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DAIRY, FOOD AND ENVIRONMENTAL

SANITATION

JANUARY 1994

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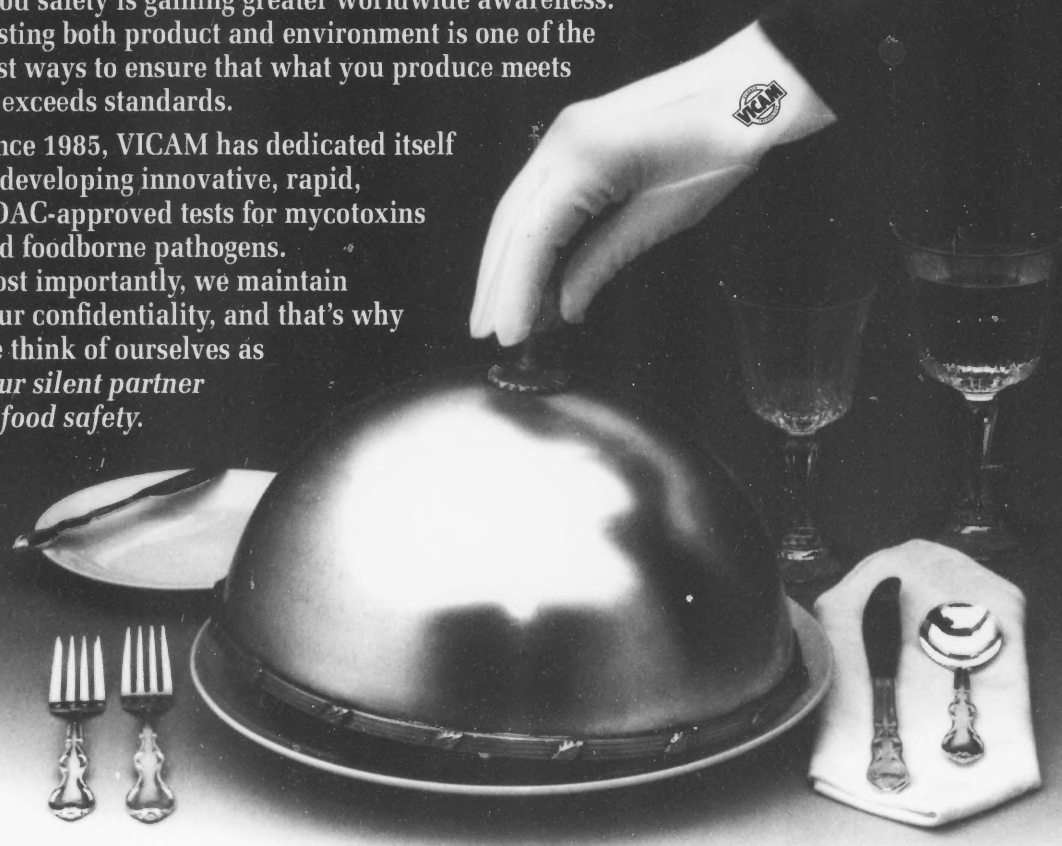

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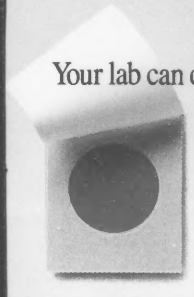

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Vol. 14 No. 1 JANUARY 1994

Dairy, Food and Environmental Sanitation CONTENTS

Articles:

Association News:

3-A Sanitary Standards

ABOUT THE COVER . . . *Photo courtesy of Lancaster Laboratories, 2425 New Holland Pike, Lancaster, PA 17601, Tel. 717-656-2301, Fax 717-656-2681.*
CORRECTION. . . *The cover photo from the December 1993 issue was incorrectly identified. The photo, courtesy of Silliker Laboratories Group, Inc., Homewood, IL, was of Randy Fleener, Manager of Chemistry, testing a meat sample using the Atomic Absorption method.*

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Thoughts From the President . . .

By
Harold Bengsch
IAMFES President

Beginning with the January, 1994 issue of the *Journal of Food Protection*, we are switching to an uncoated paper for our journals. We think that this is a change that you will note and hopefully appreciate.

You might be tempted to think that we are doing this out of a concern for the environment and that we are now using recycled paper. Actually, we have been using recycled papers for nearly two years, as well as soy oil based inks wherever possible.

This decision was made for quite another reason--to save money!

When the Executive Board met in May to finalize the budget for 1993-1994, our Executive Manager recommended that we increase dues in order to pay for the rising costs of providing our member services. The Board rejected this idea and directed Mr. Halstead to seek ways to reduce our expenses.

Since we spend more money on the journals than any other aspect of the association, it was natural that we would turn there for savings. Recent efforts by the staff had already reduced our production costs to about as low as they could go. This left the printing costs. Bids were requested and we found that our current printer's prices couldn't be beaten. As a part of the bid process we discovered that the paper used in printing the journals could account for as much as 40% of our total costs.

It is ironic that part of the expense in our paper was due to the fact that we were using recycled paper. Although the prices have come down, recycled paper is still more expensive than non-recycled paper. The Executive Board was firm in its resolve to stay with the recycled paper commitment.

It ends up that by going to the uncoated, recycled paper, we could save about $11,000 per year. We also feel that there will be added advantages in that the uncoated paper will be easier to photo-copy and will be easier to write on for you folks who like to make notes in the margins.

It ends up that our printer had a supply of coated paper on hand that needed to be used up before he could switch to the uncoated. Because we need more paper to print the *Journal of Food Protection* than we do to print *Dairy, Food and Environmental Sanitation*, we were able to make the switch sooner with *JFP*. *DFES* will follow just as soon as the old paper is used up.

We hope that you will like the results of this change as much as we think you will. I would be most anxious to hear from you concerning this.

On My Mind . . .

By
Steven K. Halstead, CAE
IAMFES
Executive Manager

. . . is TIME

I had an interesting conversation with my fifteen year old son, James, last week—if it is possible to have an interesting conversation with a fifteen year old. It seems that household chores were not getting done so my wife put together a schedule whereby each of us would be responsible for one task (i.e., cleaning the upstairs bathroom) each day. In an effort to enhance the acceptance of the idea (on James' part--I'd already been told that I bought into it!), he was given first choice of the tasks each day.

His reaction was more negative than I expected. He pointed out that he just doesn't have the time to do all the things he has to do now, let alone more things. He went on to say that he has to take out the garbage everyday, feed the barn cats everyday, feed and water his horses two times a day, work at the stables (he cleans stalls in exchange for partial board on one of his horses) everyday, plus eat, sleep and go to school. It just isn't fair and he hardly has time for his friends and goofing off.

As I listened to his litany, I couldn't help but be envious of all the free time he has! I could list all the things that I have to do everyday, but I'm sure that one of you would take me to task for all the free time I have that you don't.

Isn't it interesting how we spend our time and how we perceive it? For example, just like the rest of you, I spend more time at work each day than any other activity. Yet, because I like my work, I don't (usually) object to the number of hours that I devote to it. The same thing might be said for my hobbies or my leisure hours.

It's only when I find myself doing something that I really don't want to do (like household chores) that I perceive that the task is taking too much of my time.

How about this: What would be the reaction if churches began to teach that tithing should include time? (Maybe some do, mine doesn't.) It isn't too hard to calculate that we would be talking about at least 4 hours per week for a working person--I don't know how you would figure what a non-working person should contribute. Maybe that time could also be spent outside the church doing other good works like Girl Scouts, Boy Scouts, YMCA, working with the homeless, visiting people in hospitals, etc. As I think about it, it sounds like a pretty good idea.

Clearly, time can be thought of in exactly the same way as money. It is a commodity to be gathered and used. Which brings me to the association side of the equation. We need more than your money, we need your time, also. Whether it is given as service on a Committee, Professional Development Group, Task Force; as a delegate to the Affiliate Council or as an Officer; or as a presenter at the Annual Meeting, we need your time. Maybe you can't do more than read the journals and be informed about what is happening in your association. That's fine, we still need the time.

January is a great time to begin giving of yourself. In whatever capacity. You might even make it a New Year's Resolution!

I just had a frightening thought—what if the government taxed our time. Whoa—chills!

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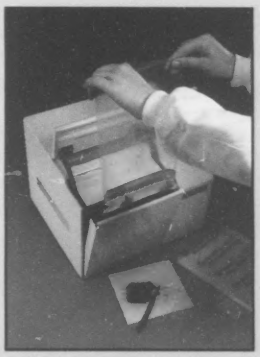
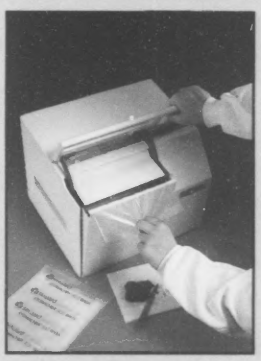


1. Insert bag into machine. Close door firmly to secure bag.



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Dairy, Food and Environmental Sanitation, Vol. 14, No. 1, Pages 8-10 (January 1994)

Good Manufacturing Practices (GMP) Are Critical for Non-Production Employees Too!

that includes:

- Management
- Maintenance
- Visitors
- Outside Contractors

Thomas Fahey West Agro, Inc., Director, Plant Sanitation, 11100 North Congress Avenue, Kansas City, MO 64153

The following is a short review of the GMPs for all plant employees including visitors and contractors. Your constant awareness of and training in sanitation and hygiene principals is critical to product safety and quality.

First let's look at several GMPs that come directly from the Pasteurized Milk Ordinance (PMO).

ITEM 20p.
PERSONNEL-CLEANLINESS

Hands shall be thoroughly washed before commencing plant functions and as often as may be required to remove soil and contamination. No employee shall resume work after visiting the toilet room without thoroughly washing his hands. All persons, while engaged in the processing, pasteurization, handling, storage, or transportation of milk, milk products, containers, equipment, and utensils shall wear clean outer garments. All persons, while engaged in the processing of milk or milk products shall wear adequate hair coverings and shall not use tobacco.

PUBLIC-HEALTH REASON

Clean clothing and clean hands (including clean fingernails) reduce the possibility of milk, milk products, containers, and equipment becoming contaminated.

ADMINISTRATIVE PROCEDURES

This item is deemed to be satisfied when:

1. *Hands are thoroughly washed before commencing plant functions and as often as may be required to remove soil and contamination.*
2. *Each employee washes his hands following a visit to the toilet room and prior to resuming work.*
3. *All persons, while engaged in the processing, pasteurization, handling, storage, or transportation of milk, milk products, containers, equipment, and utensils wear clean outer garments.*
4. *Tobacco is not used by any person while engaged in the processing of milk or milk products and adequate head coverings are worn.*

ITEM 22p. SURROUNDINGS

Milk plant surroundings shall be kept neat, clean, and free from conditions which might attract or harbor flies, other insects and rodents, or which otherwise constitute a nuisance.

ADMINISTRATIVE PROCEDURES

This item is deemed to be satisfied when:

1. *There is no accumulation of trash, garbage, or similar waste in areas adjacent to the milk plant. Waste material stored in suitable covered containers shall be considered in compliance.*
2. *Driveways, lanes, and areas servicing milk plant vehicular traffic are graded, drained, and free from pools of standing water.*
3. *Outdoor areas for milk tank truck unloading are constructed of smooth concrete or equally impervious material, properly sloped to drain, and equipped with trapped drains of sufficient size.*

ITEM 13r.
UTENSILS AND EQUIPMENT-HANDLING

After sanitization, all containers, utensils, and equipment shall be handled in such manner as to prevent contamination of any product-contact surface.

ADMINISTRATIVE PROCEDURES

This item is deemed to be satisfied when:

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Procedures to Implement the HAZARD ANALYSIS at CRITICAL CONTROL POINT System (HACCP) Manual

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1. *Sanitized product-contact surfaces, including farm cooling holding tank openings and outlets, are protected against contact with unsanitized equipment and utensils, hands, clothing, splash, condensation, and other sources of contamination.*
2. *Any sanitized product-contact surface, which has been otherwise exposed to contamination, is again cleaned and sanitized before being used.*

Let's expand on these general rules from the PMO, and highlight GMPs.

Because this plant is a facility producing food for human consumption, it is necessary that we have certain rules as to the conduct of all employees while working in the manufacturing areas of the plant.

We hope to clarify and gain understanding on the following guidelines in order that each employee is aware of your standards with regard to *Quality*, *Product Safety*, *Personal Safety*, *Standards of Conduct*, *Good Manufacturing Practices*, *Housekeeping*, and *General Plant Standards*.

Quality

Quality starts with YOU. Each employee has a responsibility to meet or better the minimum standards as established by this company.

Product Safety

All employees and maintenance personnel must be constantly aware of possible adulteration of any products.

Product safety items would include:

a) Broken glass, wire, hair, metal, gasket material or any foreign material found in product.
b) Contamination from cutting, welding, grinding, drilling, filing, etc. in production areas.
c) Dust created by breaking concrete up and toxic gases from welding.
d) Use of non-approved cleaners, sanitizers, coatings and lubricants.

Good Manufacturing Practices

Good Manufacturing Practices are the methods and controls used in the manufacture, processing, packaging and holding of food such that they assure safe controlled sanitary conditions. The guidelines covering personal hygiene and work habits are as follows:

Personal Hygiene

- Employees are required to wash their hands with a sanitizing soap prior to beginning or returning to work if food contact areas of product are to be touched.
- Loose hair on a person handling food products is very unsanitary. Precautions are to be taken to prevent loose hairs from coming in contact with product. These precautions include but are not limited to the wearing of authorized head coverings by all persons while they are in the plant area. Also beard coverings are required for all beards, mustaches over 1/4" beyond the corner of the mouth or sideburns lower than the ear lobe. Anyone not able to contain all head and facial hair will not be allowed in the factory.
- Employees assigned to production areas must report to the plant management if they have boils, a communicable disease or infected sores where there is reasonable possibility of product contamination.
- Careful sanitary precautions should be taken by employees when coughing or sneezing.

Uniforms

- Only clean uniforms can be worn in production areas. Uniforms will be changed on a daily basis. If your uniform is filthy from a maintenance chore, don't wear it out to work on a filler.
- All shirts are to be buttoned except the very top button and tucked into trousers.

Grooming Guidelines

- Hair nets or other approved hair restraints must be worn by all persons in the production and warehouse areas, except while performing welding or flame cutting operations. Prior approval of the plant engineer is required for this exception.
- Beards are to be covered with company approved covering and worn in a manner to *contain all facial hair.*
- Mustaches are permissible if they are neatly trimmed. Mustaches shall not be lower than 1/4 inch below the corner of the mouth.
- Under no circumstances are wigs or false hairpieces allowed in the production area.
- No ornamental neck or ear jewelry is to be worn in the production area.
- False eyelashes, false fingernails, hair curlers, and nail polish are not permitted.
- No rings are to be worn into the production area.
- Watches and other loose articles are to be removed prior to entering the production area.

Sanitation

- Absolutely no spitting will be tolerated in the plant.
- Use of chewing gum, candy or tobacco of any form will not be allowed in the production and warehouse areas.
- No food or beverage will be consumed in the production areas, warehouse or locker room areas.
- Chewing tobacco is not permitted anywhere in the factory.

Work Habits

- No glass containers of any form shall be taken into the production areas without the approval of the plant engineer.
- Wastepaper or refuse is to be discarded only in the proper containers and not to be thrown on the floor or ground.
- All jobs requiring welding, cutting, grinding, drilling, etc. that could create a potential food hazard must be cleaned up and the Plant Engineer notified. Every effort must be made to contain the hazard and prevent equipment contamination. Welding shields must be used whenever possible to protect people from UV light flashes.
- Pens, pencils, tools and other objects may not be carried

in pockets or pouches above the waist.

- Sitting or standing on feeding hoppers, product storage tables or racks will not be allowed.
- Safety in all phases of work is the first consideration in any job and all necessary precautions must be taken to prevent accidents.

VISITORS AND CONTRACTOR PERSONNEL SUMMARY

a) All visiting personnel must comply with all guidelines defined for proper grooming. This includes hair length and head coverings.
b) If the visiting personnel do not have an approved uniform, smocks will be issued.
c) All jewelry and cosmetic guidelines will apply.
d) All sanitation guidelines will apply.
e) All disease control guidelines will apply.

We realize that we continue to reinforce personal hygiene and hand cleaning and disinfection. However, improper handling remains the major cause of foodborne illness, whether the agent is bacterial or viral. Transmission of disease is mostly by the fecal-oral route, usually by individuals who do not wash their hands after going to the toilet.

The surface of the hands may be contaminated with virtually any types of microbes in the environment including pathogens and non-pathogens, some loosely attached, some embedded in the skin. The most heavily contaminated areas are hair on the back of the hands and the area under the fingernails.

Thus, it is essential that people involved in the processing and preparation of foods *wash* and *disinfect* their hands before handling foods, processing equipment, and utensils. Superficial hand washing, such as soap and water wash is *inadequate*.

As a maintenance man or plant manager, where were you last working or when was the last time you washed your hands before you dashed out to that broken filler or broke down that product pump?

For all employees and especially maintenance and management, it is critical to remember that beyond pasteurization, the *only* control of product safety or bacterial quality is through sanitation and hygiene, both equipment and environment. Most of the plant is C.I.P. cleanable. However, many items like product pumps need to be taken down to be adequately cleaned. If this equipment is opened and handled after cleaning and sanitizing, which includes production, it must be handled carefully, cleaned and re-sanitized prior to going back on line. During work on any equipment, the opportunity for contamination should be minimized. Airborne contamination, condensation from equipment, and aerosols from rinse hoses must be avoided while equipment is open or a complete re-cleaning and sanitizing is required for product integrity.

Coliform testing is still the best monitoring tool for post-pasteurization contamination. The presence of any coliform bacteria indicates a contamination which should not be present. The source of a persistent coliform contamination should be identified and eliminated promptly.

As one last reinforcement of why we have to be extremely careful of re-contamination and personal hygiene—remember that you only have to deposit a few bacteria in yogurt (a virtually perfect growth media) to cause serious finished product quality problems.

EXAMPLE OF BACTERIA COUNTS THROUGHOUT CLEANING PROCESS

Before Cleaning	1500 Bacteria/cm^2
After Detergent Cleaning	60 Bacteria/cm^2
After Final Rinse	10 Bacteria/cm^2
After Disinfection	1 Bacterium/cm^2

THEORETIC REPRODUCTION OF BACTERIA

TIME	
30 Minutes	**2 Cells**
60 Minutes	**4 Cells**
90 Minutes	**8 Cells**
2 Hours	**16 Cells**
11 Hours	**10 Million Cells**

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Extraneous Matter in Food Processing and Storage

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Despite continuous improvements in food processing and storage conditions, some products still become contaminated with filth and other forms of extraneous matter. Extraneous matter is defined as "any foreign matter in production associated with objectionable conditions or practices in production, storage or distribution." (6) This will include filth, decomposed materials and miscellaneous matter such as soil or glass. (6) Filth is defined as "any objectionable matter contributed by animal contaminants of product such as rodent, insect, or bird matter, or any other objectionable matter contributed by insanitary conditions. (6) These defects were the third largest cause of product recalls in 1990 with 24 total cases. (12)

This article will discuss the significance of extraneous matter, including classifications and federal regulations, and provide an overview of analytical methods used for the detection of extraneous matter in food products.

TYPES OF CONTAMINANTS AND THEIR IMPORTANCE

Filth and foreign matter includes many types of contaminants. Some are derived from insects, mite, and other origins. Presence of infestation can include whole insects, insect fragments, and insect excreta. Furthermore, there are many macroanalytical procedures to determine if insect feeding has occurred in such products as cocoa beans. Filth and foreign matter can also be of vegetable and mineral origin, such as metal fragments found in foods which accounted for eight recalls in 1990. Other foreign matter contaminants in foods which have resulted in recalls include glass, rubber, wood, machine oil, plaster, sand, and even cocaine. (12)

Filth in foods may not only be aesthetically unappealing, but can be toxic, allergenic, injurious or pathogenic to humans. (3) These contaminants can be linked to human disease either by direct agents or via vectors. One example of a direct agent is the setae or hairs from dermestid larvae. The setae, or hairs, from dermestid larvae invade the soft tissue of the alimentary tract which causes physical and antigenic trauma resulting in gastroenteritis. (2) Another example of a direct agent is the cockroach which produces certain allergens that have been shown to be highly heat-resistant (one hour at 100° C). (1) This insect has also been classified as a vector of disease. There are generally three groups of potential vectors associated with foods: (2)

1. Birds and bats;
2. Cockroaches, flies, ants, mice and rats;
3. Pantry pests, e.g., mites, moths and beetles—or stored product pests.

