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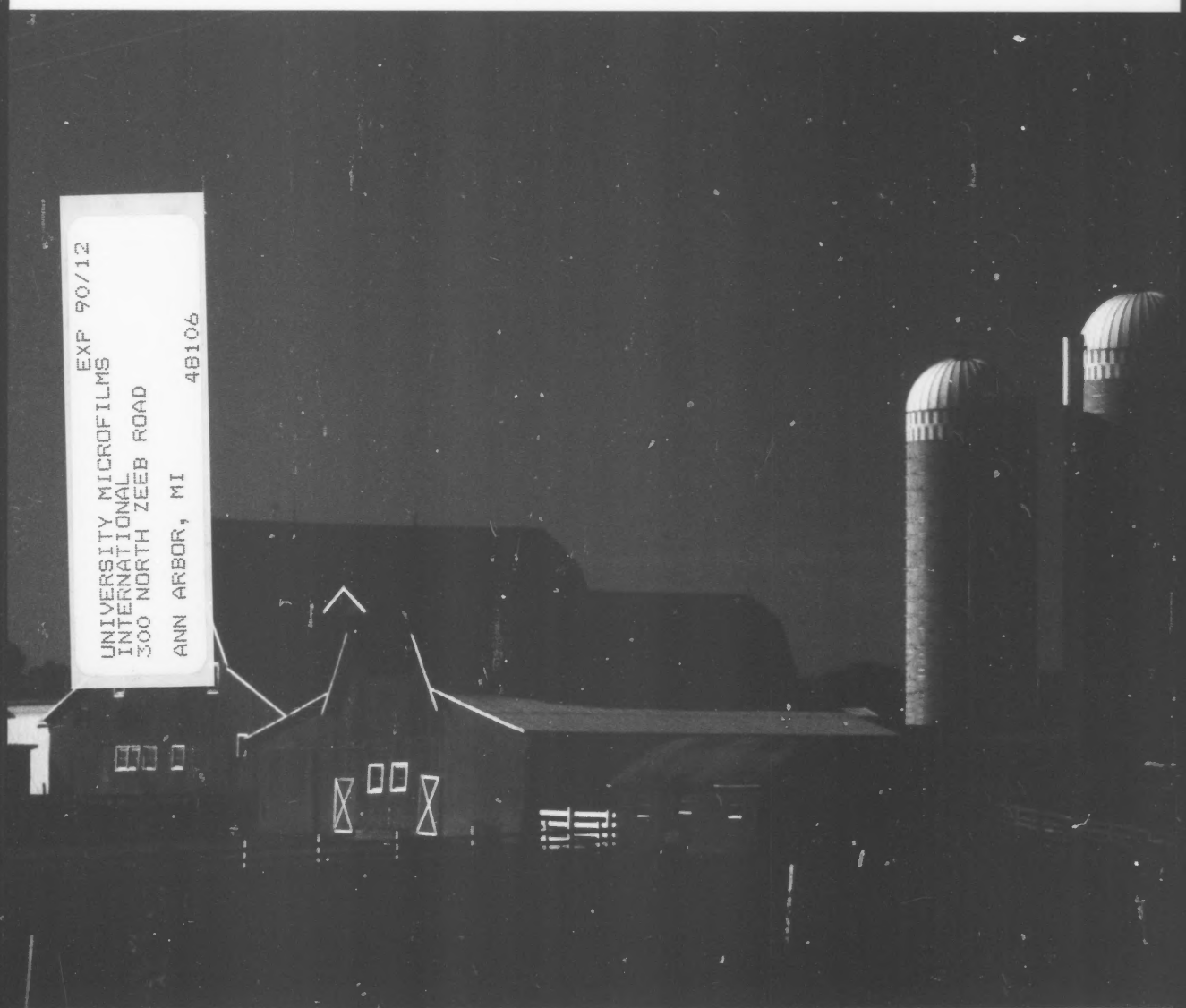
MARCH 1990



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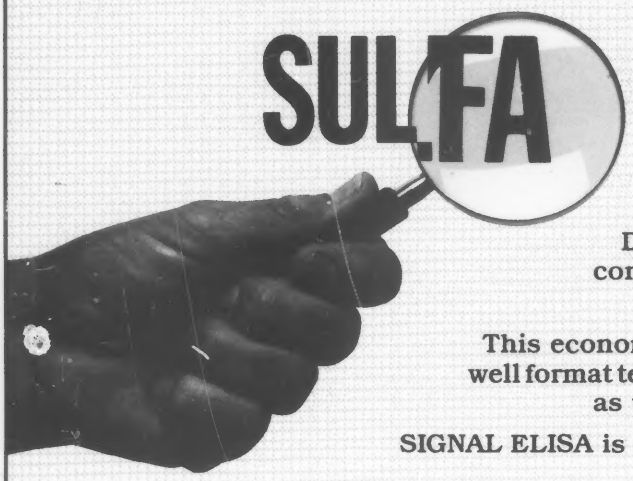

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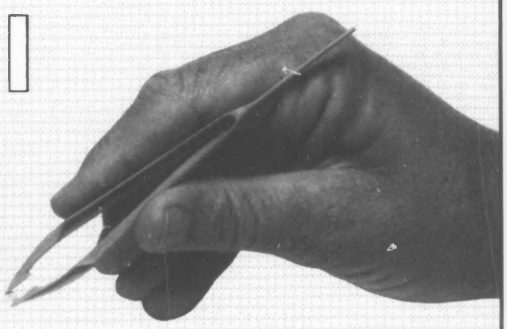

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Thoughts From the President . . .

By
Ron Case
IAMFES President

"What's in a name? That which we call a rose by any other name would smell as sweet." Would this famous line of Shakespeare be as well remembered if it read: "What's in a name? That which we call rosa fraxinifolia by any other name would smell as sweet"? I doubt it, unless Shakespeare was writing for comic relief.

Recently some members have contacted me about the possibility of changing the name of the International Association of Milk, Food and Environmental Sanitarians. In 1982-83, there was an effort to change the name of the association. At that time, it was decided to keep our present name. When our association took its present name, it fit us very well. We are an international association with members in over forty countries; our members have been sanitarians, often working in environmental health areas, inspecting dairy farms and food outlets; our colleagues from the colleges and universities were teaching dairy science and microbiology; industry members were either industrial sanitarians or quality assurance people involved with operations inspected by sanitarians.

If our name fits our organization, why are some members interested in changing it? Our formal name is long and unwieldy. The present name puts emphasis on sanitarians although many of our members are not sanitarians but are microbiologists, quality control personnel, laboratory personnel and managers who are vitally concerned with the whole area of food protection. We are not an environmental association but are concerned about the environment as it relates to food safety and food wastes. Although the roots of our organization were in the milk industry, the use of milk and food in the title is redundant since milk is food. The dairy industry is becoming a smaller part of our total food industry. In fact, most universities no longer have a dairy science program but rather have a food science program reflecting the changes in the food industry. Generally this group feels a name change would provide broader appeal to recruit members and promote the association.

There are objections to changing the name. We are a well respected, established organization that has been active, growing and addressing the food safety issues with our present name. Most people refer to us as IAMFES and very seldom is our full name ever used. Therefore, having a long name should make little difference. Many of our members are trained sanitarians and consider themselves so even if they may now be doing other work. This is the group that founded the organization and has made major contributions to the quality and safety of our food supply. They do not want to be set aside. Our roots are in the dairy industry. Combining milk under the food category, even though it is "nature's most perfect food", de-emphasizes the continuing interest of this portion of our membership. There is also some concern that leaving environmental out of the title would exclude a certain portion of our membership. The name of the association does not attract members - its programs, publications and other members do.

There are other points on both side of the questions which need to be addressed. A name change for an association is a major step which should not be taken casually. As I listen to members, I can appreciate both sides of the question. Before any name change takes place, there must be an opportunity for all viewpoints to be aired.

I have appointed a committee to study the proposal of a name change for the association:

1) identifying the positive and negative impacts of a name change;
2) identifying means of reducing those impacts upon the association, whether or not the name is changed;
3) recommending whether we should retain our present name or take a new name; and
4) proposing one or more possible names if there is an overwhelming indication a new name is needed.

Dr. Mike Doyle, our IAMFES secretary, will chair this committee. The committee will be contacting a number of members prior to this year's annual meeting and will hold an open meeting this year at our international meeting in Arlington Heights, IL. The committee will report to the board at the October 1990 Board meeting. If the committee recommends we retain our present name, no further action will occur. If the committee recommends a name change, a new name will be chosen after input from the membership. This new name would be proposed as a constitutional change which would be brought before the membership at the 1991 meeting. If approved at that meeting, it will be sent to the entire membership for a vote. If the new name is approved by that vote, the association could be renamed by January 1992. This is a very long, drawn out process but I feel that before the association changes names, all aspects of the name need to be considered and consequences of the change evaluated. This can only be done by allowing for a period of extensive comment, discussion and consensus.

Regardless of whether the or not the name is changed, there will be some members who will always feel we have done the wrong thing. If we don't address a name change, we will have a group of members who will feel we have done the wrong thing. In a democratic society, issues are discussed, debated and the majority determines the decision.

Since this issue was discussed in detail in 1982-83, we are reprinting Dr. Robert Marshall's "President's Perspective" on this topic. This may assist some members to better understand the issues. Feel free to participate in any stage of discussion of this issue. You may contact Dr. Mike Doyle, myself or any of the board members to discuss this matter.

PRESIDENT'S PERSPECTIVE

(Reprinted from December 1982 Dairy and Food Sanitation)

Dear Members of IAMFES:

Well, we asked for it--your votes and candid comments on the proposed name change--and we got it! We are overwhelmed by your response. As of November 15 we had received 876 votes that were distributed as follows: 517 for *International Association for Food Protection,* 265 for *International Association for Milk and Food Protection,* 92 for no change and 2 for the same other name. In fact, at least 12 others voted for one of the three choices but also suggested some other name.

More than 65% of you took time to explain the reason for your vote. Thus, you indicated a genuine interest in the welfare of the Association.

The Executive Board considered your response at the Fall meeting. We concluded that there is a strong opinion that the name should be changed. Since 59% voted for *International Association for Food Protection,* the choice would appear to be clear. However, the Board wants the issues to be fully discussed, and I was asked to communicate the results to you along with an abstract of the factors many persons asked be considered. We hope the affiliates will make the proposed change a matter of discussion. At the Annual Meeting in St. Louis, August 6-11, we expect to finalize plans, deciding whether and how the Constitution, Bylaws and Articles of Incorporation may be amended.

SUMMARY OF RESPONSES

Persons voting for no change:

- Leaving out *Environment* would lead to exclusion of some potential members.
- Leaving out *Sanitarian* is wrong because many, if not most, members are sanitarians.
- The word *Protection* has a negative connotation.
- Nothing wrong with present name.
- Names suggested are still too long.
- IAFP is too much like IFT.
- Some other name would be better.

Persons voting for International Association for Food Protection:

- Present name too long and this one is concise, simple and meaningful.
- The alternate name is redundant because milk is a food.
- Omitting *Milk* may help attract a broader spectrum of members.
- *Food Protection* is much broader than *Food Sanitation.*
- I'd feel more comfortable publishing in the Journal.
- Present name makes it difficult to write a justification for attending the annual meeting. At first glance it appears to be dairy science oriented.
- Present name indicates emphasis on sanitarians, but members include microbiologists, quality control personnel and others who are vitally concerned with the whole arena of food protection.
- A brief name encompassing a broad spectrum of professionals is preferable to one that highlights each specific group within the society.
- Advocate removing descriptive words, reducing the name to something new members can understand, and preventing laughter from the uninitiated when first introduced to the long name of the organization.

Persons voting for International Association for Milk and Food Protection:

- Dairy Sanitarians started the organization and deserve to continue to be recognized by it.
- Basic sanitation guidelines were often copied or adapted from early 1900's experiences with milk.
- Having *Milk* in the name is a tradition, a "security blanket" for some.
- Despite being a Milk and *Food Program Specialist* in a Division of *Environmental Health* and being in the profession, *Sanitarian,* I agree the present name is no longer satisfactory.

The above are the major points that were made. I've combined and paraphrased and shortened to make them fit this space. I hope I've not done your comments an injustice. Purposely I've not given the number who made each comment thinking that reasonable, thinking persons would prefer to consider the points individually and to weigh them in their own minds, apply them to their own experience and make up their own minds.

Finally, although one hesitates to add to confusion when much of it was eliminated by the simplicity of the ballot mailed--in that only three choices were given--it might be unwise to not share the other suggested names with you. So, here they are:

1. Food Protection International
2. Food Protection Association
3. International Food Protection Association
4. Association for Food Protection
5. Milk and Food Protection International
6. Food Protection: an international society
7. International Association of Food Safety
8. Association for Food Safety and Quality
9. International Association of (or for) Sanitarians
10. International Association of Food Sanitarians

Robert T. Marshall
President, IAMFES

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Training of Food and Dairy Staff for Microbiological Air and Surface Hygiene

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Abstract

Most workers in food and dairy plants do not realize the direct impact of their activities on the microbial quality of air and surfaces in their work environments. By use of the agar contact plate method and an efficient air sampler--"SAS" system--one can develop a training program to illustrate the impact of food processing and hygiene on that environment.

Some suggested demonstrations include: effect of cleaning of hands and utensils on microbial loads on work surfaces, effect of aerosol disinfectants on air-borne microbes in enclosed environments, effect of fumigation on the reduction of fungi, air hygiene level of critical environments such as sterile filling and packaging of yogurt, detection of air-borne phage, detection of specific microbes by selective media, and effect of dry sweeping versus wet sweeping on microbial air quality.

This proposed training program is applicable to many food industries.

Introduction

The importance of maintaining good hygiene is well known to dairy and food quality control personnel, but it can be difficult to impress on general plant workers the importance of good manufacturing practice (G.M.P.). Increasing emphasis on general hygiene conditions will enable manufacture of products with longer shelf-life, lower rejection rates, fewer complaints from the consumer, and higher production rates. Therefore, G.M.P. is financially advantageous, and training of all staff will assist in obtaining the required awareness to improve and maintain the quality of the working environment.

The proposed simple experiments in this article are suggestions for a general training program to illustrate the causes of microbiological spoilage of food and to demonstrate the methods by which airborne and surface bacteria are spread. Detailed reviews of microbiology of air and air sampling were made by Al-Dagal and Fung (1990) and Kang and Frank (1989). Surface sampling methods were reviewed by Lee and Fung (1986).

Materials and Methods

SAS System for Monitoring Microbes in Air

The "SAS" instrument (PBI International, Milan, Italy) is an entirely portable and self-contained unit and operates from a rechargeable dry battery. In the upper part is housed a Contact Agar Plate with a fan motor, and the handle contains a timer control, remote control, main switch, and associated circuitry. A tripod can be supplied with the equipment to allow remote use. The battery is of the dry cell, rechargeable type, and a voltmeter is built into the case for an indication of battery status.

Sterilization of the cover may be achieved by autoclaving or swabbing with disposable sterilizing tissues or with sterile swabs and disinfectant.

Before sampling an area, the time of sampling should be selected in accordance with environmental conditions. The timer is graduated in units. The air flow of "SAS" is 180 l/min. Remove the instrument cover, insert a closed Contact Agar Plate filled with appropriate medium (plate count agar, PCA, or other agar), and remove plate lid; replace instrument cover. Operate the machine either with the switch on the handle or by remote control. At the end of the sampling time, recover the instrument cover, replace the plate lid, and remove the closed Contact Agar Plate from the instrument. Identify each plate at this stage and then incubate for the specified time at the appropriate temperature. At the end of incubation, count the number of visible organisms on each plate, and relate the number obtained to unit air flow. The counts are reported as colony forming units (CFU)/cubic meter (m^3) using the following formula:

$$\frac{\text{number of CFU per plate}}{\text{60 liter x unit (60 liter/20 second)}} \times 1000 = \text{CFU}/m^3$$

Figure 1 shows the sequence of events in using the SAS system.

1) "SAS" ready for use.
2) Remove cover of apparatus.
3) Insert closed prepared Contact Agar Plate into slot and then remove plate lid.
4) Replace cover on apparatus.
5) Select time required for air flow (1 unit = 20 seconds = 60 l of air)
6) Press start button or operate remote control.
7) The air flow is directed onto the agar surface of contact plate.
8) At the end of the time cycle, remove cover, replace Contact Agar Plate lid, and remove covered plate from unit.
9) Incubate.
10) Count the colonies.
11) Record the results on the Microbiological Air Sampling Report (Table 1).
12) Interpret results.

"SAS" MICROBIOLOGICAL AIR SAMPLING REPORT

AIR SAMPLING CARRIED OUT BY: _____ DATE _____

SAMPLING SITE	No. OF PERSONS PRESENT IN ROOM	TEMPERATURE OF ROOM	SAMPLE IDENTIFICATION	TYPE OF MEDIA	TIME OF DAY OF SAMPLING	SAMPLE TIME*	VOLUME OF AIR SAMPLED	PLATE COLONY COUNT	NUMBER OF COLONIES /m³	ACCEPTABILITY LEVEL/m³	SAMPLING COMMENTS

TIME OF INCUBATION _____ TEMPERATURE OF INCUBATION _____

REMARKS _____ INTERPRETATION _____

* DIGITAL UNIT ON «SAS» = 20 SECONDS = 60 LTS OF AIR

Table 1. *Example of Data Collection Sheet for Monitoring of Microbes in Air.*

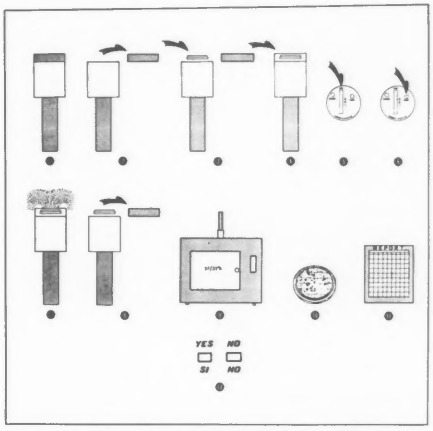

Figure 1. *Operation of SAS Unit for Monitoring Microbes in Air. See test for detailed description of steps 1 to 12.*

colonies can be made by subculturing the isolates and then performing standard microbiological tests. The data from this method can be reported in the Microbiological Surface Sampling Report sheet (Table 2).

The aforementioned procedure is similar to the Rodac plate method used in the U.S.A. (Favero et al., 1968).

"SAS" MICROBIOLOGICAL SURFACE SAMPLING REPORT
RAPPORTO SULLE CONDIZIONI IGIENICHE MICROBIOLOGICHE DELLE SUPERFICI

SURFACE SAMPLING CARRIED OUT BY _____ DATE _____

SAMPLING SITE	PLATE RUN NUMBER	TYPE OF MEDIA	TIME OF DAY OF SAMPLING	PLATE COLONY COUNT	CLASSIFICATION	ACCETTABILITY LEVEL	SAMPLING COMMENTS

INCUBATION TIME HOURS _____ INCUBATION TEMPERATURE _____

REMARKS _____ INTERPRETATION _____

Table 2. *Example of Data Collection Sheet for Monitoring of Microbes on Surfaces.*

Contact Agar Plate Method for Surface Sampling

The sterile Surfair contact plate (PBI International, Milan Italy) is filled with an appropriate medium with a convex surface and then placed in contact with the surface to be sampled. This is called the Contact Agar Plate method, using plate count agar (PCA) or other agar as needed.

To use the method, first hold the Contact Agar Plate (PCA) in the hand, remove the cover, and make contact with the surface, using light pressure. When contact is made, avoid moving the plate sideways to prevent breaking the medium surface. If the surface is not flat, roll the Contact Agar Plate (PCA) around the surface.

After sampling, reapply the cover and transfer the labelled plate to an incubator set at the appropriate temperature for the organisms under investigation. At the end of the incubation, count the number of visible colonies and report the CFU/cm^2. Identification of the isolated

Practical Experiments for Food Handlers

Experiment 1. Surface counts of utensils and environment

Purpose: To prove why all utensils and surfaces in contact with food must be clean.

Action: Ask the worker to press a Contact Agar Plate (PCA) onto the surface of blades, propellers, mixers, tables, and shelves both before and after cleaning. At the end of incubation time, the difference in number of microorganisms between the before and after plates will show the staff the adequacy of the cleaning procedure.

Experiment 2. Cleaning of surface before application of disinfectants.

Purpose: To prove why surfaces must be first washed and rinsed before applying disinfectant.

Action: Ask the operator to press the Contact Agar Plate (PCA) against a table, wall, floor, and other surfaces disinfected by a sanitizer (e.g., chlorine) *after* proper washing and rinsing. Repeat the same method on similar surfaces disinfected by a sanitizer but without washing and rinsing steps.

At the end of incubation time, the higher number of micro-organisms on disinfected surfaces *without* the washing and rinsing steps will show the reason for the correct sanitizing method.

Experiment 3. Importance of washing hands after using the toilet.

Purpose: To prove the importance of washing hands after visiting the toilet.

Action: Ask the worker to print his fingers on the surface of a Contact Agar Plate (PCA) before and after the use of the toilet (with and without hand washing). At the end of incubation time, the difference in number of micro-organisms between the plates will show the reason for correct hand washing.

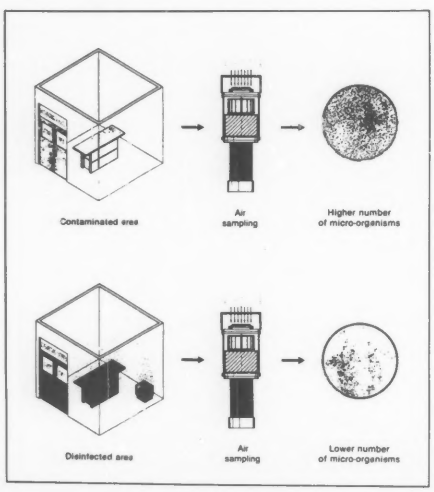

Figure 2. *Effect of Aerosol Disinfectant on Reduction of Microbes in Air.*

Experiment 4. Effect of aerosol disinfectants (Figure 2)

Purpose: To demonstrate the effectiveness of aerosol disinfection in a closed environment (cooling room, refrigerators, ripening room, filling and packing room, etc.)

Action: Air samplings with portable "SAS" loaded with a Contact Agar Plate (PCA) are made before and after area cleaning and disinfection. At the end of each sampling time, collect the plate, transfer it to an incubator, and incubate at 32°C for 48 hours to obtain CFU/m^3. A definite decrease in numbers of microbes per cubic meter of air in the disinfected area will illustrate the effectiveness of correct aerosol disinfection in terms of suitability, concentration, etc.

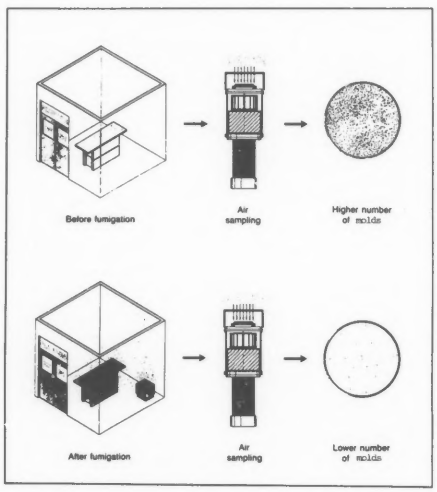

Figure 3. *Reduction of Mold Spores by Fungicide Fumigation.*

Experiment 5. Reduction of mold spores by fungicide fumigation (Figure 3)

Purpose: To demonstrate the fungicide activity of fumigation procedures like "Fumisport".

Action: Air samplings with portable "SAS Compact" are made before and after area cleaning and treatment with Fumispore. Be sure to use the correct capsule size based on the room volume. Load the air sampler unit with a Contact Agar Plate containing rose bengal/chloramphenicol agar.

At the end of each sampling time, collect the plate, transfer it to an incubator (or leave at room temperature), and incubate at about 25°C for 72 hours to obtain CFU/m^3. The absence or a definite decrease in the number of molds per cubic meter of air in the treated area will illustrate the action of the fumigant.

