FROM RAW FOODS EXPOSURE TO DIRT, VERMIN, CHEMICALS, OVERHEAD LIGHTS POOR FOODHANDLING PRACTICES CONTAMINATION FROM PERSONNEL WITH ILLNESS OR TOILET USE, SMOKING, SNEEZING, BLOWING NOSE, EXCESSIVE HANDLING OF FOOD WITH BARE HANDS CONTAMINATION FROM UNSANITARY EQUIPMENT, WORK TABLES AND UTENSILS IMPROPER CLEANING (NOT DISINFECTED) CONTAMINATED EQUIPMENT FROM WORK TO WORK TABLE IMPROPER USE OF ADDITIVES USE OF UNAPPROVED CONTAINERS LINED WITH TOXIC METALS OR MADE WITH NON-FOOD GRADE PLASTIC MATERIALS PRODUCE WERE NOT WASHED PRIOR TO USE OTHER: _____
PRE-PREPARATION (slicing, pre-cooking temp., equipment used, other conditions)	CONDITIONS CAUSING MICROBIAL SURVIVAL & GROWTH:
STORAGE (equip. used, temps., other conditions)	<ul style="list-style-type: none"> INADEQUATE COOKING OF HIGH-RISK FOODS POULTRY TO AT LEAST 170°F AND MEAT COOKED TO AT LEAST 160°F INTERNAL TEMP. ARE CONSIDERED GENERALLY SAFE TO EAT. IMPROPER HOT-FOOD HOLDING TEMPERATURES INTERNAL TEMP. NOT UP TO 165°F IMPROPER HOT-FOOD HOLDING TEMPERATURES INTERNAL FOOD TEMP. NOT ABOVE 140°F IMPROPER HOT FOOD UNIT IS BEING USED IMPROPER HOT-FOOD HOLDING TEMPERATURES COOLING TEMPS. NOT BELOW 45°F INADEQUATE COOL-AIR CIRCULATION IN COOLING UNITS - STACKING OF FOOD CONTAINERS COOKED, HIGH-RISK FOODS NOT RAPIDLY COOLED KEEP IN DEEP REFRIGERATOR OR WALK-IN COOLER (MUST BE 4" DEEP ONLY) LAPSE OF MORE THAN HALF-DAY BETWEEN PREPARATION AND SERVING (COUPLED WITH INADEQUATE REFRIGERATION CAPACITY) USE OF IMPROPERLY STORED LEFT-OVER FOODS OTHER: _____
HEAT-PROCESSING (Cooking temps - final internal °F)	
HOLDING TEMPERATURES (equipment used, other conditions observed)	
SERVICE (equipment used - Temp and Time/delay)	
SAMPLES AND SPECIMENS COLLECTED (SPECIFY POINT OF COLLECTION)	

NOTE: USE SEPARATE SHEET FOR EACH FOOD OR DISH UNDER HAZARD ANALYSIS.
 OFFICIAL NOTICE ISSUED: Y / N
 FOOD FACILITY INSPECTION REPORT SCORE: _____
 RECORDED BY: _____
 EHS:ENS-113 (2/91)
 EHS SPECIALIST: _____

systems for the foods that they process or prepare or seek help from consultants or agencies that can do this for them. Food protection agencies need to (a) stimulate development of HACCP systems, (b) consult with and guide that part of industry that does not have a staff competent to develop such systems, and (c) verify that HACCP systems are implemented and maintained. Such actions will require training food-regulatory staff, industry quality control personnel, line and kitchen supervisors, and persons who process and prepare foods at critical control points (10).

A good training program would improve understanding and stimulate staff from all the cited groups to accept and use the HACCP approach. It needs to include methods for implementing a HACCP program with limited resources, staff and time. State and federal/national agencies ought to provide more HACCP-related training, but local agencies also have to assume some of this responsibility. Administrators of governmental agencies often do not believe that staff/resources/time are available to train their personnel. Until training is given higher priority, however, food regulatory agencies will fall farther behind certain segments of the food industry in implementing HACCP activities. Professional organizations can stimulate such activity by having HACCP-related topics on meeting programs, sponsor training courses or workshops on the subject, and direct working groups or committees to develop or review HACCP policies or guidelines.

The estimated number of food establishments that implement HACCP systems is quite low for an approach that is over 2 decades old and considered by many leading public health and quality control personnel as being the state of the art and science of food safety. Food protection agencies ought to employ all aspects of it that can be incorporated into their program and stimulate its use by all food establishments under their supervision. As the results of this survey show, elements of it are now being used by a few agencies, but not in a uniform way. It is not yet universally used because of either a lack of understanding of the concept or a reluctance to change priorities and traditional program direction. Procedures for developing HACCP systems, however, are now well established and published (15, 21, 25). Such publications ought to be read by food safety officials and appropriate parts taught to their staff. The challenge is to overcome problems impeding implementation of the HACCP concept. To meet this challenge, there is a need for governmental, industrial and academia leadership and standardization of approaches.

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ACKNOWLEDGMENTS

The authors thank other members of the Committee on Communicable Diseases Affecting Man who contributed to initiating the survey. In particular, we thank C.A. Bartleson and O.D. Cook for their critical review of the manuscript. Thanks are given to several IAMFES members who assisted in reviewing forms and tabulating data during the 1992 annual meeting in Toronto. We also thank IAMFES Executive Office for distributing the forms and the affiliates for final distribution to members. Thanks are also given to the persons who took time to complete the questionnaire and submit supplemental information.

Variability Evaluation of Two Handwash Modalities Employed in the Food Processing Industry

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Introduction

Throughout the food industry, the importance of handwashing has been known for many years. The potential for food handlers to be a primary source of food transmitted disease continues to be significant (Frazier & Westoff, 1988; Harrington, 1992; Paulson, 1992; & Snyder, 1992). Usually, microorganisms which normally reside on the hand surfaces do not pose a threat of disease epidemics transmitted from food handlers to consumers. Instead, disease outbreaks occur when food handlers come into hand contact with transient pathogenic microorganisms. Often the transient contaminating microorganisms are encountered when food handlers come into hand contact with their own infected feces, the infected feces of others or with the feces of the animals being processed. Once the food handlers' hands are contaminated with disease-producing microorganisms, they can easily contaminate the food which they are processing. When that contaminated food is eaten by the consumer, they, in turn, may become infected.

The main purpose of any handwash regimen is to break the transmission vector between food handlers, the food they process, and the consumer. If the disease-producing microorganism can be removed via an effective hand wash regimen, the disease transmission vector is broken and no disease will ensue. The effectiveness in breaking this cycle hinges upon the antimicrobial effectiveness of the handwash procedure, including the antimicrobial properties of the soap used.

In any successful handwash program, two main parameters must be considered. They are the immediate and the persistent antimicrobial effects. The immediate antimicrobial effects depend upon two attributes: the mechanical removal of contaminating microorganisms and the topical antimicrobial compound's ability to kill microorganisms upon contact.

The persistent antimicrobial effects, or the ability of the handwash to keep the microbial populations at a low level after washing, is mainly dependent upon the type of antimicrobial product used.

The main determinate of immediate antimicrobial effectiveness—that of actually removing the microorganisms—depends upon the amount of the antimicrobial hand sanitizer

used, the type of the antimicrobial hand sanitizer used, the amount of time spent washing the hands, the mechanical pressure and friction exerted in the wash, and temperature of the water (Paulson & Gillis, 1988; Paulson, 1988; Paulson, 1992). However, even when a very effective handwash regimen has been developed, to be successful, personnel must comply to the wash regimen. This requires personnel to be highly self-motivated to not only perform the wash but to perform it consistently each time. Consistency in the wash is critical because the reliability of the wash procedure is dependent upon it.

From this perspective, we were interested in evaluating two handwash regimens in terms of their consistent, reproducible microbial reduction results. We compared a manual handwash regimen to an automated handwash regimen in terms of consistent degerming results.

The effectiveness of a manual handwash is dependent upon the person doing the handwash in terms of the above-listed parameters. The automated system, being internally regulated in duration, wash pressure and amounts of soap and water applied, is not dependent upon the person performing the wash.

Materials and Method

The two wash configurations used in this study were:

- | | |
|-------------------|---|
| Configuration #1: | A standard manual handwash procedure using Ivory Liquid soap. |
| Configuration #2: | The CleanTech 2000 automated hand cleansing system (Meritech, Inc., Englewood, CO) with 2% Gluconate (Meritech, Inc., Englewood, CO). |

Product Application

Configuration #1

Manual Washes

Subjects were instructed to wash their hands with Ivory liquid soap for five seconds. In order to simulate the work environment as closely as possible, no timed devices or monitors were used.

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 - Monitor Critical Control Points
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Configuration #2

Machine Washes

All machine handwash applications were used according to a standard, ten-second, pre-set wash cycle. The 5 ml volume of product dispensed was assured using a graduated cylinder to measure the solution prior to the initiation of the handwash configuration.

In using the automated hand cleansing system, subjects merely placed their hands inside openings where a proximity switch triggered the cycle to begin.

Subjects

A sufficient number of overtly healthy subjects over the age of eighteen but under the age of seventy were admitted into the study to insure that twenty subjects completed the study. The twenty subjects were randomly assigned to one of two wash methods groups consisting of ten subjects each (see Table I). Subjects were of mixed sex and age; all were free of clinically-evident dermatoses or injuries to hands and forearms. No immune-compromised subjects were admitted into the study. All subjects signed informed consent forms prior to participating in the study. An Institutional Review Board (IRB) approved the study design and subject safety prior to its commencement.

TABLE I

Study Configurations

Wash Configuration	Wash Method	Product Used	Volume of Agent Used	Wash Time
1	Manual wash	Ivory soap	N/A	5 sec.
2	Machine wash	2% chlorhexidine gluconate	5 ml	10 sec.

NOTE: Ten subjects were used in each wash mode.

Each subject performed five consecutive wash procedures. Each subject was sampled three times in the study: a baseline sample to determine the number of contaminating microorganisms residing on the hands, and after wash/inoculation cycles one and five.

Pre-Test Period

The first seven day period of this study (before the test portion of the study began) was designated the "pre-test" period. During this period, subjects avoided using medicated soaps, lotions, deodorant, and shampoos as well as skin contact with solvents, detergents, acids, and bases. Bathing in chlorinated pools and hot tubs was also avoided. This regimen allowed for the optimum stabilization of the normal microbial flora populations of the hands.

Experimental Period

The second seven day period (following the "pre-test" period) constituted the experimental period. Each subject was utilized one day of that week for a two hour period. During this period, five milliliter aliquots of approximately 10^8 /ml *Serratia marcescens* (ATCC #14756, red-pigmented strain) were pipetted into each subject's cupped hands. The inoculum was then distributed evenly over both hands and the area comprising approximately one-third of the forearm, via gentle massage. After a one-minute air dry, the Glove Juice Sampling Procedure was performed.

The first inoculation cycle constituted the baseline sample. It was followed with the assigned test configurations. The randomly assigned inoculation/wash procedure was repeated five times with a minimum of five minutes between washes. A transient microorganism count of the hands was performed following wash one and wash five, using the Glove Juice Sampling Procedure.

Glove Juice Sampling Procedure

Following the prescribed wash and rinse, non-powdered, sterile surgical gloves were donned. Seventy-five milliliters (75 ml) of sterile phosphate buffered (pH 7.8) aqueous solution containing 0.1% Triton X-100 was instilled into the glove. The glove was secured at the wrist and the hand massaged through the glove for sixty (60) seconds. Aliquots of the "glove juice" were removed and serially diluted in Trypticase Soy Broth (TSB) containing 1.0% Tween 80 and 0.3% Lecithin as neutralizing agents for the Chlorhexidine Gluconate.

Duplicate Trypticase Soy Agar (TSA) spread plates containing 1.0% Tween 80 and 0.3% Lecithin were prepared for each dilution. The plates were incubated at 30-35°C until a distinguishable red color developed. Those plates providing between twenty-five (25) and two hundred fifty (250) red-pigmented colonies were utilized in this study. The number of viable red-pigmented bacteria recovered was determined using the formula:
aliquot volume x dilution factor x average plate count of the 2 plates.

Contaminating Microorganism

Serratia marcescens (ATCC #14756, red-pigmented strain) microorganisms were used in order to clearly identify efficacy of the wash configurations used. A twenty-four (24) hour culture of *Serratia marcescens* with a population of approximately 1×10^8 cfu/ml was used in this study. Since *S. marcescens* colonies appear red, they can be clearly identified as the marker (contaminating) microorganism instead of normal skin flora. Any non-red colonies appearing on the agar plates were not counted. The employment of *S. marcescens* prevented biasing the results by confounding the normal and marker microorganism population counts.

Experimental Results

Each subject had both left and right hands sampled during the baseline as well as the test portion of the study. The data acquired from the left and right hand were combined and averaged. Tables II and III present the data obtained in the study.

TABLE II

Manual Wash Results

Subject Number	Log ₁₀ Baseline Value	Log ₁₀ Wash #1	Log ₁₀ Wash #5
1	10.55	7.68	7.28
3	8.73	7.02	7.39
4	10.23	8.00	8.07
6	10.06	7.63	7.68
8	9.89	6.77	5.85
10	8.06	6.21	7.00
11	9.96	6.92	7.31
12	9.73	7.95	8.00
14	9.72	7.41	6.67
18	10.13	5.88	6.13

mean (\bar{x})* 9.71 7.15 7.14

standard deviation (s) 0.749 0.719 0.740
 Mean or average value = $\bar{x} = \frac{\sum x_i}{n}$

$$*Standard deviation: s = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n-1}}$$

*The standard deviation represents the sum of individual log₁₀ values in each column, minus the column mean squared $\sum(x_i - \bar{x})^2$, divided by n-1 or 9. The square of the quotient is the standard deviation which is the measure of variability of the handwash results

TABLE III

Automated Wash Results

Subject Number	Log ₁₀ Baseline Value	Log ₁₀ Wash #1	Log ₁₀ Wash #5
2	10.21	8.32	7.55
5	7.61	7.98	7.56
7	9.81	7.91	7.91
9	10.22	7.84	7.25
13	7.75	7.83	7.78
15	8.79	6.45	6.37
16	9.96	7.92	8.03
17	10.23	7.82	6.98
19	7.34	7.10	7.12
20	10.29	7.69	7.34

\bar{x} 9.22 7.69 7.41
 s 1.225 0.530 0.505

Since, in this study, we were interested in the variability in the handwash configurations, we focused on the measure of variability which is the standard deviation(s). Tables IV and V represent the data on Tables II and III respectively in terms of cell value (x_i) difference from the column mean, or ($x_i - \bar{x}$),

where:

x_i = cell value

\bar{x} = column mean

TABLE IV

Manual Wash Variability Results

Subject Number	Log ₁₀ Variability at Baseline	Log ₁₀ Variability at Wash #1	Log ₁₀ Variability at Wash #5
1	0.84*	0.53	0.14
3	-0.98	0.013	0.25
4	0.52	0.85	0.93
6	0.35	0.48	0.54
8	0.18	-0.38	-1.29
10	-1.65	-0.94	-0.14
11	0.25	-0.23	0.17
12	0.02	-0.80	0.86
14	0.01	-0.26	-0.47
18	0.42	-1.27	-1.01

s 0.749 0.719 0.740

*Note: Cell value variability is calculated: $x_i - \bar{x}$.
 Example: Cell 1 (baseline): 0.84 = 10.55 (Table II, Cell 1) - 9.71 (Table II, baseline column mean).

TABLE V

Automated Wash Variability Results

Subject Number	Log ₁₀ Variability at Baseline	Log ₁₀ Variability at Wash #1	Log ₁₀ Variability at Wash #5
2	0.99	0.63	0.14
5	-1.61	0.29	0.15
7	0.59	0.22	0.50
9	1.00	0.15	-0.16
13	-1.47	0.14	0.37
15	-0.43	-1.24	-1.04
16	0.74	0.23	0.62
17	1.01	0.13	-0.43
19	-1.88	-0.59	-0.29
20	1.07	0	-0.07

s 1.225 0.530 0.505

Baseline Data

Manual Wash

As can be seen from Table IV, Column 1, the measure of variability or standard deviation of the individual subject baseline microbial counts, in log₁₀ scale, is ± 0.749 . This represents the inherent variability of the contaminating microorganism populations on each subject's hands.

Automated Wash

As can be seen from Table V, Column 1, the measure of variability (standard deviation) of the individual subject baseline counts in log₁₀ scale ± 1.022 which is significantly

larger than the manual wash group. That is, there is more inherent variability of microorganisms contaminating the hands of this group.

Test Results

Wash #1

Manual Wash

As can be seen on Table IV, Column 2, the variability of the wash results for manual wash #1 is 0.719 logs. This is not a significant change from the baseline variability ($p>0.05$).

Automated Wash

As can be seen on Table V, Column 2, the variability of the automated wash is 0.53 logs.

The automated handwash system demonstrated less variability in the wash results from the baseline measurement which is significant ($p>0.05$).

Wash #5

Manual Wash

As can be seen from Table IV, Column 3, the variability in the manual wash #5 is 0.74 logs, which is not statistically different from the manual variability of the baseline wash ($p>0.05$).

Automated Wash

As can be seen on Table V, Column 3, the variability in the machine wash is 0.505 logs, which again is statistically, significantly less than the baseline counts ($p<0.05$).

Discussion

Clearly, based on these results, the automated handwash provided more consistent (standardized) antimicrobial wash results than did the manual handwash. The exact consistency of the automated wash cannot be accurately and precisely measured since the experimental sample method used (glove juice procedure) relies on a manual massage technique which has greater inherent variability than the machine wash.

The true performance of the automated system in terms of variability probably cannot be measured unless that Glove Juice Sampling Technique is also automated. The automated system provided distinct advantage over the manual wash in terms of standardized results in this study. However, much greater benefits can be expected in the work place in terms of standardized results using the automated systems. That is because the water temperature, pressure applied in the manual wash, duration of the manual wash, and conformance to the manual wash were greater under the laboratory-controlled conditions than in the work setting.

Additionally, subjects in these kinds of controlled experimental evaluations are prone to demonstrate the "Hawthorne Effect." That is, they are more motivated to perform the measured task (manual handwash) in terms of wash regimen conformance under experimental conditions than in actual work conditions. Since the automated handwash system is not dependent upon any motivation of personnel

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other than placing their hands into the wash cylinders, it should demonstrate greater wash result consistency than the manual wash program.

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Selling Public Health Sanitation to Physicians

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What we've got here is a failure to communicate!
— Strother Martin to Paul Newman, in *Cool Hand Luke*

A mother calls a pediatrician, reporting that her young daughter has been bitten by a dog. The physician directs her to wash the bite and apply a Band-Aid to the wound. Fortunately, the girl is the niece of a health department employee, who later learns of the incident and sees that the bite is reported and the child is properly inoculated against rabies.

A patient, reporting that he had eaten in a restaurant the night before, presents himself to an emergency room physician with diarrhea and vomiting. Although no specimens are collected and analyzed, the physician pronounces this a case of "food poisoning." The patient calls the health department, demanding to know why our restaurant inspectors allow such insanitary restaurants to remain open.

A supervisory food sanitarian is subpoenaed to appear in Federal court, along with the records of a certain restaurant which has been accused of causing two cases of foodborne illness. The patients had self-reported their symptoms to the physician over the telephone. No specimens from the patient nor samples of the suspected foods were collected nor analyzed because neither the local communicable disease people nor restaurant inspectors had been notified. Yet the physician not only testifies that his patients had been afflicted with a foodborne disease, but he identifies a *specific* etiological agent!

These scenarios actually occurred within St. Louis County, Missouri, and one frequently hears of similar "sanitation horror stories" occurring elsewhere. Most public health sanitarians might quickly and correctly characterize these as examples of ignorance, arrogance, presumption or incompetence. Most would tend to blame the physicians. Few would recognize in them our own failure.