The first group produces droppings that may contain pathogens. These droppings can then become airborne or waterborne. The second group is important because of their visits to sewers, floors, fields, etc. and then back to foods and food handling surfaces. They often harbor pathogens on or in their bodies and subsequently transmit them to foods in which they come in contact. (2) It has been shown that *Salmonella* can survive in cockroaches for up to 60 days after death. (8) Thus, cockroaches are a potential source of *Salmonella* contamination, especially in foods where exposure to cockroaches occurs after heat processing or any lethal step where *Salmonella* may be killed. *Salmonella* can also be transmitted by flies along with *Shigella* and *Vibrio cholera*. (2) The third and final group are not good vectors due to their limited range during their life cycle. However, other pests such as mice and rats may bring pathogens to the area where these pantry pests are found. Pantry pests, therefore, help to distribute any contamination throughout the food during their feeding. (2)

Some of these vectors may also transmit viruses. (2,7) For example, house mice may shed viruses of lymphocytic choriomeningitis through its saliva and urine. The infected food when consumed may convey the virus to humans. (7)

There are many documented cases implicating animals and insects as vectors in the transmission of human disease. As a result of these findings, increased importance must be placed on the monitoring of products for filth to maintain good manufacturing practices and minimize the risk of disease.

REGULATORY ENFORCEMENT

Recalls of contaminated foods are a result of noncompliance with the Federal Food, Drug, and Cosmetic Act (FDC Act). Section 402(a)(3) of the FDC Act states that "A food shall be deemed to be adulterated if it consists in whole or in part any of any filthy, putrid, or decomposed substance, or it is otherwise unfit for food." (2,13) In addition, Section

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402(a)(4) protects the public from products that have been exposed to unsanitary conditions that may have contaminated the product with filth or which may render it injurious to health. (2,13)

There are several means by which the Food and Drug Administration (FDA) can enforce the Food, Drug, and Cosmetic Act. They include seizure, prosecution, injunctions and recalls. (2) The first three enforcement procedures are court actions ranging from removal of product from the market, to criminal prosecution with the possibility of a three year prison sentence. (2,13) Under the Criminal Fine Enforcement Act, monetary penalties for violations can reach a maximum of $500,000. The last enforcement procedure, recall, may be voluntary or at the request of the FDA.

Defect Action Levels

Defect action levels (DALs) are set by the FDA and represent the levels of foreign material that should not be exceeded if the product has been properly handled. (2) There are also FDA action levels for poisonous or deleterious substances such as aflatoxins and FDA tolerances for pesticides in food. DALs supply limitations taking into consideration natural and unavoidable defects that may be found in foods and commodities during their growth, harvest and storage. They contain about 200 action levels which cover approximately 75 food products.

In the event a product does not meet the guidelines or levels specified in the DALs, the FDA will take legal action to remove it from the market and classify it as adulterated. (14) All foods do not have DALs, however, and in these instances are evaluated on a case-by-case basis. Foods and commodities that are subject to and meet the requirements set forth in the DALs are still subject to legal action if the products are manufactured, packed or held under unsanitary conditions. Consequently, manufacturers must observe good manufacturing practices.

MACROANALYTICAL PROCEDURES

Both microanalytical and macroanalytical procedures are employed to evaluate foods for extraneous matter. Macroanalytical procedures are used to determine the product's overall condition with respect to filth, decomposition and foreign matter using the unaided senses of sight, smell or taste. (14) Many of these defects originate in the field, whereas others develop during improper storage. Through proper testing and investigation, the source and location can be determined.

The FDA Technical Bulletin Number 5, Macroanalytical Procedures Manual, is an excellent resource for evaluating products and conducting procedures in this area. The methods contained in this manual are part of the FDA's regulatory program which protects the health and safety of the public with respects to foods and commodities. (14) Beverages, cereals, nuts, grains, spices, chocolates, dairy products, vegetables and fruits along with many other foods and commodities are subject to examination by macroanalytical methods. Adulterations in these products are a violation.

Large amounts of product can be examined relatively quickly and inexpensively using macroanalytical testing. However, smaller or hidden defects may require microanalytical pro-cedures to be run in addition to the macroanalytical analysis.

Light Filth Procedures

The success of extracting insect and rodent filth from food products is largely due to the filth's lipophilic nature. Whereas, plant and animal products, when treated with certain reagents, tend to be hydrophilic. (4) In addition, most reagents used for extraction will separate out the foods and not affect the insoluble filth. Products analyzed for light filth are subjected to a pretreatment followed by an extraction procedure which usually involves the separation between the non-polar oil and the polar solvent (water) phase. The last step, recovery, requires removing the non-polar, top phase where the light filth is contained. This phase is then filtered onto ruled filter paper for microscopic observations.

There are other steps in pretreatment such as defatting, cooling, sieving and oil stirring that are used to help in the recovery of filth from food products. (4) For example, defatting is necessary because plant material may have lipophilic properties. This may interfere with recovery of the filth due to excessive plant material not settling out. This plant material is transferred over with the oil phase in recovery, making it difficult to distinguish and examine the light filth on the filter paper.

To perform these analyses, certain tools or equipment are required. Examples of these are sieves (metal with various mesh sizes), microscopes (stereoscopic and compound), Hirsch funnel, ruled filter paper, hot plate with magnetic stirrer, Wildman trap flask, percolator funnels, vacuum flask, vacuum pump, Soxhlet extractor, steam source, hood and petri plates. (6)

Courses on extraneous matter have been held in federal laboratories for many years. This discipline, however, is not taught in colleges and universities. There are various training courses offered around the country to aid technicians in understanding and mastering this field of study. There are also journals, publications, FDA technical bulletins, and method books such as the AOAC Manual to help further one's knowledge.

Hair Identification

Hairs find entry into food products by several avenues including fecal contamination from animal sources, clothing of animal origin worn by processing personnel, human sources, and domestic animals. (2) Identification of these hairs helps to locate and identify the source of contamination. For example, many animals groom their coats by licking. The hair is swallowed and survives digestion. (2) Rats and mice may drop pellets of excrement around food storage areas which, in turn, may contaminate the product. The identification of mice or rat hairs in products are indicators of unsanitary processing environments. However, the number and size of hairs along with other animal hair may better indicate poor handling.

The identification of hairs is an involved science. The specimen is prepared through a series of steps which expel the internal air trapped within the hair. This air, if not removed, may obscure cellular detail required in proper

identification. One of the simplest and least destructive procedures is to boil the hair in water. (4) Temporary mounts for microscopic observations can be made in water or other liquids such as mineral oil or glycerin. (2) Accurate observations and attention to detail, along with a reference collection, are essential for proper identification.

In general, hairs are identified with respect to structure, pigment and type. The structures of the hairs observed when examined microscopically include, but are not limited to, the cuticle, cortex, and medulla. (2) In addition to structure, the hair type may be helpful. These include sensory, spines, bristles, guard and fur hairs. (2,4)

STORED PRODUCT PESTS - "INSECTS"

Although stored product pests also include birds and mammals, this section will focus on insects. Much of the world's food supply is lost to pests both before and after harvest. Pre-harvest pests at losses of 37% are estimated in the United States of which 13% is directly attributed to insects. Post-harvest losses are less, but still significant, at an estimated nine percent. (5)

Many stored product insects are scavengers that eat almost anything. An insect's diet ranges from vegetable matter such as seeds, pollen, roots and stems, to animal matter including feces, feathers, skin, eggs, and pupae. (5) There are many factors that influence not only the insects' feeding habits, but also reproduction and growth. Some of these conditions include temperature, humidity, light, competing organisms, and product specificity.(4) While some stored product pests, such as rats, need water to drink, most insects require only the water they receive from the products they consume.(4)

It is helpful to understand where the majority of these stored product pests fit in relationship to classification and taxonomy. The animal kingdom is made up of a number of major divisions, or phyla, with the phylum Arthropoda having the largest number of species. The phylum Arthropoda is then divided into a number of groups called Classes, with the Class Insecta containing all the insects. The classes are then divided into a number of orders. (9) Of the 30 orders belonging to the Class Insecta, several have been recorded to be associated with stored food products. (10)

Three of these orders include domestic insects that occur in foods produced in bakeries, restaurants, kitchens and homes.

The wingless silverfish, cockroach, and cricket are found in these orders. Of the remaining orders, Hemiptera, Diptera, Hymenoptera, Lepidoptera and Coleoptera, the most important two are Lepidoptera (moths) and Coleoptera (beetles). (10) The orders are then divided into families. (8) Table 1 is a partial list of well acknowledged beetles which commonly infest stored products.

Among these beetles is one of the world's most serious pests, the Khapra beetle (*Trogoderma granarium*). (5,9,10) Adult Khapra beetles are short lived and do not normally feed. (5,10) It was once established in California, Arizona and New Mexico, but apparently has been eradicated from these states. (5) However, its potential reintroduction into the United States through imported foods remains a concern.

Table 1. Recognized stored product pests (beetles)

Family	Scientific Name	Common Name	Examples of Products
Dermestidae	*Attagenus unicolor*	Black carpet beetle	Cereal products
Dermestidae	*Dermestes lardarius*	Larder beetle	Bone and fish meal, bacon ham, sausage, cheese, potatoes
Dermestidae	*Trogoderma granarium*	Khapra beetle	Whole grain and cereal products, pinto and lima beans, dried fruit
Dermestidae	*Trogoderma variabile*	Warehouse beetle	Animal feeds, processed grains, barley, wheat, pollen oatmeal, wheatgerm
Nitidulidae	*Carpophilus hemipterus*	Dried fruit beetle	Ripe and decomposing fruits, corn, wheat, oats, rice, beans
Tenebrionidae	*Cynaeus angustus*	Larger black beetle	Corn, barley, wheat and oats
Tenebrionidae	*Gnatocerus cornutus*	Broadhorned flour beetle	Flour commeal, dog biscuits, corn, pancake flour, yeast cakes, bran and farina
Tenebrionidae	*Gnatocerus maxillosus*	Slenderhorned flour beetle	Wheat, cereal grains, pumpkins, tamarind seeds, nutmeg and peanuts
Tenebrionidae	*Latheticus oryzae*	Loanheaded flour beetle	Wheat, rice, corn, barley, rye, flour

Destruction of stored products by beetles often occurs during the larval stages. After obtaining full growth, larvae may enter a diapause stage. The duration of this stage is influenced by food, temperature, population density, and genetic makeup of the population. (5) Diapause enables the larvae to survive unfavorable conditions. (2,10)

Within the order of Lepidoptera (moths), there are four families of importance: Pyralidae, Tineidae, Oecophoridae and Gelechiidae. These families collectively contain approximately seventy species of moths that have been associated with stored product infestation. Of these 70, about seven species are considered widely distributed stored product pests. (5,10) Table 2 is a list of the most widely distributed moths associated with stored product infestation.

Table 2. Recognized stored product pests (moths)

Family	Scientific Name	Common Name	Examples of Products Infested
Gelechiidae	Sitotrogra cerealella	Angoumois grain moth	Wheat, corn
Pyralidae	Corcyra cephalonica	Rice moth	Rice, cocoa, peanuts, oilseed products
Pyralidae	Ephestia cautella	Almond moth	Dried fruits and vegetables, nuts, oilseeds, cereals, cocoa
Pyralidae	Ephestia elutella	Tobacco moth	Cereals, dried fruits and vegetables, tobacco, cocoa
Pyralidae	Ephestia figulilella	Raisin moth	Ripe and decomposing fruits, corn, wheat, oats, rice, beans
Pyralidae	Ephestia Kuehniella	Mediterranean flour moth	Cereal products, i.e. flour
Pyralidae	Plodia interpunctella	Indian meal moth	Dried fruits, nuts, cereals, oilseed products
Gelechiidae	Sitotroga cerealella	Angoumois grain moth	Wheat, corn

Moths are second to beetles with regards to importance and the number of species associated with food infestation. The larval stages of these moths are responsible for most of the product damage because of the chewing mouth parts of the larvae which are absent in the adult. (2) Webbing is also important and is a fibrous material secreted by certain larval insects during feeding.

INSECT FRAGMENTS AND IDENTIFICATION

The most likely indication that insect infestation has occurred in ground foods prior to grounding is the presence of insect parts such as antenna, wings, legs, and mouthparts, as well as other parts of the head, thorax and abdomen. Each has unique characteristics and subdivisions. Many times, the only recognizable insect parts may be the fragments of the cuticle, the outer-most layer of the exoskeleton. (2,11) The cuticle itself is made up of three layers, the epicuticle, the exocuticle and the endocuticle. (2) It may be identified as of insect origin under microscopic observations if it has at least one of the following: (4)

1. Recognizable shape;
2. Articulation or joints;
3. Hair-like setae or setal pits;
4. Setal pits;
5. Surface sculpturing and;
6. Sutures

Such characteristcs as lustre, lack of cellularity, thinness and flexibility may also help to determine if the fragment is of insect origin. (2,4) However these are not diagnostic tools used in the identification process.

Many insects can be identified from their fragments. Antennae, mandibles, cervical shields and legs are examples of those fragments most frequently used for insect identification purposes. Experience of the analyst, known fragment specimens, and identification keys are very helpful for accurate identifications. The presence of the fragment in foods and identifying the insect from which the fragment came, gives the investigator an understanding as to the source of the infestation. This may also lead to developing a history of the unsanitary conditions the product may have been exposed to during its harvest, manufacture or storage.

REFERENCES

1. Bernton, H.S., and H. Brown. 1969. Insect allergy: The allergenic potentials of the cockroach. South. Med. J. 62:1207-1210.
2. Gorham, J.R. (ed.). 1985. Principles of food analysis for filth, decomposition and foreign matter: FDA Technical Bulletin No. 1. Association of Official Analytical Chemists, Inc., Arlington, VA.
3. Gorham, J.R. 1989. Foodborne filth and human disease. J. Food Prot. 52: 674-677.
4. Gorham, J.R. (ed.). 1977. Training manual for analytical entomology in the food industry: FDA Technical Bulletin No. 2. Association of Official Analytical Chemists, Washington, D.C.
5. Gorham, J.R. (ed.) 1991. Ecology and management of food-industry pests. Association of Official Analytical Chemists, Arlington, VA.
6. Hebrich, K. (ed.). 1990. Official methods of Analysis of the Association of Official Analytical Chemists, Inc. Arlington, VA.
7. Johnson, K.M. 1965.Epidemiology of machupo virus Infection.III. Significance of virological observations in man and animals. Am. J. Trap. Med. Hyg. 14:816-818.
8. Klowden, M.J., and B. Greenberg. 1977. Effects of antibiotics on the survival of *Salmonella* in the Amencan cockroach. J. Hyg. 79: 339-345.
9. Kurty, O.L., and K.L. Harris. Micro-Analytical Entomology for Food Sanitation Control. Association of Official Analytical Chemists, Washington, D.C.
10. Munro, J.W. 1966. Pests of stored products. Hutchinson and Company Publishers, London.
11. Pfadt, R.E. (ed.). 1971. Fundamentals of applied entomology, 2nd ed. MacMillan Publishing Co., Inc. New York.
12. Russo, J.R. (ed.). 1991. What went wrong with food products in 1990. Food Industry Report. Sunvale Publishing Co., Inc. South Elgin, IL. Vol. 3, No. 11:1-6.
13. Food and Drug Administration, 1976. Federal Food, Drug and Cosmetic Act, Public Health Service, U.S. Department of Health, Education, and Welfare. Washington, D. C.
14. Anonymous. 1984. FDA Technical Bulletin Number 5: Macroanalytical Procedures Manual. Association of Official Analytical Chemists. Arlington, VA.

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Foodborne Illness (Part 3)

Clostridium perfringens Gastroenteritis

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Clostridium perfringens is a sporeforming, anaerobic (oxygen-free growth conditions), rod-shaped bacterium that can be found in soil, dust, and the intestinal tract of animals and humans; meats are likely to become contaminated during slaughter and poultry during continuous line processing. The organism can grow on food surfaces and cooking usually kills the vegetative cells; heat-stable spores survive and may grow if temperature abuse of a food occurs (long, slow cooling and non-refrigerated storage encourage reproduction). The organism will grow between 50 F (10 C) and 125 F (52 C); at the optimum growth temperature, 110 F (43.3 C) to 117 F (47 C), and in a rich media it will reproduce in about 10 minutes, making it the fastest growing bacterium known. These bacteria have exacting nutritional requirements, requiring 14 amino acids and 5 vitamins; they produce many enzymes and can scavenge many nutrients from various sources.

FOODS INVOLVED. Spores of *C. perfringens* have been found in/on many raw foods, but meats, especially roast beef and its gravy, seem to be a prime source; rolled roasts, especially over 4-5 pounds, can be a problem since they could be contaminated on the inside and are likely to be cooked only to the rare/medium rare stage (about 140-145 F); poultry, usually turkey, dressing, or gravy (chicken less frequently), can be a problem; other foods acting as vehicles include casseroles containing meat/poultry, stews, Mexican foods (including tacos, beans, and enchiladas), sauces, salads, and pork; the bacteria can be a problem in foods where heat penetration is slow/inadequate. Generally, contaminated foods do not seem spoiled.

DISEASE. The incubation period ranges from 6 - 24 hours (usually 10 - 12 hours) after consuming food. The illness is caused by ingestion of a large number of vegetative cells, 500,000 or more per gram of food. In the intestine the vegetative cells sporulate and release an *enterotoxin* which is responsible for symptoms. Sudden acute inflammation of the abdomen occurs, causing severe abdominal pain and profuse diarrhea; nausea is less common, and vomiting and fever are usually absent. The illness is generally considered mild, but fatalities have occurred in the very young and elderly. Symptoms are generally self-limited and usually subside within 12 - 24 hours.

CONDITIONS for an OUTBREAK:

1. Food contaminated with *C. perfringens*;
2. Food cooked and oxygen driven off, resulting in the anaerobic conditions needed for bacterial growth; food usually cooked the previous day or several hours in advance of serving, giving the bacteria a chance to reproduce;
3. Food held at an inadequate temperature, neither hot enough nor cold enough, giving bacteria a favorable environment for appreciable growth;
4. Foods (leftovers) consumed without reheating to 165 F (74 C) so that a large number of bacteria are ingested (over 1,000,000 per gram).

CONTROL MEASURES. Since it is almost impossible to prevent some contamination of raw foods with *C. perfringens*, prevention of its growth is essential to prevent illness. Therefore, foods need to be kept out of the "danger zone" for bacterial growth as much as possible. Effective control by food workers can be obtained by the following measures:

- Use good time-temperature control methods in food preparation: **COLD HOLDING** - rapid, even chilling of cooked meats, meat dishes, and other foods in shallow pans (small portions) to 45 F (7.2 C) or below (pre-cooling procedures outside of refrigerator may be desirable); **HOT HOLDING** - foods cooked to at least 140 F (60 C) [leftovers or previously cooked foods must be reheated quickly to 165 F (74 C)] and held at 140 F (60 C) or above during holding/serving periods. Are thermostats accurate on cold and hot holding equipment? Use a metal stem thermometer to check temperatures.
- Avoid the practice of leaving foods at room temperature and thawing frozen foods at room temperature.
- Prevent contamination (cross-contamination) of cooked foods with the bacteria by using separate food-contact

surfaces for preparing raw and cooked food items; if this is not feasible, work surfaces must be thoroughly cleaned and sanitized after being used for raw products.

- Maintain food preparation areas so that they are free of soil and dust; meat slicers, meat-cutting utensils, food-contact surfaces, and other equipment need to be properly cleaned and sanitized after use.
- Use good personal hygiene methods; hands must be thoroughly washed (using friction) frequently when handling food products, especially after handling raw products and before handling cooked products.

IN SUMMARY: for the practical control of *C. perfringens* in foods use food protection and sanitation methods that will inhibit its growth.

Part four of the Foodborne Illness Series will be published in the February, 1994 issue of Dairy, Food and Environmental Sanitation.

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Evaluation of a Personnel Change Facility

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Summary

Personnel change facilities are designed to reduce the risk of microbiological contamination of a food processing plant, by minimizing the entry of undesirable microorganisms into the manufacturing environment. A change facility at a dairy plant was monitored to assess its success in achieving this objective. The street clothing, barrier and factory clothing (hygiene) areas of the facility were evaluated by swabbing over an area of floor and determining the number of organisms recovered on Standard Methods Agar. The facility was monitored at intervals during the day for three consecutive days and the procedure was repeated on six occasions during a dairying season (September to May).

Immediately after cleaning, the street clothing and hygiene area floors and the barriers had a common level of approximately 100 cfu/100 cm^2. The hygiene area maintained this low count throughout the working day. In the street clothing area the count had risen to ten times this level (1000 cfu/100 cm^2) after 5 h of use and to 3000-9000 cfu/100 cm^2 after 24 h of use. The concentration of microorganisms on the barriers remained at a low level and in fact slightly lower than the concentrations measured on the floor of the hygiene area. Evaluation of an area under an ultraviolet light showed that, as set up in this facility, the light did not prevent the increase in microorganisms on an area of floor in the street clothing area of the change facility.

To maintain satisfactory operation of the change facility, carefully planned cleaning procedures are required. Overall the results showed that a clothing exchange facility reduces the transfer of microorganisms from the general environment to hygiene areas of the food factory.

Introduction

Increasing awareness of the problems arising from the microbial contamination of dairy plants has led to greater attention being paid to environmental sources of undesirable microorganisms. Over the past decade specialized change facilities have been built at a number of New Zealand dairy manufacturing plants. The aim of these facilities has been to minimize the entry of microorganisms on dirt particles associated with personnel entering the plant. To achieve this objective a complete separation has been instituted between street and factory clothing areas. Before the introduction of such facilities staff changed into their factory clothing in change rooms that did not enforce any such separation. The design of change facilities has evolved over a period of time as an appreciation of the important design features has developed intuitively.