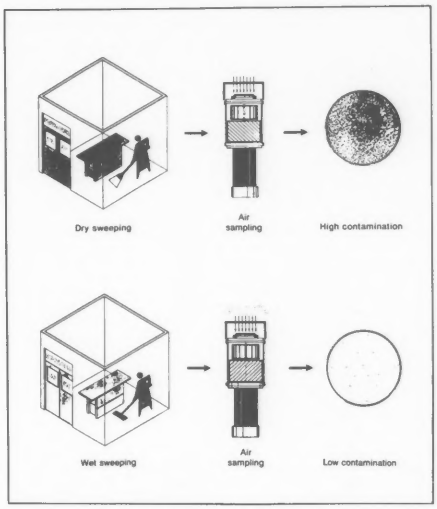

Figure 4. *Contamination of Air by Dry Sweeping Versus Wet Sweeping.*

same disinfectant at different concentrations). At the end of each sampling time, collect the plate, transfer it to the incubator, and incubate at 32°C for 48 hours. Count the Colony Forming Units per plate and relate to numbers per cubic meter of air. The lower the number of organisms, the higher the suitability of the disinfectant or the concentration at which it was applied.

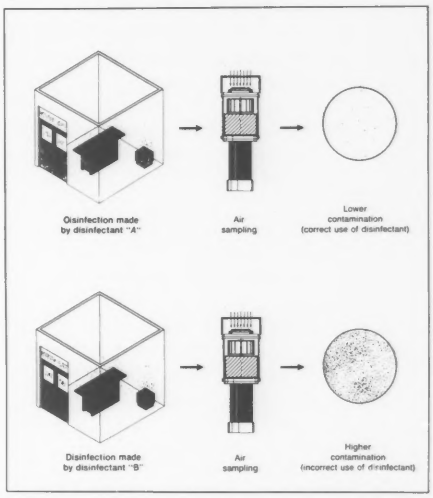

Figure 5. *Effect of Correct Application of Aerosol Disinfection.*

Experiment 6. Contamination of air by dry sweeping versus wet sweeping (Figure 4)

Purpose: To prove how dry sweeping of floors is a high source of contamination compared with wet sweeping.

Action: Air samplings with portable "SAS" loaded with a Contact Agar Plate (PCA) are made immediately after dry sweeping and wet sweeping of floors. At the end of each sampling time, collect the plate, transfer it to an incubator, and incubate at 32°C for 48 hours to obtain CFU/m^3. The difference in number of micro-organisms between the plates for dry sweeping and wet sweeping on the reduction of contamination.

Experiment 7. Effect of concentration of aerosol disinfectant (Figure 5)

Purpose: To check that aerosol disinfectant has been used at the correct concentration and in the correct way.

Action: Air samplings with portable "SAS" loaded with a Contact Agar Plate (PCA) are made with different disinfectants (or with the

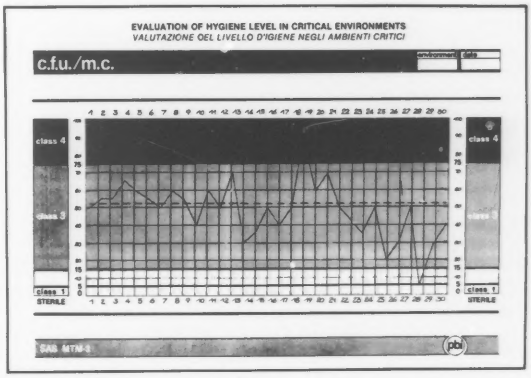

Figure 6. *Evaluation of Hygiene Level of Critical Environments.*

Experiment 8. Microbial load in air of specialized rooms.

Purpose: Evaluation of the air hygiene level in critical environments (e.g. sterile filling and packaging of yogurt, packing of special surface soft cheese, etc.)

Action: Air sampling can be made with "SAS". After completion of a preliminary test, it is recommended that at least 30 samples be obtained for each definable area, so that more significant interpretation can be made from the results. The number of CFU/m^3 of air sampled should be plotted on graph paper. This immediately gives an indication of the level of hygiene in the area sampled (Figure 6).

The highest and lowest results are excluded and then the mean value for the group of tests is calculated and drawn on the graph. This will indicate the overall pattern and will be located within one of the classes. The reliability and accuracy of the results will be shown by the degree of scatter. If some values are shown in classes either above or below the actual class, then the degree of air hygiene control is not sufficient.

Once the classification of the area has been made, then repeated regular sampling is required to monitor hygiene level. The suggested monitoring program for each classification of critical environments is shown in Table 3.

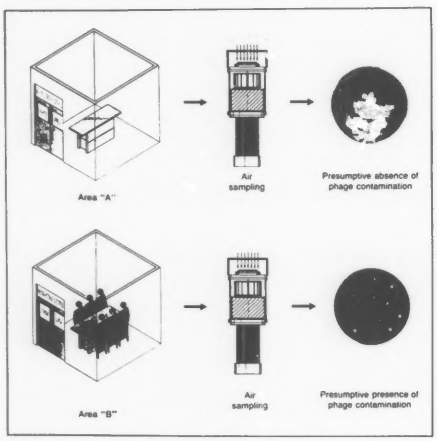

Figure 7. *Evaluation of Airborne Phage.*

Experiment 9. Evaluation of airborne phage (Figure 7).

Purpose: To check the presence of airborne phages in processing rooms as indicators of airborne contamination.

Action: Prepare Contact Agar Plates (PCA) with medium swabbed with an appropriate micro-organism sensitive to the phage. Take air samples with "SAS" unit, incubate, and observe for "no growth" plaques. The presence of plagues is a presumptive indication of phage contamination in the air.

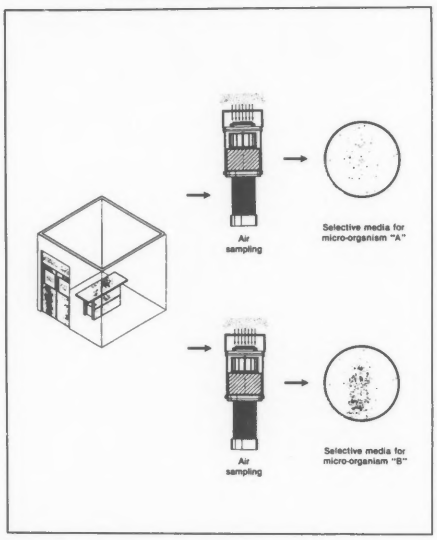

Figure 8. *Identification of Airborne Microbes.*

Experiment 10. Identification of airborne microbes (Figure 8)

Purpose: Identification of different airborne organisms using selective media.

Action: Air sampling with portable "SAS" are made with Contact Agar Plates containing different selective media. The incubation times and temperatures will be a function of the media used. The identification of microorganisms will be done by traditional microbiological tests.

SAMPLING PROGRAM AND CLASSIFICATION OF RESULTS IN CRITICAL ENVIRONMENTS

Environment Class	*No. of samples per site*	*Units per sample*	*Total sampling units*	*Total sampling time (Mins)*	*Total volume air litres*	*Total no. C.F.U. on all plates*	*Acceptability limit CFU/M³*
STERILE	3	15	45	15	2700	0	0
CLASS I	3	15	45	15	2700	13	5
CLASS II	2	12	24	8	1400	21	15
CLASS III	2	12	24	8	1400	108	75
CLASS IV	2	9	18	6	1080	216	100

NOTE: Number of samples per site, units and total sampling time relate to the use of the SAS or MTM-3 Bacterial Air Sampling Units.

Table 3. *Sampling Program and Classification of Results in Critical Environments.*

Experiment 11. Effect of surface brushing of cheese on aeromicrobiology.

Purpose: To demonstrate how surface brushing of ripened hard cheese made inside a ripening room is a source of further mold contaminations.

Action: Air samplings with portable "SAS" unit are made before and after cheese brushing. Load the air sampler unit with a Contact Agar Plate containing rose bengal/chloramphenicol agar. At the end of each sampling time, collect the plate, transfer it to an incubator (or leave at room temperature), and incubate at about 25°C for 72 hours to obtain CFU of mold/m^3. A definitive increase of number of molds in the area after cheese brushing will illustrate the risk of this action.

CONCLUSION

To obtain the best results in the application of hygiene products by food and dairy staff, it is imperative to have their goodwill and involvement. They must understand the reasons for what they are doing and why specific methods are requested. We think that these simple experiments can contribute to making the world of microorganisms less of a mystery to lay staff who will be involved in general food and dairy production routines and to help them understand the reasons for specific hygiene procedures.

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Antimicrobial Effectiveness of Hand Washing for Food Establishments

Lawrence Restaino[1] and Charles E. Wind[2]

Abstract

A complex etiological relationship exists among the factors: food; environment; and food handlers. Controlling all three factors so that they or their interactions do not become a health hazard is of utmost importance. The primary goal is to define an adequate plan which will control the resident and transient bacterial types. The overall aim of a hand sanitation program must implement hygienic measures to control and prevent contamination of the food products.

Health Departments, Sanitary Regulations, and Good Manufacturing Practices stress the importance of frequent and thorough hand washing to prevent microbial contamination. Washing the hands with ordinary soap and water removes the transient bacteria and the use of a antiseptic or sanitizer in the hand soap would control the resident bacteria. The pH of these hand soaps should be acidic to prevent hand irritation and pH altering of the skin. Hospitals have shown that an alcohol rinse containing an humectant can be very beneficial in controlling and removing both transient and resident bacteria without hand irritation.

A brief review of the physiology and morphology of the skin is necessary to understand the relationship between the resident and transient microflora and proper hand washing. The skin is a complex organ composed of two layers, the dermis and epidermis (35). The epidermal layer is composed of stratified epithelium cells in four layers (five layers in the palms and soles). The outermost layer of the epidermis is the stratum corneum which consists of 25-30 rows of flat, dead cells. It is this layer which is important to the distribution of transient and resident microflora.

The stratum corneum is in a constant state of attrition, being continuously shed and replaced routinely every 4-5 days with at least a million fragments of skin removed daily (23). These dead cells are microscopic (30x30x0.6 micrometers) which can easily be dislodged in clothing or disseminated into the air. The greater the body movement the more dead cells will be dispersed in the air (6). Influencing or affecting the microflora of the stratum corneum by proper personal hygiene including hand washing and routine bathing will drastically determine the kinds and amount of microorganisms dispersed with the dead cell fragments.

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[2]*Mullins Food Products, 2200 S. 25th Avenue, Broadview, IL*

Although the skin layer appears smooth, the epidermis actually contains many cracks, crevices, and hollows which can provide favorable growing niches (23). Bacterial flora can also become established in the hair follicles and the sweat and subaceous glands (7). An elevated humidity can create a moist and nutritious environment which can cause a rapid growth of microorganisms.

The hands are very tactile, and the opportunity for cuts, callouses, and contact with a wide array of microorganisms is very great (23). Hands are efficient samplers of the environment and contact with contaminating bacteria is to be expected (23). Included with the hands are the areas around and under the fingernails which represent a microenvironment that can be a source for microbial growth.

Factors Affecting Microbial Growth

The rate of growth and density of the microflora on the skin depends on both extrinsic and intrinsic factors. The resident bacteria remain relatively constant, while the types and density of the transient bacteria are greatly influenced by these factors (23).

Extrinsic Factors

1. Climate

Increasing the temperature and humidity causes the microflora to increase and alter bacterial ratios between resident and transient flora (30). Skin exposed to high humidity will cause bacteria to survive for a longer period of time (28) allowing as much as a 10,000 fold increase in the gram-negative rods and coryneform bacteria (1). Duncan et al. (10) showed that both high humidity and high temperature are required to increase the density of the transient microflora on the skin. The environmental temperature most conducive to rapid bacterial growth and density ranges from 30 to 40°C (23).

2. Occupation

Where a person works and what kind of tasks an employee performs have a dramatic influence on the microflora of the hands and forearms (30). Persons who work in environments that have high temperatures and humidity (such as a kitchen in a restaurant) could develop a very dense microflora on their skin (30). Total bacteria counts, the number of *Enterobacteriaceae*, and the percent *Salmonella*, *Escherichia coli* and *Staphylococcus aureus* on the hands and forearms are dramatically affected by where a person works (8). Table 1 shows the microbiological content on workers hands who were employed in 13 food

Table 1. *Microbial content of pre-washed workers hands in food and non-food industries*[a].

Food Industries	# of Persons	Log_{10} Total Bacteria	Log_{10} Entero-Bacteriaceae	% of workers hands with *Salmonella*	*E. coli*[b]	*Staph aureus*[c]
Chicken Slaughterhouse	14	6.20	3.53	36	86	100
Cattle Slaughterhouse	20	7.30	3.90	5	100	65
Pig Slaughterhouse	20	6.78	3.38	30	95	95
Egg Products I	20	6.28	3.59	25	60	55
Egg Products II	20	5.81	2.08	0	30	70
Fish	19	6.28	2.62	0	15	45
Dairy Plant	26	5.81	1.98	0	19	54
Deep-Frozen Foods	18	6.28	2.49	0	50	50
Dried Vegetables	14	5.97	2.34	0	7	29
Biscuit Factory	28	6.26	2.34	0	11	46
Chocolate Factory	28	5.63	1.76	0	4	29
Non-Food Industries						
Wool Factory	15	5.31	2.06	0	80	53
Glass Factory	14	5.95	1.74	0	0	64
Can Factory	15	5.68	1.14	0	0	60

[a]Taken from (7).
[b]*E. coli* = *Escherichia coli*.
[c]*Staph aureus* = *Staphylococcus aureus*.

and 3 non-food establishments (7). *Salmonella* was isolated from the workers' hands (ranging from 5 to 30%) only in the slaughterhouses and a processing plant for egg products. The number of *Salmonella* ranged mo.ly from 6 to 15 per hand, but up to 140 *Salmonella* cells were recovered per hand from workers in the chicken slaughterhouses (9). The percent *E. coli* and *S. aureus* on workers hands from chicken, cattle, and pig slaughterhouses and the egg plants were also quite high.

The microbiological role of hand hygiene during preparation of foods in kitchens of restaurants and hospitals has been investigated by examining 270 persons for the presence of *Salmonella* (7). Although *Salmonella* might have been contained in the food products, no *Salmonella* was recovered from any of the workers' hands. High numbers of *Enterobacteriaceae* were recovered both during work and after washing. The number of *S. aureus* on the hands of employees working in the kitchen was 40%.

3. Use of Cosmetic Lotions

The use of cosmetic lotions on the hands and forearms causes an occlusion raising the humidity of the skin resulting in an increase in the microflora (22,30). Hand lotions used to reduce dehydration of the hands and promote softness can be hazardous in a food establishment (2, 29). The use of non-antimicrobial hand lotions prior to using an antimicrobial hand soap could prevent the total effectiveness of the hand soap (30). In addition, lotions and creams bought from the supermarket could be inadequately preserved resulting in heavily contaminated products. The use of hand creams or lotions for softening hands/forearms should be curtailed during employment at a food establishment.

4. Personal Hygiene

Paramount for maintaining a normal transient and resident microflora is proper personal hygiene (21). Proper personal hygiene at a food establishment involves cleanliness relating to: 1) daily bathing; 2) hand washing which should follow any act that offers even a remote possibility that the hands have picked up contamination; 3) covering of cuts and abrasions; and 4) designated areas for smoking.

Intrinsic Factors

1. Body Location

The composition of the normal microflora varies depending on the body area (30). The face, neck, hands and hair will contain a higher proportion of transient organisms and a higher bacterial density. The exposed areas of the body are usually more susceptible to contamination from environmental sources (30). When the ecological conditions of a skin are changed, as with occlusion by a hand lotion on dry skin, the microflora will adapt to the new environment.

2. Age

The age of a person has a dramatic influence on the kinds and densities on the skin microflora (33). The skin microflora changes as a person matures. Adolescents entering puberty can produce large quantities of lipids called sebum which promotes the formation of acne caused by the bacterium, *Propionobacterium acnes*, and also increases the skin humidity in these areas.

3. Hair

The entire body is covered with a varying amount of hair except for the palms, soles, and terminal phalanges. If proper personal hygiene is practiced the hair and hair follicles will not represent microenvironments where an abnormally large density of microorganisms will grow and survive (23, 30). The scalp is the most likely area that could present a problem with respect to bacterial contamination from hair. Because of the density and increased oil production, the hair on the scalp could en-

courage the growth of a variety of bacteria including *S. aureus* and the yeast, *Pityrosporum* (30).

4. pH

The type of microbes which can live on the skin surfaces are influenced by the skin's pH (30). The pH of the skin is influenced by the secretion of lactic acid from sweat glands, bacterial production of fatty acids, and diffusion of carbon dioxide through the skin (23). The intrinsic factor that has received extensive research is the "acid mantle" theory of the skin referring to the mean skin surface pH of 5.5. This pH value is much more selective against transient organisms than the resident flora (30).

Factors that change the pH of the skin can drastically alter the normal microflora (30). The use of alkaline creams for the hands and forearms can increase the skin's pH towards neutrality. Repeated washings with alkaline soaps can cause the skin to become basic (15). Care must be taken in any food establishment to have the employees use a soap that will not alter the skin pH.

5. Nutrients

Sufficient nutrients can be derived from two types of chemical substances secreted at the skin surface: sweat and sebum. Sweat contains water soluble nutrients, whereas, sebum contains lipid (oil) soluble materials (23,30). Sweat includes many inorganic ions, primarily, chloride and sodium, some organic compounds such as urea, lactic acid, amino acids, glucose, and vitamins. Sebum contains triglycerides, wax esters, cholesterol esters and cholesterol. The roles of sebum and sweat in the growth of bacteria on the skins is still controversial.

Microflora of the Skin

The epidermis of a human being with reference to the hand/forearm areas are composed of a wide variety of microorganisms. The microflora of the skin is categorized as two types: resident and transient bacteria. Resident microflora represent particular species recovered on more than 75% of 25 sampling days over a seven month period, whereas, transients appear less than 25% of the time using the same sampling scheme (23). The bacteria isolated from the skin are mainly from the *Micrococcaceae*, *Corynebacteriaceae*, and *Enterobacteriaceae* family and the yeast *Pityrosporum*.

The resident bacteria, which are not easily removed, live in microcolonies that are usually buried deep in the pores of the skin protected by fatty secretions of the setaceous glands (23). Since the endogenous/resident microflora occasionally contains only one foodborne pathogen, this group is not so important in contaminating food products. The variety of microorganisms in the resident group, which includes the nonpathogenic *Micrococcus* and *Staphylococcus*, mainly *Micrococcus luteus* and *Staphylococcus epidermidis*, is substantially less than the kinds of bacteria associated with the transient group (23). *S. aureus* (cause of staphylococcal food poisoning) is the only true pathogenic organism included in the resident group. Although *S. aureus* is rarely an inhabitant of normal human skin, individuals that carry *S. aureus* on their skin or anterior nares (about 35% of normal adults) are particularly susceptible to infection where the normal protective skin barrier is broken (23). Since *S. aureus* is usually rare on the skin of normal individuals, classification of this bacterium as a transient or contaminant seems more appropriate.

Skin corneforms, both aerobic and anaerobic, comprise the majority of the resident microflora (23) where no species in this group is responsible for foodborne disease. The anaerobic bacterium, *P. acnes* which causes acne particularly in oily parts of the skin is also a member of the resident flora.

Of minor importance are the gram-negative bacteria and yeasts (23). The only group of gram-negative bacteria of apparent importance is *Acinetobacter*, whereas *Pityrosporum* represents the major yeast.

Transient bacteria or contaminants on the skin represent a large number of microbial types which are usually picked up from environmental sources and become attached to the outer epidermal layer (23, 30). Since these microorganisms are usually loosely attached to the outer dermis layer, the microflora is easily removed.

One area of major concern deals with the contamination of hands and forearms by transient microorganisms from feces. Clothing can become contaminated from pieces of fecal matter collected on the hairs around the anal region (20). When a person uses a toilet, their hands or forearms may be contaminated by these intestinal microorganisms including *Clostridium perfringens*, shigellae, salmonellae, hepatitis A virus, and other enteric bacteria (14). These contaminated hands/forearms can transfer intestinal microbes to foods, equipment, and other workers in the food storage and preparation areas.

Overall, transient bacteria can be any microorganism, including food pathogens, which exist in nature and become part of the skin surface for a period of time. Generally, the major group of bacteria comprising the transient microflora are the gram-negatives including the enterics (such as *E. coli* and *Salmonella*), and *Pseudomonas* (23).

Efficacy of Hand Washing

1. Overview

The cause of contaminated hands in the spread of disease has been known for over 120 years (31). The main goal of hand washing is to break the route of transmission of microorganisms from the hands to another source. Usually the removal of transient microbes is sufficient, but the reduction of resident bacteria may also be required. Hands can be contaminated from a multitude of sources including the environment, raw food products, other persons, and during toilet use (31). Low or moderate levels of *E. coli* and *Salmonella* on the hands are usually associated from sources of raw food products of animal origin, whereas, higher bacterial contamination is common when fecal matter is the vector (27).

2. Transmission of Microorganisms

It is assumed that all food handlers contain pathogens on their hands and participation in thorough hand washing to effectively remove them is mandatory (4,36). *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Serratia marcescens*, *E. coli* and *S. aureus* can survive for up to 90 minutes when artificially inoculated on fingertips (13). Once an employee's hand becomes contaminated, the fate and survival of bacterial cells become very pertinent with respect to further dissemination.

The number of pathogenic cells on a worker's hands is directly related to the probability of transfer from hands to cooked food products. Theoretically, only one viable cell is required, but for more practical terms the use of percentages is meaningful. Pether and Gilbert (27) showed when food handlers' fingertips were inoculated with greater than 600 *Salmonella* 100% of cooked corn beef samples became positive for *Salmonella* after handling. However, when the inoculum was lowered to less than 10 *Salmonella* cells per fingertip, 16% of the corn beef samples handled became positive. Therefore, the inoculum level is critical in the transmission of foodborne pathogens.

3. Hand Washing

Hand washing (without a sanitizing agent) effectively removes transient (mostly gram-negative) bacteria (5, 25, 34). When no hand washing is performed, the bacteria on the hands will accumulate and reflect the microbial flora of the environment (8, 9). Soap or detergents and water act as emulsifying agents which solubilize the grease and oils on the hands, removing the transient bacteria (5). Quick hand washing procedures can reduce the number of transient bacteria (3, 36). By increasing the friction employed with rubbing the hands together or using a scrub brush, ordinary soaps or detergents can reduce a greater number of transient bacteria as well as a minor portion of resident bacteria (5).

The inoculum level of *E. coli* and *Salmonella* on fingertips greatly influences survival time and the amount remaining after hand washing (27). With inoculum levels between 500 to 1,000 *E. coli* and *Salmonella* cells per fingertip, at least 1.0% was recovered after 45 to 60 minutes (27), whereas when a larger inoculum was used, *S. anatum* was recovered after 180 minutes. When the fingertips were artificially contaminated with greater than 6,000 *S. anatum* cells, normal hand washing with soaps and warm running water for 15 seconds followed by drying with paper towels did not completely eliminate these cells where at least 30% of the fingertips remained positive (27). However, below a level of 800 *Salmonella* cells contaminating the fingertips, hand washing procedures completely eliminated this bacterium. Therefore, hand washing with normal soap and water, followed by drying with paper towels will reduce the risk of transient *Salmonella* cells only if the initial contamination level is low. Similar results were reported by DeWitt and Kampelmacher (8, 9) who showed that routine hand washing only reduced the levels of *E. coli* (about 1.5 log cycles) and decreased the incidence of *Salmonella* on workers' hands employed in chicken and cattle slaughterhouses. More aggressive hand washing practices would be necessary to cause a greater removal of *Salmonella* and *Escherichia.*

The frequency of hand washing can also affect the number of bacteria on the skin (11). Studies performed on dairy workers showed that the mean bacteria count was twice as high for workers who did not wash their hands as compared to workers who washed four times during a work day (11).