To succeed public health sanitarians must increase communication with allied professions. We must not "preach to the choir." Our own professional conferences serve to renew, educate, and energize us, so we participate in them enthusiastically. We are less enthusiastic, however, about sharing our knowledge with other professional groups in the medical community. We should renew our efforts to do so.

Rising rates of foodborne disease (Figures 1 through 4) dictate an urgency to educate others about public health sanitation, especially food safety. Physicians, because of their unique relationship with the public, are in an excellent position to enhance our efforts.

However, public health sanitarians have a perceptible and understandable reluctance to communicate with physicians. Most would agree that sanitarians and physicians share a common mission, yet it is the physicians who are the "jet pilots" of public health. As a result, we may have feelings of trepidation when asked to share information with them through speech or written word. At the very least, we know the information will have to be presented to them accurately, concisely, and clearly focused. Confronted with a task which is perceived to be daunting, there is a strong tendency to do nothing. We must counter this tendency.

We must be confident that physicians will welcome our contribution. Although they are among the most highly educated individuals in our society, they, as we, continue to learn throughout their careers. Your shared, practical perspectives will add an interesting flavor to their usual, clinical diets. For example, when their patient presents to them with symptoms of foodborne illness, they witness only the final event in a complex web of causation. Or, as a physician friend once put it, "we just see some stuff in a toilet bowl; I'd be interested in learning about how restaurants are inspected and what you do to see that food poisoning does *not* occur!"

Two ways in which we can support our mission in common with physicians are by writing articles in their journals and speaking at meetings of their local and state professional societies. Accordingly, the following is intended to provide a kernel of pertinent information around which you may wish to form your articles and presentations to them:

State the Essential Factors

Microbes are the etiologic agents in the vast majority of foodborne illnesses seen by physicians. Therefore, among the antecedents of these illnesses, two factors will predominate:

- 1) Food has become contaminated with microbes, and
- 2) There has been sufficient time and temperature for either the microbes to have reached a critical inoculum or to have produced toxins.

State Your Goal and Request Assistance

Public health sanitarians, such as those employed in food control in your organization, are dedicated to intervening in the spread of foodborne illness principally by controlling the aforementioned essential factors. Since you sincerely need the help of physicians to enhance your efforts, *tell them so!*

Establish Common Ground

Elaborate on the historical cooperation between physicians and sanitarians. Emphasize that your profession recognizes and respects that, in the broad sense, physicians were actually the *first* sanitarians.

Inform them that a physician, Ben Freedman, M.D., of Tulane University, has written what is regarded as the definitive work on the subject of sanitation, the 1,400 page *Sanitarian's Handbook*.

Illuminate the relationship between sanitarians and physicians with a quote from the Handbook: (1)

In early biblical times . . . there was no differentiation between the functions of these two categories of public health workers (It was not until the late 19th century that) the physician sanitarian took on the title of health officer and the non-professional sanitary inspector began to grow into a professional sanitarian.

Assert your argument that today, as in the past, the interests and priorities of physicians impact food control programs.

The Relative Importance of Chronic vs. Infectious Diseases

Acknowledge that, even within the environmental health community, in recent years attention to foodborne illness has been eclipsed by chronic diseases, including the biggest killers, heart disease, cancer, and stroke. Indeed, much has been written about these times of epidemiologic transition in which a "second public health revolution" has shifted the focus of medicine from infectious disease control to chronic disease control. (2,3,4)

Affirm your belief that the health of a people is measured by more than death rates. As defined by the World Health Organization, health is "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity," (5) and that good health comes from reducing unnecessary suffering, illness, and disability. (6)

Contend that although suffering is difficult to quantify, foodborne illnesses significantly contribute to human suffering and disability. In that respect alone, foodborne diseases deserve the physicians' attention as much as do chronic diseases.

Review the Prevalence of Foodborne Illness

This is the section where you will want to introduce the big numbers, known to the news media as the "Gee Whiz" facts!

At this point, you might ask rhetorically how much foodborne disease *really* exists. Of course, the honest answer is that no one really knows.

For a variety of reasons, you explain, most foodborne disease is never reported. While the Centers for Disease Control (CDC) recorded fewer than 100,000 reported cases of foodborne disease over the five year period 1983-1987, they acknowledge that their data represents only a small fraction of the true number that occur. (7)

The Canadian researcher Ewen C. D. Todd calculated the number of cases of foodborne disease in the U.S. to be 12.6 million per year! (8) Gee Whiz!

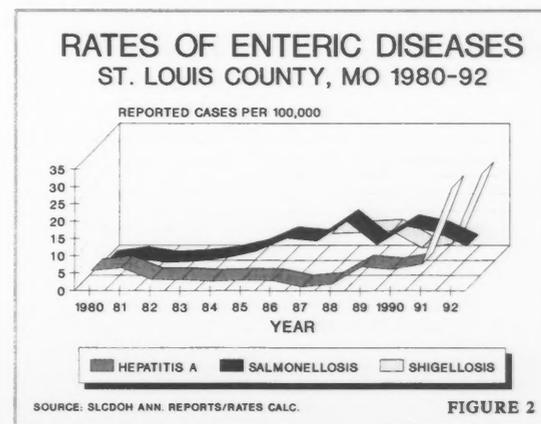
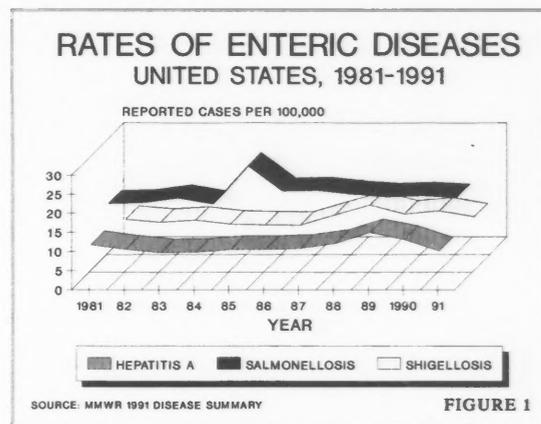
But even that figure seems conservative next to the estimate arrived at by U.S. Food and Drug Administration (FDA) microbiologists Douglas Archer and John Kvenberg who place the number at 24-81 million cases per year! (9) Double Gee Whiz!

The point to make is that *whatever* their true incidence, foodborne diseases appear to be on the rise.

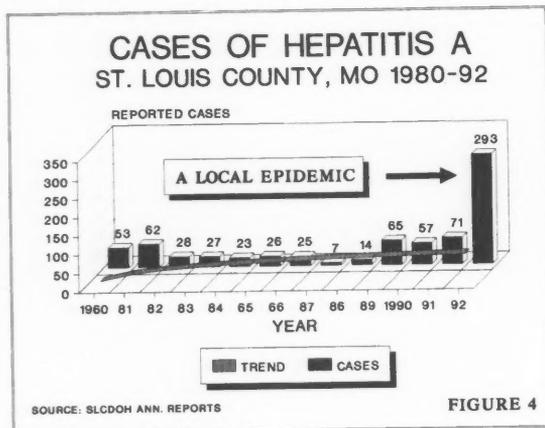
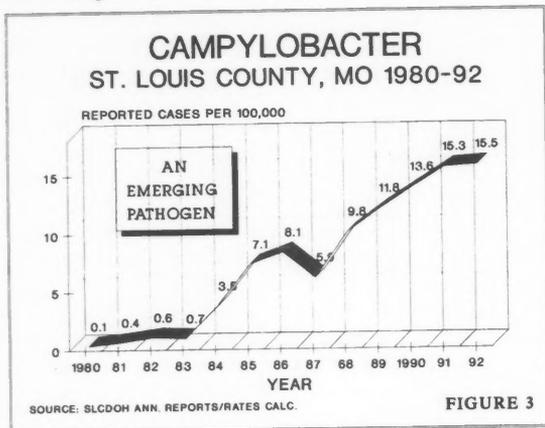
Presentation Graphics

Your paper or presentation should take advantage of the fact that most people are "visual." Accordingly, charts and graphs may be employed effectively to illustrate the ascending rates. What? You're a sanitarian, not an artist? Not to worry. Since the advent of the microcomputer, professional looking charts and graphs can be easily rendered with a program such as Harvard Graphics and a few key strokes.

Additionally, since you will most likely be communicating with local physicians, your graphs or charts should be more interesting if some are derived from local data. You may wish to compare national rates with local rates and to illustrate, if, in fact, the rates of foodborne diseases, are trending upward. (Figures 1 and 2) For additional impact you could include one of the "emerging" foodborne patho-



gens, like *Campylobacter* spp. (Figure 3) Hopefully, your area will not be experiencing a local epidemic, as is St. Louis County. But, if it is, the data will lend itself to an effective chart. (Figure 4)



Interpreting the Data

Many people look upon statistics with suspicion, and physicians are no exception. Therefore, you will appear more credible if you acknowledge that you realize the data should be interpreted with caution. Some increased reporting, you allow, may be attributable to a more aware and/or litigious public; rapidly proliferating restaurants, having more complex menus; more aggressive and better educated epidemiologists; and improved microbiological analyses.

Contributing factors may also arise from the social environment, such as the current vogue to equate raw and undercooked foods with a healthy diet. You might suggest that today's global travel increases one's exposure to disease. Also, in these difficult times, economic disparity may translate into diminished educational levels and socioeconomic status, both of which have a well recognized relationship to increased frequency of enteric infections. (10)

The Patient's Increasing Risk from Foodborne Disease

Now, that you have made the point that rates of foodborne disease are already unacceptable you can intro-

duce the fact that, in time, they will become increasingly formidable.

Despite the present fact that foodborne diseases are infrequently associated with serious consequences, they do pose a life-threatening risk to a growing proportion of our population. A case of salmonellosis or listeriosis, for example, that may cause only discomfort for a healthy adult can be fatal to a geriatric patient or the fetus of a pregnant woman. A case of "simple" gastroenteritis for a normal person may result in life-threatening complications for an individual with AIDS or other immuno-suppressed condition.

These populations at risk are already large and are growing in significant numbers. The Institute of Medicine has predicted the elderly — people over age 65 — are expected to number 50 million by the year 2020, and constitute 13 percent of the population. By 2030 they are expected to constitute 22 percent of the population, and the most rapid population increase of the next decade will be among those over 85 years of age. (11)

The AIDS-afflicted population will have grown to 1.4 million by the year 2000; and persons seropositive for HIV are accumulating by some 42,000 cases per year. (12)

Infants and young children will, in increasing numbers, be "eating out" more than ever before. That is, every mother who works must now face the problem of child care. Indeed, the proportion of women in the labor force with children under age 18 more than doubled to 60% from 1947 to 1982. (13)

Even for healthy adults, for whom foodborne illness had formerly been considered a self-limited disease, the risk of long-term consequences may be great. Archer, for example, makes strong cases for foodborne diseases leading to long term chronic illnesses, such as reactive arthritis and atherosclerosis. (14,15)

A Simple Key to Keeping their Patients Well

Partially in response to the needs of the aforementioned subpopulations, *Healthy People 2000*, the government's 300 point plan to improve the health of Americans over this decade, includes explicit objectives for the improvement of food protection. (16) Specifically targeted are the foodborne pathogens *Salmonella* spp. and *S. enteritidis*; *Campylobacter jejuni*; *E. coli* O157:H7; and *Listeria monocytogenes*. Key to risk reduction for these diseases and other foodborne diseases is one simple objective:

Increase . . . the proportion of households in which principal food preparers routinely refrain from leaving perishable food out of the refrigerator for over 2 hours and wash cutting boards and utensils with soap after contact with raw meat or poultry.

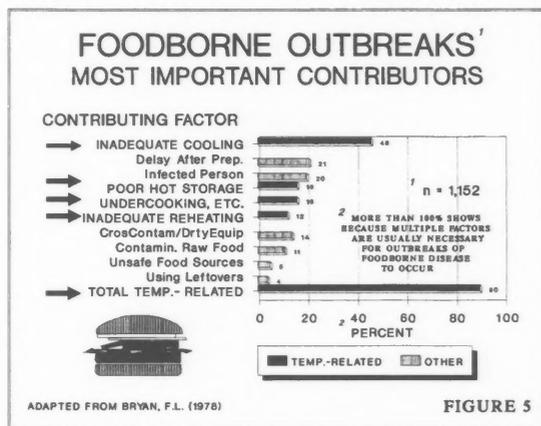
If you can convince physicians to educate their patients to adhere to this one easy-to-follow objective, the patient's risk from foodborne illnesses will be reduced substantially.

The "Essential Factors" Revisited

Earlier, you had confirmed that two factors predominated among the antecedents of foodborne illnesses. Now,

you may wish to focus on the most critical of these, time and temperature.

When the CDC microbiologist, Dr. Frank Bryan, analyzed foodborne outbreaks reported in the U.S. from 1961 to 1976, he found that various time-temperature abuses of foods were implicated in 90% of the outbreaks. (17) Of these, inadequate cooling practices (either cooling food in a large pot in the refrigerator or failure to refrigerate) were found to be the major contributors. (Figure 5)



Hopefully, members of local health departments already communicate that important message to consumers through news releases, appearances before the electronic media, and through presentations to schools and clubs. However, you should point out that physicians can have an even greater impact by counseling their patients before an episode of foodborne illness, or even afterwards, when the patients' motivation to stay well may be at its greatest. At this point you may offer the services of your organization to provide any additional information required by the physician or his/her patient.

Take the Bushel Off the Light

Don't be shy about the accomplishments of your organization. Aside from the possible "Gee Whiz" facts, like "we perform 15,000 restaurant inspections per year," the things you do routinely and probably take for granted are interesting to others.

Is your staff well-trained? Of course, they are. So why not speak of their levels of skills, education and specialized training? If you have regular inservice training, or if your state requires registration or certification for sanitarians, why not apprise the physicians of that fact? Arguably, physicians undergo more continuing education than any other professional group, so highlighting the requirements of your profession should enhance your rapport. Instill in the physicians that you consider professional certification/registration appropriate because the demands of modern technology and the epidemiological problems previously described compel public health sanitarians to be more than just the traditional "restaurant inspectors." It is essential that the public health sanitarian engaged in food control work possess experience, training, and common sense to be effective at protecting the health of the public.

Physicians' Role in Evolution of Food Safety Laws

In the U. S., Federal standards provide the foundation for most local restaurant ordinances, and many of these are based on the 1976 revision of the *FDA Model Food Service Sanitation Ordinance and Code*. (18) This 1976 revision is the most recent of several since the U.S. Public Health Service developed the first ordinance and code in 1940. Two other major revisions occurred in 1943 and 1962.

The codes are and must be continuing, dynamic processes. In the long periods between revisions of the federal code, the FDA processes new information from a variety of scientific disciplines and, when warranted, issues new interpretations, which are then implemented locally.

In point of fact are recent interpretations involving "potentially hazardous foods." These are foods which are capable of supporting rapid and progressive growth of infectious or toxigenic microorganisms. These foods, therefore, must be maintained at temperatures below 45 degrees F. or above 140 degrees F. Originally, the definition specifically excluded whole, uncracked eggs. However, this food was deemed risky after major outbreaks of *Salmonella enteritidis* infection led to the discovery that the pathogen could be present within an intact egg.

Much of the impetus for these necessary changes came from physicians who took the time to culture specimens from their patients! In part, because such reports were made, we learned that some of our assumptions about other "no problem" foods were incorrect. Examples of these are baked potatoes, which were implicated in outbreaks of botulism, and cooked rice, which is associated frequently with the emerging pathogen, *Bacillus cereus*. As a result, both foods must now be protected from time-temperature abuse.

A Healthy Tension Between Scientists and Administrators

Now, here is a subject that physicians can really relate to.

You explain that just as allowances for new interpretations were built into the federal code, its provisions were intended to be enforced by persons possessing flexibility and good judgement. Its three broad objectives are: 1) Public Health — protect the food against contamination. 2) Reduce Spoilage — ensure the soundness of food. 3) Aesthetics — meet consumer expectations. Of these three, Public Health is clearly emphasized: "Primary attention should be given to items that contribute most directly to food protection." (18)

Having said that, however, the FDA constructed a 44-item restaurant inspection sheet that, arguably, emphasizes aesthetic factors. For example, despite the fact that temperature abuse of foods causes most foodborne illness, while insects (repulsive though they may be) do not, (Figure 5) the form regards them as almost equally hazardous.

Dr. Frank Bryan attempted to resolve this dilemma by devising an alternative sheet based on epidemiological data and the biology of foodborne pathogens. (19) While this was never officially adopted, the FDA is beginning to teach the "Hazard Analysis" (HACCP) approach, long advocated by Dr. Bryan. (20)

Hopefully, in your jurisdiction, common sense prevails during restaurant inspections. Accordingly, proper food temperatures and frequent handwashing — don't contami-

nate the food and don't give the microbes the conditions for growth — are the principles emphasized by your public health sanitarians.

Legal Aspects

At this point you may want to briefly discuss the legal aspects of your restaurant inspection program, including revocation or suspension of permits, and if applicable, grading. If there is a "sunshine law" in your state or province, and, therefore, inspection sheets are public records, tell the physicians that they and their patients have the right to peruse any record of restaurant inspection.

Be sure to give due credit to the good operators, who definitely are in the majority. As with people in general, most foodservice operators try to do the right thing, but if the physician or his/her patient reads the last inspection report they can more accurately judge the restaurateur's commitment to their health.

A Final Request for Assistance

Solicit the suggestions of your audience and concede that although public health sanitarians try their very best to protect the public health, they need the help of physicians, their patients, and the general public. Despite the fact that your inspections are unannounced, and, hopefully, are frequent, realistically they can provide little more than a "snapshot" of the total process. So if they should experience a problem in a restaurant, or observe a gross sanitary violation, invite them to call you and help you fill in the picture. Announce the telephone number to make a report about a restaurant or to request more information. Managers and other supervisory personnel should be willing to tell how they may be contacted evenings and weekends.

A Suggested Conclusion

Public health sanitarians value the historical alliance between our two professions. It will grow stronger as we continue toward our common goal of health protection. So let us know how we can help you. And thanks for your help.

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NMC to Meet in Syracuse

The National Mastitis Council, in cooperation with the Empire State Mastitis Council, will hold a meeting on Thursday, July 15, 1993 at the Sheraton Inn and Convention Center in Syracuse, New York. The program is targeted toward dairy producers, veterinarians, field staff, suppliers, extension specialists, sanitarians, students, and others interested in udder health, milking management and milk quality.

The program theme is "Alternatives for Managing Clinical Mastitis." Topics include: The Cow's Response to Mastitis; Practical Procedures to Enhance the Cows' Immune Response While Limiting Antibiotic Use; Developing Farm Plans for Clinical Mastitis; Monitoring Clinical Mastitis and Therapy Response; Vaccination Programs for Controlling Mastitis; Antibiotic Alternatives; and Future Ways to Enhance the Cow's Immune Response.

The program begins at 9:30 a.m. and concludes at 3:30 p.m. Registration starts at 8:30 a.m. The registration fee is \$20 in advance; \$25 at the door. Additional attendees from the same farm may register for \$10. Producers who have completed the Milk and Dairy Beef Quality Assurance Program will receive a \$5 rebate.

For additional information, contact Anne Saeman, National Mastitis Council, 1840 Wilson Blvd., Suite 400, Arlington, VA 22201; phone: (703)243-8268; fax: (703)841-9328.

1994 International Exposition for Food Processors to be held November 3-6 in Los Angeles

The Food Processing Machinery and Supply Association's IIEFP '94 will be held Thursday, November 3rd through Sunday, November 6th, 1994 at the Los Angeles Convention Center. This will be the first West Coast IIEFP in five years.

IIEFP typically attracts over 15,000 food and beverage industry personnel from around the world. Over 400 Exhibitors display their products and services, many setting up full-scale operating machinery.