The work reported in this paper was undertaken to demonstrate whether an apparently well-designed and well-managed change facility did in fact result in a reduction in the amount of microbial contamination carried on clothing and footwear into a manufacturing environment. Prior to this exercise, no such evaluation in a New Zealand plant had been publicized, nor were publications found in the literature dealing with the experimental testing of food factory change facilities.

There have been a few studies in situations in which microbiological control is sought. Walter & Kundsin (11) examined the effectiveness of floor cleaning procedures in a hospital environment and identified activities that resulted in contamination of the air in a room. Brayment et al. (1) compared two different washing procedures for decontaminating gumboots in an animal disease facility and concluded that neither of the procedures was completely effective in preventing contamination across the demarcation line. Nagai et al. (9) studied the microbiological count on floors, footwear and slippers in a change facility associated with a hospital operating theatre.

There have been a number of studies of clean room environments; for a review see Frieben (5). Although these studies are illuminating, particularly as to the sources of microbial contamination, they are not particularly relevant to a food processing factory.

In this study, it was deemed impractical to test clothing or staff. Floors are recognized to be reservoirs of microorganisms and have been identified as important in the spread of disease (11). The footwear contacting these floors comes under the same suspicion as the floors themselves. Footwear is of special concern as it may serve as a vehicle for the transfer of microorganisms from place to place (1). It was therefore decided to monitor the microbiological state of the floor of the change facility as an indicator of the transfer of microorganisms from the outside environment to the processing rooms of the factory.

Operation of Facility

The layout of the change facility is shown in Figure 1. The facility was divided into two zones, with the "hygiene

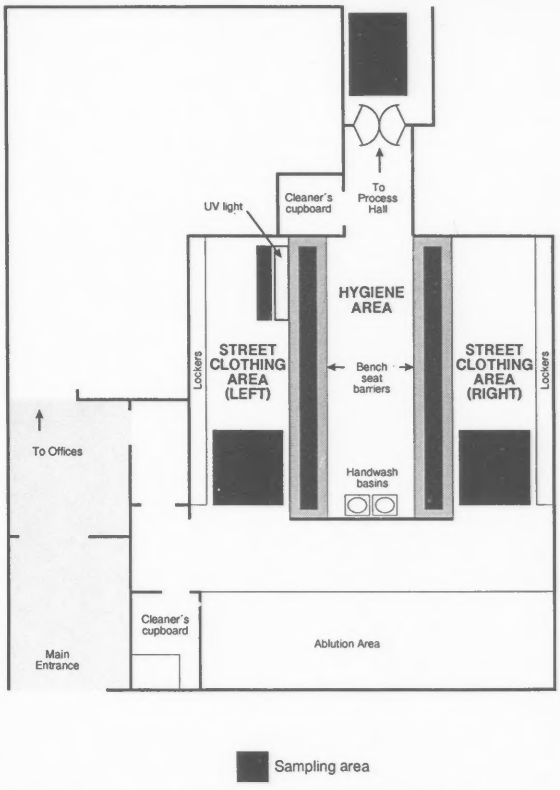

Figure 1. Layout of the change facility and location of sampling sites.

zone" separated from the "street clothing zone" by bench seat barriers. Lockers under the bench seats were used to store street footwear (on the street clothing side) and factory footwear (on the hygiene side). Factory overalls were stowed in overhead lockers. To enter the factory it was necessary for a person to remove street footwear, which was placed under the bench seat. Outer clothes were removed, as desired, and stored in a locker. The person then sat on the barrier and swung their legs across. Overalls were retrieved from an overhead locker, donned and footwear was taken from under the bench and fitted. Personnel then washed their hands before leaving the room and entering the corridor to the factory.

In a section of the street clothing area an ultra-violet (UV) light was installed with the objective of sterilizing the floor. This section of the facility was designated for use by maintenance staff. The UV light installation consisted of two tubes (Model GPH 900N, Contamination Control Ltd, Mount Wellington, Auckland) with a nominal output of 14 W at a wavelength of 254 nm. The tubes were mounted horizontally, end-to-end, approximately 100 mm off the floor with the light directed out and slightly down across the floor. The continued effectiveness of the UV lights was shown by the absence of counts on inoculated plates placed on the floor under the light source.

The change facility served a milk powder plant. The processing plant operators worked two 12 h shifts starting at 8 am and 8 pm respectively, with two operators per shift. The change facility was cleaned mid-morning at approximately 10 am after the morning shift change. The powder packing gang, which consisted of six operators, worked a single shift, starting at 6 am and finishing mid-afternoon. The total number of staff, including processing staff, tradespeople, management and laboratory technicians, using the facility was approximately 20 per day.

Methods

Structure of Experiment

The facility was tested at six times during the day (Table 1), the sampling being scheduled according to the times of peak movement of staff and the cleaning of the facility.

It was recognized that inherently there would be variation in the results arising from different personnel using the facility and the effects of environmental variables on the change facility. It was therefore decided to test the facility on three consecutive days. This three day block of measurements was undertaken at six weekly intervals, in September, October (peak milk flow), December, January, March and May, following the course of the New Zealand dairying season from spring through to autumn.

Table 1: Daily time schedule for swabbing at sample sites.

Sample Number	Approximate time of day	Plant Operation
1	10 *a.m.*	Sampled immediately after cleaning
2	3 *p.m.*	Sampled immediately before packing shift finished
3	5 *p.m.*	Sampled immediately after packing shift finished
4	6 *a.m.*	Sampled immediately before packing shift arrived
5	7 *a.m.*	Sampled immediately after packing shift arrived
6	9 *a.m.*	Sampled immediately before cleaning

Sampling Sites

The sampling sites were chosen to be in the areas where human traffic was heaviest. The sampling sites (shown in Figure 1 as blocks in black) were: on the floor immediately inside the entrance to the street clothing areas; on the floor adjacent to the UV light; on the bench seat barriers; on the

floor in the corridor immediately after the change facility. Initially the sampling site in the hygiene area was under the swing doors. However, this was found to be inconvenient and the sampling site was moved further down the corridor.

As it was not feasible to swab a complete floor area, the portion of floor selected for testing was laid out in a grid. The street clothing sample area was arranged in two columns of six rectangles (dimensions 0.60 m × 0.225 m) giving an area of 0.135 m^2 for swabbing. The floor adjacent to the UV light was laid out with four 0.135 m^2 areas (0.3 m × 0.45 m) and the barrier was laid out with a grid of twelve 0.135 m^2 areas (0.35 m × 0.386 m) arranged in a single column along the length of the barrier. On any occasion, two areas were swabbed to give a combined sampling area of 0.27 m^2. The grid in the hygiene area consisted of six 0.27 m^2 areas (0.30 m × 0.90 m). Only one sampling area was selected each occasion the hygiene area was swabbed.

Swabbing

The microbiological status of surfaces within the change facility were evaluated using an adaption of a swabbing technique. The sampling was performed with a "sweeper" consisting of a specially developed holder made of stainless steel with plate dimensions of 70 mm × 200 mm onto which three gauze pads were clamped.

Prior to each use the sweeper was sterilized by dipping in alcohol and burning off the excess. Three sterile gauze pads (75 mm × 75 mm 12 ply; Curity gauze pads, USP type VII gauze, supplied by Medic DDS Ltd, Lower Hutt) which had been soaked in sterile thiosulphate diluent (8) were then placed on the swab holder. Once assembled, the sweeper was wiped over a sample area, back and forth in one direction and then back and forth over the same surface in the perpendicular direction. When the sampling was completed, the gauze was removed with tweezers and returned to the specimen container.

Specimen containers were packed in a polystyrene insulated container, along with ice pads, and transported by overnight courier to the Institute's microbiology laboratory located 215 km away from the plant. The samples were either plated out on the day of arrival at the Institute or stored on ice overnight and plated out the following day.

Microbiological Analysis

The swabs from each specimen container were transferred to a "stomacher" bag, further sterile thiosulphate diluent added to make the volume up to 100 ml and the contents blended in a peristaltic blender (Colworth stomacher, Model No. BA6021, A. J. Seward, London) for 5 minutes. Following agitation, three aliquots each of 1 ml were removed. As is, 10 fold and 100 fold dilutions were plated out with Standard Methods Agar and incubated at 30°C for 72 h (8). After incubation colonies were counted and the number of colony forming units on each area swabbed were calculated (expressed as colony forming units per one hundred square cm [cfu/100 cm^2]).

Statistical Analysis

Arising from the range of the count data, the following treatments were applied. Logarithms of the counts were taken to normalize the data (2). The data was plotted, the graphs examined and any suspected outlier points were examined using a data rejection criterion (3) of (extreme value - overall mean)/overall standard deviation. After the statistical analyses, the back transformed mean values were then unbiased estimates of median counts (4).

The experimental design itself, with no randomization, did not determine a residual error term explicitly. Since no pattern could be seen in differences from day to day and no practical reason could be found for there being any, the variability from day-to-day was used to determine a base level of variability. The residual error term was thus taken as the combined interactions of all the factors with days.

The program Splus 3.1 (10) running on a Sun Sparc workstation was used for the statistical analysis. The method of analysis was an analysis of variance (Anova) with the four variables Sampling Position (P), Time of Day (T), Replicate Day (Day) and Month in Season (S) or Block. Significance levels were represented as P = 5%, P = 1% or P = 0.1%.

Time trends were of considerable interest in this experimental work and the changes in count with time were therefore examined in more detail. The 'Time' factor was split into three separate variables. T_m was a linear trend in log counts over the time interval 3 pm to 9 am. T_0 measured the difference of the log count at 10 am from the extrapolation of this linear trend line. Any remaining effect of time, after removal of the initial and linear terms, was accommodated by another independent time variable (T_r). Since the sampling times were associated with specific events the sample times were, for the purposes of this statistical analysis, spaced out regularly along the x-axis.

Results

The results of the analysis of variance are given in Table 2. The swab count was significantly (P=0.1%) affected by

Table 2. Analysis of variance for the significance of the independent variables and selected interaction terms.

Source		DF	Sums of Squares	Mean Square	F-ratio	Probability
Variable	Symbol					
Main Effects						
	Constant	1	2117.35	2117.35	3287.4	<0.0001
Day	-	2	7.63619	3.81809	5.9281	0.0029
Season	S	5	18.3400	3.66800	5.6950	≤0.0001
Position	P	5	517.470	103.494	160.69	≤0.0001
Time, Initial	T_o	1	45.1699	45.1699	70.132	≤0.0001
Time, Linear	T_m	1	16.3601	16.3601	25.401	≤0.0001
Time, Residual	T_r	3	0.137275	0.045758	0.07105	0.9754
Interactions						
	S×P	25	74.4831	2.97932	4.6258	≤0.0001
	P×T_o	5	88.2586	17.6517	27.406	≤0.0001
	P×T_m	5	7.89324	1.57865	2.4510	0.0331
	P×T_r	15	6.00614	0.400409	0.62168	0.8577
	S×T_o	5	18.3598	3.67197	5.7012	≤0.0001
	S×T_m	5	5.18393	1.03679	1.6097	0.1562
	S×T_r	15	12.0771	0.805141	1.2501	0.2312
	S×P×T_o	25	75.0790	3.00316	4.6628	≤0.0001
	S×P×T_m	25	13.4728	0.538912	0.83673	0.6944
	S×P×T_r	75	42.4765	0.566353	0.87933	0.7493
Error		420	270.510	0.644071		
Total		637	1218.91			

DF = Degrees of Freedom

sampling position in the change facility, time of day, replicate day and time in the season. The position of sampling was by far the most important variable, explaining over 40% of the regression sum of squares; each sample site was significantly different. This included between sites with a similar function, such as left and right barriers, and between left and right street clothing areas. Figure 2 shows the relative magnitudes of the effects on the swab count of all the experimental variables.

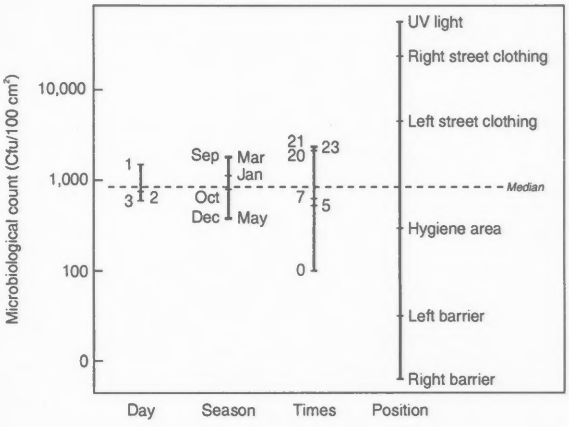

Figure 2. Relative magnitude of the variables in the change facility study. Each bar represents all the observations for that particular level of the independent variable.

Initial Counts

The initial counts immediately after cleaning of the facility were generally low; in the hygiene and street clothing areas results in the range 2 - 2500 cfu/100 cm² were obtained. In the UV area a greater range of 2 - 14 500 cfu/100 cm² was observed. Initial counts on the barriers were generally lower and in the range 2 to 900 cfu/100 cm². However some anomalously high initial counts (up to 107 500 cfu/100 cm²) were observed on the barriers in October and January. These high counts were significantly different from the other results (P=0.1% for PxToxS interaction) and were traced to contamination from the cloths used in cleaning the benches.

Effect of Time of Day

The results of most interest in this study were the trends during the course of a day. These results are displayed in Figure 3. In the street clothing zones the swab counts started at low concentrations (100 cfu/100 cm²) and rose to counts approximately fifty times greater (street clothing zone, left 3200 cfu/100 cm², right 8850 cfu/100 cm²). The counts for the swabs taken from the floor adjacent to the UV light increased in a similar manner. In contrast the counts in the hygiene area did not increase, whereas the counts on the barriers showed a slight decrease.

Variation with Time of Season

Table 3 shows the last count for each day for each sampling site, immediately prior to cleaning of the facility.

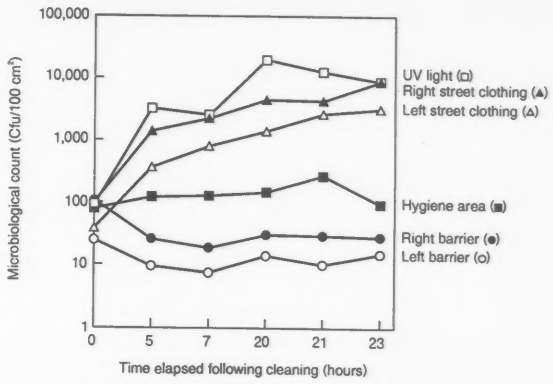

Figure 3. Microbiological counts (cfu/100 cm²) for the different areas of the change facility during the course of a day. Each data point is the median of the results for the 18 days the change facility was monitored. The points on the sampling time axis are equi-distant as they relate to specific events in the operation of the change facility. The sampling times of 0, 5, 7, 20, 21 and 23 hours after cleaning relate to times of day - 10 am, 3 pm, 5 pm, 6 am, 7 am, and 9 am respectively.

Table 3. Swab results for the areas sampled at 9 am, just prior to cleaning. Data is for individual days. The median counts for each block and the median count for the season is also given.

LEFT STREET CLOTHING

	Count (cfu/100 cm²)			
Day	1	2	3	Median
Block 1	2259	1152	22222	3867
2	407	2074	9630	2011
3	5185	4074	85	1216
4	70370	48148	2037	19040
5	778	9259	25185	5661
6	3519	1963	148	1008
Median for Season				3177

RIGHT STREET CLOTHING

	Count (cfu/100 cm²)			
Day	1	2	3	Median
Block 1	66667	40741	40741	48009
2	2333	12222	585	2550
3	21111	5185	2037	6064
4	34074	8148	1074	6681
5	9630	27037	30370	19922
6	667	23704	7407	4892
Median for Season				8862

INTERNAL HYGIENE

	Count (cfu/100 cm²)			
Day	1	2	3	Median
Block 1	481	3074	3593	1745
2	59	348	359	195
3	4	4	2	3
4	11	22	11	14
5	44	156	644	165
6	93	1593	159	286
Median for Season				93

UV LIGHT

	Count (cfu/100 cm²)			
Day	1	2	3	Median
Block 1	10741	18889	814815	54882
2	3704	37037	3704	7979
3	44444	18519	255556	59471
4	16667	740741	5556	40934
5	2037	1000	737	1145
6	3667	93	148	369
Median for Season				8756

LEFT BARRIER

	Count (cfu/100 cm²)			
Day	1	2	3	Median
Block 1	1185	2	4	20
2	2	2	2	2
3	19	37	74	37
4	59	2	19	13
5	7	19	7	10
6	19	2741	4	57

RIGHT BARRIER

	Count (cfu/100 cm²)			
Day	1	2	3	Median
Block 1	2	870	2	14
2	11	2	15	7
3	148	333	89	164
4	474	111	30	116
5	37	7	7	13
6	2	81	37	18

These results were examined to determine if there were any effects due to the time of season (block). The street clothing zones did not reveal any such effect. The hygiene area showed higher values at the beginning and end of the season.

In contrast the right barrier, but not the left barrier, showed higher values mid-season. The UV light zone showed noticeably lower values at the end of the season.

The consistency of the daily figures within some of the blocks were such as to suggest that significantly different effects were being observed on some occasions. However, these effects, despite thorough investigation, could not be correlated with any observed practice in the running of the plant nor correlated with different weather conditions.

Two very large counts were observed in the hygiene sampling area. The median count for the first block (1745 cfu/100 cm^2) was significantly higher than the median for the season (93 cfu/100 cm^2). This could have been associated with the change of the sampling site from the location at the swing doors to further along the corridor. The hygiene area was also the one area in which a suspected outlier count (118 500 cfu/100 cm^2; 7 am, Day 3, Block 1, September) was detected. The value of the outlier test (against 17 other data points for the hygiene area at 7 am) was not greater than the critical value at a confidence level of 98% and therefore the suspected outlier was not removed.

Discussion

Effectiveness of Change Facilities

The most important result of the study was the demonstration that the change facility was capable of achieving its intended purpose. This was shown by the contrast between the rise during the day of the count in the street clothing area compared with the lack of change in count in the hygiene area. There were some differences in the results when the data were inspected at the day and month level. This variability was to be expected given the variation in soil load personnel could be carrying into the facility, the variable behavior that could be expected of personnel within the facility and the extended time over which the facility was monitored. The results were, however, quite clear when all the data were averaged across the dairying season. The areas assessed were significantly different from each other and the general trends during the day were clearly demonstrated.

The swabbing method adopted may not have been a completely quantitative procedure. The recovery by swabs from surfaces has been estimated at 50-90% (6) and hence the count figures, expressed on a surface area basis, may be underestimated. This is of little concern, as in this study it was the relative magnitude of the counts on the different surfaces that was of interest.

Two vectors could potentially transfer contamination to the hygiene area of the change facility. Socks worn by personnel did contact both surfaces, with a consequent risk of transferring contamination from the street clothing zone to the hygiene zone. There was also the possibility of microorganisms being carried to the hygiene side of the facility from the processing areas of the factory. These sources of microorganisms would not seem to be great as the count in the hygiene area did not normally increase from the base level during the working day.

Some of the difference between the street clothing and the hygiene area counts may have been due to the different activities undertaken in the different areas since there is evidence (5) that the more active a person the more bacteria are shed. Also, as has already been mentioned, the higher values for the first block of observations in the hygiene area may have been associated with the movement through the swing doors. Despite these differences in experimental conditions, it is clear that the change facility confines the physical activity associated with changing from street to factory clothing to designated areas of floor. This allocation of activity, as well as the restriction on transferring dirt on shoes and clothing from one area to the other, will greatly reduce the transfer of contaminants into the working area of the food factory.

Cleaning

The counts on the street clothing side of the facility were reduced back to a base level by the daily cleaning of the floor. Although the hygiene side was protected from the increase in counts on the street clothing side, regular cleaning of the facility is obviously important.

A similar phenomenon to that observed in this work, ie. an increase of count with time and a return to base levels on disinfection, was found by Nagai et al. (9). They investigated the microbiological counts on floors, and on the soles of shoes and slippers, in a change facility for a hospital operating theatre. In this case, with presumably a cleaner environment, the disinfection was on a weekly cycle.

Some steps that will help to ensure the effectiveness of the cleaning are:

- dry sweeping or vacuuming followed by wet mopping;
- use of a sanitizer in wet mopping;
- dedicated cleaning equipment for the hygiene and the street clothing areas;
- a single use, disposable cloth for wiping the barriers;
- change occasionally, eg. at least twice a year, in the sanitizer to ensure that there is no build-up of resistance of bacteria to the sanitizer.

The cleaning operation should be scheduled to achieve minimum overall levels of contamination. Intuitively, the best time to clean is immediately after the build-up of the largest quantity of soil, which is likely to be after the movement of the largest number of people from the street clothing side to the hygiene side of the facility. Thus, if the peak use of the change facility is first thing in the morning, then cleaning should take place as soon as possible after the arrival of this group of people.

In this plant, the floor was dry within 5-10 min of wet mopping; however, during the time the floor is wet the traffic should be at a minimum, both to decrease the transfer of dirt and to decrease the risk of staff slipping on the wet floor. This consideration could also affect the scheduling of the cleaning operation.