4. Hand Soaps Containing Antimicrobial Agents

The objectives of an antimicrobial agent in the hand soap are twofold: 1) to form a residual concentration on the skin exerting a cumulative and continuous antimicrobial action on emerging microbes after the hand soap application (5, 12); and 2) to enhance the antimicrobial effectiveness of ordinary hand soap at the time of application. The majority of the work investigating different antimicrobial hand soaps has been performed under hospital conditions. Converting these results to a food service establishment may be slightly misleading. Many of the antimicrobial agents can be removed from the skin by soap fats, cooking and frying oils or oils in food products (5). Also, washing equipment with somewhat harsher detergents can cause the outer epidermal layer to swell and crack releasing or reducing the residual antimicrobial compounds on the skin. The overall efficacy of an antimicrobial hand soap usually depends on continuous use throughout the day (5). When a food service employee finishes work, chances are the hand soap used at other locations are ordinary soap which can remove the residual antimicrobial compound rather quickly.

The efficacy of antimicrobial compounds incorporated into hand soaps has been repeated by various investigators (4, 5, 11, 12, 18, 32, 34). Sprunt, et al (34) reported that during a very quick (contact time with soap less than 5 seconds) hand washing, the addition of an antimicrobial agent is not significant in reducing the microbial load in the hands. Although this hasty hand washing scheme was effective in removing microbes from the hands, the contact time was so short that any antimicrobial agent would require more application time to be effective (34).

Ericson, et al (12) showed that the residual effect (the number of bacteria remaining a certain time after washing) and cumulative effect (number of bacteria remaining after prolonged use of a preparation) were similar for hand soaps with and without antimicrobial agents. The residual effects were minimal for all soap applications (antimicrobial agents included quaternary ammonium, hexachlorophene, and trichlorocarbonilide-TCC), whereas, the cumulative effect displayed a decrease in the bacteria on the hands to a certain level (steady state) over repeated usages for all soap preparations. For the momentary effect (the immediate result on the bacterial load), the soap containing benzalkonium chloride, ethyl alcohol and TCC reduce the greatest amount of microbes from the hands as compared to ordinary soap without an antimicrobial system.

Dunsmore (11) compared a wide array of antimicrobial hand soaps to Ivory soap for reducing the microbial count of dairy workers' hands. By evaluating gram-positive cocci (transient and resident bacteria), the antimicrobial soaps were more effective in controlling the bacterial population on the hands. An ordinary detergent will remove more transient bacteria but the residents remain, whereas, an effective detergent-sanitizer removes most transients during washing and the residents are killed by the sanitizer (4, 11).

The efficacy of germicidal hand soaps and dips after two successive 15-second treatments were investigated by Sheena and Stiles (32). By using the finger imprint technique, quaternary ammonium (930 ppm) significantly decreased the bacterial content as compared to sodium hypochlorite (50 ppm) and an iodophor (25 ppm). When various germicidal hand soaps were compared to Ivory soap, 4% chlorhexidine gluconate and iodophor (0.75% available iodine) compounds released a significantly greater number of bacteria from the hands, whereas, soaps contains Irgasin DP300, 0.5% tribromosalicylanilide and

0.325% *para*-chloro-*meta*-xylenol were no better than Ivory soap.

Lowburg, et al (17,18) investigated the role of antimicrobial soaps on the removal of transient and resident bacteria. By inoculating the palm area with *S. aureus* and *Pseudomonas pyocyanea*, all soap treatments including chlorhexidine, chloroxylenol, orthophenyl phenol and an iodophor as antimicrobial agents as well as normal soap/water, were equally effective in removing these artificially inoculated transient cells (18). For removal of resident skin bacteria, Lowburg et al (17) showed that applications of detergents with certain antiseptics were required, whereas, washing or scrubbing for the same time with soap and water were virtually non-effective.

5. Alcohol Applications

To augment hand washing with and without antimicrobial agents, Ojajarvi (24, 25) and Lowburg et al (16) have examined the use of alcoholic solutions for the reduction of microorganisms on the hands. The use of an alcoholic solution containing an appropriate *humectant* and antiseptic agent was more effective in removing microbes, especially gram-negative rods than simple hand washing (16, 24). An ethyl alcohol solution was more effective in removing *S. aureus* and *Pseudomonas* from the hands than normal liquid soap or hexachlorophene detergent when similar exposure times were employed (24). In addition, an alcoholic solution containing 0.5% chlorhexidine was more effective in removing total viable bacterial cells from nurses and surgeons hands than an antiseptic hand soap or ordinary bar soap (16). Mahl (19) showed that a 60% alcohol solution was more effective in decreasing *E. coli* and *S. marcescens* in areas around and under the fingernails as compared to antimicrobial hand soaps containing 4% chlorhexidine, 0.5% *para*-chloro-*meta*-xylenol, or 0.05% stabilized iodine. In a prolonged study, Ojajarvi (26) showed that the combination of a liquid soap and alcohol solution (containing chlorhexidine and 3% glycerol) proved to be the most affective in removing microbes from the hands and more beneficial in decreasing redness and chafing. Detergents must be used on the hands to remove dirt, oils, soil and other physical contaminants acquired during a normal day, but, the frequent application of an alcoholic solution containing glycerol could prove extremely beneficial in controlling and removing additional microbes from the hands.

Conclusion

What *must* be stressed in a food service establishment is proper and frequent hand washing applications. A hand washing and a hand treatment scheme for a food service establishment must: 1) kill a broad spectrum of microorganisms (transient and resident microbes) especially pathogenic bacteria; 2) maintain a residual effect where the bacterial load on the skin is controlled between applications by antimicrobial agents remaining on the skin; 3) and be non-irritating to the skin (5).

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Industry Response to Seafood Safety

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This paper was presented at the 76th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc., Kansas City, Missouri August 13-17, 1989

I would like to talk to you about the efforts the seafood industry is taking now to effect a mandatory seafood inspection system in the United States. We think the time has come for this type of action and are working to bring it about. This morning coming in on Braniff Airways, which was one of the first times I have flown that airline in quite a while, I browsed through their in-flight magazine and found an article that was interesting. It was rather moralistic in tone and it talked about standards. A little anecdote in it was rather pertinent, I think, it made the point that there was a small town that had gotten completely out of sync in terms of its time, mainly because they relied on the factory whistle to indicate the benchmark, so to speak, at noon and the factory owner set his whistle by the big clock in front of the town jeweler not knowing that the town jeweler set the clock by the factory whistle. And, in our business now we feel it is time to reset our watches. And we should be taking a look at a new standard. Some of the people in the industry are saying "why are we doing this" along the lines of "if it ain't broke don't fix it" and feeling that we really don't have a big problem in our industry of making people sick or having inordinate problems. There are certainly many flurries, and individual situations that have been described here in other papers, but overall there really isn't a strong case that seafood presents a strong safety risk to the consumer.

That may be disagreed with by a number of people but I think it is much like the description of an elephant that is given by three blind people by virtue of their single exposure in touching that elephant in one part. The blind man who grasped it by the tail could very easily describe the elephant as much like a vine or a rope. The one who put his arms around one of the legs said "well the elephant is like a tree." And the one who grabbed the trunk said "the elephant is like a big snake, a python." And that's about the way people conceive of the seafood industry. They are looking at the degree of risk from consuming raw oysters from the south in summer months, if you have medical problems, they have one perception and feel the industry is fraught with risk. Or if they are looking at the levels of PCBs in Lake Michigan trout or in some of the large bluefish along the east coast they might think the industry's products are beset with contaminant problems with toxic substances. And yet that is almost like grabbing the tail of the elephant in describing it that way because the raw oysters and hard shell clams which are implicated amount to about 1/2 of 1 percent of the total seafood supply. The bluefish are about 1/7 of 1 percent and the Lake Michigan trout, all the Lake Michigan fish and the Great Lakes fish for that matter, are about 1/3 of 1 percent. So if one looks at these instances and says the industry has a great many problems, you really are grabbing the tail of the elephant.

I would like to suggest that we take a look at the overall industry with our eyes open. It is extremely diverse and it has been growing very rapidly. Per capita is about 15 pounds per person edible weight, which, if you want to measure in the same way that you would measure the consumption of red meats and poultry, you would have to add about 25 percent because those products are measured at a retail cut weight which does include some waste, bones, skin and so on. So that puts seafood at about 20 pounds altogether which translates into about 8 percent of the total animal protein consumed in the United States. The consumption pattern has grown about 20-25 percent in the last 6 years and its been growing steadily since the 1960s. But of that 15 pounds per capita consumption, 1/3 (close to 4 billion pounds) is in the form of canned fish, mainly tuna. Another big volume item is the frozen fish sticks and portions and frozen fillets which amounts to about 800 million pounds of edible weight or another 22-23 percent of the total. And then shrimp in all forms amounts to another 16-18 percent which amounts to about 2 1/2 pounds per capita. So those three items alone account for about 70 percent of the total. And I think we would be hard pressed to say that those items have any particular health risk associated with them that are any different than any of the other foods on the marketplace. Now add to these some of the other high-volume things like salmon products and lobster, and chowders, soups and breaded clams strips, farm raised catfish and trout, the millions of pounds of crab meat and I think we would agree that there is no inordinate health risk with any of these. So you really are looking at a total industry that has basically a very good safety record. And yet one

could ask then "what is the problem?" Why is the industry looking for more regulations? I think we should recall that anecdote about resetting our watches to another time standard, and that is what we are trying to do. We think the consumer is looking at another standard these days and the industry wants to get in sync.

This new standard is not very well defined. In fact, it might be demanding for perfection, which is an impossibility. But I think its more of a reflection that our environment has changed in ways that we really don't understand, and there is need for more security against the unknown. Perhaps it is a little bit like the blanket that the comic character Linus in the strip Peanuts carries around. It is a security blanket. And I think the consumer is saying "hey, I want to have a bigger and stronger security blanket than I used to, because I don't know what's out there." And the industry recognizes this need to improve the comfort level for these consumers. And let's face it, we have had a pretty good deal here in this country for the last 15-20 years in seafood, as I said it has been growing pretty rapidly since the late 1960s when the Catholic church changed its laws and said fish was no longer penance. The actual consumption has risen about 60 some percent. Now that is a pretty good rate on a per capita basis, 60 percent more fresh and frozen fish is being consumed than when you had to eat it. I guess that tells you something about morality--when you have to do it perhaps its not so much fun. In any event, the objective people know that we do have some nagging problems, some real ones, and these have been addressed here in the different talks here today. Many of them are related to the consumption of raw molluscan shellfish. We also know that ciguatoxin remains a problem, especially in the tropical areas, and the histamine poisoning is still another area that needs attention. But beyond this, what we are doing is experiencing a very changing industry, and we see a number of areas where the potential perhaps is greater than the actual risk today and we want to make certain that what is a potential risk, does not become a real one.

An example, new sources. With this demand for product having grown as it has over the years, we have gone to many parts of the world for our fish. We import around 60-65 percent of the total supply in the United States. And we have gone to many new countries for these products. We actually are importing right now from over 80 different countries in the world. Now some of these are pretty well developed, they have organizations to make sure of food safety, Canada is an example, but we are also importing from such places as Bangladesh and Burma and other parts of the world where one has to be a little concerned about their sanitation programs. There are new species, and these have not proven to be a problem, as yet, but I am really concerned about the new products.

There is new technology and concern over some of the pathogens in cooked ready-to-eat products and more and more fish is being given to the consumer in cooked ready-to-eat forms. So that is a new concern, and we have such high-tech food developments as surimi products which open up an entirely new area of potential problems. There is processing at sea which is coming on strong in some parts of the world, and this too, opens the potential, since that factory 2,000 miles out at sea isn't really open to visits from the FDA very often, unless they've got very good outboard motors on their little boats, because otherwise they're just not going to find that vessel out there. Aquaculture--here is another area of potential concern. Right now about 10-15 percent of the total supply of fish in the United States comes from farms. And it is growing and will continue to grow. And this opens up a new area such as the therapeutics that are necessary to maintain efficient husbandry and farms and they are now going to be a potential problem for aquaculture, one we have to be concerned with.

And then, finally, and this is perhaps the most difficult and that is the environment. We have long been aware of the need to monitor (especially the raw molluscan shellfish) growing areas, for the PSPs, the red tides, etc., improper sewage disposal. And now we know we have to be looking at chemical residues as well. As of yet, there is nothing that would suggest imminent health risk from trace residues of pesticides or chemical contaminants found in fish. But, we are really in our infancy in this and it is going to be a long-term issue for us.

Then there is the economic side of the inspection issue. We do have economic malpractices in our industry as I think most industries have. Fraud is the best way to say it and that is really the area that prompted the industry to get into the whole issue in the beginning. We didn't feel we had health concerns, but we did know we had fraud problems and the honest folks wanted to stamp them out. And this was the early 1980s that our industry group, the National Fisheries Institute, got into it. It seemed that some practices were taking place, one as an example would be a very common one, which is to bring in a pack of shrimp from another part of the world where they use the metric system and a 2 kilo pack was a pretty standard form. A block of shrimp that would be 2 kilos (4.4 pounds) was close enough to form into a block that would weigh 5 pounds and so it is very simple to take a 2 kilo pack and put it in a box and say its 5 pounds, and maybe you put a little extra water in there to make sure it is in there solid. Well this is just fine if you are selling, but if you are buying it's not so great. And, same thing if you are buying lobster tails at $15 a pound and somebody decides they need a little more ice around them so they are dipped and put back into the freezer and now you have 15-20 percent ice for $15 a pound. That is a very expensive popsicle. And the people who are becoming victimized by this, in the sense that they were competing with the fraudulent operators were saying we have to take action. So we surveyed the industry rather carefully and found that people really didn't believe that we had safety problems, but they were concerned about the economic fraud. Our first effort was to overcome it with education. We as an industry went out to the retailers and restaurant operators and said "hey watch out for the soft shoe people and try to protect yourself against this." And after a while we felt education was going to take too long so we said let's really try to improve the inspection program because the agencies that are responsible really had there hands full

with the food safety issues and were not spending an awful lot of time on economic violations of the law.

So that is what really got us into it. The first thing the industry did was to go to Congress in 1985 and ask that a new seafood inspection system be designed. Congress passed a resolution in 1986 giving this charge to the National Marine Fisheries Service of the U.S. Department of Commerce. Congress told them to design this new system based on the HACCP system or the Hazard Analysis Critical Control Point concept. The agency has been working on this for the last several years. There has been a series of workshops around the country, the industry has been very cooperative and participated in all of these and now these HACCP concept systems for each of the commodities are being tested in the actual plants to see whether they make sense. An economic evaluation is taking place by economic consultants to see how much it is going to cost, and concurrent with all of this the National Academy of Sciences is actually looking at the real health hazards associated with seafood products to try to pin these down to a more refined analytical point.

An interim report to Congress is due in a couple of months. But then, this past spring, our organization felt it was time to get the legislative process moving. So once again we went up to Congress, but this was only after struggling with one of the issues and that was which of the agencies of the federal government should be responsible for a mandatory seafood inspection program. Well, we have got friends in all three agencies, the Food and Drug Administration, the Department of Commerce National Marine Fisheries Service, and the Department of Agriculture. Each of these agencies has a number of very strong points, and also we think some weaknesses depending on the way they are structured and the way they have been able to get financing.

We went to the White House and said "why don't you decide which agency should have a mandatory fish inspection program?" Well, the White House decided it didn't want to decide, and they passed the buck off to Congress and said "Congress decide." And that is about where the issue resides on the federal agency point at this time. Except that our industry group said, well if you won't decide, we will decide, and we said we would like to see a new inspection program in the Department of Agriculture. We have a number of reasons for this, none of which is a lack of regard for the capabilities of people in the other agencies. One is a very selfish motive. We think we have the best chance of getting funded by taxpayer dollars through the Department of Agriculture, because that agency is already spending close to 1/2 a billion dollars on meat and poultry inspection and it seemed to make sense that an increase in appropriations would be easier to get when you are dealing with billions than when you are dealing with millions, and so that was a very non-altruistic approach to it, but a pragmatic one. In addition, because of our dependence on imports for some 60 percent of our product and also our dependence on the export market for about 40 percent of our own production--rather ironic, you see salmon crossing the Atlantic with American salmon going to Europe and European salmon coming here, you wonder if we couldn't save some shipping costs in there, but that is the way it happens to be--so we are export dependent as well as being import dependent. The Department of Agriculture is involved already in about 35 countries in which meat and poultry products are imported into the United States, so we felt that had a leg-up for us as well.

However it turns out, the industry's main objective is to get a better system. And in dealing with Congress, we have been successful in getting a major bill introduced by 14 rather influential Senators, with the majority leader on top of the bill. And we expect a similar piece of legislation to be introduced shortly in the House of Representatives with a hearing scheduled for Agriculture committees and the other committees that would have concurrent jurisdiction in October. In the meantime, Congressman Dingell just a few days ago introduced a piece of legislation that would grant more authority to the Food and Drug Administration and set up a mandatory system of sorts through that agency. So the issue is out in the open and hearings will be coming up in October. We are optimistic that by the end of this Congress, by the end of 1990, perhaps a piece of legislation will pass.

What we envision in a system would be rather straight forward. We would like to see certification of plants as a mandatory first step. That means that an initial inspection of facilities and procedures should be undertaken providing assurance that the operator has the ability to put out a wholesome product. And we think these requirements should be specific to the type of operation and species that are being handled. Following that we would like to see surveillance of operation which would be the HACCP procedure to be put in place by every one of these plant operators, and inspection as needed to verify adherence to the HACCP system of control. The intensity of the surveillance would vary according to the risk of the product, and the record of the operator. We would then turn to imports and we would like to see that foreign governments wishing to sell product in the United States would be required to set up a regulatory program similar to what would exist here and this would be monitored by U.S. agency people who would be visiting the foreign countries and monitoring the product at the port of entry. We would also like to see more enforcement in the molluscan growing water monitoring program and do this through additional funding for the state governments for increased monitoring and enforcement. Toxic substance monitoring--while current levels of contamination due to industrial pollution have not had widespread impact on the safety of coastal and oceanic resources, there is a need for continual monitoring of the resources for toxic substance residues. This effort on both domestic and imported product would serve to trigger compliance efforts through the HACCP programs and port-of-entry inspections if and when the surveillance shows persistent presence of toxins at levels of concern. Economic violation enforcement--the inspection system should include monitoring for economic abuses. Under the present regulatory system, economic violations do not receive intensive enforcement efforts. Since certain economic violations can result in safety concerns, we believe there is need to provide increased enforcement capabilities in this area. Increased enforcement

is necessary also to assure fair dealing and to overcome any lapse of consumers' confidence as to receiving what is being paid for.

In summary, we see an improved regulatory system combining a series of new or expanded inspection and self monitoring efforts. The system would be developed and implemented consistent with the risk-based HACCP concept and would be mandatory.

This proposed system should be designed to meet unique concerns of seafood. It would be different than the carcass-by-carcass examinations of meat and poultry, and certainly different than regulatory systems for dairy products and other foods. Its establishment is a large task, one which will require a phase-in for both the industry and government.

The government agency chosen to establish such a system will face a very challenging task. The harvest and marketing of live lobsters is far different than the processing of Alaska pollock into imitation crab meat. Fish smoking requires a different code of practice than marketing fresh haddock fillets, and on and on. Government-to-government understandings must be reached with more than 80 foreign governments. The number of import shipments exceeds 160,000 annually at scores of ports-of-entry--all the way from northern Minnesota and Michigan to Nogales, Arizona, as well as the more readily expected seaports. There is need for rapid response. Perishable products cannot wait. And a single container of lobster tail, as an example, can have a value in excess of one half million dollars. Undue delays are very expensive. The plants are very often in remote locations and are often small and seasonal.

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Case History

Anaerobic/Aerobic Pretreatment of a Confectionary Waste

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and
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S. Beuttel, Quality Control Manager[2]

Introduction

Leaf, Inc. (Leaf), formerly Hollywood Brands Inc., of Centralia, IL manufactures a variety of candy bars for domestic markets. Leaf utilizes large quantities of peanuts, corn syrup, chocolate, condensed milk and fats, some of which are wasted to the process sewer during routine clean-up procedures. A second waste stream consisting of both sanitary and cooling water is combined with the process wastewater prior to discharge to the City sewer.

The City of Centralia, in 1986, requested Leaf to develop a plan to reduce its pollution load discharged into the City sewer system. Sewerage surcharges are based on the following parameters:

- plant water use;
- effluent BOD concentration (greater than 200 mg/L);
- effluent SS concentration (greater than 250 mg/L); and
- plant location (inside city limits).

Maximum levels for fats, oils and grease (FOG) and ammonia-nitrogen (NH_3-N) of 100 mg/L and 35 lb/d, respectively, have also been established and applied to the Leaf discharge.

An investigation revealed that anaerobic/aerobic pretreatment would be the most cost-effective means for Leaf to meet its discharge limits. Various systems were considered, and the low-rate ADI-BVF system, followed by a simple once-through aeration system, was judged by Leaf to be the most cost-effective treatment plant for its needs.

A pilot plant study was initiated (fall 1986) to address concerns with operation and performance of the proposed low-rate anaerobic reactor. The pilot plant was operated on raw wastewater for 121 days at organic loadings and hydraulic retention times simulating and exceeding those anticipated in full-scale operation.

On the basis of the successful pilot results, Leaf signed a contract with ADI International to design and construct a full-scale pretreatment system.

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[1]*ADI International Inc., Salem, NH 03079 and Fredericton, New Brunswick, Canada E3B 4Y2.*

[2]*Leaf, Inc., Centralia, IL*

The following sections highlight the results of the pilot study and present operating data and details of the full-scale treatment systems.

Pilot Study

Objectives

The primary objectives of the pilot study were to:

1. Verify anaerobic treatability of the raw process wastewater.
2. Verify proposed design criteria for the full-scale system.
3. Evaluate the system performance in terms of BOD/COD/SS/FOG removal.
4. Determine degree of FOG digestion.
5. Assess reactor stability under shock loadings.
6. Determine chemical requirements for nutrients and pH control.

Apparatus

The system consisted of a feed storage container and mixer, a timer-controlled variable-speed pump to feed reactor and recirculate sludge, a 6.4-litre ADI-BVF reactor with heating tape for temperature control, biogas meter, and collection bag. A more complete description and a schematic of the pilot system was given by Cocci et al.(1).

Operation

The reactor was seeded with municipal anaerobic sludge and fed daily with a raw waste composite sample collected the previous day. The reactor was operated at a hydraulic retention time of 9.1 days, a 1:1 sludge recycle ratio and a temperature of approximately 31°C.

The study included three phases of operation: Phase 1 (day 1-55) was start-up, where the feed strength was gradually increased to full strength; Phase 2 involved steady-state operations in terms of feed strength (i.e., 100 percent) while adjusting chemical additions for both nutrient and pH control; Phase 3 included the application of two shock loadings to assess the reactor response and control strategies.

Table 1. *Sampling and Testing Schedule.*

Test	Sample			
	Reactor Influent	Reactor Effluent	Biogas	Raw Waste
Temp.	D	D		
pH	D (G)	D (G)		D (G)
BOD	W (C)	W (C)		W (C)
COD	W (C)	W (C)		W (C)
SS	W (C)	W (C)		W (C)
VSS	W (C)	W (C)		W (C)
FOG	TW (G)	TW (G)		W (G)
Alk.	TW (G)	TW (G)		
VA	TW (G)	TW (G)		
NH_3-N	W (C)	W (C)		W (C)
TKN	W (C)	W (C)		W (C)
TOT-P	W (C)	W (C)		W (C)
CO_2+H_2S (CH_4 by difference)			W (G)	
H_2S			W (G)	

Note: D = daily
W = weekly
TW = twice weekly
G = grab
C = composite (produced from daily grabs)

Sampling and Testing

The frequency of sampling and routine analyses performed on the reactor are outlined in Table 1.

All COD test results are total COD, and all BOD test results are total five-day BOD. Biogas samples were analyzed for CO_2, H_2S and CH_4 (determined by difference).

The data collected during the three phases of the study are presented in the sections below.

Raw Wastewater Data

The raw wastewater parameters are listed in Table 2.