One of the largest food and beverage machinery shows in North America, IIEFP is the cornerstone of concurrent meetings with the National Food Processors Association, the National Beverage Packaging Association, the American Institute of Chemical Engineers and the Society of Manufacturing Engineers.

For more information on IIEFP '94, contact the Food Processing Machinery and Supply Association at 800-833-4337, 703-684-1080 or FAX 703-548-6563

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State Envirothon To Feature Pesticide Education

More than 10,000 Pennsylvania high school students are expected to compete in this year's state Envirothon on June 19 at Pine Grove Furnace State Park. The event enables teams of students to learn more about the environment through hands-on, competitive events.

The winning team will represent Pennsylvania at the national Envirothon competition July 31 - August 4 at Niagara University in New York. Local teams qualify for state competition by winning county-level contests.

Envirothon teams receive study materials on aquatics, forestry, soils, wildlife and current issues. The team adviser, usually a teacher, can integrate these materials in a science or agricultural science curriculum or teach them through clubs or other activities.

This year's materials feature a pesticide education curriculum developed by Kerry Hoffman, pesticide education coordinator in Penn State's Office of Pesticide Education, with support from the Pennsylvania Department of Agriculture.

"The curriculum helps teachers explain the issues while helping students develop a better understanding of the risks and benefits associated with pesticides" Hoffman says. "It covers topics such as the fate of pesticides in the environment, pesticide residues and tolerances, alternative control tactics and integrated pest management."

Hoffman hopes the material will be used in many high school science and agriculture courses. "Integrating a pesticide education unit into existing science and agriculture curricula enables students to make their decisions regarding pesticides and food safety based on facts, not emotions," she says.

The course examines the history of pesticides and principles of pest control. "We've had pesticides as long as we've had pests," Hoffman says. "The earliest use of chemicals as pesticides dates back to 2500 B.C., when the Greeks burned sulfur to control insects and mites."

The curriculum explores pesticide terminology, the registration process for introducing a new pesticide and federal and state laws regulating pesticide use. Students learn about levels of toxicity and risk, the four possible ways pesticides can enter the body, general symptoms of pesticide poisoning and appropriate first aid. They also learn how to reduce human and environmental exposure to pesticides.

The first local Envirothon competition was held in 1979 in the Fulton, Luzerne and Schuylkill conservation districts. In 1984, the first state competition was held at Shaver's Creek Environmental Center in Centre County, with six teams competing.

By 1992, the program had grown to include more than 10,000 students from 56 of Pennsylvania's 67

countries. Interest also has spread outside the state. In 1988, a National Envirothon competition was initiated. More than 20 states now participate.

To learn more about the Envirothon contact Jenny Pyers at the Envirothon Office, 225 Pine Street, Harrisburg, PA 17101, or call (717)238-4998. The event is sponsored by the Pennsylvania Association of Conservation Districts and the State Conservation Commission.

Outbreak of *E. coli* Contamination Leads FSIS to Respond With Plan of Action

While it wasn't the first such occurrence, the recent *E. coli* 0157:H7 outbreak which killed two and sickened hundreds in the Pacific Northwest will have lasting effects on the U.S. food inspection system, said Jill Hollingsworth, D.V.M., assistant to the administrator of the U.S. Department of Agriculture's Food Safety and Inspection Service.

Hollingsworth, who has led the coordination of FSIS's *E. coli* initiatives, discussed the history of the outbreak and detailed FSIS plans to improve the current system of inspection at an Animal Health Institute Food Safety Network meeting held April 7.

On U.S. Secretary of Agriculture Mike Espy's first day in his new position, a group of USDA officials discussed the *E. coli* outbreak, Hollingsworth said. The first step was to discourage finger-pointing and to look at food safety as a shared responsibility.

"Industry's response to this crisis has been one of extreme concern," according to Hollingsworth. "They have responded with total cooperation, asking what do you want us to do?"

The initial response from consumers, however, was outrage, followed by a distrust of the current inspection system, Hollingsworth said.

With the spotlight on food safety, FSIS is looking at ways to improve the current system of food inspection. Restructuring the inspection system in a significant way could take years, however, Hollingsworth said. In the meantime, USDA is shifting its focus from visual inspection to invisible detection. Through its Pathogen Reduction Program, USDA hopes to address pathogens in food production from farm to table.

But the fundamental problem is that entirely eliminating pathogens in the meat supply is virtually impossible, said Martin Terry, AHI's vice president, scientific activities. Animal tissue is an excellent place for bacteria to grow and reproduce. As a result, there are limits to what the FSIS can do through inspection alone to eliminate the risk of foodborne contaminants, Hollingsworth and Terry said.

Both Hollingsworth and Terry agree that safeguarding the food supply is everyone's responsibility -- from

government, producers, processors and distributors, to restaurants and people preparing food at home.

"The only way to achieve the concept of sterile meat is to require that all meat products be cooked and processed by federally inspected systems," said Hollingsworth. This would mean that raw meat products would not be available to consumers, an idea which would likely be rejected.

Hollingsworth said FSIS is considering safe handling labels on all raw foods. The proposed labels would contain information on proper cooking temperatures and other food preparation safety tips. She also said that the agency is exploring several options for treating bacterial contamination including irradiation, organic rinses, and other processing methods.

"No one or no agency can do everything to ensure that food is free from contamination," Terry said. "Proper hygiene, cooking and storing techniques are ultimately the best weapons against food contamination."

Earlier in the meeting, AHI's Terry called the recent media reports linking *E. coli* outbreaks to the use of antibiotics in animal feed as "journalism as science fiction."

Terry said the argument hinges on three premises. The first is that the prolonged use of antibiotics causes bacteria to develop resistance to the antibiotics. Second, that such resistance in the intestinal bacteria of animals is then transferred to humans when they eat meat. The third premise is that there is a link between resistance to antibiotics and increasingly virulent strains of bacteria such as *E. coli* O157:H7. While the first premise is valid, its relevance to the use of antibiotics in animals has not been shown to be relevant to the development of resistance in human pathogens. There is no evidence to support the second or third premises despite decades of research by leading microbiologists, Terry said.

AHI represents manufacturers of animal health products -- the pharmaceuticals, vaccines and feed additives used in modern food production, and the medicines that keep pets healthy.

For more information please contact the Animal Health Institute, Food Safety Network, 501 Wythe Street, Alexandria, VA 22314-1917, (703)684-0011, or FAX (703)684-0125.

Ensuring Food Safety -- The HACCP Way

This publication was developed as a special USDA project to provide an introduction to deli managers on how to implement the Hazard Analysis Critical Control Point concept in their store.

Especially designed for managers of retail delicatessens, this booklet is also broadly useful throughout the food industry as an introduction to HACCP and a comprehensive guide to resources on the subject. The booklet first introduces the HACCP concept and then describes the preparation of seafood salad as an example of how to apply the seven HACCP steps. This 40 page

guide also includes flowcharts and critical control points for selected deli foods, a list of available training materials, and a bibliography.

If you are interested in obtaining additional copies, they are available at \$1.00 each. Please make check payable to: Regents of the University of California and send your request to: Robert J. Price, Ph.D., Food Science & Technology Department, University of California, Davis, CA 95616-8598.

Government Publishes Summary of the Food Chemical Surveillance Programme

The Ministry of Agriculture, Fisheries and Food today published the latest progress report summarizing the results of its food chemical surveillance programme during 1989 to 1992.

The Ministry undertakes food surveillance to ensure that the consumer receives a safe and nutritious food supply. Food surveillance is an extensive series of checks; sampling and analysis undertaken to identify and evaluate potential problems concerning the chemical safety of the UK food supply. Action is taken to protect the safety of the food supply whenever problems are identified.

This report describes the programme overseen by the Steering Group on Chemical Aspects of Food Surveillance and complements the 11 Food Surveillance Papers of its individual working parties published since the last summary report in 1989. The regular publication of these data in Food Surveillance Papers ensures that the results of the food surveillance programme are open to public scrutiny and debate.

The report is divided into distinct sections which summarize the work of its 10 working parties during this period. This work covers a broad range including natural toxicants, nutrient content, dietary surveys, contaminants and residues from the use of pesticides and veterinary products.

In addition, this report describes the important developments which have been made in surveillance methodology since the previous progress report and emphasizes the importance of estimating intakes of chemicals from food in the processes of risk assessment and risk management. It also describes the uses which are made of this food surveillance information including its contribution to the UK's role in the development of international food chemical surveillance programme.

Notes for Editors

1. Copies of the thirty-fifth report of the Steering Group on Food Surveillance, "Food Surveillance 1989 to 1992" can be obtained from HMSO (071-873-9090) or through booksellers, price £ 7.00, quoting ISBN 0 11242944 0.
2. The Steering Group on Chemical Aspects of Food Surveillance is at the heart of the monitoring of

chemical safety and nutritional adequacy of the UK food supply and works closely with other committees that advise Government on food safety. The Steering Group directs the necessarily wide range of food surveillance activities and related research and development through the work programmes of its working parties which cover the 11 broad areas making up the Steering Group's current programme. Reports from the Steering Group and its Working Parties are published regularly as Food Surveillance Papers. A list of earlier reports is given at the front of Food Surveillance Paper No. 35. An earlier report (Food Surveillance Paper No. 24, HMSO 1988) provides details of the Steering Group's food surveillance programme during 1985 to 1988.

3. A booklet, 'Food Protection', available free of charge from Food Sense, London SE99 7TT, provides a straightforward guide to current food chemical safety work carried out by central government. A video on food chemical surveillance, 'Food Watch on Chemicals', was recently issued for use in secondary schools and is available from CVL Vision, PO Box 35, Wetherby LS23 7EX.
4. The Steering Group's 10 working parties referred to in the report cover the following areas:

- Chemical contaminants from food contact materials
- Dietary surveys
- Food Additives
- Inorganic contaminants in food
- Natural toxicants
- Nutrients in food
- Organic environmental contaminants in food
- Pesticide residues
- Radionuclides in food
- Veterinary residues in animal products

In addition a new working party has recently been set up to address the area of food authenticity.

5. The surveillance programme which deals with microbiological safety of food is directed by the Steering Group on the Microbiological Safety of Food (SGMSF), whose establishment was announced by a Department of Health press release on 20 December 1990 and its terms of reference by a further press release on 17 January 1991. The first annual report of the SGMSF is expected to be published later this year.

CVM Advisory Committee Considers BST/Mastitis Issue

FDA is receiving inquiries about a March 31, 1993, meeting of the Veterinary Medicine Advisory Committee on use of Monsanto Company's bovine somatotropin (BST). The committee -- a group of outside experts -- concluded that the increased risk to human health posed by mastitis and resulting use of antibiotics is insignificant and manageable.

The following may be used to answer questions. BST is a new animal drug produced through

biotechnology and intended to increase milk production in dairy cows. It is currently under review by the agency, which has authorized its testing on more than 20,000 cows in the United States over a 12 year period.

In 1990, a special panel of the National Institutes of Health unanimously concluded that BST is effective in increasing milk production and that the composition and nutritional value of the milk from the treated cows are essentially the same as that from untreated cows. The panel also found that the meat and milk from the BST-treated herds in the U.S. tests were as safe to consumers as those from untreated cows.

Last year, a report by the General Accounting Office acknowledged that FDA's review had established BST's effectiveness and that the use of the drug did not appear to pose a direct risk to human health. GAO did, however, raise the questions of a possible indirect hazard due to increased incidence of mastitis, or inflammation of the udder.

For this reason, the meeting was convened to consider whether the increased incidence of mastitis and resulting use of antibiotics results in antibiotic residues in milk, representing a risk to human health.

FDA will consider recommendations of the advisory committee and the consultants, as well as the data and statements provided by speakers in the March 31 meeting, in deciding the next step in the review of Monsanto's somatotropin. The drug will not be approved until all questions are adequately addressed.

For more information contact Susan M. Cruzan at (301)443-3285.

New Guide Highlights Dairy Quality Assurance Guidelines

A comprehensive new brochure is available to help dairy producers understand and comply with the guidelines of the Milk and Dairy Beef Quality Assurance Program.

The free brochure, "Keeping Our Milk Grade A," opens into a 17" x 22" chart providing a quick-reference guide to prescription and over-the-counter drugs approved by the Food and Drug Administration for use in lactating dairy cattle. The chart lists drugs by compound name within treatment categories that are organized alphabetically. Specific information for each drug includes its brand name, milk withholding period, dosage form and its status as an over-the-counter (OTC) or prescription drug.

"This is a convenient, easy-to-use guide to which producers, veterinarians, feed dealers and others who recommend, prescribe or administer drugs can determine the appropriate use of a drug on their dairy herds," explains Cynthia Belgorod of Pfizer Animal Health, which produced the brochure. "The chart can be posted on a wall in a milk parlor, treatment room or veterinary clinic, so a producer or veterinarian can quickly refer to it as they're preparing to administer treatment."

The brochure also includes an explanation of the Milk and Dairy Beef Quality Assurance Program, a review of the 10 steps producers should observe to comply with the program guidelines to keep violative drug residues out of milk and help ensure the safety of the nation's milk supply, and a procedure for obtaining additional information about the program. The National Milk Producers' Federation and the Milk and Dairy Beef Quality Assurance Center cooperated with Pfizer Animal Health in the preparation of this brochure.

The national organization of Women Involved in Farm Economics (W.I.F.E.) has agreed to distribute the brochure as part of its educational programs. "The information is useful to everyone involved in the dairy industry and the brochure is straightforward and easy to understand," comments organization president Joyce Spicher. "It provides valuable help for everyone whose goal is to keep milk pure and wholesome."

Up to five copies of the brochure are free by writing to:

"Keeping Our Milk Grade A"
Pfizer Animal Health
P.O. Box 565
Horsham, PA 19044-9670

The same address can be contacted for information about bulk distribution.

Pfizer Inc. is a research-based, diversified health care company with global operations. The company reported sales of \$7.23 billion for 1992.

The Life and Duties of a City Sanitarian

Kevin Anderson, the city sanitarian for Ames, was having another long day.

"The Maintenance Shop is my third inspection this afternoon and they have no idea that I am going to inspect them today," said Anderson. "Let's see how things are going."

He walks up to Tony Zagar, M-Shop manager, shakes his hand and asks if his place is ready to be inspected. "Give me a minute before you start," said Zagar.

"No problem---a minute," said Anderson.

Anderson has been Ames' city sanitarian for a little more than 10 years. He inspects 145 food service businesses twice a year and performs yearly inspections of local school cafeterias and concession stands.

Ames restaurants score high on the state mandated inspections and Anderson is excited about new efforts being made by the Food and Drug Administration to correct some communication problems he has had with several ethnic restaurants.

Overall, Anderson said he is pleased with the level of commitment being shown by area restaurants to continually improve and work harder. He said Ames restaurants do a fine job and he stands behind their quality.

"I would be more than willing to put my food services against anybody in the state," said Anderson. "We really have been faring well in the last five years."

Competition and the addition of several educational seminars and program help are the two reasons the high marks are being received, said Anderson.

"All the competition we have here really keeps all the places on their toes," he said.

The voluntary eight-hour program is done at least twice a year and has certified 250 people in the last four years, said Anderson. Anyone in the food service business, from cooks to owners, is eligible to attend.

"Two-hundred fifty people is an excellent number, considering how difficult it is for officials to leave their businesses for the time required."

Back at the Maintenance Shop, Anderson is checking both freezer and refrigerator temperatures. "Yep, the temps are correct, everything is OK," he said, moving on to the units holding hot food. He puts several tiny thermometers into a variety of food dishes and waits a minute. "These guys are really on the ball -- it's almost as if they knew I was coming."

Immediately Zagar interrupts. "Anything wrong?" he said.

"No, nothing," said Anderson. "Did you guys know I was coming? Everything is so clean."

"Shoot, this is how it always looks," said Zagar.

Time and temperature violations of food are the number one thing Anderson looks for. "It is important to make sure the food is the right temperature and hasn't been sitting around too long," he said. "Food can easily become infected and contaminated with bacteria."

The recent Jack-in-the-Box epidemic provides a perfect example of mismanaged contaminated meat, he said. "Those people who ate the contaminated meat were really hurting," said Anderson. "So I am really tough on food services to make sure they are constantly checking temperatures."

Time and temperature violations are just two areas Anderson must fill out on an inspection form consisting of 44 items. But the number 44 is deceiving, he said. "I really probably look for more than 500 things on most inspections."

On the inspection form, there are 15 general areas he checks, ranging from food protection to insect, rodent and animal control.

Under these general areas is a list of items which Anderson must check off during his inspection. On this list are items and the point value for each item. Point values range from one to five, and each item with a point value of five is labeled a critical item. These items are very important and they range from personnel with infections being restricted to the proper labeling and storage of toxic items.

At a typical inspection, he also checks to make sure the food came from a licensed and inspected source. "We cannot allow someone to bring in home-canned food," he said. Anderson also looks for spoilage.

He then proceeds to make sure employers and employees are using proper and clean hygienic practices.

"I just like to stand in the corner and silently observe people," he said. "Just to make sure nobody is picking their nose and then not washing their hands. I also watch for smoking."

To pass an inspection, a food service establishment must earn a score of 76 out of 100 possible points.

A score below 76, but one above 59, requires a follow-up check by Anderson during the next two weeks, he said.

Scoring below 59 means the business has just 48 hours to address everything that was marked against them, said Anderson. If the follow-up check results in a score 59 or lower, Anderson can place a huge sticker saying "Poor" on the main window explaining the circumstances and conditions in the restaurant, he said. He then can move to have the restaurant temporarily shut down to make the needed adjustments.

Most cases don't reach that final phase, said Anderson.

"Before something like that happens, we bring them in for a hearing and both sides have a chance to understand the happenings."

This is why the critical items are so important, said Anderson.

"Most places don't get a low number because of some huge outbreak of rats and mice, or some other terrible thing," he said. "It is because they slacked off in a few areas, like not washing hands," he said.

Anderson is finishing tabulating the score for the Maintenance Shop.

"Well, it looks like everything is in good shape here," said Anderson. "I'm really impressed -- these guys are doing a good job." The M-Shop scores a 96.

And thanks to some efforts by the Food and Drug Administration, Anderson's problems communicating with some ethnic restaurants may soon be over.

"In the past, I've always had some really tough times explaining to some ethnic restaurant owners what needs to be done," he said.

"I didn't always understand them and vice versa." But help is on the way.

Anderson just received a packet from the FDA titled "FDA's Model Food Ordinance." The packet discusses the health codes and requirements at length, and has been translated into Spanish, Korean, Chinese and Vietnamese.

"The parts where I encountered some problems have now been translated into something they can read and understand," he said. "I'm excited as hell. This could mark the end of some of the problems."

And several ethnic restaurant owners and managers look forward to the new translated code.

"This will be nice," said Li-Jen Hung, co-owner of the Wok In, 3417 W. Lincoln Way. "Sometimes it was really hard to follow his suggestions because I could not always understand him."

The manager of the Mandarin Restaurant, 415 Lincoln Way, is excited about the new translated codes. "Oh, I understand English perfectly," said David Pei. "But this will definitely help those owners who don't."

Turning to the best and the worst restaurants in Ames, Anderson said The Hospitality Shop in Mary Greeley Hospital is the cleanest food service establishment in Ames. "It is a nice little place that serves sandwiches and soup," he said. It scored a 97 on its last inspection.

The cleanest fast food establishment was a tie between McDonald's and Burger King, said Anderson.

Among the pizza places, Great Plains Sauce & Dough Company and Pizza Pit are the two best. They earned scores of 93 and 97 respectively on their last inspections.

And the cleanest ethnic restaurant is Le's Vietnamese Restaurant. It scored an 88 on its last inspection.

But on the other hand...

The titles of the dirtiest restaurants in Ames go to the Wok In and Hardee's, 309 S. Duff Avenue, said Anderson. "I've had numerous recurring problems with those two."

Char Beebe, manager of Hardee's, responded to the accusation.