Ultraviolet Light

The area of floor under the UV light gave the highest concentrations of microorganisms. This area was used mainly by maintenance personnel. It is possible that their footwear and clothing were more contaminated than normal street clothing. This would explain the large increases from base levels.

It was notable that the trend in counts was upward throughout the day, with evidence on only one month of a reduction in count with time, indicating that the floor was not being sterilized by the UV light. UV light is known to decrease viable organisms in the air and the UV light was shown in this experiment, by exposure of inoculated plates, to be effective in killing bacteria. Dust particles lying between the UV light and microorganisms can, however, serve to protection against their destruction (7). The microorganisms on the floor were probably carried by particles of dirt and thus, to a large extent, they would have been protected from the UV radiation from the light source. If this conclusion is correct, UV lights will generally be ineffective in a change facility situation.

It is possible that the counts could have been even higher had the UV light not been in place. Direct comparison of a UV-treated and an untreated floor side by side should be undertaken to establish conclusively any benefit of a UV light source in a change facility.

Human Factors

The change facility monitored in this work operated well. Staff had been trained in the procedures and understood the reasons for following the procedures.

A change facility can cause some inconvenience. Education of staff is required to ensure that the facility is used correctly on all occasions, particularly for visits to the toilet. In some cases, steps can be taken to reduce the inconvenience; for example, if an hourly sample has to be taken to the laboratory, a transfer hatch could be used.

It is important that managers adhere conscientiously to the procedures so that they set a good example to staff. In addition, visitors who may not be familiar with the procedure need to be guided courteously but carefully through the facility.

Conclusions

A change facility of the design tested in this experimental work, with a bench seat barrier, has been shown to be effective in reducing transfer of microorganisms into the manufacturing environment of a food factory.

The successful operation of a change facility is dependent on the diligence and cooperation of all the factory staff. This means good management-staff communication and effective education of staff, not only on the operation of the facility but also on the importance of microbiological control of a food processing plant. Another important factor is adequate cleaning with well defined procedures. In this work these factors were believed to be operating and the change facility was able to control the microbiological load on the hygiene side. The results obtained justify the effort that goes into the construction and maintenance of a change facility.

ACKNOWLEDGMENTS

The assistance of Steve Flint, Bruce Hill and the staff of the Starters & Microbiology Section and the helpful advice of Dave Sowry of the Engineering Services Section of the New Zealand Dairy Research Institute are acknowledged. The assistance of Greg Arnold of the Statistics Department of Massey University is also gratefully acknowledged. Thanks are due to the management and staff of the Inglewood site of the Moa-Nui Coop Dairy Company Ltd. (now amalgamated with Kiwi Coop Dairies Ltd) for their willing cooperation in making their change facility available for this project.

REFERENCES

1. Braymen, D. T., J. R. Songer, and J. F. Sullivan. 1974. Effectiveness of footwear decontamination methods for preventing the spread of infectious agents. Laboratory Animal Science 24:888-894.
2. Davies, O. L. (Ed) 1958. Statistical Methods in Research and Production. Oliver & Boyd, London. 30 p.
3. Davies, O. L. and P. L. Goldsmith. 1972. Statistical Methods in Research and Production (4th ed.) Oliver & Boyd, Edinburgh. 49-50 p.
4. Flewelling, J. W. and L. V. Pienaar. 1981. Multiplicative regression with lognormal errors. Forest Science 27:281-289.
5. Frieben, W. R. 1983. Control of the aseptic processing environment. American Journal of Hospital Pharmacy. 40:1928-1935.
6. Greene, V. W. and Herman, L. G. 1961. Problems associated with surface sampling techniques and apparatus in the institutional environment. Journal of Milk and Food Technology 24:262-265.
7. Hedrick, T. I. 1975. Engineering and science of aeromicrobiological contamination control in dairy plants. Chemistry and Industry, 18 October, 868-872 p.
8. Ministry of Agriculture & Fisheries. 1985. Manual DDM 3, Standard Laboratory Methods, Microbiology. Method 11.1 Swabs (December 1982); Method 41.1 Standard plate count (February 1984). Ministry of Agriculture & Fisheries, Wellington.
9. Nagai, I., M. Kadota, M. Takechi, R. Kumamoto, M. Ueoka, K. Matsuoka, and S. Jitsukawa. 1984. Studies on the mode of bacterial contamination of an operating theatre corridor floor. Journal of Hospital Infection. 5:50-55.
10. Statistical Sciences Inc. (1992) Splus 3.1, Statistical Sciences Inc, Seattle, Washington.
11. Walter, C. W., and R. B. Kundsin. 1960. The floor as a reservoir of hospital infections. Surgery Gynecology and Obstetrics. 111:412-422.

Updates . . .

Video Tapes Added to the IAMFES Audio Visual Lending Library

The following selections have been added to the IAMFES Audio Visual Lending Library. The Audio Visual Library is an IAMFES member-only benefit underwritten by the IAMFES Foundation Fund, supported by Sustaining Members. For more information on the Audio Visual Lending Library, contact Ms. Dee Buske at the IAMFES office (800) 369-6337 (U.S.), (800) 284-6337 (Canada), or (515) 276-3344.

Cold Hard Facts (from the National Frozen Food Association)

Food Safe - Food Smart: HACCP and Its Application to the Food Industry (from Alberta Agriculture - Food and Rural Development)

Ice: The Forgotten Food (from the Packaged Ice Association)

Mastitis Prevention and Control (from the National Mastitis Council)

Principles of Warehouse Sanitation (from the American Institute of Baking)

SERVSAFE, second edition (from the Educational Foundation of the National Restaurant Association)

Ten Points to Dairy Quality (from Dairy Quality Assurance)

For a complete listing of IAMFES Audio Visual Library selections, see pages 40-44 of this issue.

Book Review

Food Safety. Julie Miller Jones, Eagan Press; 3340 Pilot Knob Road, St. Paul, MN 55121. 1992. 453 pp. $69 in U.S.; $83 elsewhere.

Recent publicity about foodborne pathogens, toxins, pesticide residues and parasites has caused much consumer concern regarding the safety of our food supply. Also the role of the regulators and the food industry in food protection is under close scrutiny. Conflicting information about the safety and quality of food abound in the popular media leading to consumer confusion and frustration. Julie Jones's book addresses the complex issue of food safety in a no-nonsense and matter-of-fact manner. It is an excellent esource for food scientists and technologists who deal with food safety issues.

In 15 chapters, the book discusses key food safety issues via risk and benefits, naturally occurring toxicants, food additives, foodborne pathogens and toxins as well as providing information on food irradiation, radio nucleates and incidental contamination. This information should be helpful for food industry professionals as well as consumers in understanding contemporary issues in food safety and quality. The second printing of the book contains information and terminology dealing with new food labels mandated by the Nutrition Labeling and Education Act. The book closes with an epilogue that underscores the very complexity involved in assuring and regulating food safety. The glossary of terms may be useful to a variety of reader groups.

I think that anyone involved in undergraduate teaching or in extension and outreach activity for varied clientele would find this book interesting, informative and worthwhile addition to his/her library.

Purnendu C. Vasavada, Ph.D.
Professor of Food Science
University of Wisconsin-River Falls
Food Safety and Microbiology Specialist
UW Extension

News

SERVSAFE® Seminars Cover Latest in Food Safety

The Educational Foundation of the National Restaurant Association has announced their spring schedule of "SERVSAFE® Serving Safe Food Train-the-Trainer" seminars. The seminars focus on critical food safety practices and methods for preventing food contamination; train, test and certify participants in the SERVSAFE program; and show attendees how to implement effective food safety training in their operations.

Dates and locations for seminars are as follows:

January 17-19, 1994, New Orleans, LA - cosponsored by the Louisiana Restaurant Association located at the Westin Canal Place.

January 24-26, 1994, Chicago, IL - cosponsored by the Illinois Restaurant Association, located at the Chicago Hilton & Towers.

February 7-9, 1994, Marina Del Rey, CA - cosponsored by the California Restaurant Association, located at the Marriott Marina Del Rey.

March 21-23, 1994, Philadelphia, PA - cosponsored by the Pennsylvania Restaurant Association, located at the Adams Mark Hotel.

March 28-30, 1994, Cambridge, MA - cosponsored by the Massachusetts Restaurant Association, located at the Cambridge Howard Johnson's Hotel.

April 11-13, 1994, Chicago, IL - cosponsored by the Illinois Restaurant Association, located at the Chicago Hilton & Towers.

The popular seminars are based on the nationally recognized SERVSAFE Serving Safe Food training program. The first two days of the program cover the Applied Foodservice Sanitation course, with topics including:

- Implementing a Hazard Analysis Critical Control Point system of food safety in a foodservice operation
- Waste management and recycling
- Controlling pathogens that cause foodborne illness
- Clean and sanitary facilities and equipment
- Integrated pest management
- New government standards
- Crisis management

Participants are given an exam at the end of day two of the seminar, covering these and other topics. Those passing the exam receive the SERVSAFE certificate, recognized by over 95 percent of jurisdictions with voluntary and mandatory training and certification programs.

Day three of the seminar teaches managers to conduct their own effective food safety training program for managers and employees.

Attendance at the seminar is recommended for all foodservice managers and directors, owners/operators, chefs/kitchen managers, dietary managers, corporate trainers, and anyone responsible for staff management. Attendees have the choice of enrolling in all three days of the seminar, days one and two only, or day three only.

The seminars will run from 8:30 a.m. to 5 p.m. each day. Registration must be completed in advance as some home study is required prior to the seminar. The cost for attending the full three-day program is $299; to attend the first two days, the cost is $199; and to attend the third day only is $99. National and cosponsoring state restaurant association members receive a special price of $249 for the three-day option.

For additional information, or to register, contact The Educational Foundation's customer service department at (800) 765-2122.

Dr. Daniel Y. C. Fung the 1993 Recipient of the International Gamma Sigma Delta Award for Distinguished Service to Agriculture

Dr. Daniel Y.C. Fung considers himself an educator deeply involved in teaching, research, and administration in a university setting. As a teacher, he developed new courses, new workshops and new laboratory exercises in microbiology and in food science. He has a good rapport with both graduate and undergraduate students. "Enthusiasm" is the word most often mentioned by students in relation to his classroom teaching. He constantly seeks new ways to make teaching more effective. As a result of his requirement of individual class projects in microbiology, a competitive research grant from the National Science Foundation was obtained to further develop this innovative idea in classroom teaching.

Dr. Fung's research centers on rapid methods and automation in microbiology. Previous microbiological methods were slow and time consuming, gained information of limited value, and did not allow for product and process modification. Rapids methods, as developed by Dr. Fung, allow product and process modification, and fit well into current ideas of predictive microbiology and into Hazard Analysis Critical Control Point (HACCP) Systems currently advocated for use by meat packing and meat processing plants providing safe animal product foods. These new efforts are critical to the future well-being of the food industry and to its customers.

Dr. Fung's work and influence have been a cornerstone of the very productive Food Safety Consortium encompassing meat safety work at the University of Arkansas (mostly poultry), Iowa State University (mostly

pork) and Kansas State University (mostly beef). His wealth of experience has been put to excellent use in the International Workshops on Rapid Methods and Automation in Microbiology held annually since July, 1981. This workshop has attracted about 800 participants from 40 states and 30 countries in that time and the 1993 workshop had a waiting list.

Dr. Fung's knowledge and his interests led to his participation on editorial boards of *Journal of Food Protection*, *Journal of Environmental Health* and *Journal of Food Science* in the past 5 years and to his selection of editor-in-chief of the *Journal of Rapid Methods and Automation in Microbiology* from its recent inception.

Dr. Fung has made many lecture tours in Europe and the Far East as a guest of a variety of organizations and institutes, enhancing the reputation of Kansas State University in food microbiology. Also, he has served as Institute of Food Technologists Scientific Lecturer to present lectures to local sections from 1987-1990. He is constantly in demand on the lecture circuit nationally and internationally. Since 1988, he has been an invited speaker at 19 conferences and symposia in the U.S.A. and numerous times internationally.

Dr. Fung and his group are highly sought as technical consultants by food industry companies, frequently when company personnel and other consultants can't solve a difficult problem regarding food safety and food spoilage. Their success rate at these trouble shooting ventures is outstanding.

He also enjoys the challenge of societal works. He has served as president of the Kansas City section of the Institute of Food Technologists; president of Sigma Xi, Kansas State University chapter; president of the Eta chapter of Gamma Sigma Delta; president of the Chinese American Food Society, 1988-1989; chair of the microbiology section of the American Society for Microbiology; chair of Kansas City section of IFT, 1989-91; chair of membership committee, AAM, 1987-90; Food Microbiology Division of ASM, 1990-91; coordinator of Group III symposium, ASM, 1991; and elected Group III representative, ASM, 1992-94. He has been elected as a Fellow of the American Academy of Microbiology, and has received numerous other awards.

He has been major advisor to 31 M.S. students and 11 Ph.D. students. He is highly sought as a member of other graduate advisory committees. He is currently supervising 15 graduate students of his own. He has served as Chairman of the K-State interdepartmental Food Science Graduate Program for 8 years. At the inception of the USDA National Needs Fellowship Program, he secured six Food Science Fellowships for Kansas State University. He is a team worker willing to cooperate with members of the department and outside of the department for the good of science.

Dr. Fung earned a B.S. in biological sciences at the International Christian University, Tokyo, Japan. He holds a Master of Science in Public Health from the University of North Carolina - Chapel Hill, and a doctorate in food technology-microbiology from Iowa State University. Prior to coming to Kansas State University in 1978, Dr. Fung was on the faculty at The Pennsylvania State University for nine years.

Dr. Fung has proven to be an active, productive, and effective faculty member in the Department of Animal Sciences and Industry and at Kansas State University. He will continue to be in this role in the future to improve the quality of life for citizens nationally and internationally through his active roles in teaching, research, and extension activities in applied food microbiology.

New Book Announcement

Evaluation of Certain Veterinary Drug Residues in Food

Fortieth Report of the Joint FAO/WHO Expert Committee on Food Additives

This book presents the conclusions of an expert committee commissioned to evaluate the safety of residues of selected veterinary drugs used in food-producing animals, to establish acceptable daily intakes for humans, and to recommend maximum residue limits. On the basis of a rigorous review of all available safety and residue data, the committee establishes international standards intended to promote food safety and facilitate the harmonization of international trade in animal products.

The report has two parts. The first explains several methodological issues that are specific to the safety assessment of veterinary drug residues in food. Noting problems posed by the inadequacy of data on veterinary drugs with a long history of use, the report establishes general principles of evaluation and requirements for toxicological data needed to ensure that the safety of these older products is established according to rigorous contemporary standards. General safety concerns, including the possible pharmacological effects of veterinary drugs in humans, are also discussed, together with specific issues relating to the estimates of food intake and the terminology used by the committee.

The second and most extensive part provides succinct summaries of the toxicological data examined and factors considered when evaluating each substance, identifying any potential hazards to consumer health, and allocating an acceptable daily intake and maximum residue limit. Veterinary drugs considered include five anthelminthics (closantel, flubendazole, ivermectin, tiabendazole, and triclabendazole), two antimicrobial agents (furazolidone and nitrofural), two production aids (bovine somatotropins and ractopamine), and a trypanocide (isometamidium). Acceptable daily intakes and maximum residue limits were established for seven of these drugs. For the remaining substances, the report identifies deficiencies in the available data and specifies the further information required for a re-evaluation.

For more information, please contact WHO Publications Center USA, 49 Sheridan Avenue, Albany, NY 12210.

Food and Environmental Hazards to Health

Tetanus Fatality—Ohio, 1991

In August 1991, the Ohio Department of Health received a report of a fatal case of tetanus. This report summarizes the investigation of this case.

On July 21, 1991, an 80-year-old woman sought treatment in the emergency department of a hospital in central Ohio because of a stiff jaw and dysphagia. On examination, she had slightly slurred speech and difficulty opening her mouth but no difficulty breathing. A wood splinter from a forsythia bush had been lodged in her left shin approximately 1 week; the wound site was erythematous and draining purulent material. The emergency room physician diagnosed tetanus and admitted the woman to the hospital. Treatment included tetanus immune globulin (3000 units) and tetanus toxoid (0.5 cc) and intravenous clindamycin because of a reported history of penicillin allergy.

The patient had no history of any previous tetanus vaccinations. She had been treated at an undetermined time in the 1960s for an infected wound associated with a fractured ankle. In addition, she had sought medical care periodically for treatment of hypertension and other medical problems.

The patient's clinical status gradually deteriorated, and mechanical ventilation was required because of increasing generalized rigidity. During the ensuing 2-week period, she was treated for tremors, muscle spasms, abdominal rigidity, apnea, pneumonia, and local infection from her leg wound. Despite aggressive treatment, the patient died on August 5.

As a result of this case, a public health nurse, serving as part of the Occupational Health Nurses in Agricultural Communities (OHNAC) project*, instituted community-wide educational activities to increase tetanus vaccination coverage among adults. Following these educational efforts, from August 1991 through July 1992, the number of adults receiving tetanus vaccination from the county health department increased 51%[1] over the previous 12 months (79 vaccinations compared with 52, respectively).

Editorial Note: The risk for tetanus is greater in older (aged ≥60 years) persons who lack protective levels of antitoxin. Although tetanus is preventable through adequate vaccination, 117 cases of tetanus were reported to CDC during 1989 and 1990. Supplemental information available for 110 of these cases indicates the case-fatality rate was 24%. Of 109 persons for whom age was known, 63 were aged ≥60 years. Of the 37 persons in this age group for whom vaccination status was known, 34 (92%) were inadequately vaccinated (CDC, unpublished data, 1992).

Tetanus toxoid is a highly effective vaccine. Protective levels of serum antitoxin are generally maintained for at least 10 years in properly vaccinated persons. After completion of the primary vaccination series, booster doses of tetanus toxoid, combined with diphtheria toxoid (as Td) every 10 years are recommended by the Advisory Committee on Immunization Practices, the American College of Physicians, the American Academy of Family Physicians, and the American Academy of Pediatrics.

This report and others underscore the consequences of missed opportunities for vaccination. Although the patient in this report had numerous prior contacts with the health-care system, she had no history of vaccinations against tetanus. Of the 57 persons with tetanus in 1989 and 1990 for whom vaccination status was known, 45 (79%) reported ever having received ≤2 doses of tetanus toxoid. In addition, of the 12 who had sought medical care for their injuries and for whom tetanus toxoid was indicated, 11 were not vaccinated.

Wounds such as that described in the patient in this report are common in persons with tetanus and may not be considered sufficiently severe by the person to warrant a visit to a health-care provider. In 1989 and 1990, only 27 (31%) of 86 persons with tetanus and a clear antecedent acute injury sought medical treatment for their wounds. Therefore, internists, family practitioners, occupational physicians and other primary health-care providers who treat adults should use every opportunity to review the vaccination status of their patients and administer Td and other indicated vaccines as appropriate.

Morbidity and Mortality Weekly, 3/5/93

**OHNAC is a national surveillance program conducted by CDC's National Institute for Occupational Safety and Health that has placed public health nurses in rural communities and hospitals in 10 states (California, Georgia, Iowa, Kentucky, Maine, Minnesota, New York, North Carolina, North Dakota, and Ohio) to conduct surveillance of agriculture-related illnesses and injuries that occur among farmers and farm workers and their family members. These surveillance data are used to reduce the risk for occupational illness and injury in agricultural populations.*

[1]The 51% increase in vaccinations may underestimate the total effect of this intervention because it does not include persons who obtained vaccinations from private physicians or from providers in neighboring counties.

Carbon Monoxide Poisoning Associated with a Propane-Powered Floor Burnisher—Vermont, 1992

On July 28, 1992, two employees of a pharmacy in Vermont fainted within four hours after arriving for work; at a local hospital emergency department, carbon monoxide (CO) poisoning was diagnosed based on elevated carboxyhemoglobin (HbCO) levels. The pharmacy was evacuated, and the remaining eight employees were transported to the hospital for evaluation. Further investigation by the Vermont Department of Health (VDH) revealed that, on July 24, one of the employees had fainted, but CO poisoning was not suspected, and vasovagal syncope was diagnosed. This report summarizes the investigation of these cases by VDH.

A case of CO poisoning was defined as an arterial HbCO ≥2% (for nonsmokers) or ≥9% (for smokers) in an

employee who worked at the pharmacy on July 28. Based on analysis of arterial blood samples, nine of the 10 employees met the case definition; six were women. The mean age was 26.8 years (range: 17-42 years). Reported symptoms included headache (nine patients), lightheadedness (seven), tunnel vision (five), nausea/vomiting (four), syncope (two), difficulty breathing (two), chest pain (two), and decreased hearing (one). Serum samples were taken from six case-patients within 1-1/2 hours of exposure and from the other three case-patients within 3 hours of exposure. Mean HbCO was 16.6% (range: 6.7%-25.3%). Three patients received hyperbaric oxygen therapy: one had psychometric test abnormalities, and two had syncope without psychometric testing. All nine patients recovered.

On both July 24 and July 28, the store's floors had been cleaned with a liquid propane-powered floor burnisher by a subcontractor to a cleaning service company. The floor burnisher was independently owned and operated. On both days, the subcontractor had cleaned and polished the pharmacy floors before employees arrived. No cases of illness consistent with CO poisoning were reported among cleaning service employees.