Pilot Performance Data

Performance-wise, the average BOD, COD, SS and FOG removals in the pilot were 99, 97, 74 and 96 percent, respectively, at 31°C and at a loading of 1.1 kg COD/-m^3.d.

Table 2. *Raw Wastewater Parameter Results.*

Parameter	Mean	SD	Range
BOD	6,550	3,515	3,400-19,800
COD	10,560	3,778	6,400-21,000
SS	1,050	408	522- 2,050
VSS	1,000	378	519- 2,020
FOG	635	248	362- 1,294
NH_3-N	4	2.2	1.5-7.5
TKN	19	13	1.8-49
TOT-P	17	7	3.2-30
pH	4.1	0.5	3.3-6.4

SD - standard deviation.
All units in mg/L except pH.

The temporal variations in the influent and effluent COD, BOD, SS, reactor COD and BOD loadings, removals, pH, VA and alkalinity data, biogas quantity and quality, and influent and effluent FOG data are presented elsewhere.(1)

Discussion

The overall results indicated that this low-rate anaerobic treatment technology was extremely well-suited for treating the Leaf process wastewater.

The raw wastewater parameters summarized in Table 2 showed significant variations throughout the study.

The addition of $NaHCO_3$ to increase the buffering capacity and alkalinity of the wastewater is, most times, necessary for stable anaerobic treatment of food processing wastewaters which are low in nitrogen or background alkalinity, as was the case here. Through days 1 to 61, $NaHCO_3$ addition was 2 g/L. Influent pH showed a gradual decreasing trend. These results are consistent with the fact that the prepared feed contained an increasingly higher fraction of raw waste as the study progressed. Through days 63 to 104, $NaHCO_3$ addition was reduced from 2 g/L to 0.25 g/L without upsetting the process. Effluent pH slowly declined to levels slightly above neutrality (pH of 7.0)--a desirable pH for good operation.

For the first shock load (COD of 18,500 mg/L), the regular addition of 0.25 g/L of $NaHCO_3$ was maintained. The system responded exceptionally well. On day 114 the second shock load (COD of 45,000 mg/L) was applied. Since this load (equivalent to 5 kg COD/m^3.d) represented a significant increase well beyond any loading previously attained, it was necessary to supplement the feed with additional $NaHCO_3$. On the day of slug-loading, 5 g/L $NaHCO_3$ was added to the feed. The following days (normalized feed strength) utilized 1 g/L $NaHCO_3$ until the study was terminated. During the shock loading, the maximum volatile acids concentration recorded was less than 500 mg/L. This shows that the system can tolerate significant one-day shock loads with increased dosages of $NaHCO_3$ added to the feed.

During start-up, nitrogen and phosphorus supplements were supplied to the feed to ensure adequate nutrient availability for the anaerobic microorganisms. A conservative estimate of nutritional requirements for good anaerobic treatment efficiency is based on maintaining a BOD/N/P ratio 500/5/1. Under more favorable conditions, as was the case here, this ratio was reduced on day 63 of the study to 750/5/1 without any negative impact after start-up was complete.

Overall, both COD and BOD removal efficiencies exceeded 94 percent after an initial acclimatization period of two weeks, both averaging 97 percent. Removal efficiencies of SS and VSS were lower during the same period, averaging 74 percent and 76 percent, respectively. The decline in solids removal efficiency from approximately 85 percent to 70 percent and lower starting at day 112 was attributed to the shock loads applied during this period of study. In full-scale operation, anaerobic effluent SS values should normally be 500 mg/L or lower.

Analysis for CH_4 and H_2S indicated that the biogas had a high CH_4 component (averaging 81 percent) and a low concentration of H_2S (averaging 0.09 percent). This combination yielded a biogas which was highly combustible and had minimal odor potential.

FOG concentration in the effluent did not exceed 34 mg/L and averaged 13mg/L (equivalent to 96 percent removal) following the second week of pilot operation. It appeared that FOG removal by the ADI-BVF alone would meet the City effluent requirements of 100 mg/L.

A FOG mass balance was also done to determine the degree of FOG digestion. Over the course of 120 days, approximately 30 grams of FOG entered the reactor. At the end of the study, the reactor contained less than 3 grams of FOG and, thus, over 90 percent of the FOG was digested.

Full-Scale System

Full-Scale Design Data

Design data for the raw waste influent to the treatment system was provided by the Owners and it appears below.

Average flow	= 76,000 gpd (with 75-85% occurring over 4-6 hours daily during wash down)
Peak flow	= 110,000 gpd
BOD	= 4,600 mg/L (2915 lb/day)
SS	= 1,100 mg/L
FOG	= 750 mg/L
Temp.	= 90-110°F

The final effluent limits are:

BOD	= 200 mg/L or less (greater than 95% removal)
SS	= 250 mg/L or less (greater than 77% removal)
FOG	= 100 mg/L or less
NH_3	= less than or equal to 35 lb/day (55 mg/L at design flow)

The owner also requested that ADI make some allowances for future growth projections.

ADI therefore proposed a 1.1 MG ADI-BVF reactor having an HRT of 14.5 days and BOD loading of 0.31 kg/m^3.d. Both the HRT and loading are conservative and make provision for significant production increases.

System Description (see Figure 1)

As stated above, the discharge limits are BOD/SS/-FOG = 200/250/100 mg/L, respectively. The results of the study indicated that, with the exception of SS, the other limits could be met with anaerobic pretreatment alone.

Thus ADI proposed the ADI-BVF reactor followed by an aerobic system. This aerobic plant consists of an aeration tank and a Dortmund tank clarifier and was included to ensure all effluent criteria would be consistently met and to provide capacity for future growth.

ADI's contract with Leaf included supply of the following:

1. A duplex pumping station and controls located adjacent to the manufacturing facility and a 4-inch force main to the anaerobic reactor.
2. A perforated "peanut" basket (at the pumping station) to remove coarse solids (greater than or equal to 1/4-inch diameter), rags, etc., complete with lifting davit for manual removal and cleaning daily, and auto sampler for raw influent characterization.
3. Easy access to pumping station for manual addition of chemicals.
4. 1.1 MG ADI-BVF bolted steel tank 2 inches of insulation, 92.5 ft diam by 24 ft high low-rate reactor complete with all internals including influent/sludge recycle headers; submersible, low-speed mixer (2 hp) and controls; sludge recycle/waste pump (2 hp) and controls; two gas/liquid/solids separators (GLSSs) and effluent structure; insulated, floating membrane cover and continuous biogas extraction and flaring system; and direct injection steam heater.
5. 0.25 MG bolted steel aeration tank complete with access stairway to walkway betwen digester and aeration tank, working platform and lifting davits to service floating aerators, three 7-1/2 hp aerators with cable moorings, timers and controls, and effluent and emergency overflow structures.
6. 20 ft diam Dortmund tank (60 degree, conical bottom) clarifier with no internal moving parts and complete with waste sludge pump and controls (2 hp) and return force main to digester. There is also provision to allow sludge recycle to aeration tank in future, should Owner wish to operate aeration tank in activated sludge mode.
7. Final effluent manhole complete with flow meter and automatic sampler and gravity sewer connecting to City sewer.
8. 16 ft by 16 ft operators' building and laboratory complete with exhaust hood, two sinks, still, desk, steel shelving and countertops, and all equipment necessary for analytical testing.

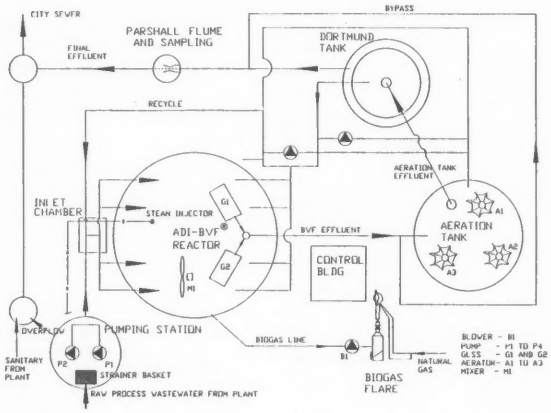


FIGURE 1 PROCESS LAYOUT OF PRETREATMENT SYSTEM

Operations

Operation of the system is very simple. The raw waste pumps deliver raw waste to the anaerobic reactor, automatically, via a system of float controls. The anaerobic sludge recycle pump and low-speed mixer are automatically controlled by separate timers.

The raw waste flows from the anaerobic reactor, by gravity, through the aeration tank and clarifier to the City sewer.

The aerators are automatically controlled and sequenced by timers.

The waste aerobic sludge pump is also run automati-

cally from a timer; the pump is run hourly, and the total daily run time is set to prevent any significant sludge accumulation in the clarifier cone. All the aerobic sludge is wasted to the ADI-BVF reactor for digestion. To date, none has been recycled to the aeration tank or wasted from the system externally.

The operator spends approximately 4 hours per day, 5 days per week, at the treatment plant. He spends approximately 3 hours per day, or 75 percent of his time, performing daily analytical tests (BOD, COD, SS, NH_3, and FOG on influent and final effluent) required by the City.

The operator's daily routine, aside from the analytical testing, includes collection of influent and final effluent, 24-hour composite samples, grab samples of digester and aeration tank effluents, cleaning the peanut basket of solids, and addition of sodium carbonate (in 50-lb bag quantities) and urea directly to the influent sump pump. The entire daily routine normally takes one hour to complete.

Full-Scale Performance Data

Full-scale performance data for the first sixteen months of operation are given in Table 3. The overall BOD removals are typically in the order of 98-99+ percent, even at loadings over twice the design value. The suspended solids removals are more scattered and range from 77 to 95 percent.

The actual performance of the ADI-BVF digester is not monitored on a routine basis in order to reduce the amount of analytical testing by the operator. However, grab samples of the reactor effluent are occasionally tested and indicate BOD removals consistently in the 90-95 percent range and higher at the higher influent loadings. The suspended solids removals through the reactor are typically in the 75-85 percent range. These performance figures do not reflect the substantial additional loading from the aerobic biological solids which are removed in the Dortmund tank clarifier.

The mixed liquor suspended solids concentration in the aeration tank typically ranges from 750 to 1000 mg/L, while the clarifier effluent is less than 175 mg/L.

The reactor sludge recycle system which recycles sludge from the effluent side of the reactor (directly beneath the two GLSSs) and the low-speed mixer are operated on an intermittently, continuous basis; the actual run time for the recycle pump and mixer are determined from field experience and adjusted from time to time so as to optimize reactor performance. An equally important function of the recycle system and mixer is to continually "turn over" the reactor sludge bed, keeping it from consolidating too much and at a high level of activity.

The raw waste leaves the factory at an average temperature of approximately 100°F, and the reactor effluent temperature ranges from nearly 100°F in the summer to a low of 80°F in the coldest winter months. Temperature variation over this range has had no impact on performance. A direct steam injection system is provided at the reactor and has been used to maintain a minimum reactor temperature of 80°F. The use of steam is not normally an ongoing occurrence in the winter but is used in extremely cold weather and during periods of low flow, as occurs during the Christmas and New Years holiday season.

The aeration system at the aeration basin consists of three 7-1/2 hp, high-speed floating aerators. Under normal conditions, only one 7-1/2 hp unit operates at a time. Each unit is provided with a draft-tube to provide mixing and uniform oxygen levels throughout the tank. Each aerator is controlled by a timer which automatically turns the aerator off and on and ensures equal run time on all units.

Chemical supplements for nitrogen (urea) and pH control (soda ash) are required; each is added manually at the influent pumping station by the operator during his daily round.

The reactor pH is normally maintained at 6.5 to 6.6; the total alkalinity normally ranges from 1100 to 1200 mg/L, and the volatile acids level is normally in the 300 to 500 mg/L range.

The operation of the treatment plant has been entirely odor-free. The anaerobic reactor is completely covered by a floating, insulated membrane cover which is maintained under a slight negative pressure. All the biogas is collected and flared without odor. The potential for odor

TABLE 3. *LCI Waste Treatment Plant - Monthly Performance Summary.*

Month	Flow gal	BOD Raw mg/L	Load lb/d	BOD Eff mg/L	BOD Rem %	SS Raw mg/L	Load lb/d	SS Eff mg/L	SS Rem %	NH_3N mg/L	FOG mg/L
Design	76,000	4,600	2,902	200	-	1,100	694	250	-	55.5	100.0
Sep. 87	52,360	3,482	1,550	26	99.2%	835	371	57	93.2%	2.2	9.9
Oct. 87	54,360	3,581	1,653	28	99.2%	708	327	93	86.9%	3.7	16.3
Nov. 87	45,706	3,259	1,226	26	99.2%	1,908	741	92	95.2%	1.3	<60.0
Dec. 87	49,000	4,534	1,888	51	98.9%	1,675	697	162	90.3%	7.1	13.7
Jan. 88	53,100	6,564	2,962	77	98.8%	1,275	575	189	85.2%	25.2	5.0
Feb. 88	47,350	3,814	1,535	78	97.9%	694	279	170	75.5%	7.3	7.6
Mar. 88	55,650	5,245	2,481	85	98.4%	1,275	603	154	87.9%	4.3	7.0
Apr. 88	54,650	9,056	4,207	79	99.1%	3,100	1,440	151	95.1%	1.6	12.0
May 88	60,857	12,865	6,498	90	99.3%	2,687	1,357	135	95.0%	1.25	6.0
Jun. 88	64,227	12,231	6,520	55	99.5%	1,409	751	80	94.3%	1.11	5.0
Jul. 88	69,500	8,514	4,911	57	99.3%	1,202	694	66	94.5%	1.58	5.0
Aug. 88	61,000	13,205	6,686	100	99.2%	1,346	681	177	86.8%	11.6	8.0
Sep. 88	55,286	9,865	4,554	55	99.4%	1,136	524	120	77.1%	9.7	7.0
Oct. 88	45,952	5,736	2,200	62	98.9%	851	326	92	89.2%	0.9	5.0
Nov. 88	46,210	10,161	3,897	64	99.4%	1,402	538	178	87.3%	1.3	12.0
Dec. 88	41,647	9,608	3,321	69	99.3%	1,240	429	174	86.0%	7.6	10.0

nuisance was a very important consideration in the choice of treatment systems, as the treatment plant is very close to a residential neighborhood.

Other important factors in the choice of treatment system were the need for pretreatment, the quantity of waste sludge generated and its concentration before dewatering.

The low-rate ADI-BVF system required no pretreatment, as it provides effective separation and digestion of both the FOG and suspended solids entering the reactor.

At the time of writing, the system has been in operation for approximately 1-1/2 years during which time no waste sludge has left the system. When sludge is finally wasted, it will be recovered directly from the digester via its sludge/recycle/wasting system. This system includes an outside piping connection for pumping directly to a tanker truck. Tentative plans are in place to truck any waste sludge to the City treatment plant. At the City plant the sludge will be dewatered either on a belt filter press or on sludge drying beds. The dewatered sludge will be disposed of with the City's primary and secondary sludges.

The reactor sludge bed is profiled periodically. The actual bed height fluctuates, rising and falling in response to loading, and the bed typically expands when loading is increased and the gas activity increases.

At the time of writing this paper (February 1989), the maximum (working) bed height is approximately 11 feet and occupies approximately 50 percent of the reactor volume. The total suspended solids concentration of the bed varies from top to bottom. The working bed typically has a suspended solids concentration of approximately 1 percent near its top, increasing to approximately 4 percent near its bottom. This range is typical for this type of reactor.

From sludge profile data and projections of solids input to date and in the future, it is estimated that at least 90 percent of the suspended solids removed by the reactor are digested and that the system will operate for another year, and possibly longer, before sludge wasting must begin. This brings the total time before sludge wasting to at least 2-1/2 years. The amount of scum is also monitored by periodic sampling. It is difficult to quantify the scum buildup as it, too, appears to be a dynamic situation, appearing for a period of time and then disappearing.

Discussion and Conclusions

The performance of the ADI-BVP digester and overall system has consistently exceeded design expectations since start-up, even though the organic loading to the system has been over twice the design value.

The system has proven to be extremely simple to operate and requires very little operator intervention.

One of the system's most attractive features is its ability to treat this raw waste which is quite variable in strength, has high levels of both suspended solids and FOG, and to digest these substances along with the waste aerobic sludge. This feature precluded the need for any equalization and primary treatment and sludge dewatering and handling equipment. Equally important is the fact that this type of system produces a minimum quantity of sludge for ultimate disposal at a time when sludge and solid waste disposal is becoming a very critical area of concern for the food industry and other industrial sectors in the United States.

References

1. Cocci et al. "Anaerobic Treatment of a Confectionary Waste," Atlanta, Georgia, FPOWC, 1987.

News

New Addition to IAMFES Lending Library

The IAMFES Lending Library has received a complimentary copy from the University Creamery at Penn State for it's use. The title of the videotape is Milk Plant Sanitation: Chemical Solution Testing.

This 13 minute video explains the proper procedure required of laboratory or plant personnel when performing chemical titrations in a dairy plant. Five major titration are reviewed - alkaline wash, presence of chlorine and iodophor, and caustic wash and an acid in a HTST system. Emphasis is also placed on record keeping and employee safety.

If you are interested in viewing the video, give Sandy a call at the IAMFES office 1-800-369-6337.

USNAC-IDF 23rd Congress to Tackle Biotech, Environment Issues Oct. 7-12 in Montreal

A global perspective on dairy biotechnology, environmental packaging, milk nutrition and other vital issues are among 42 sessions planned for the 23rd International Dairy Congress sponsored by the International Dairy Federation (IDF).

The Congress, held once every four years, will convene at the Montreal Conventional Centre, Montreal, Canada, Oct. 7-12, 1990. The Congress also features Exposition 1990, sponsored by the Canadian Dairy and Food Industries Supply Association.

The Congress theme "Dairying in a Changing World" reflects challenges facing the U.S. dairy industry, notes Dr. John Nelson, Chairman of the U.S. National Committee to IDF. The Congress is IDF's keynote event, Nelson says. "It offers a broad overview of the most current dairy trends for scientists, marketers and processors," he says. "IDF opens its doors and reports the world scene to the dairy industry."

The U.S. National Committee (USNAC) is the U.S. dairy industry representative for IDF. Thirty-five countries around the world support IDF, a nonprofit organization that since 1903 has promoted the exchange of scientific, technical, marketing and economic information for dairy producers, processors and marketers.

Montreal will be the first North American host for the International Dairy Congress. "It's a great opportunity for U.S. dairy industry lea[illegible]," says Thomas Holzinger, corporate director o[illegible]chnology, dairy and international foods, for Borden Inc. and a USNAC director.

U.S. scientists can assess research on a worldwide basis, and have an opportunity to meet their counterparts from around the world, Holzinger says. Marketers can learn advertising and marketing strategies in place in other countries, and see new products on display, he adds.

Illinois-based management consultant John W. Sliter is currently president of IDF's international Commission on Economics, Marketing and Managing. "The marketing sessions pull together expertise in world trade, dairy product consumption and product advertising -- and the people involved," Sliter notes. His marketing industry contacts made at the Congress and other IDF events are invaluable, he adds.

U.S. dairy processors attending the Congress have the opportunity to visit Exposition 1990, the first expo sponsored by the Canadian Dairy and Food Industries Supply Association (CDFISA).

More than 150 international companies have reserved booth space for Exposition 1990. Exhibits range from processing and packaging equipment to ingredients and services. CDFISA has tapped the U.S. Dairy and Food Industries Supply Association to manage the international expo. Exposition 1990 will be held simultaneously with the Congress, running Oct. 8-12, 1990, also at the Montreal Convention Centre.

The IDF Congress itself covers 16 current topics of interest in 42 half-day sessions. More than 5,000 IDF members and visitors from more than 50 countries are expected.

Registration opens Sunday, Oct. 7, with sessions beginning the following morning. All U.S. producers, processors, scientists and others are invited to attend all or part of the five-day event, Nelson stresses.

USNAC director Dr. David Hettinga encourages U.S. processors to use the Congress as a first step into the world market. "At Land O' Lakes, we have made contacts through IDF for joint ventures and for licensing product technology. It is a distinct opportunity to expand your business," says Hettinga, vice president of research, technology and engineering for Land O'Lakes, Arden Hills, Minn.

Other Congress events include an international new product display, poster sessions, technical and sightseeing tours, banquet and free admission to Exposition 1990.

The program of sessions for the 23rd Congress in Montreal includes:

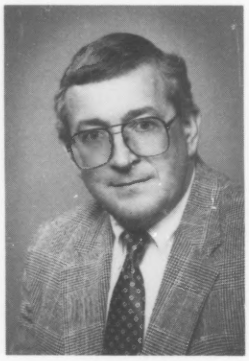
- Biotechnology -- Milk Production. A look at biotech advances in production stimulation (including bovine somatotropin), milk composition alteration, and consumer and regulatory reaction to biotechnology.
- Friends with the Environment. An overview of packaging challenges, waste disposal and sustainable agriculture.
- Promotion and Advertising. Reviewing advertising options, marketing nutrition

and dairy product advertising.

- Safety, Quality Assurance, and Legislation. With emphasis on world harmonization of standards, current dairy product safety threats, and quality assurance systems.
- Economics and Marketing. An in-depth look at marketing internationally in an era of GATT negotiations, health issues, new products and a developing world economy.
- Milk and Human Health. A look at the health and nutrition issues surrounding milkfat, minerals and cultured dairy products.

Other sessions include: Developments in Dairy Science, New Products and Milk Products as Food Ingredients, Biotechnology -- Milk Products, Milk Processing and Engineering and more.

For more information and registration materials for the International Dairy Congress, contact Harold Wainess, Secretary, USNAC/IDF, 464 Central Avenue, Room 24, Northfield, IL 60093; phone (708) 446-2402 or FAX (708) 446-2456.



Joseph Murphy

Joseph Murphy Appointed as Anderson Instrument Company Midwestern Regional Sales Manager

The Anderson Instrument Company of Fultonville, NY, announced the appointment of Joseph Murphy as the company's Midwestern Regional Sales Manager. Joe Murphy's territory will cover North and South Dakota, Minnesota, Wisconsin, Iowa, Illinois, Kansas, Nebraska and Missouri.

Joe came to the Anderson Instrument Company from Hevi-Duty Nelson where he worked as their Midwestern Regional Sales Manager. He resides in Milwaukee, Wisconsin with his wife, Mary, and son, Dan.

The Anderson Instrument Company designs and manufactures sanitary indicating, recording and process-control instrumentation used in the production of food, beverage, dairy and pharmaceutical products.

For more information please contact: Anderson Instrument Company, Inc., R.D. 1, Fultonville, NY 12072, (518)922-5315.

Global Warming, CFC Ban Highlight Ammonia Refrigerant

Recent concern over global warming and the growing hole in the earth's ozone layer have greatly increased interest in the use of ammonia as a safer alternative for large-scale refrigeration systems, as demonstrated by the second Ammonia Safety Seminar held this year in Wisconsin.

The safety seminar, which was a repeat of a seminar held last February, took place on December 6, in Appleton, Wisconsin.

One of the primary speakers, refrigeration expert William F. Stoecker, Ph.D., explained that the banning of refrigerants which have a negative effect on the ozone layer as outlined in the Montreal Protocol, especially CFC-11 and CFC-12, has and will result in major changes in the cost-efficiency, regulation and profitability of ammonia in large-scale refrigeration systems.

Stoecker, a professor of mechanical engineering at the University of Illinois at Urbana-Champaign, spoke at the Paper Valley Hotel in Appleton, Wisconsin, at an "Ammonia Safety Seminar" sponsored by Bassett Inc. Mechanical Contractors and Engineers, Appleton. Bassett is known as one of the Midwest's top specialists in engineering, installing and modifying ammonia refrigeration systems.

"The international agreement on production cutbacks of CFCs is having an incredible effect on the entire refrigeration business," said Ron Cole, a national industrial refrigeration consultant who also spoke at the safety seminar. "Ammonia has been the refrigerant of choice in many industries for more than three-quarters of a century, and its use in many

markets continues to grow. Conferences such as this are crucial to provide the training and understanding for its safe and efficient use by the many new people entering the industry. The possible expanded use of ammonia, in light of the current upheaval due to the CFC issue, makes conferences like this even more important."