"This is a very old building and there are some things we can't do a whole lot about," said Beebe. "Remodeling will help, but we have so many things going against us."

Hardee's scored a 96 on its last inspection on November 12, 1992. This inspection was a follow-up inspection resulting from the 73 it previously earned. The October inspection listed problems with toxic chemicals being marked and stored improperly and a problem with insect, rodent and animal control, according to the report.

The Wok In scored a 92 on its last inspection on August 11, 1992. This was again a follow-up inspection because of a 61 earned on a previous inspection, according to the results. The July inspection listed trouble with the critical items of food protection and temperature requirements and the incorrect labeling and storing of toxic chemicals.

"We are working harder to improve," said Jen-W-Hung, co-owner of Wok In.

Anderson feels many restaurant owners view him as too demanding.

"People always say I am too demanding and that I am an asshole," he said. "My response is that I just do my job and enforce the code."

Anderson said he has few problems dealing with restaurant owners and managers now, but he did when he first started in Ames in July, 1982.

"I was the new inspector on the block and it took a while for the food establishments to get used to my style of inspecting," he said.

Slow business activity sometimes leads to problems though.

"When business is really slow and terrible, businesses end up laying people off," said Anderson. "And as a result of that, most restaurants don't tend to clean as well during this period."

"Everything goes in cycles."

Dan Heuertz, owner of People's Bar & Grill, 2428

Lincoln Way, has received several low scores from Anderson. He said it is tough to please Anderson all the time.

"It is kind of disheartening to try your hardest on a daily basis and yet still receive a low score," said Heuertz. "It costs time and money trying to keep up with Anderson.

"But, if you are going to be in this business, you have to live up to the demands."

Beebe said being demanding is part of Anderson's job.

"What he demands is nothing that shouldn't be

demand," Beebe said. "I have the utmost respect for what he does.

Anderson has only given out two perfect scores in his 10 years here in Ames. And it hasn't happened recently.

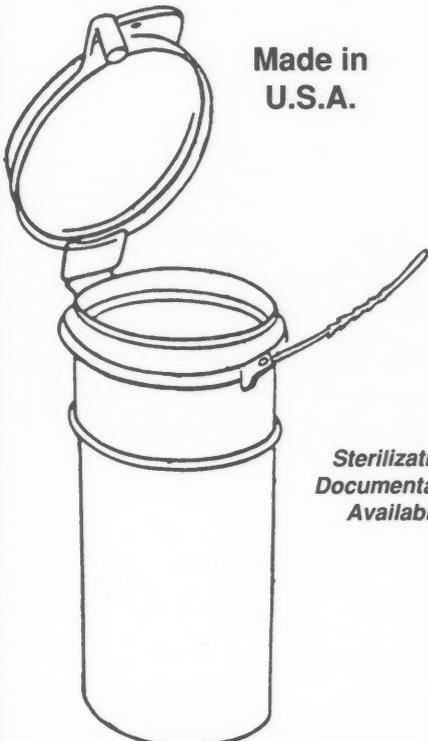
"There are never zero violations," said Anderson. "That is just the nature of the business -- there is always something.

"ALWAYS."

Reprinted from the Iowa State Daily, Friday, April 16, 1993.

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Federal Register

Department of Transportation

Research and Special Programs Administration

Safeguarding Food From Contamination During Transportation

Agency: Research and Special Programs Administration (RSPA), DOT.

Action: Notice of proposed rulemaking (NPRM).

Summary: RSPA is proposing regulations addressing the safe transportation of food products in highway and rail transportation. This action is required by the Sanitary Food Transportation Act of 1990 (SFTA). The intended effect of this rulemaking is to increase the level of safety associated with the transportation of food products. This proposal would restrict a cargo tank, tank car, or portable tank to the carriage of either food products or non-food products. RSPA has not identified any nonfood products that are acceptable to be carried in a tank vehicle that carries food products and, therefore, is not proposing an "acceptable nonfood product list." For other motor and rail vehicles, the proposal would forbid the transportation of food products in the same vehicle with poisons, infectious substances, hazardous wastes, or solid wastes (i.e., "unacceptable nonfood products"). However, such vehicles would be allowed to carry unacceptable nonfood products before or after the carriage of food products provided that the vehicle is free of any contaminating residues. The proposal would require any motor vehicle or rail vehicle that has transported unpackaged friable asbestos to be dedicated to the transportation of asbestos and refuse. These Food Safety Regulations (FSR) would not apply to: The transportation of products in farm vehicles, considered implements of husbandry, operated by a private carrier exclusively for agricultural purposes; the offering or accepting for transportation of cardboard, pallets, beverage containers, and other food packaging materials; or the transportation of food products which are packaged in two fully enclosed packagings.

Dates: *Comments.* Comments must be received on or before October 18, 1993.

Public Hearings. Public hearings will be held on (1) June 29, 1993 from 9:30 a.m. till 5 p.m. in Washington, DC; and on (2) September 13 and 14, 1993, from 2 p.m. till 5 p.m. on September 13, 1993, and from 9 a.m. till 5 p.m. on September 14, 1993, in Chicago, IL. Hearings may conclude before 5 p.m. and the second day of the hearing (September 14, 1993) may be cancelled if all persons wishing to give oral comments have been heard.

Addresses: *Comments.* Copies of SFTA may be obtained from the Superintendent of Documents, Government Printing Office, Washington, DC 20402-9371 (202)275-2091. Comments to this NPRM should be addressed to the Dockets Unit, Research and Special Programs Administration, U.S. Department of Transportation, Washington DC 20590-0001. Comments should identify the docket and be submitted, if possible, in five copies. Persons wishing to receive confirmation of receipt of their comments should include a self-addressed stamped postcard showing the docket number (i.e., Docket FS-1). The Dockets Unit is located in room 8421 of the Nassif Building, 400 Seventh Street, SW., Washington DC 20590-0001. Telephone: (202)366-5046. Public dockets may be reviewed between the hours of 8:30 a.m. to 5 p.m., Monday through Friday.

Public Hearings. The public hearings will be held in the following locations: (1) June 29, 1993, at the Federal Aviation Administration's Auditorium, 3rd Floor, 800 Independence Avenue SW., Washington, DC 20591; (2) September 13 and 14, at the Federal Aviation Administration Building, 2300 East Devon Ave., room 166-170, Des Plaines, Illinois, 60018.

Any person wishing to present an oral statement at the public hearing should notify John A. Gale, by telephone or in writing, at least two working days prior to the public hearing. Each request must identify the speaker; organization represented, if any; daytime telephone number; and the anticipated length of the presentation, not to exceed 10 minutes. Written text of the oral statement should be presented to the hearing officer prior to the oral presentation.

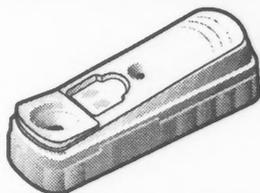
For further information contact: Edmund J. Richards, (202)366-0656, Interagency Coordinator for Hazardous Materials Safety, or John A. Gale, Office of Hazardous Materials Standards (202)366-8553, RSPA, U.S. Department of Transportation, 400 Seventh Street SW., Washington, DC 20590-0001.

Supplementary Information:

I. Background

On November 3, 1990, the President signed the "Sanitary Food Transportation Act of 1990" (SFTA; 49 App. U.S.C. 2803-2812), which requires the Secretary of Transportation (Secretary) to promulgate regulations to promote the safe transportation of food products. SFTA was enacted in response to Congressional findings that: (1) Americans are entitled to receive food and other consumer products that are not made unsafe as a result of certain transportation practices; (2) the American public is threatened by the transportation of products potentially harmful to consumers in motor vehicles and rail vehicles that are used to transport food and other consumer products; and (3) the risks posed by such transportation practices are unnecessary, and such practices must be terminated. Congress expressed concern relative to practices including the transportation of wastes

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or potentially harmful nonfood products in the same vehicles that carry food, food additives, drugs, devices, and cosmetics, as defined in the Federal Food, Drug, and Cosmetic Act (hereinafter referred to collectively as "food products"), and the backhauling of chemicals or other potentially harmful nonfood products in cargo tank motor vehicles, rail tank cars, and tank trucks that also haul food products.

On February 20, 1991, DOT published a final rule in the Federal Register (56 FR 6810) which delegated the authority to issue the regulations to be promulgated under SFTA (i.e., sections 4, 5, 6, 7, and 8) to the Administrator of RSPA. In addition, the Federal Highway Administration (FHWA) and the Federal Railroad Administration (FRA) were delegated the authority to enforce, in their respective modes of transportation, SFTA and the regulations issued under SFTA (i.e., sections 9, 10, 11, 12 and 13 of SFTA).

On February 20, 1991, RSPA also published an advance notice of proposed rulemaking (ANPRM) in the Federal Register under Docket No. FS-1 (Notice No. 91-1; 56 FR 6934). The purpose of this notice was to solicit public comments on regulatory options concerning SFTA. RSPA received over 125 comments in response to Notice No. 91-1 from a wide range of entities likely to be affected by the requirements of SFTA. The ANPRM included more than 40 questions, but commenters were not limited to responding to those questions. The questions posed in the ANPRM and the comments received in response to the ANPRM concerned (1) scope; (2) acceptable nonfood products; (3) unacceptable nonfood products; (4) dedicated vehicle products; (5) communication standards; (6) materials of con-

struction for cargo tanks, rail tank cars and tank trucks; (7) minimum insurance or liability requirements; (8) waivers; and (9) other related issues.

In response to the President's January 28, 1992 announcement of a Federal regulatory review, DOT published a notice on February 7, 1992 (57 FR 4744, Docket RR-1) to solicit comments on the Department's regulatory programs. RSPA received several comments to Docket RR-1 concerning the FS-1 ANPRM.

The underlying theme of most of the comments received to the ANPRM and Docket RR-1 was for RSPA to focus on only the specific issues identified in SFTA and not burden the various affected industries with additional, cumbersome, unnecessary, and costly regulations. They also pointed out that there are many policies and procedures already in place that are consistent with the objectives of SFTA and that they should be used as a starting point wherever possible and practicable. In developing this NPRM, RSPA has considered these comments as they affect costs and operational requirements.

This proposal focuses on those areas where contamination can occur if proper precautions (e.g., cleaning, packaging, commodity separation) are not taken and where sufficient guidelines are not available. These precautions are necessary when there is the potential for a residue being left in reusable bulk packagings that could contaminate a load of food products, or have surface contact with food products.

For the complete article on "Safeguarding Food From Contamination During Transportation", please see the Federal Register/Vol. 58, No. 97, Friday, May 21, 1993, Proposed Rules.

Food and Environmental Hazards to Health

Tetanus — Rutland County, Vermont, 1992

In July 1992, the Vermont Department of Health received a report of a case of tetanus. The last reported case of tetanus in Vermont was in 1987. This report summarizes the case investigation.

On July 12, a 31-year-old woman with left-sided face pain visited the emergency department of the hospital in Rutland. She was unable to open her mouth because of facial muscle spasms and had been unable to eat for 3-4 days because of severe pain and tightness of the jaw. Her attending physician noted trismus and risus sardonicus. She reported that on about July 5 she had walked barefoot in her garden and incurred a puncture wound at the base of her right great toe; she cleaned the wound and removed a few small pieces of wood but did not seek medical attention. On July 8, she had sought medical care from her primary-care physician for severe left-sided facial tightness and pain. She was treated with amoxicillin for presumptive sinusitis, but her condition worsened.

A presumptive diagnosis of tetanus was made in the emergency department, and the patient was admitted to the hospital. When the case was reported to the state health department, the patient's vaccination records were examined. School records indicated that she had been vaccinated with diphtheria and tetanus toxoids vaccine (DT) at ages 6 years 3 months, 6 years 5 months, and 8 years 3 months. Although she recalled receiving a tetanus booster at age 14 years, this could not be confirmed by school records or her physician.

On the basis of her clinical presentation and tetanus vaccination history, she was given tetanus toxoid, 3250 IU of tetanus immune globulin, and intravenous penicillin. Her puncture wound was thoroughly debrided; several additional small pieces of wood were removed. Although she was treated for muscle spasm, mechanical ventilation was not required. At the time of discharge 15 days later, she had difficulty performing simple tasks, such as tying shoelaces.

Editorial Note: Tetanus is a clinical diagnosis based on acute onset of hypertonia and/or painful muscular contractions (usually of the muscles of the jaw and neck) and generalized muscle spasms without other apparent medical cause (as reported by a health professional). Tetanus is caused by tetanospasmin, an exotoxin produced by *Clostridium tetani* spores, which are ubiquitous in the environment and enter the body usually through a wound;

proliferation of bacilli under anaerobic conditions results in the production of tetanospasmin.

Worldwide, tetanus is a problem among nonimmunized or underimmunized persons. In developing countries, where aseptic perinatal care and vaccination programs may not reach all risk groups, tetanus is one of the most important causes of neonatal mortality. In comparison, tetanus had become rare in the United States. Universal childhood vaccination with diphtheria and tetanus toxoids and pertussis vaccine (DTP) and widespread use of tetanus toxoid combined with improved wound management have resulted in a decrease in tetanus reported in the United States from 560 cases in 1947 (when national surveillance began) to 57 cases in 1991. Only one case of neonatal tetanus was reported to CDC during 1985-1991 (CDC, unpublished data, 1992).

Tetanus toxoid is a highly effective vaccine. Protective levels of serum antitoxin are generally maintained for at least 10 years in properly vaccinated persons. After completion of a primary vaccination series, booster doses of tetanus toxoid combined with diphtheria toxoid (as Td) every 10 years are recommended by the Advisory Committee on Immunization Practices. Although the patient described in this report had received a complete primary series of tetanus vaccinations, there was no record indicating she had received booster doses.

Of the 109 tetanus patients for whom complete information was available for 1989 and 1990, 94% were aged ≥ 20 years (CDC, unpublished data, 1992). Older persons are at greater risk for developing tetanus because many have never been vaccinated with a primary series of tetanus toxoid or with booster doses of tetanus toxoid. In 1989 and 1990, of the 57 persons with tetanus and known vaccination status, 45 (79%) had received fewer than three doses of DTP. Another eight (14%) persons had not received a booster dose in the 10 years preceding onset of illness (CDC, unpublished data, 1992).

Wounds such as that of the patient described in this report are common, especially during the summer months. Often such wounds are judged to not warrant a physician or emergency room visit. Establishment and maintenance of adequate tetanus antitoxin levels by administration of primary vaccination and routine booster vaccinations are the only means to avert tetanus. Internists, family practitioners, and other primary health-care providers who treat adults should use every opportunity to review the vaccination status of their patients and administer required vaccines.

Morbidity and Mortality Weekly Report, 10/2/92

Industry Products



Sealkeen® 8400 Series Housing and Filter Cartridge for Sterile Filtration Applications

New Housing Design for Sterile Filtration Applications

The new Sealkeen® SLK8400 Series of sanitary filter housings are introduced by Pall Corporation. Designed for use with Pall Sealkeen style filter cartridges, this housing/filter assembly is ideal for low-volume liquid or air/gas filtration applications. Sealkeen filter housings are typically used for liquid flow rates up to 2 gpm.

A new housing bowl and cover construction, utilizing heavier gauge materials, increases durability and strength. In addition, the maximum operating pressure has increased 50% to 150 psi at 200°F (93°C).

Sealkeen 8400 Series filter housings minimize fluid hold-up volume and have a patented design which eliminates the possibility of fluid by-pass to the downstream side. Conversion of the downstream O-ring to a C-gasket design allows easier installation and greater positive gasket sealing for maximum convenience and reliability.

The Sealkeen SLK8400 Series are available from Pall Ultrafine Filtration Company, which serves the pharmaceutical, biological, bioprocessing, electronics, cosmetics and food and beverage industries. The parent company is Pall Corporation.

Pall Corporation, with annual sales approximating \$700 million, is headquartered in East Hills, New York. The company is the international leader in the design, manufacture and marketing of filters and other fluid clarification devices which serve the Health Care, Aeropower and Fluid Processing markets. The company employs 6,400 people at offices throughout the world with manufacturing facilities in the United States, Puerto Rico, England and Japan. The company's shares are listed on the New York Stock Exchange (PLL) and the London Stock Exchange (0668260).

Pall Ultrafine Filtration Company -
East Hills, NY

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Spectrochrom Introduces Meat Freshness Test Kit

Spectrochrom announces our new meat freshness test kit. Our company has developed QuickKits® for mycotoxins and pesticides. Now using the same principles (even the same hardware), we are making a meat freshness test kit available.

The kit is based on the patented principle which was developed at Iowa State University by Carlos LeBron and is the subject of his Ph.D. thesis. Spectrochrom, Ltd. has developed the principle into a kit, which allows testing for freshness of meat in less than 1 hour. The actual elapsed time depends on technique and will vary with individuals, but the test is much more rapid than any plate count procedure, which would take days. It is based on the principle that cadaverine builds up on the meat as it ages and can be detected by extracting it from the meat. Derivitizing it separates the fluorescent band from others on the planar chromatography surface and estimates the concentration of Cadaverine in the samples. Fresh meat has less than 1 ug/gram and the concentration builds up to 100 ug/gram as meat ages.

Kits are available for \$500.00 complete with reusable hardware and disposables. The hardware portion (\$300.00) subtracted. The cost becomes approximately \$8.00 per test. Kits may be packed in 24, 50, or 100 test equivalents. Refills are available for \$200.00 for 24, \$400.00 for 50, and \$800.00 for 100.

Spectrochrom, Ltd. - Ogdan, IA

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Monarch Computer Database Resolves Membrane Fouling Problems

Monarch Division has developed a computer database for determining and resolving membrane fouling problems. This database is a compilation of field experiences and practices in cleaning membrane units. This valuable, one of a kind resource was introduced at the Practical Short Course on Membrane Separations in Food Processing organized by Engineering Biosciences Research Center - Texas A & M University. This database was compiled by Dr. Gerold Luss, a senior chemist for Monarch. Dr. Luss is a renowned membrane expert and a copy of his presentation is available from Monarch by calling 1-800-328-4594 and asking for Debbie Wolfe. This technology-along with Monarch's full line of Membrane cleaners and programs-will enable you to achieve your membrane system's full production capacity.

H. B. Fuller Company, Monarch Div. -
Minneapolis, MN

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Ice Cream Freezer Offers Advanced Automation

The innovative WS Series, APV Crepaco's newest line of ice cream freezers, offers the most advanced features in process automation, as well as all stainless steel construction to improve plant sanitation.

A fully automatic, user-friendly control option with new front-mounted touch panel and VDU, allows for storing of up to 60 programmed product settings. It also provides precise control and monitoring of viscosity, overrun, capacity, and cylinder pressure; instant readout for all process functions; data bar graph display; alarms and diagnostic messages; as well as synchronization with downstream filling and extruding equipment. The WS Series can also be supplied as manual or semi-automatic models.

The new ice cream freezer is all stainless steel, including the frame, refrigeration jacket and internal piping. Full length sliding side panels allow easy access for routine maintenance. APV's Kwik-Clean, Kwik-Fill system provides pushbutton operation for CIP and features a full-flow pump design to assure thorough cleaning.

Additional features of the WS Series freezer include dasher choices to suite the product; full flooded refrigeration system; and modular groupings of up to three cylinders to match production needs.

Based in Chicago, APV Crepaco has over 100 years of engineering and manufacturing experience. The Company is a leading provider of equipment and systems for heat transfer, mixing/blending, freezing, fluid handling, homogenization, process automation, separation, filling, forming, packaging and wrapping for an entire range of food and industrial process applications. APV also offers system engineering, turnkey operations, technical service support and pilot plant testing capabilities. APV Crepaco's engineering and manufacturing centers and sales and service offices are located throughout the U.S.