The Division of Occupational and Radiological Health, VDH, impounded the burnisher and tested its emissions 2 days after the incident. Readings obtained outdoors from the burnisher's exhaust pipe reached 2000 parts per million (ppm) CO after less than 1 minute of measurement, 3000 ppm while idling, and 50,000 ppm at full throttle. All other possible sources of CO (i.e., heating and air-conditioning system, water-heater system, and truck traffic outside the store) were excluded as causes of the exposure.

HbCO levels among case-patients were used to estimate CO concentration in the work environment by the Coburn equation; this approach estimated that, on the morning of exposure, the CO concentration in the pharmacy was 507-1127 ppm. The Occupational Safety and Health Administration (OSHA) standard for CO is 50 ppm averaged over an 8-hour work shift and a ceiling level of 200 ppm, not to be exceeded at any time. The store's ventilation system used 100% recirculated air.

As a result of this investigation, the pharmacy and the cleaning contractor and subcontractor were fined. VDH recommended that liquid propane-powered burnishers be replaced with electric-powered burnishers and that CO alarms be installed if use of liquid propane-powered machines continued.

Editorial Note: Unintentional exposure to CO is a major environmental hazard in the United States: each year, approximately 10,000 persons seek medical attention because of CO intoxication. Unintentional deaths attributable to CO poisoning result primarily from combustion of gasoline in motor vehicles, coal for heating or cooking, kerosene, and wood. In contrast to these fuels, propane—the source of fuel involved in this report—normally undergoes complete combustion in the presence of sufficient oxygen, producing nontoxic CO_2 and water vapor; only when the oxygen supply at the point of combustion is inadequate does combustion of propane produce CO.

Symptoms of mild CO poisoning are nonspecific, and affected persons may not seek medical care. Because the cleaning service employees involved in the episode described in this report were exposed to elevated CO levels for limited periods (i.e., less than 1 hour), they may not have suffered ill effects of exposure. Pharmacy employees likely were exposed to peak CO levels on arrival to work and to elevated levels throughout the day.

The floor burnisher involved in this incident was factory-labeled with a warning to "shut off the engine if headache occurs and check emissions." OSHA permissible exposure levels regulate indoor air quality but do not require that such machines meet emission standards or receive routine maintenance. The most likely cause of CO poisoning in this case was failure to maintain or routinely service the burnisher. In addition, inadequate ventilation may have contributed to elevated concentrations of CO in the work environment. Episodes of CO poisoning, such as that described in this report, can be prevented by using only electric burnishers indoors, maintaining and routinely servicing fuel-burning burnishers, ensuring proper ventilation of the workplace, and educating persons regarding the signs and symptoms of CO poisoning.

Deaths resulting from CO poisoning are more common in winter months. Prevention efforts should be aimed at persons who live in homes with old heating systems, gas-powered space heaters, or wood stoves. Proper use and maintenance of such home-heating systems and cleaning of obstructed chimneys can prevent CO poisoning in the home.

MMWR 9/24/93

HAZCON-Based Total Quality Management

Retail Food Operation Food Hazard Control Checklist

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St. Paul, MN 55114

The following is the third installment of the Retail Food Operation Food Hazard Control Checklist mentioned in the October 1993 column. This checklist will be continued over the next several months to cover its entirety.

RETAIL FOOD OPERATION FOOD HAZARD CONTROL CHECKLIST
[40°F - 150°F (4.4°C - 65.6°C)] [1]

FOOD SAFETY CONTROL REQUIREMENTS	PERFORMANCE EVALUATION	NEEDED TO ASSURE SAFETY
ENVIRONMENT		
Area around facility (Reg) • Area around facility, including waste storage is cleaned and maintained on an adequately scheduled basis.		
Water (Haz) • Only water meeting Environmental Protection Agency water quality standards is used. • The hot water supply is never less than 140°F (60°C), except water used for hand washing which is tempered to be between 110°F and 120°F (43.3°C and 48.9°C).		
Sewage (Reg) • Sewage systems are maintained to meet established plumbing codes. • There is no open raw sewage.		
Pest control and materials used (Reg) • A pest control program is followed on a continuing basis. - The interior and exterior of the building are litter-free. - Outside doors are self-closing and fit tightly. - Rodents are trapped in a manner that allows easy and proper disposal. No open poison bait stations are used. - No poisonous or toxic materials not immediately necessary or appropriate for maintenance of the establishment, the cleaning or sanitizing of equipment or utensil, or the control of insects or rodents are found in the establishment. - All poisonous materials and chemicals are used according to manufacturers' directions and are never used in a manner that constitutes a hazard to employees and others. - Insecticide pest (Vapona) strips and automatic intermittent aerosol insecticide dispensers are never used. - Spray bottles containing insecticides, cleaning compounds, sanitizers, or other toxic compounds are labeled prominently and distinctly, clearly with the name of the chemical and concentration, indicating the contents. Spray bottles are labeled before they are filled. - Concentrated poisonous (toxic) chemicals such as insecticides, detergents, sanitizers, or related compounds are never stored, located or used in a food preparation area in a way that will cause food contamination. - Chemicals which have been diluted for use are kept below or away from food supplies.		
FACILITIES		
Facility design (Reg) • Promotes appropriate movement of food from delivery through storage, preparation, service, and disposal.		

Abbreviations: (Haz) = Hazard; (Reg) = Regulatory; (Qual) = Quality; (OSHA) = Occupational Safety and Health Agency

[1] Temperatures, unless otherwise stated, are food temperatures. They are measured both 1/16-inch below the surface as well as at the center of food in order to determine the degree of control and stability of hot and cold systems.

FOOD SAFETY CONTROL REQUIREMENTS	PERFORMANCE EVALUATION	NEEDED TO ASSURE SAFETY
• Complete plans and equipment specifications are given to the health department and building inspection office for review and approval prior to any construction, remodeling, or alteration of the foodservice establishment.		
Floors, walls, and ceilings (Reg) • Floors are cleaned and maintained by sweeping and mopping according to the cleaning schedule. • There is no sweeping or mopping when there is uncovered food in the area. • Walls and ceilings are cleaned and maintained by washing according to the cleaning schedule.		
Hand sinks (Haz) • Are stocked with single-use towels, soap, and a fingernail brush. • Operate with a flow > 2 gallons of water per minute at a temperature of 110°F to 120°F (43.3°C to 48.9°C) within 3 seconds of being turned on. • Are cleaned on a daily basis or more often if necessary. • The fingernail brush is stored so that it can dry.		
Food sinks (Haz) • Are used only for cleaning, preparing, and thawing food. • Are cleaned and sanitized often. • Are not used for hand washing or pot and pan washing.		
Utility sinks (Reg) • Are used to supply water for cleaning and for disposal of cleaning and sanitizing solutions.		
Ventilation system (Reg) • Accumulations of grease/soil are removed from around the exterior discharge point for cooking equipment ventilation. • Hoods, filters, and interior surfaces of ventilation ducts are cleaned according to cleaning schedule. • Ventilation system is operated when cooking equipment is in use.		
Garbage (Reg) • All garbage containers are covered, cleaned and sanitized weekly. • Cardboard containers or other packaging material not containing garbage or food waste are stored in a manner that does not create a nuisance, fire hazard, or rodent harborage. • An enclosure of sufficient size is used to contain all refuse equipment or garbage and refuse materials. • Garbage and refuse storage area is clean and free of odors and litter. • Garbage and refuse containers are durable, easily cleaned, insect-and rodent-proof, non-leaking, and fire resistant. • Containers designed with drains have drain plugs kept in place, except during cleaning time. • There is adequate provision for recycling packing materials.		
Restrooms, break rooms, locker rooms (Reg) • Hand washing sinks, soap dispensers, hand drying devices, and all related fixtures are cleaned on a daily basis and maintained. • Hand cleanser and sanitary single-use hand towels are provided at each hand washing sink. • Adequate supplies of toilet tissue and non-absorbent waste receptacles are provided in the restrooms. • An additional non-absorbent covered waste receptacle is provided in the women's restroom. • A fingernail brush is kept at all employee hand washing sinks to insure feces removal. • Locker rooms and/or break rooms are clean and maintained.		
Laundry facilities (Reg) • Soiled linen is stored in _____, away from food. • Clean linen and clean equipment is stored above the floor to prevent contamination. • Laundry facilities are maintained and the process is organized.		
EQUIPMENT		
Equipment operation (Haz) • Is maintained to meet FDA code requirements.		

FOOD SAFETY CONTROL REQUIREMENTS	PERFORMANCE EVALUATION	NEEDED TO ASSURE SAFETY
Food contact surface equipment (Haz) • Meets FDA standards. • Is smooth, easily cleanable, resistant to damage from wear or cleaning, non-toxic, accessible for cleaning, and properly installed.		
Non-food contact surface equipment (Reg) • Meets FDA standards. • Is smooth, easily cleanable, resistant to damage from wear or cleaning, non-toxic, accessible for cleaning, and properly installed.		
Gaskets (Reg) • All gaskets on containers, refrigerators, and freezers are cleaned and maintained in a "like-new" condition.		
Using sanitized equipment (Haz) • All equipment used in food preparation and service is clean and sanitized. • If there is uncertainty whether the surface is clean and sanitized, it is cleaned and sanitized again, before it is used.		
Temperature measuring devices (Haz) • Every person preparing food is trained to calibrate and use a food temperature measuring device to assure that food is heated adequately for pasteurization and is processed and stored safely. • Temperature probes are sanitized by washing the stems in a hot detergent solution, and then wiping the stem with a 100 ppm sanitizer solution. • Accurate thermometers are provided in a conspicuous location in the warmest part of each refrigeration and freezer unit, and in the coolest part of all hot storage devices. • Pasteurization temperatures are verified by using a 1/16-inch point-sensitive, product temperature measuring device accurate to ± 2°F.		
Food product thermometer calibration (Haz) • Food stem thermometers, used for measuring bulk food product temperatures, are calibrated in a slush ice bath any time they are dropped, temperatures look unreasonable, or at least once a month. • Thermometers are calibrated by making a slush ice bath, in an insulated container (e.g. a small thermos container). The container is filled with crushed ice and add water (40% water 60% ice) until it reaches the surface of the ice. The temperature measuring device is then immersed at least 3 inches into the ice bath. The ice bath and temperature unit(s) will be stirred and allowed to equilibrate for at least 2 minutes. Pocket stem thermometers can be adjusted to 32°F (0°C) by holding the nut on the rear of the dial and twisting the face until the pointer lines up with 32°F. • Electronic thermometers are calibrated according to manufacturer's instructions.		
Equipment calibration (Haz) • Operating temperatures of equipment are calibrated using temperature measuring devices accurate to ±1°F (± .5°C) below 200°F (93.3°C) and ± 2°F (± 1°C) at temperatures above 200°F (93.3° C). • Temperatures are measured at the warmest or coolest spot, as appropriate for equipment function.		

*This **Retail Food Operation Food Hazard Control Checklist** will continue in subsequent issues of* Dairy, Food and Environmental Sanitation. *The February installment will cover: **Equipment (cont.) and Supplies and Materials.***

Past IAMFES Award Winners

EDUCATOR-INDUSTRY AWARD

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

In 1982 this award was split into the Educator Award and the Harold Barnum Award (for industry).

EDUCATOR AWARD

1982-Floyd Bodyfelt
1983-John Bruhn
1984-R. Burt Maxcy
1985-Lloyd B. Bullerman
1986-Robert T. Marshall
1987-David K. Bandler
1988-Edmund A. Zottola
1989-Vernal Packard
1990-Michael Stiles
1991-William E. Sandine
1992-William S. LaGrange
1993-Irving J. Pflug

HAROLD BARNUM AWARD

1982-Howard Ferreira
1983-C. Dee Clingman
1984-Omer Majerus
1985-William L. Arledge
1986-Hugh C. Munns
1987-J. H. Silliker
1988-Kenneth Kirby
1989-Lowell Allen
1990-Roy Ginn
1991-Thomas C. Everson
1992-Ronald Case
1993-David D. Fry

CITATION AWARD

1951-J. H. Shrader and William B. Palmer (posthumously)
1952-C. A. Abele
1953-Clarence Weber
1954-C. K. Johns
1955-R. G. Ross
1956-K. G. Weckel
1957-Fred C. Baselt
1958-Milton R. Fisher
1959-John D. Faulkner
1960-Luther A. Black
1961-Harold S. Adams
1962-Franklin W. Barber
1963-Merle P. Baker
1964-W. K. Moseley
1965-H. L. Thomasson
1966-J. C. Olson, Jr.
1967-William V. Hickey
1968-A. Kelley Saunders
1969-Karl K. Jones
1970-Ivan E. Parkin
1971-L. Wayne Brown
1972-Ben Luce
1973-Samuel O. Noles
1974-John C. Schilling
1975-A. R. Brazis
1976-James Meany
1977-None Given
1978-Raymond A. Belknap
1979-Harold E. Thompson, Jr.
1980-Don Raffel
1981-Henry V. Atherton
1982-None Given
1983-William B. Hasting
1984-Elmer H. Marth
1985-Ralston B. Read, Jr.
1986-Cecil E. White
1987-None Given
1988-Carl Vanderzant
1989-Clem Honer
1990-None Given
1991-Frank Bryan
1992-Ewen C. D. Todd
1993-Robert C. Tiffin

SANITARIANS AWARD

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

HONORARY LIFE MEMBERSHIP AWARD

1957-J. H. Shrader
1958-H. Clifford Goslee
1959-William H. Price
1960-None Given
1961-Sarah Vance Dugan
1962-None Given
1963-C. K. Johns and Harold Macy
1964-C. B. and A. L. Shogren
1965-Fred Basselt and Ivan Parkin
1966-M. R. Fisher

and Past Presidents

1967-C. A. Abele and L. A. Black
1968-M. P. Baker and W. C. Frazier
1969-John Faulkner
1970-Harold J. Barnum
1971-Wiliam V. Hickey
1972-C. W. Dromgold and
E. Wallenfeldt
1973-Fred E. Uetz
1974-H. L. Thomasson and
K. G. Weckel
1975-A. E. Parker
1976-A. Bender Luce
1977-Harold Heiskell
1978-Karl K. Jones
1979-Joseph C. Olson, Jr.
1980-Alvin E. Tesdal
1981-Robert M. Parker
1982-None Given
1983-Orlowe Osten
1984-Paul Elliker
1985-Patrick J. Dolan,
Franklin W. Barber and
Clarence K. Luchterhand
1986-John G. Collier
1987-Elmer Marth and
James Jezeski
1988-Kenneth Whaley and
Paul J. Pace
1989-Earl Wright
Vernon Cupps
1990-Joseph E. Edmondson
1991-Leon Townsend
Dick B. Whitehead
1992-A. Richard Brazis
Harry Haverland
1993-None Given

SHOGREN AWARD

1972-Iowa Affiliate
1973-Kentucky Affiliate
1974-Washington Affiliate
1975-Illinois Affiliate
1976-Wisconsin Affiliate
1977-Minnesota Affiliate
1978-None Given
1979-New York Affiliate
1980-Pennsylvania Affiliate
1981-Missouri Affiliate
1982-South Dakota Affiliate
1983-Washington Affiliate
1984-None Given
1985-Pennsylvania Affiliate
1986-None Given
1987-New York Affiliate
1988-Wisconsin Affiliate
1989-Georgia Affiliate
1990-Texas Affiliate
1991-Georgia Affiliate
1992-Georgia Affiliate
1993-New York Affiliate

MEMBERSHIP ACHIEVEMENT AWARD

1986-Iowa Affiliate
1987-Florida Affiliate
1988-Florida Affiliate
1989-California Affiliate
1990-California Affiliate
1991-Illinois Affiliate
1992-Illinois Affiliate
1993-California Affiliate

PAST PRESIDENTS

1912-C. J. Steffen
1913-C. J. Steffen
1914-C. J. Steffen
1915-A. N. Henderson
1916-Claude F. Bessio
1917-Wm. H. Price
1918-Alfred W. Lombard
1919-James O. Kelly
1920-Ernest Kelly
1921-C. L. Roadhouse
1922-H. E. Bowman
1923-Geo. E. Bolling
1924-J. B. Hollingsworth
1925-T. J. Strauch
1926-G. C. Supplee
1927-W. A. Shoults
1928-Ira V. Hiscook
1929-H. R. Estes
1930-R. E. Irwin
1931-A. R. B. Richmond
1932-W. B. Palmer
1933-H. N. Parker
1934-P. F. Krueger
1935-C. K. Johns
1936-G. W. Grim
1937-J. C. Hardenbergh
1938-A. R. Tolland
1939-V. M. Ehlers
1940-P. D. Brooks
1941-L. C. Frank
1942-F. W. Fabian
1943-C. A. Abele
1944-C. A. Abele
1945-R. R. Palmer
1946-R. R. Palmer
1947-R. G. Ross
1948-W. D. Tiedeman
1949-A. W. Fuchs
1950-M. R. Fisher
1951-K. G. Weckel
1952-H. L. Thomasson
1953-H. J. Barnum
1954-John D. Faulkner
1955-I. E. Parkin
1956-Harold S. Adams
1957-Paul Corash
1958-Harold Robinson
1959-Franklin Barber
1960-W. V. Hickey
1961-John Sheuring
1962-Charles E. Walton
1963-Ray Belknap
1964-John H. Fritz
1965-W. C. Lawton
1966-Fred E. Uetz
1967-P. R. Elliker
1968-A. N. Myhr
1969-Samuel O. Noles
1970-Milton E. Held
1971-Dick B. Whitehead
1972-Orlowe M. Osten
1973-Walter F. Wilson
1974-Earl O. Wright
1975-P. J. Skulborstad
1976-H. E. Thompson, Jr.
1977-H. V. Atherton
1978-David F. Fry
1979-Howard Hutchings
1980-Bill Kempa
1981-William Arledge
1982-Harry Haverland
1983-Robert Marshall
1984-A. Richard Brazis
1985-Archie Holliday
1986-Sidney E. Barnard
1987-Roy Ginn
1988-Leon Townsend
1989-Robert Gravani
1990-Ron Case
1991-Bob Sanders
1992-Damien A. Gabis
1993-Michael P. Doyle

1994 IAMFES AWARDS NOMINATIONS

The International Association of Milk, Food and Environmental Sanitarians is proud of its members and their contributions.

As a member, you are entitled to nominate deserving colleagues for the IAMFES Awards.

Nomination forms need to be completed and back to the Des Moines office by April 1, 1994.

1. Previous award winners are not eligible for the same award. Check pages 32 and 33 in this issue for a complete listing of past award winners.

2. Present Executive Board members are not eligible for nomination.

3. Candidates must be current IAMFES members in order to be nominated.

Presentation of these awards will be during the IAMFES Annual Meeting, July 31-August 3, 1994 at the Hyatt Regency River Walk, San Antonio, Texas, during the Annual Awards Banquet Wednesday evening.

NOMINATION FORMS WILL BE MAILED OUT TO THE MEMBERSHIP THE END OF JANUARY. SEND COMPLETED MATERIALS TO:

Steven K. Halstead, CAE
IAMFES, Awards
200W Merle Hay Centre
6200 Aurora Avenue
Des Moines, IA 50322

Questions? Call 800-369-6337 (includes Iowa) 800-284-6336 (Canada), 8-4:30 weekdays, or FAX 515-276-8655.

The following is a list of the awards for which a person or company may be nominated.

Nominate a deserving colleague or company for these prestigious IAMFES Awards:

- **SANITARIANS AWARD** - recognizes an individual for outstanding service to the profession of the Sanitarian.
  $1000 award and plaque

- **EDUCATOR AWARD** - presented to an educator in recognition of outstanding service in academic contributions to the profession of the Sanitarian.
  $1000 award and plaque

- **CITATION AWARD** - recognizes an individual for many years of devotion to the ideals and objectives of the association.
  plaque

- **HAROLD BARNUM INDUSTRY AWARD** - recognizes an individual for outstanding service to the public, IAMFES and the profession of the Sanitarian.
  $500 award and plaque

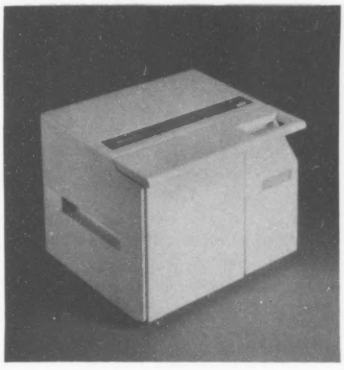
- **HONORARY LIFE MEMBERSHIP** - for an individual's devotion to the high ideals and principles of IAMFES.
  plaque and lifetime membership with IAMFES

- **BLACK PEARL AWARD** - recognizes a company for its outstanding achievement in corporate excellence in food safety and quality.
  black pearl, encased in glass and mounted on a lighted pedestal

Industry Products — Special Focus

Microbiological Testing Products and Services for Food and Dairy Products

The Industry Products — Special Focus is a new feature for Dairy, Food and Environmental Sanitation. *This feature will group news releases into general categories, such as Microbiological Tests for Food and Dairy Products, to provide readers with a consolidated source of information on the products, services and equipment available to them. Throughout 1994, the Industry Products — Special Focus will feature news releases on services, products and equipment for Dairy Processing (February), Pest Control (March), Analytical Laboratories (May), Consulting Services for the Food and Dairy Industries (June), Food and Dairy Processing (August) and Cleaning and Sanitation (October). Immediateley following this section (page 38) is another new section. The Where to Find It section features small advertisements for suppliers with products related to that issue's Industry Products — Special Focus.*



Stomacher® Lab Blender

The Stomacher Lab Blender rapidly removes microorganisms from all types of food samples as well as pharmaceutical ointments and creams. The unique blending process of the Stomacher Lab Blender takes place in a sterile, disposable plastic bag, thereby eliminating cross contamination and the need for clean-up between samples.