Many corporations which rely on large-scale refrigeration have discovered the monetary advantages of using ammonia. By volume, ammonia is roughly one-eighth the cost of other refrigerants.

Not only is ammonia less expensive to use, but it's an extremely efficient refrigerant, according to Stoecker. "It possesses very favorable thermodynamic and heat-transfer properties. For condensation and evaporation, both inside and outside tubes, ammonia has roughly twice the heat-transfer coefficient as its alternatives, R-22 and R-502," he said.

In addition, ammonia is remarkably tolerant of water contamination, behaves favorably with oil, has no effect on the ozone layer and possesses a built-in leak detection system--a naturally alarming odor.

For more information please contact: William Bassett at (414)739-5312.

Seafood Industry Contributes Billions to U.S. Economy

Directly and indirectly, the United States seafood industry contributes $49 billion to the nation's economy. "If recent market trends continue, the economic activity associated with seafood products in the United States will reach $62.9 billion by the turn of the century," says Lee Weddig, Executive Vice President of the National Fisheries Institute (NFI). Of the $49 billion the seafood industry contributes, $20.3 billion is paid as wages and salaries to over 1.8 million full-time equivalent positions.

The NFI is the nation's largest seafood trade association. Its research division, the National Fisheries Education and Research Foundation, released the report, entitled *Economic Activity Associated with Fishery Products in the United States* in mid-January.

The report captures all economic activity from the harvesting sector to retailers and restaurants. Of the six market sectors included in the analysis, the food service sector generates the greatest direct and indirect impacts -- $22 billion in economic activity and over 1.2 million full-time jobs. (Throughout the analysis, jobs are defined as full-time equivalent positions.) Processing contributes the next greatest impact -- $13 billion in economic activity and 304,000 jobs. The harvesting sector accounts for $7.1 billion in economic activity and 108,000 workers. Next is the distribution sector, which contributes $3.2 billion to the nation's economy and 69,000 jobs. Finally, seafood sold in retail stores accounts for $3.1 billion in economic activity and 102 thousand jobs.

Using landings, import-export data and industry costs from 1986, the report also breaks down the economic impacts of the seafood industry by domestic products, imports, regions and species. Increases in consumption since 1986 indicate that the economic impacts occurring today are much greater. Nonetheless, this report is the first comprehensive economic analysis to link all sectors of the U.S. seafood industry including exports, aquaculture products and high-seas landings to the nation's economy.

Other results of the study include:

- •U.S. produced aquaculture products accounted for $4.15 billion in economic activity of which $1.70 billion in income was paid to 140,000 full-time employees.
- •Impacts associated with fish and shellfish caught in the U.S. account for most of the industry totals. Annual economic activity amounts to $26.7 billion of which $10.7 billion are wages and salaries.
- •Industrial fish products (such as fish meals and oils) have a wholesale value of $170 million.
- •Average mark-up from wholesaling to processing is 119%, but varied from 78% for industrial products to 295% for cured and smoked products.

The study was performed by Kearney/Centaur, a division of the international management consulting firm of A.T. Kearney. Copies of the report are available from the National Fisheries Education and Research Foundation. For information on costs and how to order, please contact NFI Communications Department, The National Fisheries Institute, 1525 Wilson Boulevard, Suite 500, Arlington, VA 22209 (703)524-8881.

MIF & IICA and NMPF Announce Three-Point Program to Maintain Safe Milk Supply

In a recent letter to Food and Drug Administration (FDA) Acting Commissioner James Benson, Milk Industry Foundation and International Ice Cream Association (MIF & IICA) President E. Linwood Tipton, joined National Milk Producers Federation (NMPF) CEO James C. Barr, in responding to concerns about animal drug residues found in milk. The letter outlines a three-point program, jointly developed by NMPF and MIF & IICA, to ensure a continued supply of safe and wholesome milk for all those who enjoy dairy products.

"We are once again undertaking a review and

analysis of the current situation regarding possible animal drug residues in milk," wrote Tipton, in the January 11 letter to the Commissioner. "The first step of this review has already been taken."

Scientists from many of the dairy industry's major companies and dairy farmer organizations met early last week to discuss the issue. The participants stressed that industry testing results show a much lower incidence of residues than reported in the December 29, 1989 *Wall Street Journal*. They further concluded that industry efforts, beyond those of the regulatory agencies, are effective in preventing milk with illegal drugs from reaching the retail shelf. While reassuring consumers that the milk they purchase is safe, the scientists also committed to developing plants to enhance and strengthen the industry's safety network.

The specific elements of this three-point program include:

1. **An initiation of an immediate review of present testing/monitoring procedures in the Pasteurized Milk Ordinance.**

   This includes examining present methodology for adequacy, efficiency, and developing recommendations for changes, as necessary. Activities will be coordinated with the FDA and the National Conference on Interstate Milk Shipments.

2. **Continuing and expanding a comprehensive dairy farmer and veterinarian animal drug education program.**

   An extensive educational program for dairy farmers and veterinarians about the proper use of animal drugs was undertaken last year. This has been greatly expanded to include guidelines on proper animal drug usage and a quality assurance pharmaceutical checklist for farmers; creating and distributing announcements and flyers delineating approved and unapproved drugs; and conducting educational seminars on proper animal drug usage. Much of the work on this has been completed already and is currently being reviewed by FDA and USDA. As soon as the review is completed, this expanded program will be implemented throughout the country.

3. **Implementing a public information program to accurately inform consumers about the safety of our nation's milk supply.**

   A public information program will be developed to provide facts to consumers and the media regarding actions being taken and about any possible animal drug residues, and their significance, which might be in the food supply.

"To supplement the industry program, we believe FDA must also initiate a review of the same issues and take positive action to ensure that withdrawal times and tolerances for approved animal drugs are realistic, based on the sensitivity of testing methods used and public health significance," Tipton said. "This is an area that deserves the immediate attention of FDA, and we are prepared to work with the Agency in this regard."

MIF & IICA are national trade associations representing milk processors and ice cream manufacturers. Activities range from legislative and regulatory advocacy to market research, education and training. MIF has 220 member companies that process 80 percent of the fluid milk and fluid milk products consumed nationwide. IICA has 200 member companies that manufacture and distribute an estimated 85 percent of the ice cream and ice cream-related products consumed in the United States.

For more information contact Jerry Kozak (202) 296-4250.

American Dairy Products Institute Announces 1990 Annual Meeting and Technical Conference Plans

The American Dairy Products Institute will hold its 4th Annual Meeting on April 23-24, 1990, at the Chicago O'Hare Marriott Hotel, Chicago, Illinois. The meeting will be held in conjunction with the Institute's biennial Dairy Products Technical Conference, to be held at the same location on April 25-26. This year's Conference will be co-sponsored by the Center for Dairy Research, University of Wisconsin, Madison.

All evaporated and dry milk and whey products manufacturers, allied industry representatives interested in the processing, marketing, and utilization of these products, government and university representatives and end-products users are invited to attend the Annual Meeting and Technical Conference.

Informative programs have been arranged for these events with a wide range of subjects addressed by knowledgeable speakers from industry, state and national government and academia. Meeting attendees will have an excellent opportunity to discuss technological advances and exchange marketing strategies with colleagues from throughout the world who will be participating in the meeting.

As usual, an entertaining program will be available for attending spouses.

Additional information about the meeting can be obtained by contacting Dr. Warren S. Clark, Jr., Executive Director of the American Dairy Products Institute, 130 North Franklin Street, Chicago, IL 60606 (312)782-4888 or (312)782-5455. FAX (312) 782-5299.

Milk Scare Thwarted

Recent national news coverage reporting the results of milk surveys in ten U.S. cities have created increased attention on milk safety. The surveys report about one third of the milk samples contained animal drug residues, with the principle drug of concern being the suspected carcinogen, sulfamethazine.

As a leading supplier of agricultural residue tests, Neogen Corporation immediately instituted an Emergency Milk Task Force to help all facets of the milk and dairy food industry respond to consumer concerns and to increased testing needs.

Thanks to the foresight and financial support of the National Dairy Board, Neogen Corporation developed and now markets a rapid test for sulfamethazine under the tradename Agri-Screen.

Two types of Agri-Screen sulfamethazine milk tests are available. A field kit that screens up to 12 milk samples for sulfamethazine at 10 parts per billion (ppb) is read visually by comparing color changes. The test can be used by anyone for results in 15 minutes that tell if a sample is safe or unsafe.

A lab kit containing supplies for 18-22 tests is also available for screening or to give exact results in parts per billion. This test detects sulfamethazine levels down to 2.5 ppb when used with a reader. Costs of the tests vary from $3.50 to $4.27 per test.

The availability of these tests now makes it possible to monitor sulfamethazine all along the food chain from farm to store shelves.

Farmers should consider testing feed or milk if concerned that sulfamethazine might be present. Sulfamethazine is not cleared for use by FDA in lactating animals, but is sometimes used to treat dry cows. Farmers should test milk from any individual cows they suspect before dumping milk into the bulk tank. FDA reports that milk containing sulfamethazine from just one cow can contaminate the milk, when pooled, of 70,000 cows. An Agri-Screen test for feed allows a farmer to test for inadvertent sulfamethazine contamination. A common source of sulfamethazine residues, Purdue University experts say that 20 pounds of feed containing sulfamethazine can contaminate one full ton of clean finished feed.

Agri-Screen tests also make it easy for milk carriers to test before pickup, co-ops and other direct buyers to screen trucks before off-loading, and to test before, during, and after processing.

Further dairy processors like cheese, yogurt and ice cream manufacturers can now easily and quickly test incoming ingredients.

Neogen's Emergency Milk Task Force is concentrating on four major efforts to help the dairy industry with immediate and long-term steps to assure residue-free products, including:

1) Making immediate survey testing available to state agriculture departments and dairy processors to help determine if problems exist.
2) Testing services are available at Neogen's Lancing headquarters to anyone interested in having samples tested. Results will be reported to the customer within 24 hours.
3) Test kits will be available next day to those customers using on-site tests - for both the lab kits and field kits.
4) Neogen task force coordinators are available to help set up and train laboratory personnel to run sulfamethazine tests on location.

In a story picked up nationally by daily newspapers, Neogen president, Jim Herbert was quoted as saying,"The dairy industry is perhaps the best monitored and most safety conscious segment of the food industry and consumers should continue to have the same confidence they've always had in the quality of the nation's milk products."

Neogen Corporation is a Lansing, Michigan based publicly held agricultural biotechnology firm. The company develops and markets products to detect and aid in the control of agricultural residues affecting food and the environment.

For more information please contact: Bart Seelye, Neogen Corporation, 620 Lesher Place, Lansing, Michigan 48912 (517)372-9200.

Statistical Process/Quality Control Applied to Productivity Improvement for the Food Processing Industry

An intensive, five-day "Deming type", Statistical Process/Quality Control (SQC/SPC) Short Course for the food processing and related industries will be held **April 9-13, 1990** at the University of California, Davis University Club. The course will cover statistical problem-solving tools developed in the U.S., and used successfully in Japan. Dr. W. Edward Deming, a prominent American statistician, has been instrumental in bringing these statistical approaches to Japan.

The SQC/SPC Short Course is for managers, superintendents, food technologists, quality assurance personnel and administrators who deal with statistical quality control in food production facilities. The course will cover selected material on statistical quality control and emphasize practical examples and individual and small group exercises.

The first half of the short course, which ends mid-day Wednesday, teaches basic statistical approaches used to increase productivity through quality assurance. In problem solving sessions the attendee will learn how to improve productivity through raw data analysis and data mechanics. The second half of the course, which starts mid-day

Wednesday, shows how statistical and analytical tools improve profitability through product quality. The effective application of statistical methods to achieve cost effective quality and production systems will be emphasized.

Most of the instructors will be available through the week to consult individually with students who have specific statistical problems. (Certified Quality Engineers may earn re-certification by attending each SQC/SPC Short Course).

The registration fee for the entire short course is $595. Reference materials, lunches, beverage breaks and a banquet are included in the registration fee. Registrants will receive a certificate of course attendance.

For detailed program or further information contact: Bob Pearl/Sharon Munowitch, University Extension, University of California, Davis, CA 95616; (916)757-8899.

CAST Releases Report on Mycotoxins

A new task force report from CAST, Council for Agricultural Science and Technology, stresses the importance of the economic and health risks of naturally occurring fungal toxins known as mycotoxins. These diverse toxins, such as the aflatoxins, potentially occur in foods and feeds and can cause a wide range of injury when consumed by humans and animals. Effects can include immune suppression with increased susceptibility to diseases, lowered productivity in animals, acute damage to vital organs and tissues, carcinogenicity, and death.

It is estimated that one-quarter of the world's food crops are affected annually by mycotoxins. The economic impact of mycotoxins is derived directly from crop and livestock losses, as well as from costs of regulatory control programs designed to reduce risks of exposure.

The task force of 23 scientists was cochaired by John L. Richard and Richard J. Cole, U.S. Department of Agriculture researchers. The authors recognize that there is cooperative effort on the part of academia, government, and industry to solve the complex mycotoxin problems. They concluded the report by outlining additional research needs regarding the increased effects mycotoxins are having on U.S. agriculture.

The 91-page report entitled *Mycotoxins: Economic and Health Risks* is available for $10 as Report No. 116 from CAST, 137 Lynn Avenue, Ames, IA 50010, (515)292-2125. CAST is an association of 29 food and agricultural scientific societies.

To obtain a 35-mm color slide or black and white print of the report cover, call CAST at (515) 292-2125.

For more information please contact: John L. Richard, Cochair, (309)685-4578; Richard J. Cole, Cochair, (912)995-4441 or Kayleen A. Niyo, Scientific Editor, (515)292-2125.

Dairy Food Processors Maintain Milk's Safety

The Milk Industry Foundation (MIF) and International Ice Cream Association (IICA) responded swiftly to reports stemming from a *Wall Street Journal* article concerning animal drug residues in milk to assure consumers that milk is safe to drink. "The dairy industry has always maintained a responsible attitude for assuring a safe, wholesome and nutritious supply of milk," said MIF & IICA President E. Linwood Tipton. "We recognize that milk is one of America's sacred foods. For that reason the industry goes to great expense to maintain consumer confidence."

Tests conducted by the *Wall Street Journal* and the Center for Science in the Public Interest analyzed lowfat and skim milk using a commercial test kit that has only been approved as a screening test. It detects classes of drugs but does not indicate levels or identify specific drugs. In spite of this, the article said a large number of samples were found "contaminated with antibiotics or sulfa drugs, including sulfamethazine, a known carcinogen." In fact, the test cannot specifically measure levels of sulfamethazine residues or confirm the presence of the illegal drug. This requires further tests for confirmation.

Tipton criticized the media for "food scare sensationalism," adding that the industry would not tolerate illegal drugs in milk such as sulfamethazine. MIF & IICA support the FDA and states in their efforts to impose severe penalties for farmers and veterinarians who use or misuse illegal drugs. Tipton said, "Our member companies won't buy milk with illegal drugs and we are committed to living up to the confidence that consumers have in our products."

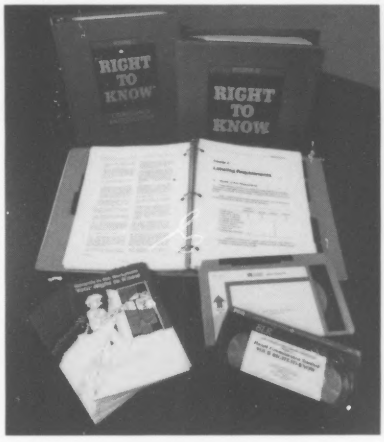
Manfred Kroger, professor of food science at Pennsylvania State University and media spokesperson for Institute of Food Technologists says, "In our highly technological society, everyone is exposed to thousands of chemicals every day. To make sound judgments, people must read beyond the headlines and become skilled interpreters of information." According to Kroger, "The media compound the problem in being far too uncritical in their reporting of findings -- whatever has dramatic impact and whoever creates the most drama are favored."

In response to the recent *Wall Street Journal* article, Frederick J. Stare, M.D. and Professor of Nutrition Emeritus at Harvard University said, "Milk is an excellent food and most people's health would improve if they would consume two or three glasses

of lowfat milk every day, even if it did contain trace amounts of various antibiotics or other drugs, as it probably does." The industry agrees; milk is a safe and healthful food.

According to a "Talk Paper" issued by FDA on December 29, 1989, "The FDA has made available to the milk-producing states tests for all the antibiotics and sulfa drugs reported by the newspaper. All of the drugs have been used in human medicine for more than 40 years and all but sulfamethazine are approved." FDA also stated unequivocally that they see no public health threat associated with animal drug residues in milk at the levels reported by the *Wall Street Journal.*

MIF & IICA are national trade associations representing milk processors and ice cream manufacturers. Activities range from legislative and regulatory advocacy to market research, education,



and training. MIF has 220 member companies that process 80 percent of the fluid milk and fluid milk products consumed nationwide. IICA has 200 member companies that manufacture and distribute an estimated 85 percent of the ice cream and ice cream-related products consumed in the United States.

For more information please contact: Jerry Kozak at (202)296-4250.

Seton's Right-To-Know Training Program: A Three-Part Approach to OSHA Compliance

Seton's Right-To-Know Training Program is a three-part instructional package that helps employers educate employees about the proper ways to handle hazardous materials. Because the Program consists of three components, it provides employers with several ways to reinforce training messages -- and ensure compliance with OSHA regulations.

Part 1 consists of booklets that put basic compliance information directly into employees' hands. Written in clear, simple language and cleverly illustrated, these booklets quickly communicate to workers the safe way to deal with potential workplace hazards. Part 2 is a Compliance Encyclopedia - a handy 600-page reference guide that provides step-by-step instructions detailing the proper way to develop a written program and an overall employee training plan, as well as labeling and MSDS requirements. A one-year subscription to the "Right-To-Know Compliance Advisor" is included. Part 3 is Right-to-Know training film -- a 20-minute visual presentation that shows workers how to read labels and MSDS sheets. The film applies to any manufacturing environment and is available in film or video formats.

The entire Program can be ordered as a kit at savings of over $100; or the individual components can be ordered separately. In addition, Seton offers a complete line of Right-To-Know Labels and Signs for compliance throughout your facility. For more information or to place an order, please contact Seton Name Plate Company, P.O. Box ZGO-1331, New Haven, CT 06505. For fastest service call toll-free 800-243-6624.

Food and Environmental Hazards To Health

Babesiosis - Connecticut

Since August 1988, six cases of babesiosis - a rare protozoan parasitic disease - have been reported to the Connecticut Department of Health Services (CDHS); only two cases thought to have been acquired in Connecticut were reported before 1988.

The first person became ill in August 1988; onset of illness in the other five persons occurred between late June and mid-August 1989. Ages ranged from 68 to 86 years; five were men. All six persons had fever, headache, and fatigue. Two of the patients were taking oral corticosteroids for chronic obstructive pulmonary disease; none were otherwise immunosuppressed, and none were asplenic. Four patients were treated with both quinine and clindamycin; one received quinine without clindamycin; the sixth received no specific therapy for babesiosis. All six are now asymptomatic, and their parasitemia has cleared.

Five of the patients (including the first case-patient) lived within 3 miles of each other; the sixth lived 22 miles away. None of the patients gave a history of recent travel to areas with known endemic babesiosis, and none had received blood transfusions before becoming ill. Gardening near the home was the principal outdoor activity of four persons; the other two walked in fields near their homes. Only one person recalled being bitten by a tick before becoming ill, and all six had observed mice in the areas around their homes.

For all six persons parasites were detected on peripheral blood smears. In addition, each had IgG antibody titers to *Babesia microti* of $\geq$1:1024. *B. microti* was isolated (by hamster inoculation) from the blood of two patients and from eight (73%) of 11 mice trapped near four of the patients' homes. A statewide survey conducted in 1976-77 detected *B. microti* antibodies in mice collected in four of 22 sites. Three of these four sites are within 20 miles of five of the patients' homes and within 45 miles of the other patient's home.

The CDHS has alerted Connecticut physicians to the presence of a newly recognized focus of babesiosis within the state and has advised physicians to report all suspected cases. Surveys are planned to determine the extent of the infection in humans and rodents.

Editorial Note: *Babesia* is a protozoan parasite of red blood cells. In the United States, babesiosis is most commonly caused by *B. microti*. Babesiosis was recognized in the Northeast in the 1960s and is endemic in Nantucket, Martha's Vineyard, Shelter Island, and parts of Long Island.

In humans, *B. microti* infection may be subclinical or may present as a febrile illness with constitutional symptoms and anemia. Manifestations are most severe in elderly, immunosuppressed, or asplenic persons.

The natural hosts for *B. microti* include the white-footed mouse and the meadow vole. Tick bite by *Ixodes dammini* is the usual source of human infection. In addition, infection can be transmitted by blood transfusion. Entomologic surveys have detected increases in *I. dammini* and its spread to new areas. Physicians should be aware that babesiosis could occur in areas where *Babesia* was not previously considered endemic.

MMWR 9/29/89

Lyme Disease - United States, 1987 and 1988

In 1987 and 1988, CDC surveyed state health departments for reported cases of Lyme disease (LD [Lyme borreliosis]); in 1987, 2368 cases meeting the case definition of their respective states were reported, and in 1988, 4572 cases were reported. Demographic data were available for 54% of reported cases: 92% were white, 4% Hispanic, 2% black, and 2% Asian; 51% of cases occurred in females. Age-specific incidence rates were highest for children < 15 years of age and for persons 25-44 years of age (0.2 per 100,000 population). In the Northeast and North Central regions, 64% of LD patients had onset of illness from May through August; in comparison, in the Pacific region, where 33% of patients had onset in these months, more cases occurred from January through May.

In 1987 and 1988, cases were reported from all states; however, in nine states, infection was thought to have been acquired out of state. Indigenous cases now have been reported in all states except Alaska, Arizona, Hawaii, Montana, Nebraska, New Mexico, and Wyoming. (Missouri and Nevada did not report indigenous cases in 1987 or 1988 but had done so previously.) In 1987 and 1988, 94% of U.S. cases were reported from nine states: New York, New Jersey, Wisconsin, Connecticut, Pennsylvania, Rhode Island, California, Massachusetts, and Minnesota; the six states in the upper northeast accounted for 80% of all cases. In 1988, New York City (Westchester and Suffolk) reported 44% of U.S. cases. LD remains rare in the Mountain region, where, in 1987 and 1988, five cases were reported, and nine cases have been reported since 1980.

Estimates of regional incidence (per 100,000 persons) varied approximately 100-fold: 6.1 in the Mid-Atlantic region, 3.7 in New England, 0.7 in the North Central states, 0.6 in the Pacific states (1987 data only), 0.2 in 16 Southeast and Southwest states, and <0.1 in the Mountain region.

Editorial Note: National surveillance for LD relies on states for reports. Since 1982, when national surveillance began, state surveillance systems for LD have changed considerably. LD has been made a reportable disease in 31 states and the District of Columbia, and surveillance for LD has intensified, especially in areas where the disease is endemic.

Since 1982, 13,825 cases of LD have been reported. From 1982 through 1987, the number of cases increased nearly fivefold from 492 to 2368; in 1988, reported cases doubled (4572 cases). LD is the most commonly reported vectorborne disease in the United States. From 1983

through 1987, LD accounted for 50% of the vectorborne infections reported to CDC. Tickborne diseases (e.g., LD, Rocky Mountain spotted fever [RMSF]) accounted for 95% of these infections; fleaborne typhus and plague and mosquitoborne arboviral infections accounted for the remaining 5%.

The increased incidence of reported LD probably is due to improved awareness and recognition of the disease, as well as to an actual increase in incidence and geographic spread. Other factors may also contribute to the increase. For example, because the clinical and laboratory diagnosis of LD may be imprecise, other conditions possibly may be misdiagnosed and reported as LD. In addition to differences in clinical interpretation of erythema migrans (EM), misdiagnosis may also result from the lack of standardization of serologic testing and from cross-reactivity with *Treponema* and with other *Borrelia*. In areas with endemic LD, persons with illnesses other than LD - but who previously have been infected with *B. burgdorferi* (the causative agent for LD) - also may be misdiagnosed. Conversely, several factors may be responsible for failure of a case of LD to be diagnosed and/or to meet the case definition. These include early treatment of symptoms resulting in abrogation of the specific antibody response, the low sensitivity of serologic tests in early LD, and the failure of approximately 25% of LD patients to manifest EM. The extent of underreporting of LD is unknown.