APV Crepaco - Lake Mills, WI

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Five Automatic Temperature Compensated Handheld Refractometers

Kernco Instruments Co., Inc. is pleased to introduce four new automatic temperature compensated refractometers to join its Model ATC-M 0-32% refractometer. The new models feature ranges of 0-10% with readability to 0.1% (Model ATC-10), 0-15% with readability to 0.2% (Model ATC-15), 0-20% with readability of 0.2% (Model ATC-20). These refractometers provide a sharp boundary line in the field of view, and an adjustable eyepiece allowing each operator to adjust to individual eyesight. Readings are automatically compensated for temperature between the range of 10-30°C.

The fourth new refractometer is the 0-90% triple scale with readability of 0.2% (Model 400C-ATC). The Model 400C-ATC features heavy duty construction, a metal secondary prism with a light transmitting system, and switch-selectable ranges of 0-42%, 42-71%, and 71-90%. This refractometer can be used in many applications, eliminating the need for a special refractometer for the specific ranges required. The 400C-ATC also has the automatic temperature compensation between 10-30°C, the Amici prism for color elimination to obtain sharp boundary line in the field of view, and adjustable eyepiece.

These refractometers are widely used to measure sugar content of fruit, fruit juice, soft drinks, beverages, and tomato juice, as well as measuring the concentration of aqueous solutions such as cutting oil, quenching oil, and other concentrates.

Units are approximately 6.75" in length and weigh 10 oz. (the Model 400C-ATC weighs 12 oz and is 8" long).

**Kernco Instruments Co., Inc. -
El Paso, TX**

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Porter International Announces Non-Toxic Foul Control Coating System

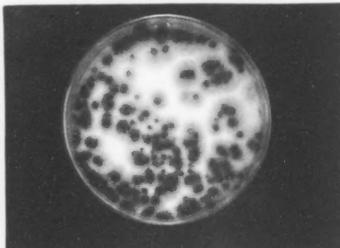
Porter International, market leaders in the high performance coatings and protective linings industry, announces the introduction of INTERSLEEK® Foul Release Coating Systems. This extraordinary new technology is now commercially available, after years of commitment to develop a non-toxic system that provides long term fouling control. This evolutionary chemistry employs NO toxins or biocides normally found in foul control coatings.

Over a properly prepared and primed substrate, Porter International's advanced silicone polymer coating technology provides a low-energy surface, to which fouling has extreme difficulty attaching. Wave action and currents create a self-cleaning effect and any loosely adhered fouling simply falls off under its own weight. Fouling organisms are not killed, they are merely kept from aggressively attaching to the surface--a feature which provides important environmental advantages. With no toxins, there are no regulatory constraints.

Porter International is providing INTERSLEEK® for power plants, inland waterway structures, or any structure exposed to raw water, where plant or animal life can choke up intakes or block piping. The Great Lakes area, for instance, is infested with zebra mussels, which stick to anything they can get their threads on; while the Gulf of Mexico suffers from clinging sea grasses, and the Eastern Seaboard wrestles with hydroids, blue mussels, and other barnacles.

Porter International - Louisville, KY

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Bacto® Special Yeast and Mold Medium

Difco Laboratories now offers Bacto®¹ Special Yeast and Mold Medium, a new agar medium for the detection of airborne microorganisms. Like other mycological media, it can be used for the detection of saprophytic fungi and supports the growth of morphological characteristics used in the identification of *Aspergillus* species. By either adjusting the pH or adding specified antimicrobial agents, the medium will inhibit the growth of most bacteria which could grow as contaminants.

The need for detecting airborne microorganisms in industrial and institutional settings has been recognized and protocols for monitoring and assessing bioaerosols have been developed in the United States by the American Conference of Governmental and Industrial Hygienists (ACGIH) Committee on Bioaerosols. This committee specifies Malt Extract Agar. Difco's Special Yeast and Mold Medium meets these specifications. Some European countries may specify procedures that require the formulation of Special Yeast and Mold Medium.

Special Yeast and Mold Medium is prepared as a dehydrated culture medium in 500 gram packages and is available from leading laboratory supply distributors.

¹Registered trademark of Difco Laboratories, Detroit, Michigan 48232-7058, USA

Difco Laboratories - Detroit, MI

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Walker Now Offers a Sanitary CIP Agitator for Silo Tank Applications

Walker Stainless Equipment Co. Inc., has introduced a sanitary stainless steel CIP agitator for their silo storage tanks. Walker's unique design directs CIP solution flow to clean the agitator blades with pressure from a chamber that is totally free of springs, exposed threads and unsealed crevices. Easy external adjustment assures proper seal compression. Simple removal of all basic components for periodic inspection can be accomplished in less than two minutes. Walker's sanitary CIP agitator is available for new Walker silo storage tanks. Retrofit systems for existing silo tanks are available upon request.

**Walker Stainless Equipment Co., Inc. -
New Lisbon, WI**

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New Salmonella Test Method Receives AOAC Approval

The AOAC Official Methods Board has granted Official First Action for a modified method of performing Organon Teknika Corporation's Salmonella-Tek™ enzyme-linked immunosorbent assay (ELISA). The new, simplified method provides improved test performance.

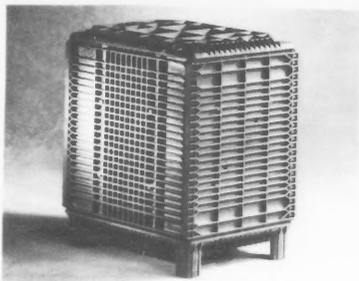
In a 1200-sample comparative study against the BAM/AOAC procedure, the modified Salmonella-Tek™ ELISA method presented no false positives and increased the detection rate of true *Salmonella* positives.

This new AOAC-approved procedure requires incubation at 42°C and the addition of novobiocin to the post enrichment broth. It also eliminates the need for agitation and centrifugation. Laboratories may obtain copies of the modified procedure from Organon Teknika Corporation.

In addition to the Salmonella-Tek™, Organon Teknika's food microbiology line includes a *Salmonella* confirmation test, screening and confirmation tests for *Listeria*, and a new ELISA test for rapid detection of *E. coli* 0157:H7. Organon Teknika Corporation is a unit of the Pharma Group companies of AKZO N.V.

Organon Teknika - Durham, NC

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All-Plastic 640 Cheese Shipper is Accepted by Wisconsin Department of Agriculture

Container also meets new sanitary requirements for whey recovery

The Atlas 640 Shipper™, a rugged, all-plastic, collapsible cheese container, has received acceptance from the Food Division of the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), A.R. Arena Products, Inc. announced today.

The Atlas Shipper also meets newly established DATCP sanitary requirements for use with accepted whey recovery systems. It offers dairy plants a cost-effective alternative to traditional wooden 640 cheese forms, which under DATCP's new policy cannot be used in whey recovery systems after January 1, 1994. With the Atlas Shipper, plants not only can continue to generate whey revenue, but they also can implement whey recovery without having to segregate whey collection streams.

In addition, the Atlas Shipper can help cheese plants better comply with phosphorus and chlorine effluent standards, and reduce waste disposal costs. Under regulations recently approved by the Wisconsin Natural Resources Board, dairy plants that discharge to surface waters or to municipal waste water treatment facilities under the Wisconsin Pollution Discharge Elimination System are required to meet a 1 mg/L total phosphorus effluent standard. By using the Atlas Shipper in a DATCP-accepted whey recovery system, dairy plants can substantially decrease the amount of raw product that is discharged and, as a result, substantially reduce their phosphorus and chlorine emissions.

"The Atlas 640 Shipper has received acceptance from both the Food Division of the Wisconsin Department of Agriculture, Trade and Consumer Protection and the Dairy Division of the United States Department of Agriculture (USDA)," said Tony Arena, president and founder of A.R. Arena Products, Inc. "It provides a single solution for dairy plants that are seeking simultaneously to generate whey revenues and to comply with new, stringent environmental regulations."

The company also announced it will sell other components -- plastic press boards and stainless steel coil springs -- at competitive prices to help dairy plants comply with DATCP regulations. According to DATCP's new policy, wood press plates cannot be used with whey recovery systems after January 1, 1994. In addition, dairy plants must ensure by that date that all springs used are constructed of a non-corrosive material.

The Atlas Press Board, made of FDA and 3A compliant engineering plastic, is accepted by the DATCP and the USDA. Unlike other plastic press boards which are made of .750 inch thick high density polyethylene, the Atlas Press Board is constructed of a material with three times the stiffness, permitting a much thinner, lighter, and more cost-effective design.

"We used our expertise in engineering plastics to design an extremely rigid, durable press board that offers equal or better performance than that of other plastic press boards," said Arena. "By optimizing the use of these high-tech materials, we are able to offer our press boards at a price point unmatched in the industry."

In addition to the plastic press board, A.R. Arena Products will sell stainless steel coil springs. The springs, which are accepted by the USDA Dairy Division, also will be sold at a cost that is lower than current market prices.

A.R. Arena Products, headquartered in Rochester, N.Y., specializes in the complete design, development, and production of material handling containers and pallets, utilizing the most advanced computer-aided-design techniques and thermoplastic technology.

The Atlas 640 Shipper is a registered trademark.

A.R. Arena Products - Rochester, NY

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Compost/Environmental Thermometer

The newly developed Iso-Thermex multiple thermocouple computerized thermometer is capable of monitoring the temperature of compost, soil or water in 1 to 256 points in banks of 16 points with an accuracy of 0.1 deg. C and a resolution of 0.015 deg. C.

The Iso-Thermex is a multi-channel thermocouple interface to IBM-PC compatible computers. It is supplied with software for printing, storing and graphing results of measurements. Optional temperature sensors in a variety of designs are available.

Temperature profiles of soil, compost or water can be performed by the Iso-Thermex using multiple temperature monitoring sites. By adding an optional controller the user can set temperature limits to activate air blowers and other electromechanical devices.

Columbus Instruments - Columbus, OH

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Durable RO Membrane Housings Ensure Long-Term Performance

Combining the proven strength and durability of stainless steel with high quality construction, Osmonics' new RO housings for 2.4-inch spiral-wound separators (membrane elements) offer OEMs and end-users an exceptional value.

These corrosion-resistant separator housing assemblies are comparably priced to PVC and fiberglass housings, yet provide superior long-term performance without warping, cracking or weeping -- problems common to PVC and reinforced plastic (FRP) housings. Precise I.D. tolerances assure a tight separator fit and prevent leakage around seals.

OSMO® 2.4-inch stainless steel housings are lightweight and incorporate easy-to-use features, including a simplified clamp-type end cap closure which provides easy assembly on the machine and quick membrane replacement. The housings are subjected to Osmonics' strict quality control standards.

These versatile housings fit all standard length 2.4-inch membrane elements, including FASTEK™ CTA and PA-TLC™ (Polyamide Thin Layer Composite) separators and other dimensionally equivalent spiral-wound separators.

Osmonics also manufactures a complete range of cartridge filter and separator housings constructed of polypropylene, PVC, steel or stainless steel, as well as custom-designed RO machines and complex water purification systems. **Osmonics, Inc. - Minnetonka, MN**

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Sanitary Design Checklist - Summary

The following checklist is an outline of Sanitary Design columns from the past eight issues of Dairy, Food and Environmental Sanitation.

Donald J. Graham
Senior Food Technologist
Sverdrup Corporation
St. Louis, MO

General

Defining Your Problem Areas

- 1** Has your consumer complaint rate been steadily rising due to foreign materials found in your products?
- 2** Did your last FDA inspection result in a long list of deficiencies on FDA report 483?
- 3** Will your facility require expansion or renovation to meet long-term quality goals and objectives?
- 4** Does your USDA inspector continually request improvements that will require capital expenditures?
- 5** Do you discourage or prohibit plant visitors because you are uncomfortable with the impression the plant would make?
- 6** Has your accident rate increased because of crowded conditions resulting in hard-to-reach areas that require constant cleaning and maintenance?
- 7** Do your quality assurance/quality control sanitation audits continually pinpoint major sanitation deficiencies that can only be corrected by major renovation?
- 8** Are you planning to produce new products that will require a more sophisticated sanitary environment?
- 9** Do you require a new plant or a major renovation conceived, designed and constructed using the best sanitation criteria?

Design-Existing Facilities

Evaluating Your Facilities

- 1** Are critical areas of the plant maintained under positive air pressure to help prevent airborne contaminants, including insects, from entering?
- 2** Are raw materials kept sufficiently isolated from processed products to prevent cross-contamination?
- 3** Is the plant designed to restrict nonessential personnel from passing through processing and packaging areas?
- 4** Are personnel areas and restrooms located so they do not open directly into processing areas?
- 5** Is the ventilation adequate to promptly remove excess steam and odors from the process area?
- 6** Are ceiling areas designed to prevent the accumulation of dirt and debris which could contaminate your food products during processing?
- 7** Is your plant constructed to minimize the entry of insects, birds and rodents and to facilitate the control and elimination of those that do gain entry?
- 8** Is the landscaping designed and laid out to avoid creating harborage and attractions for insects, birds and rodents?
- 9** Is piping exposed over the product stream?
- 10** Do sewer lines run over process areas, raw material, ingredient and finished goods areas?
- 11** Does the roof over the processing areas have a smooth, nongravel surface to permit cleaning?
- 12** Is incoming air filtered to avoid contamination of product stream?
- 13** Are there correctly designed handwashing stations in your process area?
- 14** Have the details of your design been checked against applicable government regulations by a competent engineer?

Walls, Floors, Ceilings

Are They Sanitary?

- 1 Are walls, floors and ceilings made of impervious, easily cleanable, nonpainted, nonpeeling, inert material?
- 2 Are walls free of ledges or, if present, are the ledges slanted at a 60 degree angle?
- 3 Are your walls window-free? If windows are present, are they permanently shut or, if they must be opened, adequately screened?
- 4 Are floor, wall junctions covered with a minimum 1" radius?
- 5 Are dock entries constructed to prevent bird nesting and pest entry?
- 6 Are floors properly sloped to the drains at 1/4" per foot?
- 7 Are the drains constructed for automatic flushing (trench type drains)? Are nontrench drains designed to prevent water retention in or around the drain?
- 8 Are the docks located above grade level to prevent rodent entry?
- 9 Have horizontal surfaces (pipe hangers, beams, duct work) over exposed product areas been eliminated?
- 10 Have drop ceilings been avoided in product processing areas?
- 11 Are ceiling lights adequately protected to prevent glass or other contamination from falling into product due to breakage?
- 12 Is lighting adequate to permit adequate cleanup?
- 13 Are threaded pipe hangers, unistrut, or similar supports prohibited?

Equipment

Is It Designed to be Sanitary and Cleanable?

- 1 Are all food contact surfaces nontoxic, nonabsorbent and corrosion-resistant?
- 2 Are all food contact surfaces approved by the appropriate regulatory agency?
- 3 Are gear boxes, motors, drives or bearings located outside the product zone to avoid product contamination due to leakage?
- 4 Are food-grade lubricants used on food contact equipment?
- 5 Are welded joints continuous-welded, ground smooth and flush in food contact equipment, including pipelines?
- 6 Is all material used for inspection ports, windows and lights made of shatter-resistant material?
- 7 Are all dead ends and cross-connections between processed and unprocessed product eliminated?
- 8 Are sharp corners, cracks, crevices and other hard-to-clean areas eliminated on your food contact equipment?
- 9 Has your organization demanded that equipment vendors provide a system to adequately and easily clean the equipment they provide to your operation?
- 10 Is all product handling equipment located inside buildings or penthouses?
- 11 Is your equipment arranged and located to permit easy access and cleaning, such as at least 6" off the floor, 18" from the ceiling, and 36" from the wall and other equipment?
- 12 Are floor attachments minimized?
- 13 Are off-the-floor racks provided for equipment parts dismantled for cleaning or changeover?
- 14 Are all pipe joints free of fractures?
- 15 Do you have adequate screens, metal detectors or magnetic traps installed to detect foreign materials in your product line?
- 16 Do you fluidize, air convey, or pump to eliminate hard-to-clean screw conveyors, bucket elevators, etc.?
- 17 Do you avoid the use of open grating for catwalks and stairs over processing areas or equipment?
- 18 Is equipment constructed so operators do not have to place their hands in the product zone to adjust the equipment during operation?

HAZCON — Based Total Quality Management

Total Quality Management (TQM) — A System for Safety, Customer Satisfaction and Productivity Assurance Part XIV

O. Peter Snyder, Jr., Ph.D.
Hospitality Institute of Technology and Management,
830 Transfer Road, Suite 35,
St. Paul, MN 55114

The HAZCON-Based TQM Process Components — A Schematic Look at TQM

Looking at the Total Quality Management system in a more schematic way (Fig. 1), one must begin with the output. The objective is to conform to customer quality standards. **The first standard is safe food.** Any deviations in customer quality needs, wants, and expectations are fed back through sales (the server) to management for adjustment and improvement of the recipe, and/or the preparation, holding or serving processes.

Management has the resources and leadership, and must lead the quality improvement program. It uses the feedback information not only from customers but also from employees to improve the processes as well as the input to the processes.

HAZCON is an analysis of the flow of each product from its original growing and production through final consumption to assure safety. In a complete HAZCON program, one must control supplies, methods (procedures), people, equipment, facilities, and environment. To the extent possible, all of these elements should be provided by suppliers with HAZCON-based Total Quality Management programs. In between output and input are the processes by which any microorganisms, chemicals, and hard foreign objects in food are reduced to a level that will not harm the customer. Rocks are removed from beans. Hot dogs are cut into small pieces if used in hot dishes, casseroles, etc. Raw foods are washed to remove chemicals and insects. Food is cooked to reduce infectious organisms to a safe level. These processes typically include hand washing; cleaning cutting boards; cooking thin foods, thick foods, sauces, gravies, etc. There must be a "language" for this process analysis. The sub-elements of a process are tasks. The sub-elements of tasks are steps. Examples of process tasks and steps are:

Processes

- Preparation Processes
- Management HAZCON — TQM manual
- Environment safety assurance and insect, rodent exclusion
- Facility sanitation and maintenance

- Equipment sanitation and maintenance
- Supplier certification of supplies and material
- Personnel training in pathogen control
- Food production, such as for packaging and cooking roasts
- Customer product abuse prevention

Tasks

- Receive — inspect
- Store
- Pre-preparation
- Preparation
- Cooling
- Storage
- Preparation for service
- Cooling and storage of leftovers

Steps (example)

- Steps for pre-preparation;**
- Take meat from storage;
- Trim fat;
- Put into 2-quart casing;
- Vacuum and seal

Food Process Hazard Control Analysis

When one has a background knowledge of hazards and control processes as described in earlier columns, and has integrated the principles previously presented, one can begin the hazard control analysis (Fig. 2). The tasks are listed on the left side of the diagram, Food Process Hazard Control Analysis. The control analysis is on the right. The first tasks begin with employee hand washing, ensuring the safety of the water, taking care of insect and rodent control, and food contact surfaces.

Purchasing standards are then applied. Food is received and stored. It is cut, chopped, staged, and cooked. Production of the food item is completed. The food is then served or used, and leftovers are dealt with properly.

One can see from this diagram how hazard control time-temperature standards have been applied so they can "fit" any generic food process.

HAZCON Procedures Work Sheet

The work sheet, HAZCON Procedures Work Sheet (Fig. 3), has been developed to help people understand the analysis of a process. Let's use the preparation of prime rib of beef as an example. Typically, the process is entitled, "Preparation of Prime Rib of Beef". A series of tasks must be performed in order to convert the raw beef into finished product, serve it, and take care of leftovers. These tasks begin with purchasing, followed by receiving, etc., as listed on the work sheet, ending with leftovers.

Within each task, steps must be performed. For example at receiving, the beef is received and checked for weight, conformity to fat standards, temperature, packaging, and use-by dates. If the beef is acceptable according to these criteria, it is then stored for future use.

Each of the steps is analyzed for hazards, hazard controls how the hazard controls might fail, monitoring and actions to keep the hazards within control limits, action if the hazard is out of control, and the inspection and verification of the self-control program. Referring back to the seven HAZCON principles, (February 1992 column, page 85), one finds that this information reflects what is expected in terms of hazard controls.