Reciprocating paddles force the liquid diluent through the sample removing intact microorganisms in as little as 30 seconds. The Stomacher Lab Blender yields equivalent results when compared to conventional blenders with all types of foods including meats, dairy products, fruits and vegetables and baked goods. Three versions are available, the Model 80 for volumes of 5-80ml, the Model 400 for volumes of 80-400ml, and the Model 3500 for 1000-3500ml. All three feature variable speed and a timer.

Tekmar Company - Cincinnati, OH

Please circle No. 252
on your Reader Service Card

Bacteriological Testing Kits for HACCP Programs Available with Different Media

Double Integral Sanitation Ltd. has developed bacteriological testing kits that are excellent for HACCP programs.

Called SWAB and COUNT, B-Y-M-INDICATORS and ENVIRONMENTAL SWABS, these simple high performance kits are gamma radiated to ensure absolute sterility and provide reliable test for semi-quantification of microbiological analyses with no laboratory facilities required.

Unique Features:

Simple -	Can be used by anyone
No Preparation	Ready to use, no sterilization, no clean-up
No Dilutions	Eliminates serial dilutions
Two Tests Each Time	Paddles have two different media in each unit
Practical	Designed to fit into difficult places without effecting performance
Economical	Low price and high reliability

The test kits are available with different media to monitor General Bacteria, *Salmonella*, Coliforms, Yeasts and Molds.

Custom-made media combinations are available on special orders.

Double Integral Sanitation Ltd - Mississauga, Ontario, Canada

Please circle No. 253
on your Reader Service Card

4-METHYLUMBELLIFERYL-β-D-GLUCURONIDE for the Detection of E. coli

4-Methylumbelliferyl-β-D-Glucuronide (MUG) is a chemical substrate which provides an accurate, convenient and economical method for detecting the presence of *E. coli*, often in less than a day. β-glucuronidase is present in almost all strains of *E. coli* but absent in most other enteric bacteria. This enzyme hydrolyzes MUG and produces 4-methylumbelliferone, a fluorogenic product which can be easily detected by long wave UV (366 rm) light. Whe MUG is incorporated into a modified MacConkey Agar or Lauryl Tryptose Broth seeded with a single *E. coli* cell, fluorescence is usually detectable in 12 to 20 hours. This fluorescence is considered presumptively positive for *E. coli*. MUG is available in 1 gm, 5 gm, 25 gm and 100 gm packaging.

Marcor Development Corporation - Hackensack, NJ

Please circle No. 254
on your Reader Service Card

FDA Recommends the Use of LacTek™ Milk Testing Kits

AOAC Research Institute Certifies LacTek

Idetek Inc. reported today that its LacTek™ beta-lactam test kits for detecting antibiotic residues in milk have been formally certified by the Research Institute of the Association of Official Analytical Chemists (AOAC) and recommended for use by FDA Center for Veterinary Medicine.

The AOAC certification validates all performance claims of the LacTek kits. In all cases, the LacTek test results met or exceeded FDA minimum requirements. These claims include detection of the six beta-lactam drugs. In addition, the LacTek method is unaffected by multiple freeze-thaw cycles, high bacterial counts or high somatic cell counts. It is the only test system that was certified by AOAC for use with pasteurized milk.

The four-step, seven-minute LacTek test kits are the only beta-lactam milk screening tests available that utilize enzyme immunoassay (EIA) technology. Rapid and highly accurate, EIA is the leading methodology used in the human medical diagnostics industry. Each LacTek kit features proprietary and highly specific antibodies that eliminate unwanted cross-reactivity and non-specific binding problems, a major cause of false positives. False positives are responsible for production delays, the dumping of good milk, and major financial losses. The system also includes the LacStation II™ reader/printer, which provides an objective, printed record of test results.

Idetek, Inc. - Sunnyvale, CA

Please circle No. 255
on your Reader Service Card

New Food Testing Laboratory Opened by Deibel Laboratories, Inc.

Deibel Laboratories, Inc., in its 26th year of operation, announces the opening of another food testing laboratory in Oconomowoc, WI.

Specializing in microbiological testing of food products, the Oconomowoc lab is an addition to those in Madison, WI, Sarasota, FL, and Chicago, IL. (The Chicago lab is called Chem Bio Consultant and Laboratories, Inc.)

Some unique services of Deibel Labs:

- *Listeria* (Rapid and conventional)
- *Salmonella* (Rapid and conventional)
- *E. coli* O157:H7
- Special Microbiological projects
  - *Challenge and Shelf Life Studies
  - *C. botulinum* studies
- HACCP Short Course (2 days)
- a_w and proximate analysis of foods

Test results can be FAXed to you within two hours of completion.

Deibel Laboratories - Oconomowoc, WI

Please circle No. 256
on your Reader Service Card

Amoco Technology Company Increases Investment Diagnostic Center

Amoco Technology Company reported that it has concluded the purchase of a building located at 31 New York Avenue in Framingham, Massachusetts. The site will serve as the primary location for Amoco Technology Company's diagnostic business activities.

Amoco Technology Company, is committed to developing diagnostic products for the research, food and clinical markets. In 1992, an initial purchase of 61,000 sq. ft. of multipurpose space was made to accommodate the growing needs of the business units. The purchase of an additional 39,000 sq. ft. solidifies Amoco's commitment to the diagnostics industry and satisfies existing facility requirements for the businesses.

The site, known as the Framingham Development Company, houses three business units: GENE-TRAK Systems Corporation, IMAGENETICS, and Betagen. GENE-TRAK Systems Corporation is a leading supplier of diagnostic products to the food, industrial, and clinical markets. In 1986, GENE-TRAK Systems revolutionized rapid methods available to the food industry with the introduction of a DNA probe-based assay for the detection of *Salmonella* in food. Currently, there are seven assays available for the detection of food pathogens and a DNA probe system for diagnosing infectious diseases is being developed. GENE-TRAK Systems Corporation is also the U.S. distributor of microbiological culture media manufactured by E. Merck, Darmstadt, Germany, Boehringer Mannheim's enzymatic food analysis test kits, Orion Corporation's Hygicult® Agar Slides, and Hanna Instruments' Foodcare line of thermometers.

IMAGENETICS manufactures and sells products for use in cytogenetic laboratories and molecular pathology research.

Betagen manufactures and sells instrumentation to automate and accelerate routine genetic analysis procedures used in DNA research laboratories.

Amoco Technology Company - Framingham, MA

Please circle No. 257
on your Reader Service Card

Applied Research Institute Adds Microbiology Products

Applied Research Institute, Inc. announced that it has added the Becton Dickinson line of Microbiology Products for Food and Dairy Testing to its new catalog.

These products include Culture Media and BBL's new Disposable Dilution Bottles.

Applied Research Institute has served the Food and Dairy Testing industries for over 40 years with testing methods, apparatus and chemical reagents.

The new catalog can be obtained from
Applied Research Institute - Perth Amboy, NJ

Please circle No. 258
on your Reader Service Card

Residue Screening is a SNAP with a new Beta-Lactam Test Kit from IDEXX

IDEXX Laboratories, Inc., is introducing a Beta-Lactam screening test in the revolutionary new SNAP™ format. The SNAP Beta-Lactam test recently passed AOAC review and has received FDA approval for commercial sale.

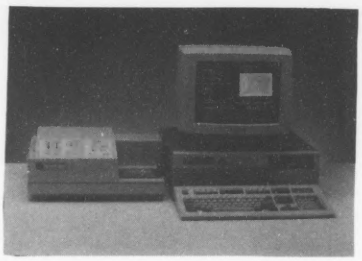
The SNAP Beta-Lactam test is an enzyme-linked receptor-binding assay for detecting antibiotic residues in milk. It's fast, easy, and convenient to use and read. No pre-mixing or pre-measuring of reagents is needed to run the test. Test time is less than 10 minutes, without the need for large instrumentation or extensive equipment. Its size and portability make it convenient for use in the lab, intake, reload, and field testing environments.

The test procedure is very simple. First, raw whole milk is added to the sample tube provided. The sample tube and SNAP device are warmed in a heat block for five minutes. Then the heated sample is poured into the sample well of the device and drawn to an indicator which signals activation. The user then pushes the SNAP activator button to complete the test. Results, available in four minutes, are determined by comparing color development of the sample spot to the control spot in the Results Window.

The SNAP Beta-Lactam test wil be available in volume lots of either 20 or 100 test kits.

IDEXX Laboratories, Inc. - Westbrook, ME

Please circle No. 259
on your Reader Service Card



Bacteria and Yeast Identification System: The Biolog Microstation

The Biolog Microstation System is the only test panel system that can identify a broad range of ENVIRONMENTAL microorganisms along with virtually ALL MEDICALLY IMPORTANT species. Over **1,100 species** of organisms can be identified using a 96-well plate format of just 3 test panels that cover all major groups: Gram-negative bacteria, Gram-positive bacteria, and Yeast.

The four simple steps to set up a test take about one minute of labor, and the test results are analyzed in seconds with the aid of user-friendly computer software. Software systems allow the user to create their own data bases for research or epidemiologic studies, compare species within their own and the Biolog data base, gather comparative species information, store data and prepare customized report forms. Both manual entry and automated plate reader systems are available.

Biolog, Inc. - Hayward, CA

Please circle No. 260
on your Reader Service Card

Microfluidics Offers Complimentary Sample Testing

Microfluidics has restructured their sample testing program. This new program offers an opportunity to send samples to the applications laboratory at Microfluidics for complimentary process testing utilizing the proprietary Microfluidizer® technology.

The sample testing program has been redefined to support a new contract manufacturing service that enables customers to take advantage of Microfluidizer processing without capital investment. Participants will receive a full report of the process results and can preview the extensive capabilities and product benefits achieved with this unique technology.

The Microfluidizer technology is a patented, proprietary design. Utilizing a unique interaction chamber, the equipment boasts no moving parts in the process stream, producing more uniform product and particle sizes as small as 0.1 micron. Sample testing is a complimentary service and is intended to show prospects the dramatic effects of the technology.

Microfluidics Corporation - Newton, MA

Please circle No. 261
on your Reader Service Card

FPL Food Products Laboratory Specializes in Food and Agricultural Industries

FPL Food Products Laboratory, Inc.; a full Service Lab Specializing in the Food and Agricultural industries. FPL offers Nutritional testing and labeling services to help the industry comply with the Nutritional Labeling and Education Act (NLEA). Extensive applications in Microbiology; Salmonella, Listeria, Coliforms, E. coli O157:H7, Staph Aureus, Shelf Life Studies. Inorganic and Organic Chemistries, QC consultations. Methods: AOAC, BAM, AACC. Certifications Affiliations: USDA, EPA, Japanese Ministries of Health and Welfare, AOAC, AACC, IFT, NWFPA, AAMP, WSMA, HIMA, HFMA, ODI.

Food Products Laboratory, Inc. - Portland, OR

Please circle No. 261
on your Reader Service Card

Penzyme Certified by AOAC to Test for Antibiotics in Milk

Penzyme® III, a SmithKline Beecham Animal Health Product, has just been certified for use by milk processor laboratories and receiving stations to detect certain beta-lactam antibiotics in raw, commingled milk by the Association of Official Analytical Chemists (AOAC) Research Institute. The company's related field test, Penzyme® Milk Test, was also certified by AOAC.

The colorimetric, qualitative test can be used to screen incoming milk for residues of amoxicillin, ampicillin, cephapirin and penicillin G in unprocessed milk. These drugs are used to treat more than 90% of the mastitis cases diagnosed in the United States, according to university researchers.

Penzyme III is a simple, economical test, says Terry Fritz, SmithKline Beecham dairy market manager. "A reliable, easy-to-read 'yes' or 'no' result is ready in just minutes," he adds. "By passing these rigid standards, Penzyme has been certified to detect antibiotics at a minimum 90% sensitivity level with 95% confidence."

Both Penzyme III and Penzyme Milk Test are available through veterinarians and distributors of animal health products.

SmithKline Beecham Animal Health, Exton, PA, is one of the largest animal health companies in the U.S. and the fourth largest in the world. It is a leading researcher, manufacturer and marketer of animal health and nutrition products for livestock, poultry, equine and companion animals.

SmithKline Beecham Animal Health - Exton, PA

Please circle No. 262
on your Reader Service Card

Microbiology Analyses Available from Lancaster Laboratories

Lancaster Laboratories offers a wide range of microbiology-related services that can help prevent costly product scares or provide additional QA/QC support capabilities. Services include plate counts and bacteriological identification, pathogen detection, vitamin assays, shelf-life analyses, consumer complaint testing, extraneous matter analyses, and environmental sanitation inspections. Also provided are full complementary services in support of HACCP quality processes. All analyses follow standardized methodology and approved procedures. Expedited service is available, and results can be provided by fax or computer interface.

Lancaster Laboratories, Inc. - Lancaster, PA

Please circle No. 263
on your Reader Service Card

Envirocon Introduces Six Hour MicroQuik™ Culture Assay Tests

With the MicroQuik™ Culture Assay Gram Negative, Coliforms, Tottal Count, Enterococcus, or E. coli can be identified in six hours. These resultts are quantitative as well as qualitative. Envirocon supplies prepared media dishes using Nutrient Agar combined with their patent pending technology. MicroQuik™ Culture Assays are designed for use with membrane filter or spread method testing. Place your specimen on the media as detailed in the product insert, incubate for six hours and check for results. Enzymatic technology saves you time and saves your company money.. One of the Culture Assays has been submitted to AOAC for testing and approval.

Envirocon International, Inc. - Concord, CA

Please circle No. 264
on your Reader Service Card

Charm Sciences Offers Rapid Tests for Residue Detection and More

Charm Technology continues to define quality assurance and quality control with rapid tests for residue detection. From raw milk, to finished product, Charm Sciences offers a comprehensive line of residue detection tests.

The Charm Transit Test is a fast and inexpensive multi-antibiotic test that can be performed by the bulk milk hauler. Using portable equipment and low cost, tableted reagents, the test takes as little as 3 minutes.

The Charm II System can test for 8 families of Antibiotics. It tests for Aflatoxins and Pesticides. It gives you Microbial counts in raw milk, tests for Bacteria, in both raw and finished products and can even be used for Sanitation Monitoring.

The Charm Alkaline Phosphatase (CAP) Test, run on the Charm II System detects Alkaline Phosphatase in a full range of liquid and semisolid dairy products.

Charm Sciences provides a wide range of rapid tests for Antibiotic, Aflatoxin and Pesticide detection, total viable organism count, shelf life prediction, sanitation surveillance and pasteurization control.

In addition, Charm Sciences offers custom designed software for on line data management.

Charm Sciences, Inc. - Malden, MA

Please circle No. 265
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Pure and Authenticated Biological Cultures Available from American Type Culture Collection

ATCC (American Type Culture Collection) is a primary resource for biological culture standards. ATCC has over 50,000 different strains of living cultures and culture derived genetic materials available to the science community. Available cultures include algae, animal viruses, bacteria, cell lines, fungi, protozoa, plant viruses, and yeasts. ATCC's holdings include reference cultures for all standard testing protocols.

ATCC also offers several unique products for working with cultures, training workshops and manuals on culturing techniques, and contract laboratory services, such as bulk culture preparations and proprietary long-term culture storage.

ATCC is a private, nonprofit science organization affiliated with 22 professional scientific societies in the U.S. and Canada, each of which appoints one member to serve on ATCC's Board of Directors.

American Type Culture Collection - Rockville, MD

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Where to Find It

See our Ad on the Back Cover.

Where to Find It

IAMFES Audio Visuals Library

A Free IAMFES Members Benefit

DAIRY

❑ **Babcock Method for Determination of Butterfat in Raw Milk** - A videotape report that describes the purposes, procedures and refinements of The Babcock Method for determining fat content in raw milk. Revised test procedures are presented which will result in greater accuracy and reproducibility. Viewing is recommended by anyone in public health or the dairy industry who uses the Babcock test. (Ozark Film & Video Production, Inc.)

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

❑ **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)

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

❑ **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)

❑ **Ether Extraction Method for Determination of Raw Milk** - (26 minute video). Describes the ether extraction procedure to measure milkfat in dairy products. Included is an explanation of the chemical reagents used in each step of the process. (CA-1990)

❑ **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)

❑ **The Gerber Butterfat Test** - (7 minute video). Describes the Gerber milkfat test procedure for dairy products and compares it to the Babcock test procedure. (CA-1990)

❑ **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)

❑ **Mastitis Prevention and Control** - (2-45 minute videos). This video is ideal for one-on-one or small group presentations. Section titles include: Mastitis Pathogens, Host Defense, Monitoring Mastitis, Mastitis Therapy, Recommended Milking Procedures, Postmilking Teat Dip Protocols, Milk Quality, Milking Systems. (Nasco)

❑ **Milk Plant Sanitation: Chemical Solution** - (13 minute video). 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)

❑ **Pasteurizer: Design and Regulation** - (15 1/2 minute videotape). This tape provides a summary of the public health reasons for pasteurization and a nonlegal definition of pasteurization. The components of an HTST pasteurizer, elements of design, flow-through diagram and legal controls are discussed.

❑ **Pasteurizer Operation** - (10 1/2 minute videotape). This tape provides a summary of the operation of an HTST pasteurizer from start-up with hot water sanitization to product pasteurization and shut-down. There is an emphasis on the legal documentation required.

❑ **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)

❑ **Safe Milk Hauling - You're the Key** - (34 minute videotape). Recommended for anyone who samples, measures and collects milk from dairy farms. The purpose of this tape is to acquaint milk handlers with the proper procedures for sampling and picking up milk at the farm and delivering it safely to the handling plant. This tape provides an excellent review for experienced milk haulers and shows step-by-step procedures for novice milk haulers. (Cornell University)

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

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

FOOD

❑ **BISSC - A Sign of Our Times** - (video). 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.

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

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

❑ **Food Quality, Food Safety, and You!** - (80 slides, script, and cassette tape). This is an educational program designed for consumers. The presentation 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—Food Smart—HACCP and its Application to the Food Industry** - (2-16 minute video modules). Module 1 - Introduces the seven principles of HACCP and their application to the food industry. Viewers will learn about the HACCP system and how it is used in the food industry to provide a safe food supply. Module 2 - Provides guidance on how to design and implement a HACCP system. It is intended for individuals with the responsibility of setting up a HACCP system. (Alberta Agriculture, Food and Rural Development)

❑ **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 of the micro-organisms 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) Staphylococcus Aureus (meats), (3) Bacillus Cereus, and (4) Salmonella (meat). Viewers will learn typical errors in the preparation, holding and serving of food. Also included are examples of correct procedures which will reduce the risk of food contamination. (Perennial Education)

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

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

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

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

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

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

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

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

❑ **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.

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

❑ **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)

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

❑ **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.

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

❑ **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)

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

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

❑ **Supermarket Sanitation Program - "Cleaning and Sanitizing"** - (12.5 minute videotape). Contains a full range of cleaning and sanitizing information with minimal emphasis on product. Designed as a basic training program for supermarket managers and employees.

❑ **Supermarket Sanitation Program - "Food Safety"** - (10.5 minute videotape). Contains a full range of basic sanitation information with minimal emphasis on product. Filmed in a supermarket, the video is designed as a basic program for manager training and a program to be used by managers to train employees.

❑ **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.

❑ **Your Health in Our Hands - Our Health in Yours** - (8 minute videotape). For professional food handlers, the tape covers the do's and don'ts of food handling as they relate to personal hygiene, temperature control, safe storage and proper sanitation. (Jupiter Video Production)

ENVIRONMENTAL

❑ **The ABC's of Clean - A Handwashing & Cleanliness Program for Early Childhood Programs** - For early childhood program employees. This tape illustrates how proper handwashing and clean hands can contribute to the infection control program in daycare centers and other early childhood programs. (The Soap & Detergent Ass'n.)

❑ **EPA Test Methods for Freshwater Effluent Toxicity Tests (using Ceriodaphnia)** - (22 minute tape). Demonstrates the Ceriodaphnia 7-Day Survival and Reproduction Toxicity Test and how it is used to monitor and evaluate effluents for their toxicity to biota and their impact on receiving waters and the establishment of NPDES permit limitations for toxicity. The tape covers the general procedures for the test including how it is set up, started, monitored, renewed and terminated.

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

❑ **Foodservice Disposables: Should I Feel Guilty?** - (11 1/2 minute videotape). The video, produced by the Foodservice & Packaging Institute, Inc., national trade association of manufacturers and suppliers of single service articles for foodservice and packaging, examines such issues as litter, solid waste, recycling, composting and protection of the earth's ozone layer, makes for an excellent discussion opener on the theme of conservation of natural resources (trees, fresh water and energy) and the environmental trade-offs (convenience, sanitation and family health) that source reduction necessarily entails. (Foodservice & Packaging Institute, Inc.)