Until more sensitive and specific laboratory diagnostic tests become available, diagnosis of LD relies predominantly on clinical features. Serologic testing may be of greatest diagnostic utility in patients who have symptoms compatible with late-stage LD. The validity of serologic test results depends largely on the experience of the diagnostic laboratory and its quality-control procedures. No published data exist on the diagnostic utility of antigen-detection assays in the laboratory diagnosis of LD. A comparative study of licensed LD diagnostic kits is planned by the Association of State and Public Health Laboratory Directors.

State- and community-based epidemiologic studies have documented an increase in human cases and an expansion of affected areas. Entomologic surveys have detected local increases of *Ixodes dammini*, the principal tick vector in northeastern and central states, and its spread to new areas. However, because the risk for acquiring LD varies widely by locality, the disease appears to be of public health consequence only in certain regions - specifically, coastal counties on both sea-boards and in certain counties in the upper Midwest. In the southeastern, southwestern, and Mountain states, RMSF remains the leading vectorborne disease: from 1983 through 1987, 3160 RMSF and 659 LD cases were reported from the Southeast and Southwest, and 37 RMSF and seven LD cases were reported from the Mountain states.

Data concerning risk factors for acquiring LD are limited. In suburban areas where LD is endemic, infection may be acquired principally around patients' residences and risk of exposure may be continuous during the transmission season. Under these circumstances, certain personal protection measures (e.g., the daily application of repellents) may not be practical. Further efforts are needed to evaluate the effectiveness of environmental modifications and focal application of acaricides (chemicals effective against ticks) for the control of vector ticks in these circumstances. Where LD is transmitted sporadically through occasional or brief exposures during recreation or work, personal protection measures are most appropriate for prevention.

Measures recommended to reduce exposure to ticks include avoiding areas endemic for LD; using repellents; wearing long-sleeved shirts and long pants, and tucking pants into the top of socks; wearing light-colored clothing; and inspecting clothing and skin frequently for ticks. Animal studies suggest that *I. dammini* may not efficiently transmit infection until after 48 hours of attachment and that prompt removal of attached ticks may limit transmission. However, it is unknown how long a tick must attach to human hosts before infection occurs.

N,N-diethyl-m-toluamide (DEET) is effective in repelling *I. dammini* and other vector ticks. In view of the possible risk for toxicity, the use of DEET-containing repellents solely to prevent LD may be inappropriate in areas without endemic LD. Permethrin (0.5%) sprayed onto clothing also is effective in reducing the numbers of adherent ticks, including *I. dammini* and others. However, permethrin aerosols are available only in certain states that have obtained Environmental Protection Agency approval for their distribution.

MMWR 10/6/89

Lyme Disease - Canada

From 1977 through May 1989, 30 cases of Lyme disease (LD [Lyme borreliosis]) were reported to Canada's Laboratory Centre for Disease Control (LCDC). Ontario is the only province in which LD is a reportable condition; however, active laboratory surveillance for LD is conducted in other provinces. In Ontario, the diagnosis of LD is based on recognition of erythema migrans (EM), with involvement of at least two of the three organ systems ususally affected by LD (joints, nervous system, and cardiovasculary system), or EM and an indirect immunofluorescence antibody titer $\geq$ 1:128 or an enzyme-linked immunosorbent assay optical density $\geq$0.40, or EM and isolation of *Borrelia burgdorferi*. Without EM, diagnosis is based on involvement of at least one organ system and positive serology or isolation (C. LeBer, Ontario Ministry of Health, personal communication, 1989).

For 25 (83%) of the 30 cases, exposure probably occurred in Canada. Four patients had a documented history of tick bite during travel to the southeastern United States before onset of symptoms; one case was acquired in Germany. Seventeen (68%) of the 25 indigenous cases were reported in Ontario, and five (20), in Manitoba. The areas in Canada with the highest number of cases border

on the American states with the highest reported incidence of LD.

A tick bite was documented for 47% of the patients; the remainder had either no history of a bite or no available information. For 48% of LD patients, EM was documented. The most frequently documented presenting symptom was rash (38%), followed by arthralgia/arthritis (28%) and influenza-like illness (13%). Most had multiple symptoms; five patients had neurologic involvement. Five (17%) of the 30 LD patients were hospitalized.

Comment: In several provinces, studies are being planned to determine the prevalence of infected vectors in Canada. The Department of Entomology, University of Manitoba, identified, and the Smithsonian Institute in Washington, D.C., confirmed, two female *Ixodes dammini* ticks collected in Gunton and Winnipeg, Manitoba. The only other Canadian reports are from Long Point, Ontario. Intensive sampling efforts for *I. dammini* in other regions of Manitoba in 1989 found only *Dermacentor variabilis* (American dog tick).

To acquire more complete incidence data for Canada, LCDC is interested in receiving reports of any additional cases through provincial/territorial epidemiologists.

MMWR 10/6/89

Seizures Temporally Associated with Use of DEET Insect Repellent - New York and Connecticut

In August 1989, epidemiologists from the New York State Department of Health (NYSDH) investigated five reports of generalized seizures temporally associated with topical use of N,N-diethyl-m-toluamide (DEET). Three of the case-patients, one from New York and two from Connecticut, were reported by a pediatric neurologist who practices in both states. One case was reported initially to an entomologist in New York, and one was reported directly to the NYSDH. The cases occurred in June through August 1989.

The patients, four boys aged 3-7 years and one 29-year-old man, had few prodromal symptoms and recovered quickly. All five had unremarkable medical histories, and none had had a previous seizure or neurologic event. All had normal nonfocal neurologic examinations after their seizures, and four had normal complete laboratory examinations and normal computerized tomography and/or magnetic resonance imaging examinations. Each had had topical cutaneous exposure to varying concentrations of DEET; four had had fewer than three applications. The interval between last use of DEET and onset of seizures ranged from 8 to 48 hours. One patient developed urticaria before his seizure; he was one of two patients who developed an urticarial reaction to phenytoin administered to control seizures.

While reinforcing the importance of DEET in preventing Lyme disease (LD [Lyme borreliosis]), health officials in New York, Connecticut, and New Jersey issued a health alert on August 22 advising caution in the use of DEET-containing repellents. The NYSDH is planning to conduct epidemiologic studies to evaluate the association between DEET and neurologic events.

Editorial Note: For health officials in New York and Connecticut, two of the states where LD is of growing concern, inquiries about the potential adverse effects of insect repellents have increased. Recent anecdotal reports of seizures temporally associated with the use of DEET have heightened public awareness of DEET's potential adverse effects.

DEET has been marketed in the Unites States since 1956 and is used by an estimated 50-100 million persons each year. Since 1961, at least six cases of toxic systemic reactions from repeated cutaneous exposure to DEET have been reported. Six girls ranging in age from 17 months to 8 years, developed behavioral changes, ataxia, encephalopathy, seizures, and/or coma after repeated cutaneous exposure to DEET; three died. Another six systemic toxic reactions have been reported following ingestion of DEET. Additionally, episodes of confusion, irritability, and insomnia have been reported by Everglades National Park employees following repeated and prolonged use of DEET.

DEET is partially absorbed through the skin and has been used to enhance dermal delivery of other drugs. Adverse reactions include allergic responses, direct neurotoxicity, and dermatitis. One of the girls who died after dermal exposure was partially deficient in the enzyme ornithine carbamoyltransferase; DEET may interfere with the urea cycle metabolic pathway.

Anecdotal reports of seizures are difficult to interpret. None of the recent cases in New York and Connecticut have been clearly established as DEET toxicity. In contrast to cases described in the medical literature, the New York and Connecticut patients were all male, DEET exposure was less intense, few prodromal symptoms or encephalopathy were seen, and recovery was more rapid and complete. With the dramatic increase in the prevalence of DEET use in areas with endemic LD, the reported cases of seizures temporally related to DEET use may be coincidental. However, these cases may represent a different, previously unreported spectrum of toxic reactions. Careful toxicologic and epidemiologic studies must be conducted, including adequate documentation of DEET levels in affected and unaffected persons.

Clinicians evaluating patients with unexplained seizures should consider the possibility of exposure to DEET. However, since the exact circumstances under which DEET-related neurotoxicity may occur are unclear, DEET should not be accepted as the cause of a seizure until appropriate evaluation has reliably excluded other possible etiologies.

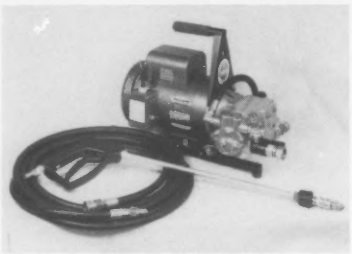
The optimal concentration of DEET for prevention of tick bites is unknown. However, repellents containing 20%-30% DEET applied to clothing are approximately 90% effective in preventing tick attachment. To minimize the possibility of adverse reactions to DEET, the following precautions are suggested:

- Apply repellent sparingly only to exposed skin or clothing.

- •Avoid applying high-concentration products to the skin, particularly of children.
- •Do not inhale or ingest repellents or get them into the eyes.
- •Wear long sleeves and long pants, when possible, and apply repellent to clothing to reduce exposure to DEET.
- Avoid applying repellents to portions of children's hands that are likely to have contact with eyes or mouth.
- Never use repellents on wounds or irritated skin.
- Use repellent sparingly; one application will last 4-8 hours. Saturation does not increase efficacy.
- Wash repellent-treated skin after coming indoors.
- If a suspected reaction to insect repellents occurs, wash treated skin, and call a physician. Take the repellent can to the physician.

Specific medical information about the active ingredients in insect repellents if available from the National Pesticide Telecommunications Network, telephone (800)858-7378.

Industry Products



High Pressure Blasts Dirt, Paint & Grime

Pressure Cleaning Products Company (PCP) announces their new line of *Water Whip* cold pressure washers to clean away grease, grime, dirt and paint. Available in both gas and electric models, the *Water Whip* line features American made, industrial quality motors and pumps. Along with all ceramic plungers and stainless steel valves, the oil bath pumps incorporate a pulsation dampening system for less tiring operation. A down stream chemical injector system allows soaps, degreasers and other caustic chemcials which may damage pumps, to be injected into the water blast.

Pressure Cleaning Products Company - Maple Grove, MN

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Brickmann Instruments Introduces Metrohm Karl Fischer Titrator 701....the Smallest KF Titrator Ever!

Brinkmann Instruments, Inc., has introduced the Metrohm Karl Fischer Titrator Model 701....the smallest KF titrator ever!

The world's smallest Karl Fischer titrator as well as the optimum work station, the new Model 701 is equipped for true two-way communication...computer via RS232C and operator via alphanumeric display.

Model 701 automatically determines the titer, blank, drift, or sample water in just 30 seconds, then aspirates the titrated sample at the touch of a button.

Brinkmann Instruments, Inc. - Westbury, NY

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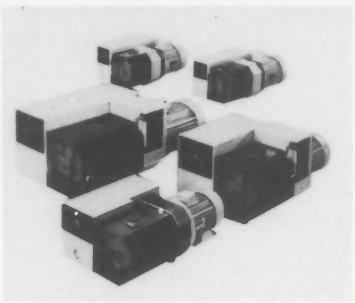

Kinney Introduces New Line of Single-Stage Vane Pumps

A new line of single-stage vane pumps has been introduced by the Kinney Vacuum Company.

Kinney KSV Series vacuum pumps offer high perfomance in a modular design capable of continuous duty from atmosphere to 29.9 inches Hg Vac.

KSV models operate with air-cooled oil radiators for efficient cooling. A unique oil sealing and lubrication design offers exceptional lubrication even when operating at atmospheric pressure for long periods of time.

An internally mounted coalescing exhaust filter recovers up to 99.9 percent of the oil aerosols from the exhaust gas while an external filter removes particulates from the oil before it recirculates through the pump.

All KSV Series pumps are equipped with gas ballast valves which admit up to 10 percent of secondary air to avoid condensation of vapors in the pump chamber.

Kinney Vacuum Company - Canton, MA

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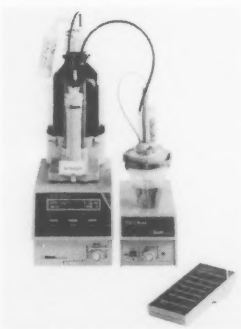
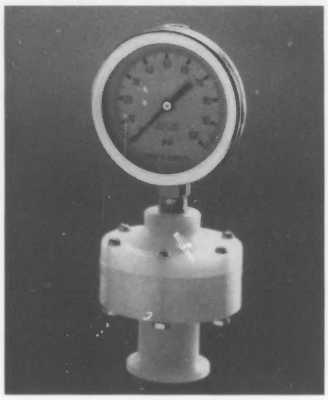




New Vertical Gauge Guard Offers Revolutionary Alternative for Sanitary Monitoring of In Line Pressure

The revolutionary new Vertical Gauge Guard (tee series) from Sani-Tech features a unique flexible teflon diaphram which provides a protective barrier between process fluid and the in-line pressure gauge guard.

The liquid-filled gauge guard isolates and protects pressure and/or vacuum instruments and tubing on ultra pure or highly corrosive sanitary fluid lines.

The Sani-Tech vertical gauge guards are stocked in a range from 0 to 100 PSI. Alternative PSI ranges are available upon request from the manufacturer. Sani-Tech Vertical Gauge Guards are stocked in PVDF and Polypropylene in standard sizes from 1/2" to 3".

Sani-Tech - Andover, NJ

Please circle No. 264
on your Reader Service Card

New Process and Industrial Instrumentation Catalog

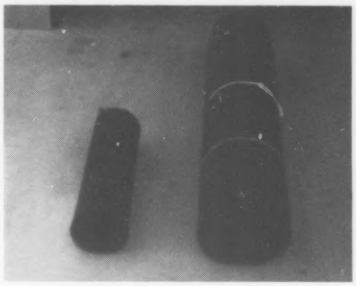
Modutec now offers a catalog featuring: New Industrial splash and hose proof digital panel instrumentation. New Process Instrumentation - Loop Powered and Backlighting off the signal power only, no external power required.

New OEM Product Development using surface mount manufacturing and design technology to: Reduce product cost, reduce product size, reduce power consumption and product enhancements.

Unique Elliptical Bargraph Instrumentation.

Modutec - Manchester, NH

Please circle No. 265
on your Reader Service Card



The Widest High Density Polytethylene Net in the Industry

Gundle Lining Systems, the largest manufacturer of High Density Polyethylene in the world, is now manufacturing the widest High Density Polyethylene drainage net in the industry, 14 feet wide. The XL-14 Gundnet now produced by Gundle is a structure made of two sets of plastic strands arranged together to form a "net" or "mesh" used for leachate collection and detection systems. The special arrangement of these strands allows fluids to be easily conveyed along the plane of the net. The new 14 foot net allows for easier installation and saves time, space, and money as opposed to using sand or an aggregate.

Gundle Lining Systems - Houston, TX

Please circle No. 266
on your Reader Service Card

Robbins & Myers, Inc., offers Technical Bulletin on the Moyno® 2000 Processing Cavity Pump

Robbins & Myers, Inc., a pioneer in the development of progressing cavity pump technology, is offering a full-color technical bulletin describing the Moyno® 2000 progressing cavity pump. Complete with photographs, illustrations and tables, this bulletin includes the operating principles, features, benefits and extensive technical data on the Moyno 2000 progressing cavity pump.

Designed for maximum performance, minimum maintenance cost and least possible down-time, the Moyno 2000 pump sets the standard for value and reliability. Its features include:

Advanced metallurgy, Precision rotor/stator geometry, Improved gear-type universal joints with patented seals, Heavy duty tapered roller bearings, Rear gear joint (reduces radial load on drive shaft and bearings), One-piece hollow drive shaft (reduces run-out bearing wear; extends packing life), Shaft sleeve, solid drive shaft and extended auger options, Pressures to 2000 PSI, Capacities to 2500 GPM.

Robbins & Myers, Inc. - Springfield, OH

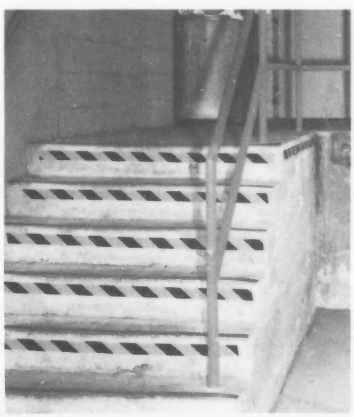
Please circle No. 267
on your Reader Service Card

Centrifugal Blower/Exhauster

The new turbotron Centrifugal Blower/Exhauster was designed specifically to replace the positive displacement blower. The computer-designed impeller provides pressures to 15 PSIG, vacuum to 16 inches Hg, and operational characteristics similar to conventional positive displacement equipment. This unit is ideally suited to pneumatic conveying, industrial applications, gas handling and water/wastewater treatment. The blower/exhauster is designed for new installations or equipment upgrades.

Lamson Corporation - Syracuse, NY

Please circle No. 269
on your Reader Service Card



Seton OSHA Warning Tapes: Employee Safety and OSHA Compliance on One Roll

Seton's OSHA Warning Tapes comply fully with OSHA regulations for workplace safety markings. A variety of striped and checked patterns are available to warn employees of potential hazards: Yellow/Black for marking physical hazards; White/Black to designate traffic or housekeeping; Red/White for fire protection equipment; and Magenta/-Yellow for radiation hazards.

Seton OSHA Warning Tapes are available in two styles: Deluxe and Economy Grade. Deluxe tapes are constructed of durable all-weather vinyl and are protected with a clear overlaminate for use in harsh environments. Economy Grade tapes are the low-cost solution for marking walls, railings or doorways--wherever there is no direct contact with foot traffic. Tapes are 2" or 3" wide and come in big 54' rolls.

Seton Name Plate Company - New Haven, CT

Please Circle No. 268
on your Reader Service Card

Time/Temperature Monitoring Helps Meat Industry Improve Quality Control for Worldwide Markets

To meet the quality control challenge, the meat industry is using time-temperature monitors (TTMs) to ensure product quality. Ryan Instruments monitors 75% of all time-temperature monitored shipments worldwide. Also known as "Ryan Recorders", TTMs give meat suppliers and shippers the temperature data they need to check product quality.

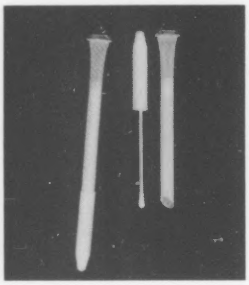
Temperature fluctuations, which can affect meat quality, are more likely to occur during ocean shipments and long-haul domestic deliveries. TTMs chart temperature profiles during shipping and storage. At any time, the shipment's temperature history is displayed in an easy-to-read graph form.

Time-temperature information allows all interested parties to determine how well the temperature was managed during shipment. As a result, they can determine various levels of product quality.

Temperatures are constantly recorded while either in storage or transit. The temperature variations are sensed by temperature-reactive elements in the device. These readings can be downloaded into a computer, or printed directly on a chart.

Ryan Instruments - Redmond, WA

Please circle No. 270
on your Reader Service Card



New Sanaline Self-Contained Sterile Swab System

Sanaline announces the introduction of a new convenient swab system for microbiological testing of equipment surfaces and product containers.

Sanaline Sani-Swab tubes are made of clear unbreakable plastic and are pre-filled with a buffer solution within a sealed chamber. Totally self-contained and as portable as ball-point pens, they are ready to use anywhere as a transport system. The extra length, six inches, permits swabbing in hard-to-reach places.

Each unit holds 3mL of buffer solution containing two neutralizers, sodium thiosulphate and aryl sulfonate complex, to be used as specified in Standard Methods for the Examination of Dairy Products, and methodology outlined by the Sub-committee on Food Utensil Sanitation, The American Public Health Association.

Sani-Swabs permit the flexibility of testing with any media desired since they do not contain media. Each unit is embossed with production date and batch number to ensure efficacy. The cap has a tamper-evident seal to ensure reliability. Units are shipped with clear usage instructions and with tube labels for sample identification.

Sanaline - Scituate, MA

Please circle No. 271
on your Reader Service Card

SHAT-R-SHIELD, INC. is Offering a new Line of Teflon Coated Heat Lamps

The clear teflon coating can withstand temperatures of over 500 degrees Fahrenheit and acts as a protective envelope against thermal shock and liquid splatters thereby reducing the chances of serious accidents. If a Shat-R-Shield lamp is dropped or broken, virtually all of the shattered glass is contained within the teflon coating.

Available in 250R40 clear and red, Shat-R-Shield Heat Lamps are being used in food processing plants, kitchen warming areas, deli cases, hotel/motel bathroom and poultry and animal boarding areas.

SHAT-R-SHIELD, INC. - Salisbury, NC

Please circle No. 272
on your Reader Service Card

New Literature Available

Penberthy, Inc. has released a new Technical Bulletin, No. L1202, describing features and specifications of the Levelmark Model 606 Dual Point Ultrasonic Liquid Level Switch. The Levelmark Model 606 is an ultrasonic gap switch providing two points of switch action, making it ideal for applications such as pump logic. The unit is cost effective, since only one electronics assembly is required.

Penberthy, Inc. - Prophetstown, IL

Please circle No. 273
on your Reader Service Card

Drew Offers Mini Chlorine Dioxide Generator System

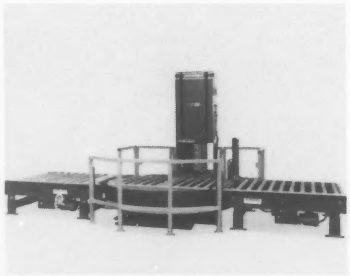
Drew's Equipment Services Group recently introduced a Mini chlorine dioxide generator system. The unit is used with DREWCHLOR chlorine dioxide precursor product. The mini generator system is a prepackaged design for low flow output of chlorine dioxide. The unit is ideal for laboratory, pilot plant and small scale applications. The unit consists of a triplex metering pump; one head for feeding DREWCHLOR chlorine dioxide precursor, one head for feeding hydrochloric acid (pH control) and one head for feeding sodium hypochlorite.

A fresh water supply flows through the generator at a predetermined flowrate and pressure. DREWCHLOR and the other chemical products are added to this line by the metering pump. The aqueous solutions flow through the primary and secondary static inline mixers where the reaction to produce chlorine dioxide takes place. The solution exits the unit and travels through the discharge piping to the application feedpoint.

The mixing action inside the two mixing chambers is caused by the solution flowing around and through the motionless mixing sections. A sampling valve is provided so that samples can be drawn off periodically to check the pH and the concentrations of the effluent solution. The mini generator system includes a strainer, flow switch, flow meter and calibration cylinders to insure a safe stand-by operation of the unit.

Drew Industrial Division - Boonton, NJ

Please circle No. 274
on your Reader Service Card



Extech's Test and Measurement Catalog

Extech's 1990 Catalog features portable and benchtop instruments for Test and Measurement, Plant Maintenance, Water Quality and Monitoring and Control. Complete specifications, pricing and full descriptions are provided for instruments including, Full function Digital Multimeters, Thermometers, Humidity Meters, Panel indicators, Tachometers, pH and conductivity Meters, AC/DC Clamp Meters, Recorders, Pocket Computers with modems, printers, dataloggers and more.

EXTECH Instruments Corp. - Waltham, MA

Please circle No. 275
on your Reader Service Card

Automatic Spiral Stretch Wrap System

As part of its versatile Sidewinder Series of stretch wrappers, Infra Pak has announced the availability of the Sidewinder L Series Conveyorized Turntable Automatic (LCTA).

The Sidewinder LCTA model is an economical conveyorized turntable stretch wrap system capable of wrapping 30 random loads per hour. Load weight on the turntable is dispersed over four points, allowing the system to handle loads of up to 4,000 pounds.