Food System — Process Hazard Control and Analysis

Most regulatory agencies' approach to HAZCON has a major fault in that the regulatory sector focuses on records of past processes that government inspectors can scrutinize in order to find mistakes and then criticize operations. This is not a preventive approach. Punishing an operator for a mistake that occurred six months ago, for instance, has no benefit in terms of future zero-defect operations.

Rather, the government needs to review and approve processes before they are started, as is done now with low-acid canned food, acidified food processes, and meat and poultry processes, and then consult with operators to help them achieve zero-defect operations.

Process Pre-Control Documentation for Hazard Control

The correct approach to HAZCON entails an organization finding all of its hazards and then, writing what it believes to be effective hazard control policies, procedures, and standards. Then, a Food Process Authority, who could be a consultant or government official, should be asked to review the process to verify the adequacy of the program. This is the basis for precontrol. Note, this still leaves the requirement for periodic government verification that the organization is following its precontrol hazard control verification.

The three-column approach shown in the table (Fig. 4), Food System — Process Hazard Control and Analysis, is a simplification of the previous seven-column document. It works well for analyzing an existing process to see if it is adequately controlled. The first column is the control process as described by the company in its Policies, Procedures, and Standards QA Operations Manual. Each functional area of control is reviewed by the process safety certifier from management to production methods. Note that one must start with management, since employees only follow management requirements, not government requirements. Each process element will cover:

1. What is to be done
2. How it is to be done so that it is safe, and the time temperature, a_w , pH, Eh of the step(s)
3. What tools, equipment, etc., are to be used, and their specifications for use
4. What supplies will be used, and what standards the supplies will meet
5. How employees will recognize that they have done each task correctly
6. Who will monitor the process
7. What action will be taken by each employee for minor deviations, and what action will be taken by management for major deviations
8. What records will be kept.

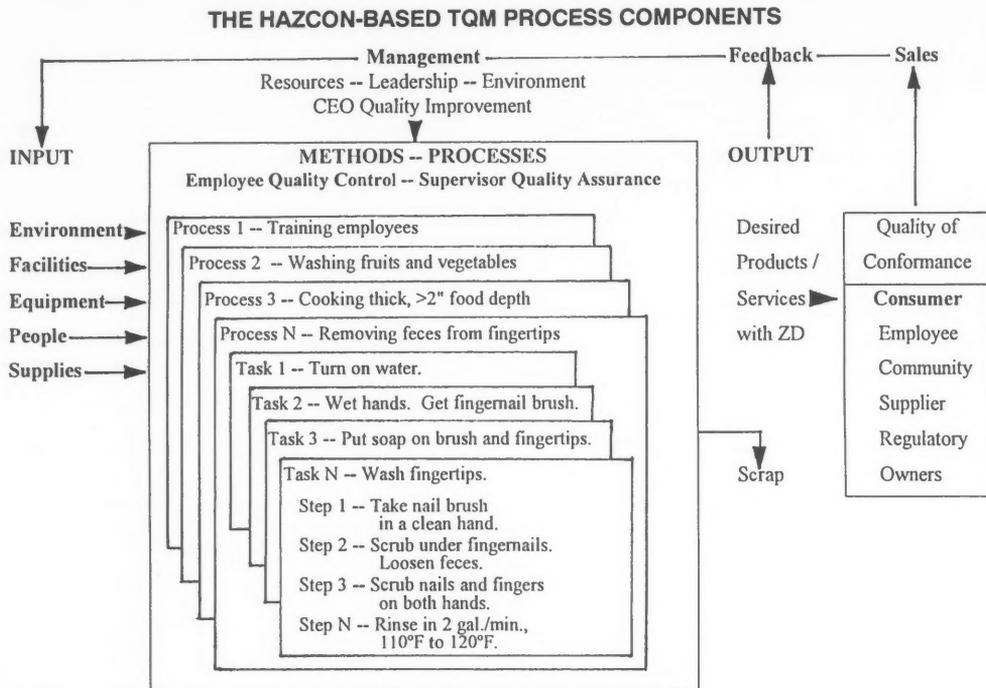
Process Must Meet Minimum Government Safety Standards

The Food Process Authority will then review the process and will agree or disagree with hazard assessment as listed by the company in the second column. While a company may significantly exceed a government hazard control standard (e.g., beef will be given a pasteurization dose of greater than 12.1 minutes at 140°F for a 7D *Salmonella* spp. destruction), it cannot have a lesser standard without proof of hazard control.

The final column is then used by the Food Process Authority to present his or her assessment as to whether the process provides adequate hazard control.

Note, this format is not necessary for hazard control analysis when people become experienced in hazard control analysis. An experienced Food Process Authority can simply read a company's HAZCON-based TQM Policies, Procedures, and Standards manual and recipes (see the previous barley soup recipe, January 1993 column, page 28), and do the hazard determination and control analysis directly from these documents.

FIGURE 1



This figure is representative of TQM Process Components. Depending on the specific situation, there can be hundreds of processes and tasks. N indicates the Nth Process or Task.

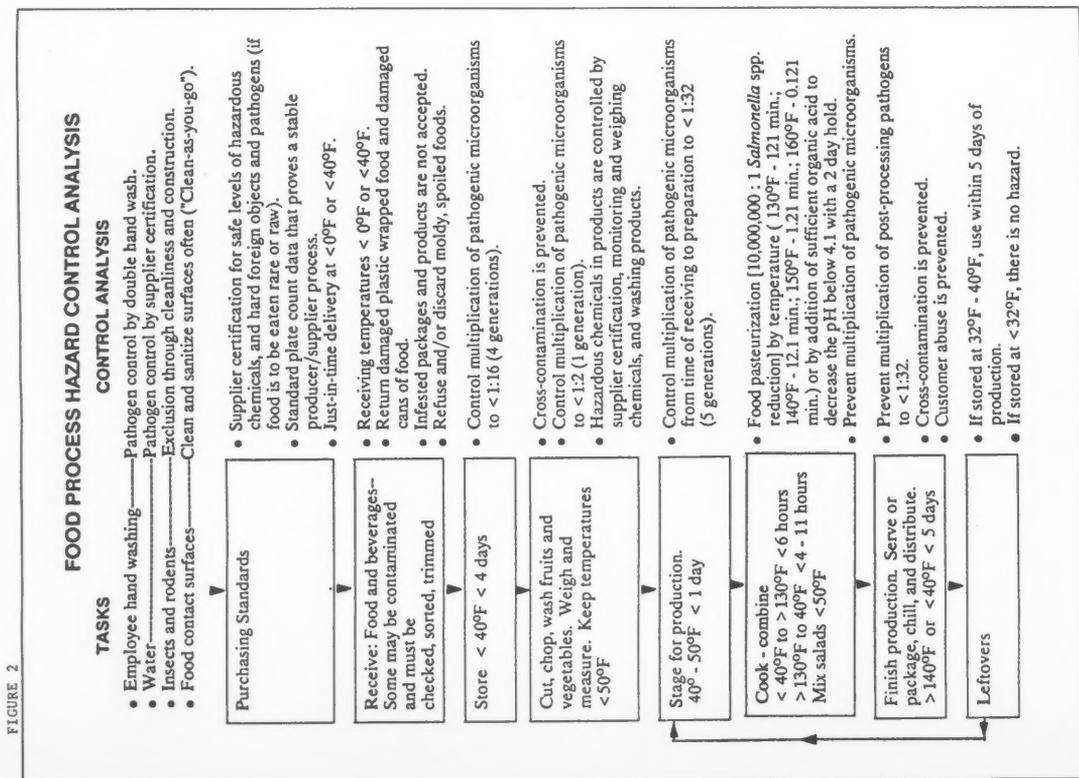


FIGURE 3

HAZCON PROCEDURES WORKSHEET

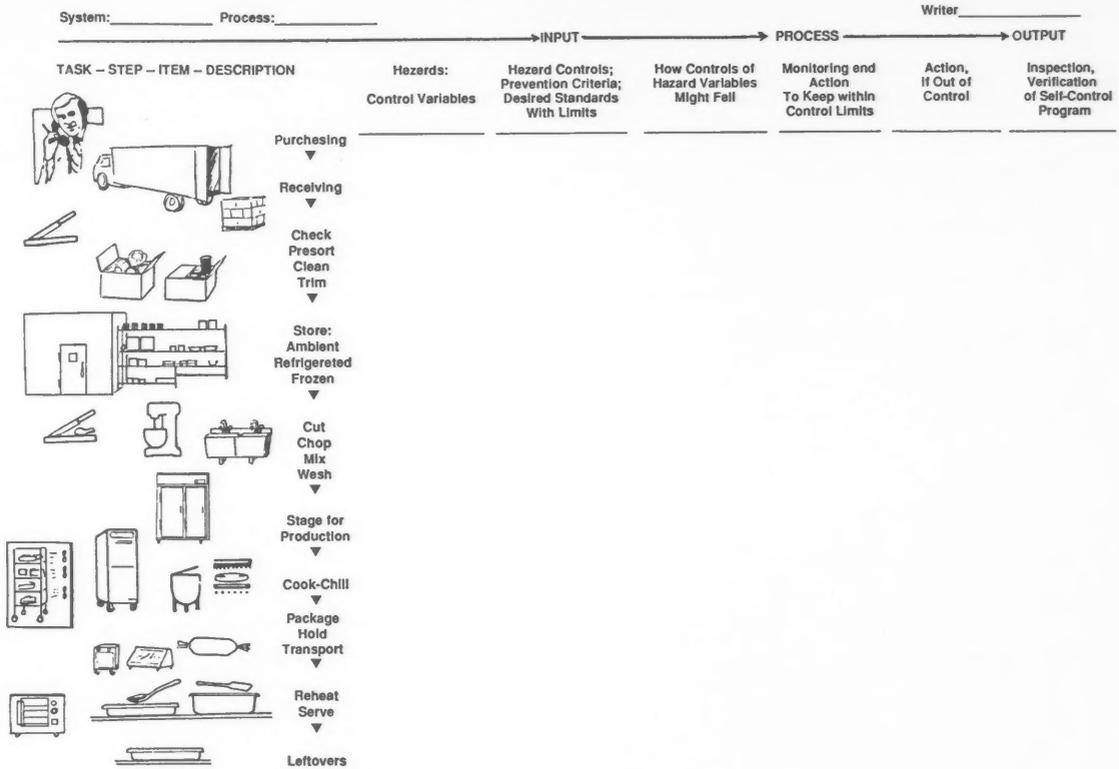


FIGURE 4. FOOD SYSTEM -- PROCESS HAZARD CONTROL AND ANALYSIS
GOVERNMENT/CHILLED FOOD
PROCESS AUTHORITY CONTROL ANALYSIS

PROCESSOR/OPERATOR
QA/QC PROCEDURES

Process
Task (the critical control point)
Step (the control procedure and standard)

- Consider the following when developing safety and quality-assured policies, procedures, and standards for self-control processes and tasks.
1. Identify possible microbiological, chemical, and hard foreign object contaminants.
 2. Identify the point of contamination of a mistake to prevent control.
 3. Identify the expected level of contamination, the level at which it becomes a concern (Q) and the level it should never reach (Q₀).
 4. Identify the process variables that control the process (Q₁).
 5. Identify how much each process variable might fluctuate.

Write policies, procedures, and standards that provide zero-defect hazard and quality control over each variable, to include additives.

1. Specify the value of the critical standard Q₀ and the value of the critical standard Q₁ within which compliance, following specified procedures, must keep the process. List control procedures "If _____, then _____".
2. If a person exceeds Q₀, specify to keep the process within Q₁ (+/-2σ of Q₀).
3. Specify action and person if the process exceeds Q₁ (+/-2σ of Q₀).
4. Specify employee management sampling plan to keep control (+/-1σ, to include what is measured, how often, what record is kept).
5. Specify procedures for inspection and verification of the self-control program above by an independent observer.

The following are process elements and variables to be covered:

1. MANAGEMENT CYCLE: Degree of commitment; adequacy of QC-QA-QI resources; organization
2. CONSUMER: Immune status; control of consumer abuse; warning labels
3. ENVIRONMENT: Air; water; temperature;
4. FACILITIES: Cleanability; insect proof; capacity; well maintained; capable; adequate safety layout; construction; capable; adequate humidity controlled; temperature;
5. EQUIPMENT: Reliability; cleanliness; humidity controlled; maintenance ability
6. PERSONNEL: Selection; training; capability; experience; following standards; observing and checking; healthy; good interpersonal relations; employees know interrelationships
7. SUPPLIES AND MATERIALS: Supplier certification; QA supplies; correct amount; proper grades; minimum waste; handling
8. METHODS: Efficient; correct step sequence of procedures with limits of control; proper temperature; proper transport; inspect, delay, store and additives) which control all contamination to produce specification products and services with a very stable process (Cpk > 1).

How Might Controls Still Fail:
Analysis at Each Step
which Verifies that the Process Is
Safe/Controlled

1. Is there an accurate assessment of the hazard?
2. Is there adequate technical control?
3. Is there adequate in-house TQM system self-control?
 - a. Accurate checklist and sampling plan
 - b. Complete written program with policies, procedures, and standards
 - c. Complete assignment of management, supervisory, employee responsibilities
 - d. Training of everyone involved
 - e. Everyone is trained and performance certified
 - f. There is process control
 - g. Problem deviation investigation and corrective action
 - h. There are program auditing and enforcement, to include:
 - In-house verification that standards are met and action taken, if out of control
 - Independent auditor evaluation of compliance
 - In-house process that standards are being met
 - Independent auditor evaluation and verification of compliance

Hazard/Government Requirement
Determination (Analysis)

- MICROBIOLOGICAL
- Bacteria
 - Viruses
 - Molds
 - Fermenters
 - Chemicals
 - Toxins
 - Hard FOREIGN OBJECTS
 - Broken teeth
 - Foreign objects of the mouth
- REGULATORY
- Labeling
 - Fraud
 - Construction standards
 - Waste emission standards, water, air

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- Microbiological Media, Products, Services, Supplies, Tests

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- Sanitation/Cleaning Equipment, Products, Services, Supplies
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103	116	129	142	155	168	181	194	207	220	233	246	259	272	285	298	311	324	337	350
104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338	351
105	118	131	144	157	170	183	196	209	222	235	248	261	274	287	300	313	326	339	352
106	119	132	145	158	171	184	197	210	223	236	249	262	275	288	301	314	327	340	353
107	120	133	146	159	172	185	198	211	224	237	250	263	276	289	302	315	328	341	354
108	121	134	147	160	173	186	199	212	225	238	251	264	277	290	303	316	329	342	355
109	122	135	148	161	174	187	200	213	226	239	252	265	278	291	304	317	330	343	356
110	123	136	149	162	175	188	201	214	227	240	253	266	279	292	305	318	331	344	357
111	124	137	150	163	176	189	202	215	228	241	254	267	280	293	306	319	332	345	358
112	125	138	151	164	177	190	203	216	229	242	255	268	281	294	307	320	333	346	359
113	126	139	152	165	178	191	204	217	230	243	256	269	282	295	308	321	334	347	360

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102	115	128	141	154	167	180	193	206	219	232	245	258	271	284	297	310	323	336	349
103	116	129	142	155	168	181	194	207	220	233	246	259	272	285	298	311	324	337	350
104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338	351
105	118	131	144	157	170	183	196	209	222	235	248	261	274	287	300	313	326	339	352
106	119	132	145	158	171	184	197	210	223	236	249	262	275	288	301	314	327	340	353
107	120	133	146	159	172	185	198	211	224	237	250	263	276	289	302	315	328	341	354
108	121	134	147	160	173	186	199	212	225	238	251	264	277	290	303	316	329	342	355
109	122	135	148	161	174	187	200	213	226	239	252	265	278	291	304	317	330	343	356
110	123	136	149	162	175	188	201	214	227	240	253	266	279	292	305	318	331	344	357
111	124	137	150	163	176	189	202	215	228	241	254	267	280	293	306	319	332	345	358
112	125	138	151	164	177	190	203	216	229	242	255	268	281	294	307	320	333	346	359
113	126	139	152	165	178	191	204	217	230	243	256	269	282	295	308	321	334	347	360

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On My Mind . . .



By
Steven K. Halstead, CAE
IAMFES
Executive Manager

. . . is European Food Pricing

In early May, I had the opportunity to attend a conference in Europe. I accepted the invitation thinking that this would be a good way to get a "feel of the land" and to make some preliminary investigations into the possibilities of holding a meeting for our European members. All this at little cost to IAMFES.

The conference was sponsored by European Incentive and Business Travel and Meetings and was held in Geneva, Switzerland. Swissair paid for my travel and the Movenpick Radisson provided my lodging. All IAMFES had to pay for were the meals. Thus, I soon learned a big difference between Switzerland and the United States. **THE PRICE OF FOOD!**

(Luckily, my wife had some vacation time coming so we blew the family budget and bought her a plane ticket. She was able to attend the conference and exhibits with me and her perspective of the meeting planners industry was quite interesting. But that's another column!)

In the United States we have come to expect not only clean safe food, but cheap food. This was brought home to us the very first time we looked at a menu in Geneva. At that time, however, we were in the hotel and unsure whether this was a manifestation of "hotel food is always more expensive than anybody else's", or if this was what we were going to find throughout our visit.

It was not until we got to downtown Geneva that we were able to compare directly with products from the U.S. This was at, you guessed it, McDonald's. You might find it interesting to take the following list with you to McDonald's the next time you go: A Big Mac costs us 5.70 Swiss francs, which translates to approximately \$3.90 U.S. A fish sandwich was \$2.05, cheeseburger \$2.12. The six piece McNuggets were \$3.34, but you had to pay extra for the sauces, unlike my local McDonald's. Fries ranged from

\$1.36 for the small to \$1.98 for the large and Cokes (without ice) were \$1.43 for the small up to \$2.12 for the large.

Another thing that we didn't see were the "meal deals" wherein they would have a special price if you bought a combination of a sandwich, fries, and soft drink.

Perhaps the most interesting visit to "food from back home" was on our last night when we decided to stop by Pizza Hut. Ignoring the fact that a family size, super supreme with beverages costs us over \$40.00, we found the extensive wine list and dessert menu quite un-american. Just goes to show how much those Swiss enjoy their sweets.

Following the conference in Geneva, we took a couple of train trips into the country side. Because of their marvelous train system, you can buy a ticket and see the country by rail, getting off and on at your leisure.

On one excursion to a small Swiss village, we sought out a grocery store. It brought back memories of the "mom and pop" grocery stores of years ago. The store probably covered about fifteen hundred square feet and had an interesting array of products. It did not have the magazine rack, the pharmacy, the health and beauty aides, and paper products that we take for granted here in the states. It did have, however, a bakery and a very small frozen food section. For the most part, it was canned foods and usually only one brand and one size at that.

Accustomed as I am to looking at sanitary conditions, I was somewhat taken back by the display of the bakery products which were in an open case. I pointed to a loaf of bread and the clerk nonchalantly grabbed it and threw it in a sack for me. No plastic gloves, no tissue, no paper wrapper, just threw it in a sack! It was delicious.

The bottom line of all this is that not only is food in the U.S. cheaper, it is safer. I believe that the members of IAMFES have a great deal to do with both.

Affiliate News

Upcoming IAMFES Affiliate Meetings

1993

JULY

•13-15, Basic Pasteurization Course, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

AUGUST

•1-4, 80th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc. to be held at the Stouffer Waverly Hotel, Atlanta, GA. For more information please contact Julie Heim at (800)369-6337 (US) or (800)284-6336 (Canada).

•17-19, Special Problems Course, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Seven Oaks Hotel, 1400 Austin Hwy, San Antonio, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

SEPTEMBER

•9-10, Wisconsin Laboratory Association Annual Meeting will be held at the Paper Valley Hotel, Appleton, WI. For more information please contact Wisconsin Laboratory Association, P. O. Box 28045, Green Bay, WI 54304.