❑ **Garbage: The Movie** - (24 1/2 minute videotape). A fascinating look at the solid waste problem and its impact on the environment. Viewers are introduced to landfills, incinerators, recycling plants and composting operations as solid waste management solutions. Problems associated with modern landfills are identified and low-impact alternatives such as recycling, reuse, and source reduction are examined. (Churchill Films)

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

❑ **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 alternative pest-control efforts; biological pesticides, genetically-engineered microbes that kill objectionable insects, the use of natural insect predators, and the cross-breeding and genetic engineering of new plant strains that produce their own anti-pest toxins. (Films for the Humanities & Sciences, Inc.)

❑ **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.)

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

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

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

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

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

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

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

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

❑ **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.

❑ **Eating Defensively: Food Safety Advice for Persons with Aids** - (14 1/2 minute videotape). While HIV infection and AIDS are not acquired by eating foods or drinking liquids, persons infected with the AIDS virus need to be concerned about what they eat. Foods can transmit bacteria and viruses capable of causing life-threatening illness to persons infected with AIDS. This video provides information for persons with AIDS on what foods to avoid and how to better handle and prepare foods. (FDA/CDC)

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

❑ **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)

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

❑ **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)

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

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, 200W Merle Hay Centre, 6200 Aurora Avenue, Des Moines, IA 50322. (Material from the Lending Library can be checked out for two weeks only so that others can benefit from its use.)

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(continued on page 56)

3-A Sanitary Standards for Air or Hydraulically Driven Diaphragm Pumps for Milk and Milk Products, Number 44-01

Formulated by
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards program to allow and encourage full freedom for inventive genius or new developments. Diaphragm pump specifications heretofore or hereafter developed which so differ in design, material, construction, or otherwise, as not to conform with the following standards, but which in the manufacturer's or fabricator's opinion are equivalent or better may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time.

A

SCOPE

A.1

These standards cover the sanitary aspects of air or hydraulically driven diaphragm pumps for milk and milk products.

A.2

In order to conform to these 3-A Sanitary Standards, diaphragm pumps shall comply with the following design, material, and fabrication criteria.

B

DEFINITIONS

B.1

Product: Shall mean milk and milk products.

B.2

Surfaces

B.2.1

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

B.2.2

Nonproduct Contact Surfaces: Shall mean all other exposed surfaces.

B.3

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

C

MATERIALS

C.1

All product contact surfaces shall be of stainless steel of the AISI 300 Series*1 or corresponding ACI*2 types (See Appendix Section E.), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types and is nontoxic and nonabsorbent, except that:

C.1.1

Rubber and rubber-like materials may be used for O-rings, seals, diaphragms, valve seats, check valve balls and flaps, and parts having the same functional purposes.

C.1.2

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

C.I.3

Plastic materials may be used for O-rings, seals, diaphragms, valve seats, check valve balls and flaps, and parts having the same functional purposes.

C.1.4

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

C.1.5

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

C.1.6

*1 *The data for this series are contained in the following reference: AISI Steel Products Manual, Stainless & Heat Resisting Steels, November. 1990, Table 2-1, pp. 17-20. Available from American Iron and Steel Institute, 1000 16th St., NW, Washington, DC 20036 (202-452-7100) (Use most current edition).*

*2 *Steel Founder's Society of America, Cast Metals Federation Bldg., 455 State St., Des Plaines, IL 60016 (708-299-9160).*

The final bond and residual adhesive, if used, of bonded rubber and rubber-like materials and bonded plastic materials shall be nontoxic.*[3]

C.1.7

Check valve balls may also be of hard rubber (a vulcanized rubber having a ratio of combined sulfur to rubber hydrocarbon in excess of 15 percent and a Shore A Durometer value in excess of 90) that is nontoxic and relatively resistant to abrasion, will maintain its original characteristics, such as form, shape and dimensions, and will not affect the product and shall, when subjected to the test regimen set forth in the current 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-, (a) comply with the criteria in Section I (1) and Section I (3), (b) have maximum weight gains as set forth in Section I (2) of 0.30 and in the Cleanability Response, 0.30 in Product Treatment with Solution I and 0.30 in Product Treatment with Solution J.

C.2

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

C.3

In hydraulically driven diaphragm pumps, the hydraulic fluid used shall be food grade white oil as provided for in 21 CFR Parts 172. 878 and 178.3620A.

D

FABRICATION

D.1

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

D.2

All permanent joints in metallic product contact surfaces shall be continuously welded. Welded areas on product contact surfaces shall be at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds and crevices in the final fabricated form.

D.3

Rubber or rubber-like materials, hard (vulcanized) rubber and plastic materials having product contact surfaces that are a coating or covering shall be bonded in such a manner that the bond is continuous and mechanically sound, and so that when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment, the rubber and rubber-like material, hard (vulcanized) rubber or the plastic material does not separate from the base material to which it is bonded. The final bond and residual adhesive, if used, shall conform to the criteria in C.1.6.

D.4

Pumps that are to be mechanically cleaned shall be designed so that all product contact surfaces of the pump, and all nonremovable appurtenances thereto can be mechanically cleaned and are readily accessible for inspection.

D.4.1

All product contact surfaces not designed to be mechanically cleaned shall be easily accessible for cleaning and inspection either when in an assembled position or when removed. Removable parts shall be readily demountable.

D.5

There shall be no threads on product contact surfaces.

D.6

Gaskets having product contact surfaces shall be removable. Any gasket groove or gasket retaining groove shall not exceed 1/4 in. (6 mm) in depth or be less than 1/4 in. (6 mm) wide except those for standard O-rings smaller than 1/4 in. (6 mm), and those provided for fittings in Section D.8.

D.7

All internal angles of 135 degrees or less on product contact surfaces shall have minimum radii of 1/4 in. (6 mm), except that:

D.7.1

Where for space or functional reasons, such as intricately machined or molded parts, it is impossible to have a radius of l/4 in. (6 mm), smaller radii may be used. In no case shall such radii be less than 1/32 in. (1 mm).

D.7.2

The minimum radii in gasket grooves, gasket retaining grooves, or grooves in gaskets, shall not be less than 1/8 in (3 mm) except those for standard 1/4 in. (6 mm) and smaller O-rings and those provided for fittings in Section D.8.

D.7.3

The minimum radii in grooves for standard 1/4 in. (6 mm) O-rings shall be not less than 3/32 in. (2 mm) and for standard 1/8 in. (3 mm) O-rings shall be not less than 1/32 in. (1 mm).

D.7.4

When a flat diaphragm is in its neutral position the angle formed between the diaphragm and the wall of the chamber at the clamping point on the product side shall be not less than 90 degrees.

D.7.5

A tubular diaphragm design shall provide a straight through flow path void of any cracks or crevices.

D.7.6

When a flat diaphragm is in its neutral position the angle formed between the diaphragm and the rod attachment, at the clamping point on the product side, shall be not less than 90 degrees. This requirement pertaining to the clamping point is not applicable if the rod attachment is completely encapsulated by the diaphragm material.

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*[3] *Adhesives shall comply with 21 CFR Part 175 - Indirect food additives. Adhesives and components of coatings. Document for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 (202-783-3238) (Use most current edition).*

D.7.7

The clamping point(s) on the flat or tubular diaphragm shall be designed so that there is effective liquid sealing at the clamping point regardless of the pumping stroke position of the diaphragm.

D.8

Inlet and outlet connections shall conform with the applicable provisions of the current 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products, Number 63-.

D.9

Leak Detection

D.9.1

The chamber on the nonproduct side of a pneumatically driven diaphragm pump shall be provided with a means of detecting a leak in the diaphragm. A detection system capable of sensing the presence of liquid and stopping the pump shall be installed in both nonproduct chambers of the pump. The presence of any liquid may be caused by a ruptured diaphragm.

D.9.2

Hydraulically driven diaphragm pumps shall be equipped with diaphragms to provide a double barrier between the product and the hydraulic system, and shall include a leak detection device to reliably sense rupture of either diaphragm. The space between the two diaphragms shall be equipped with a pressure activated switch or conductivity probe to immediately signal diaphragm rupture by contact closure and to stop the pump motor.

D.9.3

The manufacturer shall provide a failsafe leak detection system which will make the pump stop whenever liquid is sensed on the nonproduct side of the diaphragm, or pressure rise or change in conductivity is sensed in the intermediate space or the leak detection system fails.

D.9.4

The leak detection apparatus shall be easily tested independently, or verified on the pump while the pump is in operation. One test method for pneumatic pumps is to submerge the detector probe(s) in a conductive fluid such as water to determine that the pump does stop. In the case of a hydraulically driven diaphragm pump, pressure can be applied to the monitoring chamber via the hose barb to test the pressure activated switch for shutdown signal or the conductivity probe apparatus may be tested independently via a test switch on the probe.

D.10

The pump shall be drainable when disassembled for manual cleaning and/or inspection.

D.11

The means of supporting pumps shall be one of the following:

D.11.1

With legs. Legs shall be adjustable, smooth with rounded ends, and have no exposed threads. Legs made of hollow stock shall be sealed. Legs shall be of sufficient length to provide a clearance between the lowest part of the base, pump, motor or drive and the floor no less than:

D.11.1.1

Four in. (10 cm) on pumps with legs designed to be permanently mounted or fixed to the floor or pumps having a horizontal base area of more than 1 sq ft (0.09 sq m) or;

D.11.1.2

Two in. (5 cm) on pumps having a horizontal base area of not more than 1 sq ft (0.09 sq m) and not designed to be fixed to the floor.

D.11.2

If mounted on a wall or column the point of attachment of a diaphragm pump to its mounting shall be designed for sealing. The mounting, if supplied by the manufacturer, shall be designed for sealing to the wall or column. The design of a diaphragm pump to be mounted on a wall or column shall be such that there will be at least a 4 in. (100 mm) clearance between the outside of the diaphragm pump and the wall or column.

D.12

Any guard(s) required by a safety standard that will not permit accessibility for cleaning and inspection shall be designed so that it (they) can be removed without the use of tools.

D.13

Nonproduct contact surfaces shall be smooth, free of pockets and crevices and be readily cleanable and those to be coated shall be effectively prepared for coating.

APPENDIX

E

STAINLESS STEEL MATERIALS

Stainless steel conforming to the applicable composition ranges established by AISI[*1] for wrought products, or by ACI[*2] for cast products, should be considered in compliance with the requirements of Section C.1 herein. Where welding is involved the carbon content of the stainless steel should not exceed 0.08 percent. The first reference cited in C.1 sets forth the chemical ranges and limits of acceptable stainless steels of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical composition of these cast grades are covered by ASTM[*4] specifications A351/A351M, A743/A743M and A7441/A744M.

F

PRODUCT CONTACT SURFACE FINISH

Surface finish equivalent to 150 grit or better as obtained with silicon carbide properly applied on stainless steel sheets is one method of complying with the requirements of Section D.1 herein. A maximum Ra of 32 micro in. (0.8 microm), when measured according to the recommendations in ANSI/ASME B.46.1 - Surfaces Texture, is considered equivalent to a No. 4 finish.[*5]

[*4] *Available from ASTM, 1916 Race St., Philadelphia, PA 19103-1187 (215-299-5400) (Use most current edition).*

[*5] *Available from the American Society of Mechanical Engineers, 345 E. 47th St., New York, NY 10017-2392 (212-705-7722) (Use most current edition).*

These amended standards shall become effective November 20, 1993 at which time 3-A Sanitary Standards for Air Driven Diaphragm Pumps for Milk 9-90 and Milk Products, Number 44-00, shall be rescinded and become null and void.

3-A Sanitary Standards for Plate Type Heat Exchangers for Milk and Milk Products, Number 11-05

Formulated by
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards program to allow and encourage full freedom for inventive genius or new developments. Plate type heat exchanger specifications heretofore and hereafter developed which so differ in design, material, fabrication, or otherwise as not to conform with the following standards, but which, in the fabricator's opinion are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time.

A

SCOPE

A.1

These standards cover the sanitary aspects of plate type heat exchangers for milk and milk products.

A.2

In order to conform with these 3-A Sanitary Standards, plate type heat exchangers shall comply with the following in design, material and fabrication criteria.

B

DEFINITIONS

B.1

Product: Shall mean milk and milk products.

B.2

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

B.3

Nonproduct Contact Surfaces: Shall mean all other exposed surfaces.

C

MATERIALS

C.1

All product contact surfaces shall be of stainless steel of the AISI 300 Series*[1] or corresponding ACI*[2] types (See Appendix, Section E.), or equally corrosion-resistant metal that is nontoxic and nonabsorbent, except that:

C.1.1

Rubber and rubber-like materials may be used for gaskets. These materials shall comply with the applicable provisions of the current 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C.1.2

Plastic materials may be used for gaskets. These materials shall comply with the applicable provisions of the current 3-A Sanitary Standards for Multiple-Use Plastic Materials used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C.1.3

Bonded rubber and rubber-like materials and bonded plastic materials having product contact surfaces shall be of such composition as to retain their surface and conformation characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and sanitizing treatment.

C.1.3.1

The final bond and residual adhesive, if used, of bonded rubber and rubber-like materials and bonded plastic materials shall be nontoxic.*[3]

C.2

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

D

FABRICATION

D.1

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

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*[1] *The data for this series are contained in the AISI Steel Products Manual, Stainless & Heat Resisting Steels, November 1990, Table 2-1, pp. 17-20. Available from the Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086 (412-776-9460) (Use most current edition).*

*[2] *Steel Founders Society of America, Cast Metal Federation Bldg., 455 State St., Des Plaines, IL 60016 (708-299-9160) (Use most current edition).*

*[3] *Adhesives shall comply with 21 CFR Part 175 - Indirect food additives. Adhesives and components of coatings. Document for sale by the Superintendent of Documents, U.S. Government Office, Washington, DC 20402 (202-783-3238) (Use most current edition).*

D.2

All product contact surfaces shall be easily accessible for cleaning and inspection either when in an installed position or when removed.

D.2.1

Removable parts shall be readily demountable. Heat transfer plates shall be readily removable from the press.

D.2.2

There shall be no more than 8 clamping bolts. Bolts, if used, shall be located in cutouts so as to be easily removable.

D.3

All internal of 135 degrees or less on product contact surfaces, shall have radii of not less than 1/4 in. (6 mm) except where smaller radii are required for essential functional reasons. In no case shall such radii be less than 1/32 in. (1 mm).

D.4

There shall be no threads on product contact surfaces.

D.5

Connections in product contact surfaces shall conform to the applicable provision of the current 3-A Sanitary Standards for Sanitary Fittings and Connections for Milk and Milk Products, Number 63-.

D.6

Heat transfer plate gaskets shall be continuous and shall be removable or shall be bonded to the transfer plate in such a manner that the bond is continuous and mechanically sound so that in the environment of its intended use the gasket does not separate from the plate.

D.7

A leak detector groove of sufficient width to be readily cleanable and open to the atmosphere at both ends shall be provided to allow the leakage past the gaskets to drain to atmosphere so as to prevent accumulation of product.

D.8

SUPPORTS

D.8.1

The means of supporting a plate heat exchanger shall be one of the following:

D.8.2

Presses (or frames) shall be provided with legs of sufficient length to give a clearance of at least 4.0 in. (100 mm) between the lowest part of the press and the floor. Legs shall have rounded ends and have no exposed threads. If made of hollow stock they shall be effectively sealed.

D.8.3

Farm cooling presses (or frames) that are designed for mounting on a wall or column, shall have at least 4.0 in. (100 mm) clearance between the outside of the plate heat exchanger and the wall or column.

D.9

Presses (or frames) shall be so constructed that when opened, plates and/or terminal frames may be separated to provide a space for cleaning and inspection equal to the lesser of the width of one plate or 15 in. (380 mm).

D.10

Nonproduct contact surfaces shall be smooth, relatively free of pockets and crevices, and be readily cleanable. Surfaces to be coated shall be effectively prepared for coating.

E

STAINLESS STEEL MATERIALS

Stainless steel conforming to the applicable composition ranges established by AISI*1 for wrought products, or by ACI*2 for cast products, should be considered in compliance with the requirements of Section C.1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08 percent. The first reference cited in C.1 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM*4 specifications A351/A351M, A743/A743M and A744/A744M.

F

PRODUCT CONTACT SURFACE FINISH

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D.1 herein.

G

Heat exchanger presses (or frames) should be located at a sufficient distance from walls to permit easy access to the plates.

G.1

There should be unobstructed access to one side of the heat exchanger.

**4 Available from ASTM, 1916 Race St., Philadelphia, PA 19103-1187 (215-299-5400) (Use most current edition).*

These amended standards become effective November 20, 1993.

3-A Sanitary Standards for Equipment for Packaging Viscous Dairy Products, Number 23-02

Formulated by
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards program to allow and encourage full freedom for inventive genius or new developments. Frozen desserts, cottage cheese and similar dairy products packaging equipment specifications heretofore or hereafter developed which so differ in design, material, fabrication, or otherwise as not to conform with the following standards, but which, in the fabricator's opinion are equivalent or better may be submitted for the joint consideration of the IAMFES, USPHS, and DIC, at any time.

A

SCOPE

A.1

These standards cover the sanitary aspects of unitized equipment for holding, mechanically opening, forming, dispensing, filling, closing, sealing, or capping containers for viscous dairy products, or wrapping viscous dairy products, and all parts essential to these functions. The equipment shall perform one or more of the following functions:

1. Holding the container preparatory to further processing
2. Mechanically opening the container
3. Forming the container
4. Dispensing a preformed container
5. Applying and sealing a supplementary fitment
6. Other processing equipment, as defined herein
7. Filling the container
8. Closing the container
9. Sealing the container
10. Capping the container
11. Wrapping the product
12. Applying a tamper-evident security seal.

The equipment shall start at the point(s) where the product, container, container blank, container material or wrapping material first enters the equipment. The equipment shall end where the processed container exits the equipment. These standards do not pertain to the container, or to other equipment such as labelers, printers, or daters not furnished as part of the unitized equipment, nor shall these standards apply to equipment for milk or nonviscous fluid milk products.

A.2

In order to conform with these current 3-A Sanitary Standards, equipment for packaging viscous dairy products shall comply with the following design, material, and fabrication criteria.

B

DEFINITIONS

B.1

Product: Shall mean frozen desserts, cottage cheese, sour cream, yogurt, whipped butter, cream cheese, processed cheese and other similar viscous dairy products, including added ingredients.

B.2

Viscous: Shall mean nonfluid product which is pumpable or flowable at packaging condition.

B.3

Container: Shall mean a single service packaging enclosure or material being formed into the package, including its body, cap, cover, fitment or closure, and a wrapper or other structure, capable of holding the product.

B.4

Mechanical Holding, Opening, Forming, and Dispensing Equipment: Shall mean the equipment for performing all or part of the following integral functions of feeding, holding, forming, seaming, opening and dispensing the containers.

B.5

Mechanically Filling Equipment: Shall mean the equipment for filling the container with the product.

B.6

Mechanical Capping, Closing, Sealing, and Wrapping Equipment: Shall mean the equipment for capping, closing, sealing the container and applying the security seal, or wrapping the product.

B.7

Other Processing Equipment: Shall mean product handling equipment such as pumps, mixers, blenders, ingredient feeders, and texturizers, integral to the filler equipment, which process, treat, flavor or add supplements to the product immediately prior to filling.

B.8

Surfaces

B.8.1

Product Contact Surfaces: Shall mean all surfaces which are exposed to the product, surfaces from which liquids may drain, drop, or be drawn into the product or into the container, and surfaces that touch the product contact surfaces of the container

B.8.2

Nonproduct Contact Surfaces: Shall mean all other exposed surfaces.

B.9

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

B.10

Electrodeposited: Shall mean coated to specific dimensions or processed to specified dimensions after coating.[*3]

B.11

Arithmetical Mean (Ra): Shall be the arithmetical mean of the absolute values of the profile departure within a sampling length.[*4]

B.12

Supplementary Fitment or Device: Shall mean any component or assembly which is attached to the container. Examples include but are not limited to pour spouts, closures, handles and tamper evident seals.

C

MATERIALS

C.1

All product contact surfaces shall be of stainless steel of the AISI 300 Series[*1] or corresponding AC1[*2] types (See Appendix, Section E), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types and is nontoxic and nonabsorbent, except that:

C.1.1

Those surfaces of holding, forming, opening, dispensing, closing, capping, sealing or wrapping equipment which touch the product contact surfaces of the container or from which liquids may drain, drop or be drawn into the container, may be made of a nontoxic, nonabsorbent metal that is corrosion resistant under conditions of intended use or may be made of metal made corrosion resistant and wear resistant by a coating of chromium or nickel or an equally corrosion and wear resistant nontoxic metal.

C.1.2

Rubber or rubber-like materials may be used for filling nozzles, plungers, compression-type valve plugs, gaskets, diaphragms, O-rings, rollers, belts, sealing rings, slingers, drip shields, protective caps for sanitary connections, container opening, dispensing, capping, wrapping and closing parts, filler valve parts, seals, short flexible tubing, agitators, agitator seals, agitator bearings, forming, rotors, augers, impellers, mixing paddles, stators and housings and parts having the same functional purposes, may be made of, or covered with, rubber or rubber-like materials.