Modular design and use of a programmable controller make the Sidewinder LCT compatible with all cling stretch materials. The power conveyor system is compatible with most "upstream" material handling systems and can be loaded by fork truck or its own pallet accumulation section.

Infra Pak, Inc. - Dallas, TX

Please circle No. 276
on your Reader Service Card

New Mill-Q Plus Water Systems Offer Greater Convenience

Millipore Corporation is pleased to announce the availability of its new Milli-Q Plus Water Systems. These new systems offer organic-free (15 ppb TOC), pyrogen-free (water passes LAL test), 18-megohm water "on demand" plus new product features that result in more convenient operations.

Simply remove the expended cartridge pack and snap in a new one. Because there are no dead points, there is virtually no hold-up volume and no stagnation. An automatic maintenance signal will alert the user when the purification pack must be changed to ensure optimal water quality at all times. The ultrafiltration cartridge (for pyrogen-free applications) is easy to change and requires no tools.

The Milli-Q Plus system for life science applications provides an automatic sanitization cycle that allows the system to be flushed during "off hours", so your work is uninterrupted. All systems offer automatic recirculation in the "stand-by" mode to ensure fresh, ultrapure water even during periods of infrequent use.

Millipore Corporation - Bedford, MA

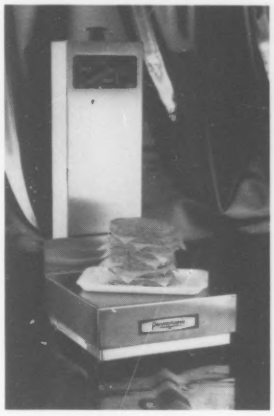
Please circle No. 277
on your Reader Service Card

Affi-Prep Protein A MAPS II Kit

Protein A, from *Staphyloccus aureus*, binds to the Fc region of immunoglobulins from most mammalian species with high specificity. When coupled to a suitable hydrophilic support, protein A can be used to purify IgG, to selectively remove IgG prior to analysis of other immunoglobulin classes, or to absorb immune complexes to purify antigens. Protein A preparations have been used extensively to purify both polyclonal and monoclonal IgG and IgG subclasses from a variety of mammalian species. Currently, protein A affinity chromatography is being widely used to purify monoclonal antibodies from murine ascites fluid or culture medium supernatants. However, the usefulness of protein A in this application has been limited because, using published methods, most IgG_1 immunoglobulins have low affinity for protein A. This results in poor igG_1 retention on protein A affinity supports. Since many murine IgG monoclonal antibodies belong to the IgG_1 subclass, poor IgG_1 retention represents a significant purification problem. The Affi-Prep protein A MAPS II kit optimizes the binding and recovery of many immunoglobulins, including muring IgG_1, IgG_{2a}, and IgG_{2b} subclasses. The Affi-Prep protein A MAPS II kit contains enough reagents to perform over 100 analytical cartridge runs, for purification of up to 500 mg of murine IgG.

Bio-Rad Laboratories - Richmond, CA

Please circle No. 278
on your Reader Service Card



Pennsylvania Scale Company Introduces Redesigned 4700 series Stainless Steel washdown checkweighting scale

Pennsylvania Scale Company, a long-time, leading manufacturer of quality, precision weighing and counting scales and scale systems, announces the availability of its newly redesigned 4700 Series Stainless Steel washdown checkweighing scales. All stainless steel construction, including a stainless steel load cell, makes the 4700 Series checkweighing scales able to stand up to washdown applications and harsch environments.

Available in the usual 5 lb, 10 lb, 50 lb and 100 lb capacities, the 4700 is also available in a 25 lb capacity model, a new feature added in response to customer requests. The 4700 Series checkweighing scales feature washdown accuracy of one part in 2,500 counts. The display indicates OVER, UNDER, and ACCEPT tolerances by use of easy-to-read analog bar graphs. These bar graphs, which are fully programmable by the operator using one button, consist of 30 yellow bars for UNDER, 10 red bars for OVER, and one green bar for ACCEPT.

The 4700 Series Stainless Steel washdown checkweighing scales are USDA approved for use in federally inspected meat and poultry facilities.

Pennsylvania Scale Company - Leola, PA

Please circle No. 279
on your Reader Service Card

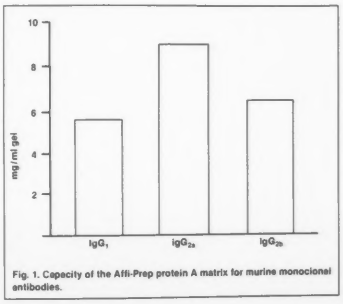


Fig. 1. Capacity of the Affi-Prep protein A matrix for murine monoclonal antibodies.

FiSan ACF

FiSan ACF is designed for foam cleaning applications in processed food operations, meat and poultry processing plants, bakeries and beverage production facilities. It is cost effective and is designed to be used with foamizers. It offers superior cleaning and rinsing performance. It thoroughly cleans stainless steel, aluminum and other multi-metal processing equipment. It performs well at energy-saving ambient temperatures.

FiSan ACF removes a variety of food soils, such as fat, blood and lightly carbonized or baked-on soils. It's ideal for all foam cleaning applications: walls, floors, overhead piping and other hard-to-reach areas.

FiSan ACF offers balanced alkalinity for worker safety, excellent rinsing due to incorporation of sequestrants, low end use costs and versatile usage.

Oakite Products, Inc. - Berkeley Heights, NJ

Please circle No. 280
on your Reader Service Card

Smart Thermometer

Rugged yet simple to use Digital Smart Thermometer accepts one or two inputs each of type J or type K thermocouples. Microprocessor circuitry provides for fast and accurate indication of temperature in both celsius and fahrenheit plus displays differential temperature between the sensors. Measure temperature with a Type J thermocouple, range -95 to 1562 Deg.F(-70 to 850 Deg.C) or Type K range -150 to 2200 Deg.F(-100 to 1200 Deg.-C). Accuracy is 0.1% of reading and Select resolution of 01 Deg. or I Deg. Front panel selections include a Hold function to hold temperature reading, MIN/MAX measurement recordings, and high or low audible temperature alarm.

EXTECH Instruments Corporation - Waltham, MA

Please circle No. 281
on your Reader Service Card

Forum For Professional Sanitarians

A number of special observances are recognized during the month of March. Some have been officially established through Congressional or Presidential proclamations. Important events celebrated during March that relate to food and health include: National Nutrition Month; National Drug and Alcohol Awareness Week; Mental Retardation Month; National Poison Prevention Week; Agriculture Week; Save Your Vision Week; Red Cross Week; National Peanut Month; Hamburger Week; Egg Salad Week; and would you believe Bubble Gum Week. Other events and subjects recognized during March range from Girl Scout Week and International Women's Day to Music in our School Month and National Pig Day. One subject that you won't find highlighted during March or observed during any other month is Food Safety Education.

Many health departments aren't waiting for a National Food Safety Education Week. They are already leading the way. One example is the Fivco District Health Department in Ashland, Kentucky. The Fivco District is gaining a solid reputation for their food safety education efforts. In addition to developing several of their own handouts the Fivco District also makes use of training material from the state extension service.

The Texas Restaurant Association is another local food safety education leader that's not waiting for a special day or week. This industry association has offered a manager sanitation course for a number of years. The Texas Restaurant Association also offers members videotapes, posters, and other training materials on food sanitation.

Make your plans now for Hamburger Week and National Pig Day but don't worry about a Food Safety Education Week. While the Congressional process for declaring special observances is fairly simple, Food Safety Education remains unobserved. Coordinating a drive for proclamation of a National Food Safety Education Week would be an ideal objective for a number of professional organizations or regulatory agencies. If National Bowling Week and National Dairy Goat Awareness Week can achieve this status Food Safety Education should be a sure thing.

OFF THE CLIPBOARD: - The FDA State Training Branch held a Vacuum Packaging workshop in Rockville, Maryland, earlier this month. This workshop covered microbial ecology of vacuum packaged foods with emphasis on the public health concerns as applied to retail facilities. Other food sanitation workshops are scheduled by the state training branch during 1990. Send a self addressed and *stamped* envelope for a description.

-Kudos to the City of Milford Health Department in Connecticut. Last November this column requested information on local/state initiatives on evaluating food service equipment. The City of Milford has a unique program where the Sanitarian can place a notice on equipment when found to have serious sanitation problems. The stick on notice reads "Notice - When this equipment is replaced it must be replaced with commercial grade equipment approved by the health department." Milford is also using a computerized inspection management system.

-"Backhauling" is a new term being applied to the use of the same vehicle for transporting both food and waste. Congress is considering several bills that would ban the hauling of garbage in refrigerated trucks designed to transport meats and produce. Three "Transportation Tips" have been prepared on this subject and can be obtained from the Office of Transportation, US Department of Agriculture, Washington DC 20090-6575. More information can be obtained by calling (202)653-6246.

-Some sanitarians may find themselves evaluating beer brewing systems during restaurant inspections. "Brew-pubs" have opened in the same 29 states that allow restaurants to brew limited quantities of beer. We would be interested in hearing from any local health departments with brew-pubs in their jurisdictions.

-The best way to obtain copies of the FDA translations of food code requirements is to request copies from your state food protection branch. The translations are provided in Chinese, Korean, Vietnamese and Spanish.

-More information on CDC home-study courses in food sanitation can be obtained by calling CDC at (404)639-2142.

-A number of readers identified a typing mistake in the January column. Canada's code requirement for cold storage is *39.2 F* (4 C) and not 39.5 F.

Homer C. Emery, RS
Chair, FDA Interpretations Committee

March Field Inspection Quiz

1. Exposure to arsenic would be possible when working with:
   A. Paris Green
   B. Warfarin
   C. Ronnel

2. Elevated levels of arsenic in urine could result from recent consumption of:
   A. Shrimp
   B. Dried Fruits
   C. Red Meats

3. After drinking several diet soft drinks a consumer calls in complaining of headaches, dizziness, diarrhea and itching. The caller is most likely experiencing an allergic reaction to:
   A. Aspartame
   B. Sulfite
   C. Copper

4. Time required for heat inactivation of Salmonellae in a high water activity environment at a temperature of 140 F (assuming a population of 1,000 per gram is reduced to 1 per gram).
   A. 5.1 minutes
   B. 33 seconds
   C. 51 minutes

5. The minimum temperature that Type E botulism organisms have been reported to multiply:
   A. 38 F
   B. 40 F
   C. 33 F

Answers to February FIQ: 1. (B); 2. (C); 3. (B or C); 4. (A); 5. (A). In December's FIQ a typo appeared in item #5 Listeria could cause the most *concern* in ready to eat ham salad.

Affiliate News

Alberta Association Milk Food and Environmental Sanitarians

An Open Invitation to AAMFES Members

by Karen Emde, President

It is only natural for everyone to want a safe, clean, healthy environment, food supply and drinking water. All sectors of society profess concern and want someone to do something about the problem. One hundred percent risk abatement is not a realistic goal.

Governments will develop major, expensive, and at times, hastily poor designed programs as an immediate response to the public's concerns, often without actually ever having assessed the real risk to the public's health.

People will tend to overestimate the infrequent and dramatic risks to themselves while underestimating the common "mundane" events. They will demand "something be done"; for example, the banning of all Chilean produce because TWO grapes contained traces of cyanide.

The news media tend to prey on this type of fear and are major culprits in ensuring inappropriate use of public funds for infrequent, isolated and sensationalist events continues. They help ensure governments and businesses develop programs to solve these "problems" without some political and business leaders ever truly understanding the problem the news media and the public think they want solved at that moment.

Unfortunately, political leaders must be "sensitive" to the desires of the public if they wish to remain leaders after the next election. News media must be "sensitive" to the issues of importance to the public and will continue to sensationalize and over-dramatize the news to sell papers or have a high standing in the ratings.

As public/environmental health professionals we should be helping to put public and environmental health risks in perspective. We should also strive to articulate and communicate these risks and the priorities to the public as well as to our business and political leaders.

The AAMFES executive would invite persons interested in developing AAMFES policy statements on issues of public and environmental health to participate on a policy committee. We hope that such a committee will be able to speak on behalf of AAMFES and help bring some perspective, as well as provide sensible and realistic recommendations for our political and business leaders on issues of public and environmental health.

To meet this challenge, AAMFES must be in a position to effectively understand the issues, develop policies, assess the real and perceived risks, and be able to communicate this to the public, the media and community leaders.

The AAMFES Executive.

The following members have been elected to serve as the Executive Committee for the 1990 year:

President, Karen Emde.....Edmonton
Past President, Ron Pillidge.....Stony Plain
President-Elect, Tom Lampman.....Edmonton
Treasurer, Mike Mavromaras.....Edmonton
Secretary, Kim Graham.....Edmonton
Director, Kevin McLeod.....Vegreville
Director, Dan Campbell.....Edmonton
Director, Dr. Harry Jackson.....Edmonton

Upcoming IAMFES Affiliate Meetings

APRIL

4, Ohio Association of Milk Food & Environmental Sanitarians Spring Meeting, Park University Hotel, Columbus, OH. For more information write or call Donald Barrett, Health Dept., 181 S. Washington Blvd., Columbus, OH 43215, 614-645-6195.

4-6, Missouri Milk, Food & Environmental Health Association Annual Meeting, Breckenridge on the Lake, Osage Beach, MO. For more information contact John Norris, Division of Health, Box 570, Jefferson City, MO 65101, 314-751-6400.

5-6, Nebraska Association of Milk & Food Sanitarians Third Annual Meeting at the University of Nebraska, Lincoln, East Campus Union. For more information contact Jerry Hunt at 402-556-0908.

11-12, Florida Association Milk Food & Environmental Sanitarians Spring Educational Conference, Deland FL, Hilton Hotel. For more information contact W.R. Thornhill, 3023 Lake Alfred Rd., Winter Haven, FL 33881, 813-299-6555.

MAY

7-9, 1990 Pennsylvania Association of Dairy Sanitarians & Dairy Laboratory Analysts Annual Meeting at the Keller Conference Center, Penn State University, University Park, PA. For more information, contact Sid Barnard, 8 Borland Lab, University Park, PA 16802, 814-863-3915.

16, Ontario Food Protection Association will hold a Spring Workshop entitled "Effective Employee Education in the Food Industry: Training a Trainer" at the Toronto Airport Hilton hotel. For more information contact programme co-ordinators, Bob Tiffin, 519-885-8284 or FAX 519-885-8210 or Ann Roberts, 519-822-5530 or FAX 519-822-5530.

23-25, South Dakota Environmental Health & South Dakota Rural Health, Ramkota Inn, Pierre, SD. For information contact Dave Micklos, SD State Dept of Health, 523 E. Capital, Pierre, SD 57501, 605-773-3141.

JUNE

5-6, Texas Association of Milk, Food & Environmental Protection Annual Meeting, held at the Howard Johnson-South Plaza, Austin, Texas. For more information contact Janie Park, Secretary, P.O. Box 2363, Cedar Park, TX 78613-2363, 512-458-7281.

14, Alabama Association of Milk, Food and Environmental Sanitarians 1st Annual Spring Meeting will be held in Montgomery, AL at the Hotel Monticello on South Monticello Drive. For further information and agenda, write or call T.A. McCaskey, Dept. Animal & Dairy Sciences, Auburn University, Auburn, AL 36849-5415, 205-844-1518.

SEPTEMBER

18-20, New York State Association of Milk and Food Sanitarians Annual Meeting, at the Sheraton Inn-Syracuse, Liverpool, NY. For more information contact Paul Dersam, 27 Sullivan Rd., Alden, NY 14004, 716-937-3432.

26-28, Kansas Association of Sanitarians Annual Meeting, Red Coach Inn, Salina, KS. For more information contact John Davis, 1900 East 19th, Wichita, KS 67214, 316-268-8351.

Updates . . .

Pre-show Seminars Help Foodservice Operators Gain Competitive Edge

All the latest on foodservice management techniques, trends and procedures is presented in pre-Show seminars from The Educational Foundation of the National Restaurant Association. With seminar topics for everyone from the hands-on owner on down, these seminars are a valuable training resource for those attending the National Restaurant Association Show.

Seminars will be offered on Saturday, May 19, and Sunday, May 20, in both half- and full-day formats. Seminar registration is a separate charge from general admission to the Show. All seminar registrations include course materials and a certificate of completion. Full-day seminar attendees receive lunch. The seminars are all held in McCormick Place North, lower level, adjacent to the complimentary shuttle bus drop off site.

For additional information, contact: The Educational Foundation of the National Restaurant Association, Customer Service Department, 250 S. Wacker Drive, Suite 1400, Chicago, IL 60606, (800)522-7578 or (312)715-1010.

Translation of Selected Food Code Provisions in Designated Languages

This document may be provided to food establishment operators, for whom English may be a second language, to inform them about selected provisions for the model food codes, including items frequently found to be a problem. This material enables regulators to provide selected food code requirements in several languages using terminology which should be familiar to food establishment operators. Local experience within a jurisdiction may dictate that regulatory officials reproduce all or only some of the items contained in this list of basic provisions.

The translated material in this document is not intended to expand or abridge the provisions of any of FDA's model food codes, nor is it intended to alter regulatory policy used in connection with enforcement action.

The manual is offered in English, Chinese, Korean, Spanish and Vietnamese. IAMFES is offering it for $3.00 to members and $4.00 to non-members to cover postage and handling.

For more information, call the association at (515)232-6699 or write Margaret Marble, IAMFES, 502 E. Lincoln Way, Ames, IA 50010-6666.

Date Change

The Pennsylvania Association of Dairy Sanitarians and Dairy Laboratory Analysts Conference has been changed to May 7-9. Please see the Calendar for more information.

NFI Announces Move

The National Fisheries Institute announced that they will be moving to Arlington, VA March 1, 1990. The new address is:

1525 Wilson Boulevard
Suite 500
Arlington, VA 22209

New telephone numbers after March 1:
Administration/General: (703)524-8880
NFI Facsimile Machine: (703)524-4619

The National Fisheries Institute is the largest seafood trade association representing over 1,000 member companies involved in all aspects of the seafood industry.

Food Science Programs

- Statistical Process/Quality Control - April 9-13
- Principles of Food Product Development - April 25-27
- Introduction to Statistical Methods for Sensory Evaluation of Food - May 3-5
- Sensory Evaluation of Food Update - May 7-9
- Deep Frying of Foods: Science & Practice - May 16-18

For more information call the University of California, Davis, CA (916)757-8777.

ASI Sanitation and Safety Course for Food Processors and Warehousers

The seminar will be held May 14-16, 1990, in St. Louis, MO at the Embassy Suites Hotel downtown. For further information on the seminar and registration please contact Nancy Sullivan at the American Sanitation Institute, 7625 Page Blvd., St. Louis, MO 63133 or call (800)325-3371 (in Missouri (314)725-2555).

American Institute of Baking

- Advanced Pest Control - April 2-3
- Principles of Pizza Production - April 9-11
- Principles of Pizza Production, Hands-On - April 11-13
- Refrigeration Technology - April 9-13
- Labeling of Baker Products - April 23-24
- Safety Management - April 30-May 2

For more information please contact the American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

Letter to the Editor

The following is in response to a letter that was sent out from IAMFES announcing the resolutions passed at the Annual Meeting in August.

Thank you for your letter of September 6, 1989, and for the copy of IAMFES' resolution regarding municipal solid waste. We applaud your efforts to develop recycling programs for plastic single service items and your commitment to stop the use of fully halogenated chlorofluorocarbons in polystyrene foam cups and trays.

I understand your association's concern that single service products are becoming the focus of State and local efforts to reduce the municipal solid waste generated potentially at the expense of public health and food safety. The U.S. Environmental Protection Agency (EPA) is very much aware of the interaction between single service items and food safety and sanitation.

As you know, the EPA is concerned about the growing amount of waste produced in this country and has promoted source reduction (i.e., reducing the amount and toxicity of waste produced) of municipal solid waste. Source reduction is the most preferred option in the EPA's waste management hierarchy, followed by recycling and then landfilling and incineration.

In our source reduction program, we are looking for ways to safely reduce *all* components of the solid waste stream, not just large volume components. We have initiated an effort with the Conservation Foundation, a non-profit organization, to develop a method for evaluating source reduction options. The Conservation Foundation will convene a source reduction steering committee with representatives from industry, government, and the environmental community. This steering committee will help us work through the many issues that affect source reduction efforts, including balancing public health concerns with improving solid waste management.

If you are interested in learning more about our effort with the Conservation Foundation or any of our other municipal solid waste source reduction activities, please contact Paul Kaldjian of my staff at (202)382-2349. Thank you again for your letter and for your interest in municipal solid waste management issues.

Sincerely,
Sylvia K. Lowrance
Director
Office of Solid Waste
U.S. Environmental Protection Agency

Dear Editor:

I read with interest Dr. John Molenda's article in the October issue entitled "Veterinary Public Health and the Challenge of Effective Foodborne Disease Control Education-Training-Information Programs." The overview of the three emerging pathogens was both interesting and informative. The assertion that educational programs need to place a higher priority on foodborne disease prevention is also well taken. However, Dr. Molenda's comments about lack of food safety priorities in nutrition and (by inference) other professional food service education management programs could benefit from additional information about foodservice curriculum and food safety texts.

According to the Council of Hotel, Restaurant and Institution education there are approximately 1040 senior and community colleges offering degrees in Hotel, Restaurant and Institutional management. Of these schools, approximately 350 offer or require students to take the *Applied Foodservice Sanitation* course. Many additional schools offer equivalent programs from the American Hotel and Motel Association's Educational Institute or use any of several basic food safety texts. In addition, almost all of the quantity food production and preparation texts contain a significant chapter on food safety techniques. While the penetration of food safety into hotel, restaurant and institutional curricula is less than we would like it to be, it is significant and growing.

Food safety knowledge also has been established as a required competency for foodservice managers seeking certification from professional associations as well as managers serving with the U.S. Army and Air Force.

Dr. Molenda correctly states that too many people know too little about foodborne disease. We suggest establishing and defining appropriate standards for food safety knowledge at all levels of the population and developing ways to deliver that knowledge will challenge all food educators and managers as well as their colleagues in the Veterinary Public Health Community.

Sincerely,
Paul Martin
Director, Educational Programs
The Educational Foundation of
the National Restaurant Association

New IAMFES Members

Alaska

Larry Montgomery
Municipality of Anchorage
Anchorage

Arizona

Leon Smith
United Dairymen of Arizona
Tempe

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Taco Bell Corporation
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DAIRY

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

❑ **Controlling Volumes and Fat Losses** - (110 slides-tape-script-30 minutes). Keeping milk volume and product loss from farm to supermarket of fluid dairy products is discussed. This set was done with the cooperation of the dairy industry who reviewed the script and provided opportunities to take pictures. It is designed to be used by milk plants for their processing personnel, regulatory representatives, field staff and milk haulers. (Penn State-1982)

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

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

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

❑ **The How and Why of Dairy Farm Inspections** - (110 slides-tape-script-15 minutes). This was developed at the request of seven northeast dairy cooperatives and with their financial support. Emphasis is on clean cows, facilities and equipment and following proper procedures. Regulatory agencies cooperated in reviewing the script and taking pictures. This was developed for farmers, youth and allied industry. (Penn State-1984)

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

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

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

❑ **Producing Milk of Good Quality and Flavor** - (114 slides-tape-script-25 minutes). The steps and corrective measures necessary to produce quality milk with good flavor are outlined. It is directed at dairy farmers, field staff, milk haulers and youth. (Penn State-1982)

❑ **Tests for Milk Quality and Composition** - (140 slides-tape-script-25 minutes). This set shows and describes in simple terms the various quality tests performed on milk samples. These include bacteria, antibiotics, freezing point, pesticides, somatic cells, flavor and others. The purpose, desirable results, and ways to improve poor results are outlined. It was developed for farmers, youth, field staff and allied industry. (Penn State, 1983)

FOOD

❑ **BISSC - A Sign of Our Times** - (50 slides-script-tape). The presentation was prepared by the Baking Industry Sanitary Standards Committee. The purpose of BISSC, formed in 1949 by six of the national organizations serving the baking industry, is to develop and publish voluntary standards for the design and construction of bakery equipment. Those Standards are now recognized as the definitive sanitation standards for equipment used in the baking industry.