•16-17, Minnesota Sanitarians Association, Inc.'s Annual Meeting will be held at the Earl Brown Center, St. Paul, MN. For more information contact Paul Nierman at (612)785-0484.

•20-22, New York State Association of Milk and Food Sanitarians 70th Annual Conference will be held at the Holiday Inn, Genesee Plaza,

Rochester, NY. For more information contact Janene Gargiulo at (607)255-2892.

•28-29, California Association of Dairy and Milk Sanitarians will hold their Annual Meeting at the Ontario Hilton, Ontario, CA. For more information contact John Bruhn, University of California-Davis, at (916)752-2191.

•28-30, Wyoming Environmental Health Association Annual Education Conference, in conjunction with the Wyoming Public Health Association, will be held at the Casper Hilton Inn, Casper, WY. For further information contact Kenneth Hoff at (307)235-9340.

OCTOBER

•6-8, Kansas Association of Sanitarians 64th Annual Educational Conference will be held at the Doubletree Hotel, Overland Park, KS. For more information contact Galen Hulsing at (913)233-8961.

•7-8, Fourteenth Annual Joint Educational Conference sponsored by the Wisconsin Association of Milk and Food Sanitarians, Wisconsin Environmental Health Association and Wisconsin Dairy Plant Fieldmen's Association, will be held at the Chula Vista Resort, Wisconsin Dells, WI. For further information contact, Neil Vassau, Publicity Chairperson, P.O. Box 7883, Madison, WI 53707, (608)267-3504.

•26-28, Basic Pasteurization Course, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

NOVEMBER

•15-17, Pennsylvania Association of Dairy Sanitarians and Dairy Laboratory Analysts Fall Meeting will be held at Penn State University, University Park, PA. For more information, contact Mike John at (717)762-7789.

Affiliate Council Candidates

The following two candidates are running for Affiliate Council Office. A vote of the IAMFES Affiliate Delegates will determine the winner. This individual will serve one year as Affiliate Council Secretary, then moving on to serve as Affiliate Council Chairperson for one year, also sitting on the Executive Board through their term of office as Chairperson.

James Steele

James Steele is a Food and Microbiology Specialist for Environmental Health Services, Alberta Health, Edmonton, Alberta, Canada. He has worked for the Environmental Health Services since 1979.

As a consultant in Environmental Health Services and to 27 local health authorities, James has had significant involvement in the development, use and interpretation of the Public Health Act and the regulations under this act; is developing and implementing food programs for public health inspection in Alberta; and is determining the acceptable public health limits of toxicological data as it relates to food. He also conducts refresher seminars for Public Health Inspectors, and is a member of numerous interdepartmental

and Federal/Provincial committees. These include the Alberta Biotechnology Committee, the Antitampering Network, the Food Inspection Agencies Committee, the Tourism Standards Council and the Advisory Committee on Certification in Food Sanitation and Hygiene.

James graduated with a B.S. in Biochemistry and Zoology and 2nd class honors from the University of the West Indies. Later he earned his M.S. in Food Microbiology from the University of Alberta. Prior to this, James attended the Grenada Boys Secondary School, Grenada, West Indies. There he matriculated with the University of Cambridge, receiving 'O' and 'A' level certificates of education.

In addition to this, James has enhanced his education by successfully completing a number of short courses. Through the PAO, he took a Management Development Course and two internal courses - Consulting Skills I and II, learning management and interpersonal theories and skills and the means to apply them. Courses in Applied Epidemiology and Biostatistics, computer programming and a certification course for Supervisors of Retort Operations round out his education.

James has been a member of the International Association of Milk, Food and Environmental Sanitarians for twelve years. He has also been very active in the Alberta Association of Milk, Food and Environmental Sanitarians since that time, holding the offices of secretary and president.

Presently, James is the editor of the Sanitarian Review. But, he has found time to do some writing himself, having articles published in scientific journals.

Hockey is an interest of James'. He put that interest together with his managing skills, serving as the manager for a couple of teams in the St. Alberta Minor Hockey Association house league.

Susan S. Sumner

Susan S. Sumner is an Assistant Professor/Extension Food Microbiologist at the University of Nebraska-Lincoln. She is an active researcher in the area of foodborne bacterial pathogens and works closely with the food industry on issues related to the microbiological safety of foods. Her current projects include investigations to prevent and eliminate *Salmonella* on poultry and *Escherichia coli* O157:H7 on meat. Susan teaches Quality Assurance at the University of Nebraska. She also conducts HACCP, food safety/sanitation and quality control workshops in Nebraska. Prior to her academic appointment, she was a Project Microbiologist II and Assistant Manager in the Eastern Microbiology Laboratory at the National Food Processors Association in Washington, DC.

Susan received her B.S. degree in Food Science from North Carolina State University and her M.S. and Ph.D. in Food Science/Food Safety and Toxicology from the University of Wisconsin-Madison at the Food Research Institute.

Susan has been active in IAMFES for many years. She is currently a member of the Editorial Review Board of the *Journal of Food Protection*; the affiliate representative for the Nebraska Association of Milk and Food Sanitarians; a member of the Applied Laboratory Methods Professional Development Group; and a member of the Undergraduate Recognition Task Force. Susan is the past-chair of the Nebraska Affiliate of IAMFES.

Susan's other professional memberships include: Institute of Food Technologists, Regional Communicator for IFT, Food Microbiology Division IFT, Extension Division IFT, Dairy Technology Division IFT, Ak-Sar-Ben Section IFT (member-at-large, alternate councilor, executive committee, board of directors, American Society for Microbiology, Sigma XI, Phi Tau Sigma, Phi Kappa Phi, General Foods Graduate Fellowship 1984-87.

Susan has presented numerous papers at local and national meetings and is the author of over 25 research articles and extension publications. She participates in regional workshops on food safety. She is currently involved in an extension project to improve food safety training of foodservice personnel and in a NSF/Agriscience Summer Institute at Kansas State University.

Susan is married and has one son.

State of the Association - 1993

Mark Nelson, WAMFS (Wisconsin Association of Milk and Food Sanitarians) President

September, 1992 marked the convening of the 13th Annual Joint Educational Conference. The origin of JEC predates my personal experience with WAMFS, but in the years I have been able to attend, it has been easy to pick up on a number of associated traditions. All who have benefited from the conference offerings will have noted a continuous drive on the part of the organizers toward growth, program diversity and increased professionalism. The November issue of this newsletter contained an announcement indicating a change in the dates and location for the 1993 Joint Conference. In order to accommodate the needs of an expanding program, it became necessary to move to a location with the appropriate facilities. Please note that the 1993 gathering will be held at the Chula Vista Resort in Wisconsin Dells on October 7-8, 1993, and that the title will be Joint Conference - Milk, Food and Environmental Symposium. Several notable program changes will be made in response to the desires of the various groups. Each organization will be more independent in the topics of study sponsored; there will be more exhibitors, with allotted program time to demonstrate products and services; and you will be able to attend in-depth discussions on several pertinent subjects presented in seminar format. In summary, the 1993 experience promises to be an exciting chance to learn, grow and socialize in a professional atmosphere. Mark your calendars and submit your departmental budgets NOW so that you will be sure to be present to be a part of this stimulating event and benefit from the professional development opportunities it will offer.

One additional event being planned in conjunction with the Conference is a recognition of the 50th anniversary of the Charter of the Wisconsin Association of Milk and Food Sanitarians. On June 19, 1943 our organization became an affiliate of the International Association of Milk, Food and Environmental Sanitarians. That's correct! For the past fifty years, your group has been pursuing the advancement of the ideals of promoting safe food and environmental conditions for the citizens of our state. Such an accomplishment certainly requires that we recognize the persons responsible for carrying on such a cause, and also that we offer due celebration of the past and rededicate ourselves to continuing commitment for the future. Our own very able and dedicated Past-President and Affiliate Council Representative, Joe Disch, has been charged by the Executive Board with the task of searching the archives, assembling pertinent facts and figures, and coordinating the planning of the recognition ceremony to be held at the Joint Conference. If you have knowledge of people and events which would contribute to the meaningful recognition of such an occasion, please contact Joe at (608)266-3111. Your contributions will be sincerely appreciated by your colleagues of present and past.



MMFEHA Officers for 1993: Left to right - Linda Wilson, Secretary, David Stull, Treasurer; Janet Murray, Vice-President; Terry Long, President-Elect; Calvin Badding, President and Jerry Brown, Recent Past President

Missouri 1993 Annual Conference Report

The Annual Education Conference for the Missouri Affiliate of IAMFES took place in Columbia, Missouri on April 7-9, 1993. Over 200 attendees gathered as forty presenters shared their knowledge and expertise in the areas of milk, food and environmental health, institutional health programs and personal well being. At the Awards Banquet, Connie Behymer, C.P.S., Environmental Sanitarian II, was presented the second Wilbur S. Feagan Award. The award was presented by the sponsor, Wilbur S. Feagan, President of F&H Food Equipment Company, Springfield, MO. A plaque and \$500 honorarium is given each year to an outstanding regulatory field sanitarian. C. David Welde was presented the Monarch Sanitarian Citation Award sponsored by the Monarch Division of H.B. Fuller Company. This award recognized outstanding professional, education and personal activities which make up significant contributions in the field of sanitation.

William Winters Hayes, a junior in the Department of Food Science and Nutrition at the University of Missouri-Columbia, was presented the J. E. Edmondson Scholarship Award (\$500). Special Recognition Awards for outstanding service and commitment to public health in the State of Missouri were awarded to Ron Gaston, Joe Hainline, Charles Kendrick, Ronnie Blumer, Jay Martin, David Boyer and

Diana January. An Honorary Life Membership Award was given to Wilbur Feagan. Lifetime Memberships were awarded to Joe Harman, Ron Blumer, Judy Heady and Ray Lange. Ann Fearman, Gary Gill, Harold Jackson, David Kruse, Terry Long and JoAnn Robertson received Distinguished Service Awards.

Officers elected were President, Calvin Badding; President Elect, Terry Long; Vice President, Janet Murray; Treasurer, David Stull; Secretary, Linda Wilson; and Auditors, Gerald Worley and Linda Wilson.

Report of the Connecticut Association of Dairy and Food Sanitarians Annual Meeting, January, 1993

The Annual Meeting of the association was held at the Hawthorne Inn on January 20, 1993. Over 70 members and guests attended. Elected as officers for 1993 were Colleen Meares, president; Dave Herrington, vice president; Don Shields, secretary; Kevin Gallagher, treasurer; and Carl Dickinson, assistant treasurer. Elected by the membership for a three year term to the Board of Governors were Jack McGuire, Pete Nuzzo, Carl Erlacher, Paul Gotthelf, and J. Frank Martin. Don Rondini was elected to fill a two year term and Larry Brewer to fill a one year term. Dan Donahue becomes the immediate past president.

Speakers at the meeting included Alan Nelson of Consumer Protection who discussed metric labeling coming in 1994. He described how the labeling should be formatted and the proper form. Christopher Flick from DeKalb Plant Genetics in Mystic described cell culture techniques used to produce new plants through biotechnology. Such plants would include those resistant to herbicides, insects, and drought, as well as those producing higher grain yields.

Diane Hirsch of the UConn Extension Service spoke about nutritional aspects of concern to consumers. She discussed trends in food eating habits, including low fat foods, and consumption of more fruits and vegetables and current thinking about ways to lose weight. The last speaker was Stew Leonard, Jr. who is president of Stew Leonards markets in Norwalk and Danbury. He presented information on how to keep customers happy and coming back to the food store.

Synopsis of Papers for the 80th Annual Meeting

The following are abstracts of papers to be presented at the 80th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc., to be held in Atlanta, Georgia, August 1-4, 1993.

BACTERIA ON BEEF BRISKETS AND GROUND BEEF: ASSOCIATION WITH SLAUGHTER VOLUME AND ANTEMORTEM CONDEMNATION, Allan T. Hogue*, Veterinary Medical Officer and David W. Dreesen, USDA/FSIS/SISPD, Room 4449, South Agriculture Building, Washington, DC 20250

Aerobic plate counts of 3455 brisket and 1370 ground beef samples were examined for association with slaughter volume in 547 U.S. beef slaughter establishments. High volume beef slaughter establishments controlled total aerobic bacteria counts on briskets and ground beef more effectively than low volume establishments. Lower APCs may have resulted from measures taken to prevent contamination, effective decontamination, obtaining cattle from fewer sources, specialization in slaughter procedures, and less variation in procedures used. *Salmonella* contamination increased as antemortem condemnation increased in establishments that slaughter calves. Slaughter volume was not correlated with contamination on briskets or ground beef with *Salmonella*. *Salmonella* contamination was more closely associated with the health of animals brought to slaughter than with conditions in the beef slaughter establishments.

PREVALENCE OF SALMONELLA IN RAINBOW TROUT (ONCORHYNCHUS MYKISS), Melissa E. Denton*, Research Assistant, F. Ann Draughon, Brian A. Anthony and Tan Wei, University of Tennessee, Department of Food Science and Technology, P. O. Box 1071, Knoxville, TN 37901-1071

The incidence of *Salmonella* was determined in 30 rainbow trout samples from 25 retail stores in Knoxville, Tennessee. Fifty grams of trout (whole muscle) was selectively enriched for *Salmonella* at 35°C for 24 h in both tetrathionate and selenite-cystine broth and streaked for isolation on brilliant green agar and bismuth sulfite agar. Five samples (16.7%) were found *Salmonella* positive. One sample was found *Salmonella* positive from both tetrathionate and selenite-cystine enrichment, while the other four positive samples were only found from selenite-cystine broth. Aerobic plate counts and coliform counts were also evaluated for each sample. The aerobic plate count ranged from 2.7 to 8.7 log CFU/g with 37% of the samples ≥ 6.0 log CFU/g. The coliform counts ranged from <1 to 5.8 log CFU/g with 37% of the samples ≥ 3.0 log CFU/g.

INCIDENCE OF CLOSTRIDIUM BOTULINUM IN MODIFIED ATMOSPHERE PACKAGED VEGETABLES, E. Jeffery Rhodehamel*, Research Microbiologist, Timothy Lilly, Jr., Haim M. Solomon, and Donald Kautter, Division of HACCP Programs Food and Drug Administration, 200 C Street, S.W., Washington, DC 20204

The modified atmosphere packaging (MAP) of vegetables may provide an anaerobic environment conducive to *Clostridium botulinum* growth and toxin production. Because of this concern about MAP vegetables, the incidence of *C. botulinum* spores in commercially available, pre-cut MAP vegetables was determined. One-pound packages (454 grams) of MAP vegetables were asep-

tically opened in a laminar flow hood. Each package was equally divided (approximately 150 grams each) among three 1-liter bottles containing 500 ml of freshly steamed and cooled sterile TPGY broth. TPGY broth cultures were incubated at 35°C for 7 days. Positive and negative controls were included with each sample. The broth cultures were tested for toxicity at the end of the incubation period, by using the standard mouse bioassay. The 725 samples analyzed included 337 shredded cabbage, 201 chopped green pepper, 90 mixed vegetable, 35 Oriental salad, 24 shredded cole slaw, 24 Italian salad, 7 carrot, 4 onion, and 3 broccoli. One sample of shredded cabbage, one chopped green pepper, and one Italian salad were positive for the presence of *C. botulinum* Type A spores (0.41% overall incidence rate). Results indicate a low incidence of *C. botulinum* spores in commercially available pre-cut MAP vegetables.

RATES OF ADHERENCE TO STAINLESS STEEL BY FOODBORNE MICROORGANISMS, Scott K. Hood*, Research Assistant and E.A. Zottola, University of Minnesota, 1334 Eckles Avenue, St. Paul, MN 55108

Attachment of microorganisms to food processing surfaces may cause contamination that contributes to food safety concerns and reduced product quality. To determine adherence rates, stainless steel chips (6 mm x 6 mm) were immersed in tryptic soy broth (TSB) or diluted TSB (dTSB) containing either *Salmonella typhimurium*, *Escherichia coli* O157:H7, *Listeria monocytogenes* or *Pseudomonas fragi* in lag, log or stationary phase. Chips were removed at selected times up to 30 min. To enumerate the attached cells, the chips were rinsed, stained with acridine orange and viewed using epifluorescent microscopy. The highest initial adherence was seen for *P. fragi* (dTSB, stationary) and *S. typhimurium* (dTSB, stationary), however, little increase in attached cells was seen over 30 min. The lowest rates of adherence were seen for *E. coli* (all conditions) and *S. typhimurium* (TSB, stationary). The microorganisms with the highest rates of attachment may be of the most concern in a food processing environment.

COMPRESSED AIR, CITY WATER AND DUST AS SOURCES OF CONTAMINATION OF A DAIRY ASEPTIC PROCESSING SYSTEM, Corey Lerbs, 6125 Camden Avenue N., Brooklyn Center, MN 55430

Five species of strictly aerobic bacteria were repeatedly isolated from aseptically processed milk or soy-milk spoilage tests at Tetra Pak's pilot plant. *Pseudomonas syringae* was found throughout the compressed air system, *Pseudomonas aeruginosa* was prominent in city water. *Bacillus cereus*, *B. polymyxa*, and *B. circulans* were prominent in dust. None of the five isolates could be isolated from the unprocessed milks. All five grew on rubber (EPDM) gaskets immersed in phosphate buffer and produced mucoid colonies on sucrose media. Cleaning buckets contained only facultative bacteria including *Enterobacter aerogenes*. Equipment samples showed no sign of the bacteria causing spoilage of aseptically processed milk or soy milk.

Spouse/Companion Tours and Special Events

ATLANTA — A "PEACH" OF A TOWN

Buckhead *Martin Luther King, Jr.*
Cyclorama *Lenox Square*

Monday, August 2, 1993 — 9:00 a.m. - 2:30 p.m.

Cost: \$22, Lunch on your own,
Lenox Square (\$27 on-site)

The results are in and as you probably are aware, Atlanta has been chosen to host the 1996 Olympic games in addition to being the site of the 1994 Super Bowl and the 1993 IAMFES Annual Meeting. What an outstanding opportunity to view some of the sites where the games will be held, in addition to viewing some of Atlanta's most well known attractions.

Your ride through downtown will take you to the location of the new Georgia Dome, the Omni sports complex and the massive World Congress Center. We'll then move on through Georgia State University, the State Capitol and Government complex, and Martin Luther King, Jr.'s Memorial and Birth Home as you ride down "Sweet Auburn." You'll have an opportunity to see the Inman Park area, the first garden suburb developed in the 1880's.

You will relive the Battle of Atlanta as you stop and tour the Cyclorama, an awe inspiring three dimensional diorama depicting the Battle of Atlanta during the Civil War. This is the world's largest panoramic painting measuring 50' high and 400' in circumference.

Next, you'll drive up world famous Peachtree Street where among other sights, you'll see the fabulous Fox Theatre, Colony Square and the majestic Woodruff Arts Center.

As you continue your trip, you will drive through Atlanta's elegant Northwest residential area, noted throughout the country for its breathtaking homes set amid acres of glorious greenery and spectacular landscaping. You will see the Governor's Mansion, the Atlanta History Center's Swan House plus the stunning homes of many influential and famous Atlantans.

Your destination is to the most famous shopping area on Peachtree Street — Lenox Square. 200 shops and restaurants of all varieties, including Ralph Lauren, Doris Vitton and Laura Ashley, make this shopping mall anchored by Rich's, Macy's and Neiman Marcus a favorite of Atlantans. There you can enjoy a dutch treat lunch.

THE CHARM OF THE OLD SOUTH

Covington, Georgia

Tuesday, August 3, 1993 — 9:00 a.m. - 3:30 p.m.

Cost: \$37, including lunch (\$42 on-site)

Take a trip back in time to the quiet serenity of Covington, Georgia, one of the few areas whose magnificent plantations and town homes were spared by General Sherman on his "march to the sea."