C.1.3

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

C.1.4

Plastic materials may be used for filling nozzles, plungers, compression type valve plugs, gaskets, O-rings, diaphragms, rollers, belts, sealing rings, slingers, drip shields, agitator seals, agitator bearings, protective caps for sanitary connections, container opening, dispensing, forming, capping, wrapping and closing parts, filler valve parts, seals, short flexible tubing, short connectors, viewing ports, rotors, agitators, augers, impellers, mixing paddles, stators and housings and parts having the same functional purposes, may be made of, or covered with, plastic materials.

C.1.5

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

C.1.6

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

C.1.7

The final bond and residual adhesive, if used, of bonded rubber or rubber-like materials and bonded plastic materials shall be nontoxic.[*5]

C.1.8

Rubber and rubber-like materials and plastic materials having product contact surfaces that are a bonded coating or a covering shall be of such composition as to retain their surface and conformation characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

C.1.9

Single service gaskets of a sanitary type may be used on parts which must be disassembled for cleaning.

C.1.10

When materials having certain inherent functional properties are required for specific applications, such as rotary seals and container forming parts, carbon and/or ceramic materials may be used. Carbon and ceramic

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[*1] *The data for this series are contained in the AISI Steel Products Manual, Stainless & Heat Resisting Steels, November 1990 Table 2-1, pp. 17-20. Available from the Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086 (412-776-9460) (Use most current edition).*

[*2] *Steel Founders Society of America, Cast Metal Federation Bldg., 455 State St., Des Plaines, IL 60016 (708-299-9160).*

[*3] *QQ-N-290A: Federal Specification for Nickel Plating (Electrodeposited) November 12, 1971. QQ-C-320B: Federal Specificatio for Chromium Plating (Electrodeposited) June 17, 1974 with amendment 4, April 10, 1987. Both documents available from The General Services Administration, Seventh and D Sts., NW, WFCIA, Washington, DC 20405 (202-472-2205) (Use most current editions).*

[*4] *Additional information on arithmetical mean (Ra) is contained in ANSI B.46.1-1978. Available from The American National Standards Institute, 1430 Broadway, New York, NY 10018 (212-354-3300) (Use most current edition).*

[*5] *Adhesives shall comply with 21 CFR Part 175 - Indirect food additives. Adhesives and components of coatings. Document for sale by the Superintendent of Documents, U.S. Government Office, Washington, DC 20402 (202-783-3238) (Use most current edition).*

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

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

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materials shall be inert, nonporous, nontoxic, nonabsorbent, insoluble, resistant to scratching, scoring and distortion when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment or sterilization.

C.2

In packaging equipment designed to be sterilized or sanitized by steam, hot air, chemical, or other means, all materials having a product contact surface used in the fabrication of fittings valves, tubing, gaskets and nonmetallic component parts shall be such that they retain their mechanical, surface and conformational characteristics, and their metallurgical, and chemical integrity under the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment, or sterilization.

C.3

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

D

FABRICATION

D.1

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

D.1.1

Surfaces used to apply sterilizing chemicals to the product contact surfaces of the package may have a surface finish at least as smooth as a Ra finish of 125 microinch (3.18 micrometer).

D.2

Permanent joints in metallic product contact surfaces shall be continuously welded. Welded areas of product contact surfaces shall be at least as smooth as No. 4 ground finish on stainless steel sheets free of imperfections such as pits, folds, and crevices.

D.2.1

Hoses with permanently attached sanitary fittings when used for short flexible connections shall meet current 3-A Sanitary Standards for Hose Assemblies for Milk and Milk Products, Number 62-.

D.3

The minimum thickness of electrodeposition shall when used on stainless steel be 0.0002 in. (0.005 mm) for all product contact surfaces. When the parts listed in C.1.1 are to be coated are other than stainless steel the minimum thickness of the electrodeposited coating shall be 0.002 in. (0.05 mm).

D.3.1

The minimum thickness of a coating of electroless nickel alloy, as specified in C.1.1 shall be 0.002 in. (0.05 mm).

D.4

All product contact surfaces not designed to be mechanically cleaned shall be easily accessible for cleaning and inspection either when in an assembled position or when removed. Removable parts shall be readily demountable.

D.5

Packaging equipment that is to be mechanically cleaned shall be designed so that the product contact surfaces of the packaging equipment and all nonremovable appurtenances thereto can be mechanically cleaned, and are easily accessible for inspection.

D.6

Product contact surfaces shall be self-draining except for normal clingage. The bottom of the filler bowl or hopper shall have a minimum pitch of 1/8 in. per ft (10 mm per m) toward the plane of the outlet(s).

D.7

All filler bowls and product hoppers shall be effectively enclosed or covered and covers shall be self-draining.

D.7.1

Filler bowls or product hoppers not designed for mechanical cleaning or sterilization with pressurized steam shall be equipped with covers which (1) shall be sufficiently rigid to prevent buckling, (2) if provided with handles, the handles shall be adequate, durable, conveniently located and of sanitary design, welded in place or formed into the cover materials, and, (3) unless gasketed and clamped, shall have downward flanges not less than 3/8 in. (10 mm) along all edges. The edges of all cover openings shall extend upward at least 3/8 in. (10 mm) or be fitted with a permanently attached sanitary pipeline connection conforming to D.14.

D.7.2

Nonremovable covers for filler bowls or product hoppers or other assemblies (1) shall be of a type that can be opened and maintained in an open position, (2) shall be designed to be self-draining when in the closed position, (3) shall be designed so that when the covers are in any open position, liquid from the exterior surface shall not drain into the product, or on to a product contact surface, and (4) shall be designed so that when in the fully open position condensation from the underside of the cover will not drain into the product or onto a product contact surface. Covers of openings that will be held in place by gravity or vacuum may be of the lift-off type and may be provided with a clamp(s) or other device(s) to maintain them in position.

D.7.3

Agitator shaft openings through the bridge or top enclosure shall have a minimum diameter of 1 in. (25 mm) on packaging equipment which requires removal of the agitator shaft for cleaning, or be of a diameter that will provide a 1 in. (25 mm) minimum annular cleaning space between the agitator shaft and the inside surface of the flange for the opening on packaging equipment which does not require removal of the agitator for the cleaning. A shield that can be raised or dismantled to permit the cleaning of all its surfaces shall be provided with means to protect against the entrance of dust, oil, insects and other contaminants into the packaging equip-

ment through the annular space around the agitator shaft.

D.7.4

Agitators, mixing paddles and similar devices, if not designed for mechanical cleaning, shall be readily accessible for manual cleaning and inspection either in an assembled position or when removed. A seal for a shaft, if provided, shall be of a packless type, sanitary in design, and durable, with all parts readily accessible for cleaning.

D.8

The packaging equipment shall be so designed that adjustments necessary during the operation may be made without raising or removing the product hopper or filler bowl cover(s).

D.8.1

Packaging equipment for aseptic or extended shelf-life operation shall be designed so that adjustments necessary during the operation may be made without jeopardizing the sterility of the unit.

D.9

Gaskets

D.9.1

Gaskets having a product contact surface shall be removable or bonded.

D.9.2

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

D.9.3

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

D.9.4

Gasket grooves or gasket retaining grooves in product contact surfaces for removable gaskets shall not exceed 1/4 in. (6 mm) in depth or be less than 1/4 in. (6 mm) wide except those for standard O-rings smaller than 1/4 in. (6 mm) and those provided for in the sanitary fittings specified by Section D.14.

D.10

Radii

D.10.1

All internal angles of 135 degrees or less on product contact surfaces shall have radii of not less than 1/4 in. (6 mm) except that:

D.10.2

Smaller radii may be used when they are required for essential functional reasons, such as those in filler nozzles, paper scoring devices, mandrels and forming molds. In no case shall such radii be less than 1/32 in. (1 mm).

D.10.3

The radii in gasket grooves, gasket retaining grooves or, grooves in gaskets shall be not less than 1/8 in. (3 mm), except for those for standard 1/4 in. (6 mm) and smaller O-rings, and those provided for in the sanitary fittings specified in D.14.

D.10.4

The radii in grooves for standard 1/4 in. (6 mm) O-rings shall not be less than 3/32 in. (2 mm) and for standard 1/8 in. (3 mm) O-rings shall be not less than 1/32 in. (1 mm).

D.10.5

The minimum radii for fillets of welds in product contact surfaces shall be not less than 1/4 in. (6 mm) except that the minimum radii for such welds may be 1/8 in. (3 mm) when the thickness of one or both parts joined is less than 3/16 in. (5 mm).

D.11

Shields and Guards

D.11.1

Covers, diverting aprons, shields, or guards shall be provided as necessary and shall be so designed and located to prevent liquid or other contaminants from draining or dropping into the container or product, or onto product contact surfaces, except that:

D.11.1.1

Shields and guards may not be required in equipment designed for aseptic or extended shelf-life operation if the system provides a controlled environment such as an enclosure pressurized with sterile air or inert gas, or an environment controlled by flowing air rendered sterile by incineration, filtration, irradiation, or other means provided that fill lines and filler bowls shall be located or otherwise protected so that condensate drippage into open containers is precluded.

D.11.2

Any guard(s) required by a safety standard shall permit accessibility for cleaning and inspection.

D.12

Each fill valve or valve block shall have a deflector shield installed at the lowest practical location in such a manner that it will collect the maximum amount of condensate draining from the exterior of the valve or valve block and discharge it to waste away from the open container, except that:

D.12.1

Deflector shields may not be required in a system designed to prevent the formation of condensate in critical areas. The formation of condensate in critical areas can be prevented by 1) maintaining a valve block temperature higher than the dew point of its operating environment, by either warming the valve block or chilling the ambient air (2) dehumidifying the ambient air, or (3) maintaining a flow of unsaturated air, across the valve block, of sufficient volume and velocity to prevent the formation of condensate.

D.13

There shall be no threads on product contact surfaces except as provided for in Section D.19.

D.14

Sanitary fittings shall conform with the applicable provisions of the current 3-A Sanitary Standards for

Sanitary Fittings for Milk and Milk Products; Number 63-00; 3-A Sanitary Standards for Plug-type Valves for Milk and Milk Products, Number 51-; 3-A Sanitary Standards for Compression-type Valves for Milk and Milk Products, Number 53-; 3-A Sanitary Standards for Diaphragm-type Valves for Milk and Milk Products, Number 54-; 3-A Sanitary Standards for Boot-Seal Type Valves for Milk and Milk Products, Number 55-; 3-A Sanitary Standards for Rupture Discs for Milk and Milk Products, Number 60-; 3-A Sanitary Standards for Fittings Thermoplastic Plug-Type Valves for Milk And Milk Products, Number 52-00; 3-A Sanitary Standards for Hose Assemblies for Milk and Milk Products, Number 62-; except that materials conforming to C.1.3 or C.1.5 or C.1.6 and C.1.7 may be used for caps of sanitary design for the protection of terminal ends of sanitary tubes.

D.15

All instrument connections having product contact surfaces shall conform to the current 3-A Sanitary Standards for Instrument Fittings and Connections used on Milk and Milk Products Equipment, Number 09-.

D.16

All metal tubing shall comply with the applicable provisions for welded sanitary product pipelines found in the current 3-A Accepted Practices for Permanently Installed Sanitary Product Pipelines and Cleaning Systems with Amendment number 605-, and/or with current 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33-.

D.17

Pressure and level sensing devices, if used, shall conform with the applicable provisions of the current 3-A Sanitary Standards for Pressure and Level Sensing Devices Number 37-.

D.18

Flow meters, if used, shall conform with the applicable provisions of current 3-A Sanitary Standards for Flow Meters for Milk and Milk Products, Number 28-.

D.19

Pumps, if used, shall conform with the applicable provisions of current 3-A Sanitary Standards for Centrifugal and Positive Rotary Pumps for Milk and Milk Products, Number 02- or current 3-A Sanitary Standards for Homogenizers and Pumps of the Plunger Type, Number 04-.

D.20

When provided by the manufacturer, equipment for producing air under pressure and/or air piping which is supplied as an integral part of the filling equipment shall comply with the applicable provisions of the current 3-A Accepted Practices for Supplying Air Under Pressure in Contact with Milk, Milk Products and Product Contact Surfaces, Number 604-.

D.21

Coil springs having product contact surfaces shall have at least 3/32 in. (2 mm) openings between coils including the ends when the spring is in free position. Coil springs shall be readily accessible for cleaning and inspection.

D.22

If coding and/or dating is to be performed, coding and/or dating devices shall be designed, installed and operated such that these operations are performed in such a manner that open or unsealed containers are not subject to contamination. If shielding is provided, it shall be properly designed and installed to preclude contamination of open containers.

D.23

Supports

D.23.1

The means of supporting packaging equipment shall be one of the following:

D.23.1.1

If legs are used, they shall be smooth with rounded ends and have no exposed threads. Legs made of hollow stock shall be sealed. Legs shall provide a minimum clearance between the lowest part of the base and the floor of not less than 6 in. (150 mm).

D.23.1.2

If casters are used, they shall be mounted on legs of sufficient length to provide a clearance between the lowest part of the base and the floor of no less than 6 in. (150 mm). The casters shall be durable and of a size that will permit easy movement of the packaging equipment.

D.24

Nonproduct contact surfaces shall be smooth, free of pockets and crevices and be readily cleanable and those to be coated shall be effectively prepared for coating.

APPENDIX

E

STAINLESS STEEL MATERIALS

Stainless steel conforming to the applicable composition ranges established by AISI[*3] for wrought products, or by ACI[*4] for cast products, should be considered in compliance with the requirements of Section C.1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08 percent. The first reference cited in C.1 sets forth the chemical ranges and limits of acceptable stainless steels of the 300 series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM[*7] specifications 351/A351M, A743/A743M and A744/A744M.

F

PRODUCT CONTACT SURFACE FINISH

Surface finish equivalent to 150 grit or better as obtained with silicon carbide properly applied to stainless steel sheets is considered in compliance with the requirements of Section D.1 herein. A maximum Ra of 32 micro in. (0.8 microm), when measured according to the

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[*6] *Available from the American Society of Mechanical Engineers, 345 E. 47th Street, New York, NY 10017-2392 (212-705-7722) (Use most current edition).*

[*7] *Available from ASTM, 1916 Race St., Philadelphia, PA 19103-1187 (215-299-5400) (Use most current edition).*

recommendations in ANSI/ASME B.46.1 Surface Texture, is considered equivalent to a No. 4 finish."[6]

G

CULINARY STEAM

Steam used as the sterilizing medium for product contact surfaces shall meet the criteria for culinary steam as specified in the current 3-A Accepted Practices for a Method of Producing Steam of Culinary Quality, Number 609-.

These standards are effective November 20, 1993, at which time the 3-A Sanitary Standards for Equipment for Packaging Frozen Desserts, Cottage Cheese, and Similar Dairy Products, Number 23-01 are rescinded and become null and void.

New Members

(continued from page 45)

Richard A. Yest
Fromageries Bel, Inc.
Hilbert

Virginia

Dafne Diez de Medina
Virginia Tech
Blacksburg

Argentina

Julio Gonzalez
Nestle Argentina
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Coming Events

1994

February

•**3-4, Microbiological Concerns in Food Plant Sanitation & Hygiene,** a two day interactive lecture course, sponsored by Silliker Laboratories Group, Inc., will be held in New Orleans, LA. For further information, contact Silliker Laboratories, Education Services Dept. at (800) 829-7879.

•**January 31-February 2, National Mastitis Council 33rd Annual Meeting,** in conjunction with the ASAE Third International Dairy Housing Conference, will be held at the Hyatt Orlando, Orlando, FL. For further information, contact the National Mastitis Council at (703) 243-8268

•**22, Georgia Association of Food and Environmental Sanitarians Annual Meeting** will be held at the Holiday Inn Airport North in Atlanta, Georgia. The subject for the meeting will be "Hot Topics in Food Safety." For more information contact Mark Harrison at (706)542-2286.

•**23-25, Mid-Continental Assn. of Food and Drug Officials Annual Conference,** to be held at the Plaza Inn, Kansas City, MO. For more information, contact Darryl Cohen, Milk and Food Protection, Kansas City Missouri Health Dept., (816) 283-0434.

March

•**7-10, Better Process Control School.** For more information please contact Robert Price (916/752-2194) or Pamela Tom (916/752-3837), Food Science and Technology Department, University of California, Davis, CA 95616-8598, FAX: (926)752-4759.

•**14-15, HACCP for Seafood Processors,** a two day interactive workshop designed for those responsible for implementing a HACCP plan in a seafood plant, will be held in Boston, MA. Sponsored by Silliker Laboratories Group, Inc., more information is available by calling Silliker's Education Services Dept. at (800) 829-7879.

•**16, Annual Food Industry Conference** will be sponsored by the Food Science Department at Purdue University. For more information contact James V. Chambers, Food Science Department, Smith Hall, Purdue University, West Lafayette, IN 47907, Phone: (317)494-8279.

April

•**6-8, Annual Educational Conference of the Missouri Milk, Food and Environmental Health Assn.** will be held at the Ramada Inn, Columbia, MO. For more information, contact Janet Murray at (816) 263-6643.

•**11-13, Microbiology and Engineering of Sterilization Processes** will be given at the St. Paul Campus of the University of Minnesota. For further information, contact Dr. William Schafter, course coordinator, Department of Food Science and Nutrition, 1334 Eckles Avenue, St. Paul, MN 55108, (612)624-4793.

•**12-13, Carolina's Association of Milk, Food and Environmental Sanitarians** will meet in Greenville, SC. For more information, contact Beth Johnson at (803)935-6201.

•**18-21, Purdue Better Process Control School** will be sponsored by the Food Science Department at Purdue University. For more information contact James V. Chambers, Food Science Department, Smith Hall, Purdue University, West Lafayette, IN 47907, Phone: (317)494-8279.

•**18-22, Wyoming Environmental Health Assn. and Wyoming Public Health Assn. Annual Educational Conference** will be held at the Holiday Inn, Sheridan, WY. The theme for this conference will be "Public Health / Planning the Future." For more information, contact Stephanie Whitman at (307) 721-5283.

May

•**7-12, Food Structure Annual Meeting** will be held at the Holiday Inn Downtown City Hall, Toronto, Ontario, Canada. For more information, please contact Dr. Om Johari, SMI, Chicago (AMF O'Hare), IL 60666-0507, USA (or call 708-529-6677, FAX: 708-980-6698).

•**18-21, Purdue Better Process Control School** will be sponsored by the Food Science Department at Purdue University. For more information contact James V. Chambers, Food Science Department, Smith Hall, Purdue University, West Lafayette, IN 47907, Phone: (317)494-8279.

•**25-27, International Conference on Food Physics,** sponsored by the International Society of Food Physicists and the Editorial Board of Journal of Food Physics, will be held at the University of Horticulture and Food Industry, Budapest, Hungary. For further information contact A. S. Szabo, President of the Organizing Committee, H-1118 Budapest, Somloi Street 14-16, Phone: 361-1850-666/470, Fax: 361-166-6220.

July

•**8-15, Rapid Methods and Automation in Microbiology International Workshop XIV,** to be held at Kansas State University, Manhattan, KS. For more information contact Dr. Daniel Y. C. Fung at (913)532-5654, FAX (913)532-5681. A mini-symposium will occur on July 8th and 9th.

•**31-August 3, 81st Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians** will be held at the Hyatt Regency Hotel, San Antonio, TX. For more information contact: Julie Heim — Registration; Scott Wells — Exhibits; at (800)369-6337 (US), (800)284-6336 (Canada), or (515)276-3344.

August

•**23-24, Microbiological Concerns in Food Plant Sanitation & Hygiene,** a two day interactive lecture course, sponsored by Silliker Laboratories Group, Inc., will be held in Chicago, IL. For further information, contact Silliker Laboratories, Education Services Dept. at (800) 829-7879.

September

•**19-21, Indiana Environmental Health Assn. Fall Annual Educational Conference** will be held in Muncie, IN. For additional information, contact Tami Barrett at (317) 633-8400.

October

•**5-8, 1994 International Dairy Show,** sponsored by the International Dairy Foods Association, Milk Industry Foundation, National Cheese Institute and International Ice Cream Associaiton, co-sponsored by the American Butter Institute, will be held at the Minneapolis Convention Center, Minneapolis, MN. For more information, contact International Dairy Show Convention Management at (703) 876-0900.

•**12-13, Iowa Association of Milk, Food and Environmental Sanitarians Annual Meeting** will be held at the Best Western Starlite Village (formerly the Ramada Hotel), Waterloo, IA. For more information call Dale Cooper at (319)927-3212.

•**25-26, HACCP for Meat and Poultry Processors,** a two day interactive workshop designed for those responsible for implementing a HACCP plan in a processing plant, will be held in Dallas, TX. Sponsored by Silliker Laboratories Group, Inc., more information is available by calling Silliker's Education Services Dept. at (800) 829-7879.

November

•**2-3 North Dakota Environmental Health Assn. Annual Educational Conference** will be held at the International Inn, Williston, ND. For more information, contact Deb Larson at (701) 221-6147.

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

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