❑ **Food Quality, Food Safety, and You!** - (80 slides, script, and cassette tape). This is an educational program designed for consumers. The presentiion deals with the role of the consumer in maintaining the freshness, quality and safety of food in the home. It is intended for use by home economists, dieticians, cooperative extension agents and others interested in food quality and safety. (Cornell University)

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

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

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

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

❑ **Legal Aspects of the Tampering Case** - (about a 25-minute, 1/2" videocassette). This was presented by Mr. James T. O'Reilly, University of Cincinnati School of Law at the fall 1986 Central States Association of Food and Drug Officials Conference. He emphasizes three factors from his police and legal experience - know your case, nail your case on the perpetrator, and spread the word. He outlines specifics under each factor. This should be of the greatest interest to regulatory sanitarians, in federal, state and local agencies. (1987)

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

❑ **100 Degrees of Doom — The Time and Temperature Caper** - (14 minute videotape). Video portraying a private eye tracking down the cause of a salmonella poisoning. Temperature control is emphasized as a key factor in preventing foodborne illness. (Educational Communications, Inc.)

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

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

❑ **Psychiatric Aspects of Product Tampering** - (about a 25 minute, 1/2" videocassette). This was presented by Emanuel Tanay, M.D. from Detroit, at the fall 1986 conference of CSAFDA. He reviewed a few cases and then indicated that abnormal behavior is like a contagious disease. Media stories lead to up to 1,000 similar alleged cases, nearly all of which are false. Tamper proof packaging and recalls are essential. Tampering and poisoning are characterized by variable motivation, fraud and greed. Law enforcement agencies have the final responsibilities. Tamper proof containers are not the ultimate answer. (1987)

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

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

❑ **Seafood Q & A** - (20 minute VHS). Anyone who handles seafood, from processor to distributor to retail and foodservice, must be prepared to answer questions posed by customers. This tape features a renowned nutritionist and experts from the Food & Drug Administration, the National Marine Fisheries Service, and the National Fisheries Institute who answer a full range of questions about seafood safety. Excellent to educate and train employees about seafood safety & nutrition. (National Fisheries Institute).

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

❑ **Wide World of Food Service Brushes** - An 18 minute video tape that discusses the importance of cleaning and sanitizing as a means to prevent and control foodborne illness. Special emphasis is given to proper cleaning and sanitizing procedures and the importance of having properly designed and constructed equipment (brushes) for food preparation and equipment cleaning operations.

ENVIRONMENTAL

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

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

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

❑ **Down in the Dumps** - (26 minute VHS). Garbage is no laughing matter. The fact is that we are running out of space to dump the vast amounts of waste we create each day. Since many of the former methods of disposal are environmentally unacceptable, what are we to do? The program examines the technological approaches to the garbage dilemma, including composting, resource recovery, and high-tech incinerators, and public reaction to the creation of new waste treatment facilities. (Films for the Humanities & Sciences, Inc.)

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

❑ **Kentucky Public Swimming Pool and Bathing Facilities** - (38 minute videotape). It was developed by the Lincoln Trail District Health Department in Kentucky and includes all of their state regulations which may be different from other states, provinces and countries. It was very well done and could be used to train those responsible for operating pools and waterfront bath facilities. All aspects are included of which we are aware, including checking water conditions and filtration methods. (1987)

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

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

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

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

OTHER

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

❑ **75th IAMFES Annual Meeting Presentations.** 30 cassette tapes covering the complete conference. 5 videotapes covering various symposia and sessions (For more specific information, contact Sandy.)

If you are interested in checking out any of our audio-visuals, please fill out this form with the box or boxes checked as to which presentations you wish to view. Mail to: IAMFES, Lending Library, 502 E. Lincoln Way, Ames, IA 50010-6666. (You'll be notified by telephone when your tape or slide set is being mailed. Material from the Lending Library can be checked out for one week only so that others can benefit from its use.)

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Dairy, Food and Environmental Sanitation Instructions for Authors

Nature of the Magazine

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

The major emphases include: 1) practical articles in milk, food and environmental protection, 2) new product information, 3) news of activities and individuals in the field, 4) news of IAMFES affiliate groups and their members, 5) 3-A and E-3-A Sanitary Standards, amendments, and lists of symbol holders, 6) excerpts of articles and information from other publications of interest to the readership.

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

Submitting Articles

All manuscripts and letters should be submitted to the Associate Editor, Margaret Marble, IAMFES, 502 E. Lincoln Way, Ames, Iowa 50010-6666.

Articles are reviewed by two members of the editorial board. After review, the article is generally returned to the author for revision in accordance with reviewer's suggestions. Authors can hasten publication of their articles by revising and returning them promptly. With authors' cooperation articles are usually published within three to six months after they are received and may appear sooner.

Membership in IAMFES is not a prerequisite for acceptance of an article.

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Types of Articles

Dairy, Food and Environmental Sanitation readers include persons working as sanitarians, fieldmen or quality control persons for industry, regulatory agencies, or in education. *Dairy, Food and Environmental Sanitation* serves this readership by publishing a variety of papers of interest and usefulness to these persons. The following types of articles and information are acceptable for publication in *Dairy, Food and Environmental Sanitation.*

General Interest

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

Book Reviews

Authors and publishers of books in the fields covered by *Dairy, Food and Environmental Sanitation* are invited to submit their books to the editor. Books will then be reviewed and the review will be published in an issue of *Dairy, Food and Environmental Sanitation.*

Preparation of Articles

All manuscripts should be typed, double-spaced, on 8-1/2 by 11 inch paper. Side margins should be one inch wide.

The title of the article should appear at the top of the first page. It should be as brief as possible and contain no abbreviations.

Names of authors and their professions should follow under the title. If an author has changed location since the article was completed, his new address should be given in a footnote.

Illustrations, Photographs, Figures

Wherever possible, submission of photos, graphics, or drawings to illustrate the article will help the article. The nature of *Dairy, Food and Environmental Sanitation* allows liberal use of such illustrations, and interesting photographs or drawings often increase the number of persons who are attracted to and read the article.

Photographs which are submitted should have sharp images, with good contrast.

Examples of Proper Bibliographic Citations

Paper in a journal

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

Paper in a book

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

Book

Fennema, O. R., W. D. Powrie, and E. H. Marth. 1973. Low-temperature preservation of foods and living matter. Marcel Dekker, Inc., New York. 598 p.

Patent

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

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Coming Events

1990

APRIL

•4, 40th Annual University of Maryland Ice Cream Conference. Contact Dr. James T. Marshall, Department of Animal Sciences, University of Maryland, College Park, MD 20742 or call (301)454-7843.

•4, Ohio Association of Milk Food & Environmental Sanitarians Spring Meeting. For more information write or call Donald Barrett, Health Dept., 181 S. Washington Blvd., Columbus, OH 43215 (614)645-6195.

•4-6, Missouri Milk Food & Environmental Health Association Annual Meeting. Breckenridge on the Lake, Osage Beach, MO. For more information contact John Norris, Division of Health, Box 570, Jefferson City, MO 65101, (314)751-6400.

•5, Indiana Environmental Health Association, Inc., will hold its Spring Conference at the Radisson, Keystone-at-the-Crossing in Indianapolis.

•5-6, Nebraska Association of Milk and Food Sanitarians Annual Meeting. To be held at the University of Nebraska, Lincoln. For more information, contact: Jerry Hunt (402)556-0903.

•9-13, Statistical Process/Quality Control Short Course. University of California. For more information, contact: Robert C. Pearl, Director of Continuing Education for the Food Industry, University Extension, University of California, Davis CA 95616.

10-12, Florida Association Milk Food & Environmental Sanitarians Annual Meeting, at the Hilton Hotel, Deland, Florida. For more information contact Dr. Ron Schmidt, University of Florida Food Science and Human Nutrition, Gainesville, FL 32611, (904)392-8003.

•11-12, Florida Association Milk Food & Environmental Sanitarians Spring Educational Conference, Deland, Florida, Hilton Hotel. For more information contact W.R. Thornhill, 3023 Lake Alfred Rd., Winter Haven, FL 33881, (813)299-6555.

•18, Design of Experiments by Microcomputer to be held in St. Paul, Minnesota. For more information or registration materials, contact the American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121 (612)454-7250 FAX (612)454-0766.

•19, Economic Statistical Process Control by Microcomputer to be held in St. Paul, Minnesota. For more information or registration materials, contact the American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121 (612)454-7250 FAX (612)454-0766.

•22-24, 1990 Philadelphia Restaurant Food & Equipment Show, sponsored by the Pennsylvania Restaurant Association. Will be held in Philadelphia at the Valley Forge Convention Center, King of Prussia. Call 1-800-346-PROS or (717)697-4199 for details, FAX (717)790-9441.

•23-24, American Dairy Products Institute will hold its 4th Annual Meeting at the Chicago O'Hare Marriott Hotel, Chicago, Illinois. The meeting will be held in conjunction with the Institute's biennial Dairy Products Technical Conference, to be held at the same location on **April 25-26.** This year's Conference will be co-sponsored by the Center for Dairy Research, University of Wisconsin, Madison. Additional information about the meeting can be obtained by contacting Dr. Warren S. Clark, Jr., Executive Director of the American Dairy Products Institute, 130 North Franklin Street, Chicago, IL 60606 (312)782-4888, or (312)782-5455 FAX (312)782-5299.

•23-25, Third Annual Beverage Industry Conference sponsored by the Beverage Industry Advisory Council (BIAC) of the Food Processing Machinery & Supplies Association (FPM&SA). Hotel Intercontinental, Chicago, Illinois. For more information call (800) 331-8816.

•24, Illinois Spring Meeting will be held at the Blue Moon Restaurant, Elgin, IL. For more information contact Clem Horner (708)693-3200.

•24-27, Experimental Baking and Related Physical Dough Tests to be held in Fargo, North Dakota. For more information or registration materials, contact the American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121 (612)454-7250 FAX (612)454-0766.

•25-26, Dairy Products Technical Conference at the O'Hare Marriott in Chicago, Illinois. Co-sponsored by The Center for Dairy Research (Madison, Wisconsin) and the American Dairy Products Institute (Chicago, Illinois). For more information contact Sarah Quinones (CDR) at (608)262-2217 or Dr. Warren S. Clark, Jr. (ADPI) at (312)782-4888.

MAY

•1-2, Harrisburg Restaurant Food & Equipment Show, sponsored by the Pennsylvania Restaurant Association. Held in Harrisburg at the Farm Show Complex, Harrisburg. Call 1-800-346-PROS or (717)697-4199 for details, FAX (717)790-9441.

•7-9, 1990 Pennsylvania Association of Dairy Sanitarians & Dairy Laboratory Analysts Annual Meeting at the Keller Conference Center, Penn State University, University Park, PA. For more information, contact Sid Barnard, 8 Borland Lab, University Park, PA 16802, (814)863-3915.

•7-11, Electrical Troubleshooting. American Institute of Baking, Manhattan, KS. Contact: Melinda Enns at (913)537-4750.

•8-10, Introduction to Food Chemistry, to be held in Chicago, Illinois. For more information or registration materials, contact the American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121, (612)454-7250 FAX (612)454-0766.

•14-17, Introduction to Cereal Chemistry and Technology to be held in Minneapolis, Minnesota.
For more information or registration materials, contact the American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121, (612)454-7250 FAX (612)454-0766.

•14-17, Purdue Aseptic Processing and Packaging

Workshop, sponsored by the Food Science Department at Purdue University. For information contact James V. Chambers, Food Science Department, Smith Hall, Purdue University, West Lafayette, IN 47907, (317)494-8279.

•**14-18, Applications and Troubleshooting Microprocessor Control Circuits Seminar**, presented by The American Institute of Baking. To register, write to American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502, (913)537-4750 or (800)633-5137 or FAX (913)537-1493.

•**16, Ontario Food Protection Association**, will be holding a Spring Workshop at the Toronto Hilton Hotel. The title of this theme is: "Effective Employee Education in the Food Industry: Training a Trainer." for more information contact programme co-ordinators, Bob Tiffin (519)885-8284, FAX (519)822-8210 or Ann Roberts (519)822-5530 or FAX (519)822-5530.

•**19-23, The 71st Annual National Restaurant Association Restaurant, Hotel-Motel Show**, held at McCormick Place, Chicago, IL. For more information contact National Restaurant Association, 150 N. Michigan Ave, Ste. 2000, Chicago, IL 60601, (312)853-2525, FAX (312)853-2548.

•**22-24, Adding Fiber to Food: How and Why** to be held in Chicago, Illinois. For more information or registration materials, contact the American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121, (612)454-7250 FAX (612)454-0766.

•**23-25, South Dakota Environmental Health & South Dakota Rural Health,** Ramkota Inn, Pierre, SD. For information contact Dave Micklos, SD State Dept of Health, 523 E. Capital, Pierre, SD 57501, (605)773-3141.

JUNE

•**4-5, HACCP** to be held in Chicago, Illinois. For more information or registration materials, contact the American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121, (612)454-7250 FAX (612)454-0766.

•**4-5, Starch: Structure, Properties, and Food Uses** to be held in Chorleywood, United Kingdom. For more information or registration materials, contact the American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121, (612)454-7250 FAX (612)454-0766.

•**5-6, Texas Association of Milk, Food & Environmental Protection Annual Meeting**, held at the Howard Johnson-South Plaza, Austin, Texas. For more information contact Janie Park, Secretary, P.O. Box 2362, Cedar Park, TX 78613-2363, (512)458-7281.

•**18-19, Dough Rheology and Baked Products Texture** to be held in Short Hills, New Jersey. For more information or registration materials, contact the American Association of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121, (612)454-7250 FAX (612)454-0766.

JULY

•**6-7, International Symposium on Rapid Methods and Automation in Microbiology: Ten Years of Excellence.** Contact Dr. Daniel Y.C. Fung, Director, 207 Call Hall, Kansas State University, Manhattan, KS 66506, (913)532-5654, FAX (913)532-7059.

•**6-13, International Workshop on Rapid Methods and Automation in Microbiology: Ten Years of Excellence.** Contact Dr. Daniel Y.C. Fung, Director, 207 Call Hall, Kansas State University, Manhattan, KS 66506. (913)532-5654, FAX (913)532-7059.

16-18, American School Food Service Association 44th Annual Conference to be held at the New Orleans Convention Center, New Orleans, Louisiana. For more information call (703)739-3900 or (800)877-8822.

AUGUST

•**5-9, IAMFES 77th Annual Meeting**, Woodfield Hilton Towers, Arlington Heights, IL. For more infor-mation, contact Steven K. Halstead, IAMFES, Inc., 502 E. Lincoln Way, Ames, IA 50010 (800)369-6337.

•**7-8, Dietary Managers Association** to be held at the Hyatt Orlando, Orlando, Florida. For more informa- tion call (708)932-1444 or (800)323-1908.

•**15-18, FOOD PACIFIC, 1990** will be held at Vancouver's domed stadium, B.C. Place. Those wishing to attend may obtain further information by contacting: B.C. Food Exhibitions Ltd., 190-10651 Shellbridge Way, Richmond, B.C., Canada V6X 2W8 (604)660-2288.

•**26-31, Eighth International Biodeterioration and Biodegradation Symposium.** University of Windsor, Ontario, Canada. For more information contact Mary M. Hawkins, Corresponding Secretary, 10657 Galaxie, Ferndale, MI 48220-2133, (313)544-0042.

To insure that your meeting time is published, send announcements at least 90 days in advance to: IAMFES, 502 E. Lincoln Way, Ames, IA 50010.

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Woodfield Hilton and Towers - Arlington Heights, Illinois - August 5-9

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❑ *Journal of Food Protection* or
❑ *Dairy, Food and Environmental Sanitation*

Other Fees: (Per Person)

Cheese & Wine Reception (Sun., 8/5)
"Taste of Chicago" (Mon., 8/6)

Art Institute, Lunch, Sears Tower (Mon., 8/6)
Long Grove Shopping, Lunch (Mon., 8/6)
Water Tower Place, Lunch, Shopping (Tues.,
Haeger Pottery Tour, Lunch, Shopping (Tues
Morton Arboretum, Lunch, Shopping (Wed.,
Kraft Cooking Demo (Hotel) (Wed., 8/8)
IAMFES Awards Banquet (Wed., 8/8)

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Registration Information

Send payment with registration to IAMFES, 502 E. Lincoln Way, Ames, IA 50010-6666. Make checks payable to IAMFES. Pre-registration must be post-marked by July 30, 1990. The pre-registration deadline will be strictly observed. For additional information contact Julie Heim at 1-800-369-6337.

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The IAMFES policy on meeting cancell
"Registration fees, minus a $15.00 process
written cancellations post-marked at least
start of the meeting. No refunds will be r
less than two (2) weeks prior to the start o
registration may be transferred with writte

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ust 5-9, 1990

FOR OFFICE USE

Date Rec'd._____ First initial Last name

ID#_____ Registration #_____

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(please print) **Last Name**

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Mon/Tues/Wed)	$ 40 ($50 on-site)	
rcle: Mon/Tues/Wed)	$ 60 ($70 on-site)	
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	$ 15 ($20 on-site)	
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8/6)	$ 20		
(Tues., 8/7)	$ 25		
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Exhibitor Information

An exhibition of products and consultant services will be at the Woodfield Hilton and Towers. For more information on exhibiting at the conference, please contact Scott Wells at 1-800-369-6337.

IAMFES

77th Annual Meeting
Special Events Program

LONG GROVE VILLAGE/HOBSON HOUSE RESTAURANT

Monday, August 6, 1990
9:30 a.m. - 3:30 p.m.
Cost: $20.00 (Includes Lunch)

Turn your watch back to yesteryear and explore the treasurers at a crossroads in our country's past! We'll be taking you to Long Grove, a 19th Century village featuring antiques, boutiques and over 100 charming and unique specality shops. Relax and enjoy lunch at Hobson House Restaurant, family-owned for more than 25 years and featuring a homemade, buffet-style lunch served in garden surroundings. Your afternoon is free to continue shopping, sampling fresh apple cider and homemade fudge or simply visit with friends in a charming atmosphere untouched by progress. **(Tour limited to 46 people).**

ART INSTITUTE TOUR

Monday, August 6, 1990
Cost: $25.00 (Includes Lunch)

One of the World's leading art museums is located in Chicago. This tour will show it to you. You will be picked up at the hotel and driven to the Art Institute. The price of admission is included and Monet's Series Paintings will be on exhibit during the time of your visit. Lunch is provided in the garden level restaurant of the Institute. After lunch you will be taken to the Sears Tower. Here on the 103rd floor of the World's tallest building, you will look down upon the East, West, North and South beauty of Chicago. Admission to the Tower is included. **(Tour limited to 46 people).**

HAEGER POTTERY/MILK PAIL VILLAGE

Tuesday, August 7, 1990
9:00 a.m. - 3:30 p.m.
Cost: $20.00 (Includes Lunch)

The world's largest art pottery awaits you on this guided walking tour of Haeger Potteries. Watch the old world master potter spin works of art on his potter's wheel. You will browse through the factory outlet salesroom and select your favorite art pottery pieces. We've planned a quaint lunch at the Milk Pail Restaurant, nestled in the beautiful woods and fields of Milk Pail Village and famous for its country fare. Following a delicious meal, shop leisurely through over 20 shops of country ware, paintings, clothing, crafts and one-of-a-kind treasures. **(Tour limited to 46 people).**

"MAGNIFICENT MILE" — WATER TOWER PLACE TOUR

Tuesday, August 7, 1990
Cost: $25.00 (Includes Lunch)

Experience the Crown Jewel of Chicago's Magnificent Mile. You will be taken from the hotel, driven along beautiful Michigan Avenue and dropped off at Water Tower Place. Glass-enclosed elevators, fountains and beautiful greenery are just a part of this tremendous shopping and architectural marvel. Not a millionaire? That's O.K., browsing is fun, too! Lunch is provided at "the 95th" — an elite Chicago dining experience. Situated on the 95th floor of the John Hancock building, this restaurant offers an unparalleled view of Chicago. **(Tour limited to 45 people).**

MORTON ARBORETUM TOUR

Wednesday, August 8, 1990
Cost: $20.00 (Includes Lunch)

The Morton Arboretum is a 1,500 acre preserve consisting of native Illinois prairie and forest land and beautiful cultivated gardens. Tour participants will be taken from the hotel to the Arboretum. Once there, an Arboretum Naturalist will come on board the bus to narrate a tour of the grounds. Lunch is included and will be served in picturesque "Ginkgo Restaurant" overlooking Crabapple Lake. After lunch, ample time will be given for browsing in the gift shop, strolling among the flower gardens or viewing a slide show provided by the Arboretum. **(Tour limited to 45 people).**

KRAFT COOKING DEMONSTRATION (WOODFIELD HILTON AND TOWERS HOTEL)

Wednesday, August 8, 1990
Cost: FREE

Kraft Cooking Demo will be held at the Woodfield Hilton and Towers. Details on this event will be published at a later date.

From the Ames Office . . .

By
Steven K. Halstead
IAMFES
Executive Manager

It is a cold, rainy, sleety, snowy, Saturday morning in Chicago. The weather is fit for neither person nor beast, but the people gathered don't seem to notice.

They are the 1990 Program Advisory Committee and have come here from all over the country. All would rather be home with their families, but they are in this room to work out the details of the 1990 Annual Meeting Education Program.

President-Elect Bob Sanders, the Program Chairman, is in charge overall. Gale Prince is chairman of the Advisory Committee. Attending the meeting are Mark Banner, Randy Daggs, Rusty Bishop, Ann Draughon, Ellen Koenig, Jim Marshall, Bob Richardson and John Bruhn. Because of the knowledge, effort and sacrifice of these people, the 1990 Program will be outstanding.

As I sit and listen, I am suddenly struck by the "power" gathered. These people either know or know somebody who knows just about everything that is happening in food protection in this country if not the world. It was a name droppers dream come true. A typical example comes to mind:

The Chairman asks: "Can we get somebody to fill us in on where we are going with regulatory efforts on aflatoxin detection and measurement." After a moment of silence, the names and credentials begin to flow. People from industry, state and federal agencies, trade and professional association, equipment manufacturers, lobby groups, risk management experts, etc., are called out and the chairman writes them down. A discussion follows and it is decided that so-and-so will be invited to present a paper on the topic. Then its on to the next topic. Its a different topic but the results are the same. A list of potential presenters is again developed and a decision to invite is extended.

I am not sure which generates the greater awe in me - the willingness of this group to service IAMFES or their expertise. Whichever, it is awesome! Bob, Gale, Mark, Randy, Rusty, Ann, Ellen, Jim, Bob and John, it was a wonderful, exciting, satisfying and successful way to spend a Saturday. Thank you.

P.S. One of you left a red tie and tie clasp. I have it, so....

To receive information on membership with IAMFES Circle 360 on this card

IAMFES

DFES 3/90

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Reader requests for information are sent to the appropriate company. Follow-up on reader requests are the responsibility of the company advertising.

The Advertisements included herein are not necessarily endorsed by the International Association of Milk, Food and Environmental Sanitarians, Inc.

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105	118	131	144	157	170	183	196	209	222	235	248	261	274	287	300	313	326	339	352
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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
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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

This second Reader Service Card is provided to allow co-workers to also respond to companies of interest.

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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
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108	121	134	147	160	173	186	199	212	225	238	251	264	277	290	303	316	329	342	355
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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

Place
Stamp
Here

IAMFES

502 E. Lincoln Way
Ames, Iowa 50010

Place
Stamp
Here

IAMFES

502 E. Lincoln Way
Ames, Iowa 50010

This is the cow
that caught the bug,
that was treated by penicillin
(and ampicillin and erythromycin
and sulfamethazine etc.)
that spoiled the milk,
that contaminated the silo,
that shut down the plant,
that lost $100,000.
Because somebody didn't
take 5 (or 7, or 12) minutes to do one
of the new family of Charm Tests.

Nothing works like a Charm.

Penicillin Assays Inc.

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