You will be greeted in Covington by a local guide who will take you down historic tree-shaded streets lined with antebellum homes.

Let your imagination soar as you visit the majestic Regency Hall, constructed before the turn of the century with 18 inch thick solid brick walls. This elegant Old South mansion is furnished with an extensive collection of fine American Empire furniture from the 1800-1840 period and Victorian and Empire Revival furniture from the 1870-1885 period. There is a marvelous collection of antiques and fine porcelain.

Sound enchanting? Wait till you see what's next as we move on to Whitehall, a 13,000 square foot antebellum home built in 1830. One of the most outstanding examples of Greek Revival architecture in Georgia, Whitehall has been beautifully renovated and furnished to reflect its original grandeur. In fact, Margaret Mitchell, author of *Gone With the Wind*, personally lobbied MGM to use Whitehall as "Twelve Oaks" in the famous movie.

You'll enjoy a delicious Southern buffet lunch amid the breathtaking splendor of the Blue Willow Inn. This antebellum home converted into a wonderful restaurant is located in Social Circle, Georgia, just five miles from Covington.

You'll be charmed by your visit to the Old South and your glimpse of days that are truly *Gone With the Wind*!

ATLANTA'S HOMEGROWN HITS

CNN *Underground Atlanta*
World of Coca-Cola

Wednesday, August 4, 1993 — 10:00 a.m. - 4:00 p.m.

Cost: \$26, Lunch on your own (\$31 on-site)

Take a ride on one of Atlanta's longest escalators as you begin to experience the electricity of the world's foremost news service in action. Tour the Atlanta Headquarters of CNN and CNN Headline News, the two 24 hour all news networks that have revolutionized television journalism. You will see Ted Turner's dream blossomed into reality. See how many CNN

personalities you recognize as you walk through the studios and production areas. Learn the behind-the-scenes activities that lead to the finished product you see on the air.

Next, your bus will whisk you to Underground Atlanta, the setting which bridges the past to the present for the journey into Atlanta's future. You'll enjoy touring the six city blocks which have been transformed into a spirited urban market place featuring 200,000 square feet of specialty shops, restaurants, entertainment, and push carts. Treat yourself to lunch at one of Underground's many eateries.

After lunch, encounter the past, present and future as you begin your exciting tour of the World of Coca-Cola. You will be greeted at the door by the world's most remarkable Coca-Cola sign, a revolving neon spectacular. Inside, you'll see priceless memorabilia tracing the more than 100-year history of the world's best-known consumer product. Through dazzling exhibits, you'll travel to the more than 160 countries of Coca-Cola. Enjoy a taste of timeless refreshment at a fanciful soda fountain of the future, and you'll shop in a one-of-a-kind Coca-Cola store.

MONDAY NIGHT SOCIAL EVENT

"GRANITE" — You'll Love the Stone Mountain Plantation Evening

Monday, August 2, 1993 — 6:00 p.m. - 11:30 p.m.

Cost: \$35 (\$40 on-site)

Children \$20 (\$25 on-site)

Hop on board your transit buses for your ride to one of the true wonders of the world — breathtaking Stone Mountain. As you arrive at the resort park, you'll truly be in awe at the magnificence of this 3,200 acre site of scenic beauty.

"Granite" you'll love Stone Mountain as you look up at the world's largest granite monolith with the images of Jefferson Davis, Robert E. Lee and "Stonewall" Jackson captured forever in a sculpture larger than an entire football field and carved meticulously over the years.

You will be fascinated by the typical Southern Plantation of the 1800's where your lawn party will be held. Stroll through a completely restored antebellum plantation, including the plantation house, overseer's house, cabins and outbuildings. All are completely and authentically furnished.

Then proceed to the Meadow of the Plantation where dinner will be served under a tent erected especially for our group. Your Old South Barbecue Buffet will include Fried Chicken, BBQ Pork, Brunswick Stew, Cole Slaw, Potato Salad, Baked Beans, Corn on the Cob, Rolls and Butter, Cobbler, and Iced Tea. There will be a cash bar available throughout the evening.

And if that's not enough, experience Stone Mountain's spectacular show of luminous lasers projected on the Mountain's North face. From special reserved seating, you'll delight in seeing comical characters, dramatic stories, and graphic images choreographed to popular music on this one million square foot screen.

You'll treasure the scenic beauty and pure Southern style fun of this night at Georgia's Stone Mountain Park!

ATLANTA BRAVES BASEBALL OUTING

Tuesday, August 3, 1993 — 6:00 p.m.

Cost: \$18 (\$20 on-site)

The Atlanta Braves will be hosting the Philadelphia Phillies on Tuesday, August 3. We have now purchased a block of tickets for this game which includes your bus ride to and from the ball game. Sign up now for an enjoyable time at the baseball game - seats are limited!!

NEW THIS YEAR!

CHILDREN'S SUPERVISED ACTIVITIES

'Get Away Room'

Monday, 8:45 a.m. - 2:45 p.m.

Tuesday, 8:45 a.m. - 3:45 p.m., and

Wednesday - 9:45 a.m. - 4:15 p.m.

Free

Plans are being made this year to provide supervised activities for the children who accompany their parents to the IAMFES Annual Meeting. They are on vacation after all, right? Right! So let's make it fun for them also.

There will be a 'Get Away Room' on Monday, Tuesday and Wednesday for the children to play video games, pinball machines, watch movies, etc. Also, on Wednesday Evening, there will be a '**Kids Banquet**' for the children while the parents attend the IAMFES Annual Awards Banquet. All children's activities will be properly supervised.

Please watch for more details on these events in the upcoming issues of IAMFES' Journals.

Wednesday Kids Banquet: \$10 (\$15 on-site)

80th IAMFES Annual Meeting Registration Form

Stouffer Waverly Hotel — Atlanta, Georgia — August 1-4, 1993
(Use photocopies for extra registrations)

FOR OFFICE USE

Date Rec'd. _____ First initial _____ Last name _____
ID# _____ Registration # _____

***Sign up to become
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member discount.

First Name (will appear on badge) _____ (please print) Last Name _____
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Please check where applicable:

- IAMFES Member
- Non-Member
- Local Arrangements
- 30 Yr. Member
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Registration

- IAMFES Member (Banquet included) \$145 (\$180 on-site)
- Non-Member (Banquet included) \$195 (\$230 on-site)
- IAMFES Student Member \$ 20 (\$ 25 on-site)
- IAMFES Member One Day (Circle: Mon/Tues/Wed) \$ 75 (\$ 95 on-site)
- Non-Member One Day (Circle: Mon/Tues/Wed) \$100 (\$125 on-site)
- Spouse/Companion (Name): _____
- Children (14 & Under), Name: _____

Total Amount _____

***New Membership Fees:**

- Membership (Dairy, Food & Environmental Sanitation) \$ 50
- Membership Plus (Dairy, Food & Env. Sanitation & Journal of Food Protection) \$ 80
- Student Membership Dairy, Food & Env. San. or Journal of Food Protection \$ 25
- Student Membership Plus (Dairy, Food & Environmental Sanitation & Journal of Food Protection) \$ 40

POSTAGE CHARGES: OUTSIDE THE U.S. - SURFACE RATE
AIRMAIL

Other Fees: (Per Person)

- Cheese & Wine Reception (Sun., 8/1) _____
- Stone Mountain Plantation Evening (Mon., 8/2) _____
- Atlanta Braves vs. Philadelphia Phillies Baseball Game (Tues., 8/3) _____
- IAMFES Awards Banquet (Wed., 8/4) _____
- IAMFES Kids Banquet (Wed., 8/4) _____
- Atlanta — A "Peach" of a Town (Mon., 8/2) _____
- The Charm of the Old South (Tues., 8/3) _____
- Atlanta's Homegrown Hits (Wed., 8/4) _____

of tickets _____

\$ 15 per journal _____
\$ 95 per journal _____
FREE _____
\$ 35 (\$ 40 on-site) _____
\$ 20 (\$ 25 on-site) _____
\$ 18 (\$ 20 on-site) _____
\$ 30 (\$ 35 on-site) _____
\$ 10 (\$ 15 on-site) _____
\$ 22 (\$ 27 on-site) _____
\$ 37 (\$ 42 on-site) _____
\$ 26 (\$ 31 on-site) _____

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Registration Information

Send payment with registration to IAMFES, 200W Merle Hay Centre, 6200 Aurora Avenue, Des Moines, IA 50322. Make checks payable to IAMFES. Pre-registration must be post-marked by July 9, 1993. The pre-registration deadline will be strictly observed. For additional information contact Julie Heim at 1-800-369-6337 (US), 1-800-284-6336 (Canada).

Refund/Cancellation Policy

The IAMFES policy on meeting cancellation/refunds is as follows: "Registration fees, minus a \$15.00 processing fee, will be refunded for written cancellations post-marked at least two (2) weeks prior to the start of the meeting. No refunds will be made for cancellations made less than two (2) weeks prior to the start of the meeting; however, the registration may be transferred to colleague with written notification to IAMFES."

Exhibitor Information

An exhibition of products and consultant services will be at the Stouffer Waverly Hotel. For more information on exhibiting at the conference, please contact Scott Wells at 1-800-369-6337, 1-800-284-6336 (Canada).

Guest Room Commitment
GOOD UNTIL JULY 1, 1993
Make Your Reservation Now

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I AM FES

80th Annual Meeting
August 1-4, 1993
Stouffer Waverly Hotel
Atlanta, Georgia

Please check accommodation requested:

- Single (1 person) Triple (3 persons)
 Double (2 persons) Quad (4 persons)

Bed type:

- King Bed
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Please indicate here if you have a disability requiring special accommodations.
All room rates are subject to prevailing taxes.
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(Check-in Time
is after 3 p.m.)

DEPARTURE DATE _____

(Check-out
Time is 12 p.m.)

SPECIAL REQUESTS _____

After July 1, 1993 reservations will be accepted on a space availability basis only. Reservations will be held until 6:00 p.m. on the date of arrival, unless guaranteed by one night advance deposit, payable by certified check or a Major Credit Card.

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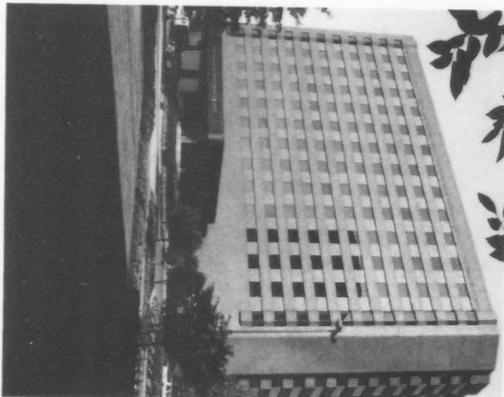
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1993 IAMFES Workshops

Quality Assurance in Microbiology

Conducted by Michael H. Brodsky,
Ontario Ministry of Health

July 30-31, 1993, Stouffer Waverly Hotel, Atlanta, GA

If an auditor paid a surprise visit to your laboratory, would your QA program and your practices be adequate for accreditation purposes? Are your SOP's documented? Have you been meaning to develop or introduce a QA program but "haven't found the time" or are unsure how to do it?

If any of these questions make you feel uncomfortable, uneasy or embarrassed, register for the one-and-a-half day Quality Assurance Workshop for Microbiology Laboratories and put your mind at ease.

Learn how to confidently describe the QA program operating within your laboratory and outline procedures related to specific analytical protocols. Be confident in the results generated by your laboratory and ensure that your clients will not doubt the validity of the data.

Rapid Microbiological Methods

Conducted by Daniel Y.C. Fung, Kansas State University and James Dickson, Iowa State University

July 30-31, 1993, Stouffer Waverly Hotel, Atlanta, GA

A one-and-a-half day workshop on Rapid Microbiological Methods will be conducted under the direction of Daniel Y.C. Fung and Jim Dickson. The program will include lectures and hands-on experience on some systems. Commercial companies will be invited to demonstrate their systems and instruments in the workshop. With increasing awareness and concern about food safety, rapid methods in microbiology are essential as a first step to help monitor the microbial safety of our food supply and when problems arise these methods are needed to quickly pin-point the source of the problem so that actions can be taken. The workshop is designed for laboratory directors, food scientists, applied microbiologists and consultants. Appropriate hand-out materials will be provided for the participants in the workshop

The 1993 Workshop topics are a result of suggestions from the Applied Laboratory Methods Professional Development Group.

Informational
Brochures
will be
available soon

Workshop Hours will be:
Friday, July 30 - 1:00 to 5:00 p.m.
Saturday, July 31 - 8:30 a.m. to 5:00 p.m.

Informational
Brochures
will be
available soon

Workshop Registration Fees are:			
Before June 1, 1993		After June 1, 1993	
Member	\$195	Member	\$225
Non-Member	\$235	Non-Member	\$265

For further information, please contact IAMFES at
(800)369-6337 (US), (800)284-6336 (Canada), FAX (515)276-8655

REGISTRATION FORM

- Rapid Microbiological Methods Workshop
 Quality Assurance in Microbiology Workshop
 Stouffer Waverly Hotel — Atlanta, GA — July 30-31, 1993

First Name (will appear on badge) (please print) Last

Title Employer

Mailing Address (Please specify: Home Work)

City State/Province ZIP/Postal Code

Area Code & Telephone # FAX #

Charge Card Payments: VISA/MASTERCARD/AMERICAN EXPRESS

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REGISTRATION:

	Before 6/1/93	After 6/1/93
IAMFES Member	\$195	\$225
Non-Member	\$235	\$265

TOTAL AMOUNT ENCLOSED: \$ _____
US FUNDS on US BANK

Limited Seating—RESERVE NOW. (Subject to cancellation)

Exp. Date _____

Signature: _____

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Coming Events

1993

July

•**7-9, Principles of FOOD Microbiology**, sponsored by Silliker Laboratories Group, Inc., will be held in Chicago, IL. For more information contact Silliker's Education Department at (708)957-7878.

•**13-15, Basic Pasteurization Course**, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

•**16-23, Rapid Methods and Automation in Microbiology: International Workshop XIII** to be held at the Kansas State University, Manhattan, KS. For more information contact Dr. Daniel Y. C. Fung, Workshop Director, telephone (913)532-5654, FAX (913)532-5681. A mini-symposium will occur on July 16-17.

August

•**1-4, 80th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc.** to be held at the Stouffer Waverly Hotel, Atlanta, GA. For more information please contact Julie Heim at (800)369-6337 (US) or (800)284-6336 (Canada).

•**10-11, Mini Workshop on the Management of Refrigerated and Frozen Foods in the Distribution System**, sponsored by Purdue, Michigan State and Ohio State Universities, will be held at the Hilton Inn at the Airport, Indianapolis, IN. For program information please contact James V. Chambers, Purdue University, at (317)494-8279, William C. Haines, Michigan State University, at (517)355-2176 or Winston D. Bash, Ohio State University at (614)292-7004.

•**16-20, Special Problems in Milk Protection**, sponsored by the USPHS/FDA State Training Branch and the Pennsylvania Department of Agriculture to be held in Harrisburg, PA. For course information contact Richard Eubanks (301)443-5871 or Paul Hogue (717)787-4316.

•**17-19, Special Problems Course**, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Seven Oaks Hotel, 1400 Austin Hwy, San Antonio, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

September

•**9-10, Wisconsin Laboratory Association Annual Meeting** will be held at the Paper Valley Hotel, Appleton, WI. For more

information please contact Wisconsin Laboratory Association, P. O. Box 28045, Green Bay, WI 54304.

•**16-17, Minnesota Sanitarians Association, Inc.'s Annual Meeting** will be held at the Earl Brown Center, St. Paul, MN. For more information contact Paul Nierman at (612)785-0484.

•**20-22, New York State Association of Milk and Food Sanitarians 70th Annual Conference** will be held at the Holiday Inn, Genesee Plaza, Rochester, NY. For more information contact Janene Gargiulo at (607)255-2892.

•**20-24, Special Problems in Milk Protection**, sponsored by the USPHS/FDA State Training Branch and the Nevada Department of Human Resources to be held in Reno, NV. For more information contact Richard Eubanks (301)443-5871 or Joseph Nebe (702)687-4750.

•**27-30, Insect Cell Culture and Protein Expression with Baculovirus Vectors**, sponsored by the American Type Culture Collection's Laboratory Workshops Department, will be held in Rockville, MD. For more information, please contact ATCC Workshops Manager, 12301 Parklawn Drive, Rockville, MD 20852, (301)231-5566, FAX (301)770-1805.

•**28-29, California Association of Dairy and Milk Sanitarians** will hold their Annual Meeting at the Ontario Hilton, Ontario, CA. For more information contact John Bruhn, University of California-Davis, at (916)752-2191.

•**28-30, Wyoming Environmental Health Association Annual Education Conference**, in conjunction with the Wyoming Public Health Association, will be held at the Casper Hilton Inn, Casper, WY. For further information contact Kenneth Hoff at (307)235-9340.

October

•**3-8, 1993 National Safety Council Congress and Exposition "World Class Solutions"** will be held at the McCormick Place, Chicago, IL. For more information, please contact Robin L. Ungerleider at (708)775-2303.

•**6-8, Kansas Association of Sanitarians 64th Annual Educational Conference** will be held at the Doubletree Hotel, Overland Park, KS. For more information contact Galen Hulsing at (913)233-8961.

•**7-8, Fourteenth Annual Joint Educational Conference** sponsored by the Wisconsin Association of Milk and Food Sanitarians, Wisconsin Environmental Health Association and Wisconsin Dairy Plant Fieldmen's Association, will be held at the Chula Vista Resort, Wisconsin Dells, WI. For further information contact, Neil Vassau, Publicity Chairperson, P.O. Box 7883, Madison, WI 53707, (608)267-3504.

•**12-15, DNA Fingerprinting**, sponsored by the American Type Culture Collection's Laboratory Workshops Department, will be held in Rockville, MD. For more information, please contact ATCC Workshops Manager, 12301 Parklawn Drive, Rockville, MD 20852, (301)231-5566, FAX (301)770-1805.

•**13-14, Annual Conference of the North Central Cheese Industries Association** to be held at the Sheraton Inn Airport

Hotel, Minneapolis, MN. For further information contact E.A. Zottola, Executive Secretary, NCCIA, PO Box 8113, St. Paul, MN 55108.

•**19-21, Food Preservation 2000 - Integrating Processing, Packaging, and Consumer Research** is sponsored by and held at U. S. Army Natick Research, Development and Engineering Center, Natick, MA, USA. For additional information, please contact Lisa McCormick or Sonya Herrin, Science and Technology Corporation, (804)865-7604.

•**26-28, Basic Pasteurization Course**, sponsored by the Texas Association of Milk, Food and Environmental Sanitarians, will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information, please contact Ms. Janie F. Park, TAMFES, P. O. Box 2363, Cedar Park, TX 78613-2363, (512)4458-7281.

November

•**14-16, The Food Industry Environmental Conference and Exhibition**, presented by the Environmental Science and Technology Laboratory and Georgia Tech Research Institute, will be held at the Omni Hotel at CNN Center, Atlanta, GA. For more information contact Edd Valentine or Charles Ross at (404)894-3806.

To insure that your meeting time is published, send announcements at least 90 days in advance to: IAMFES, 200W Merle Hay Centre, 6200 Aurora Avenue, Des Moines, IA 50322.

Future Annual Meetings:

1994

•**July 31-August 3, 81st Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc.** to be held at the San Antonio Hyatt Regency, San Antonio, Texas. For more information, please contact Julie Heim at (800)369-6337 (US), (800)284-6336 (Canada) or 515-276-3344.

1995

•**July 30-August 2, 82nd Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc.** to be held at the Pittsburgh Hilton and Towers, Pittsburgh, Pennsylvania. For more information, please contact Julie Heim at (800)369-6337 (US), (800)284-6336 (Canada) or 515-276-3344.

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