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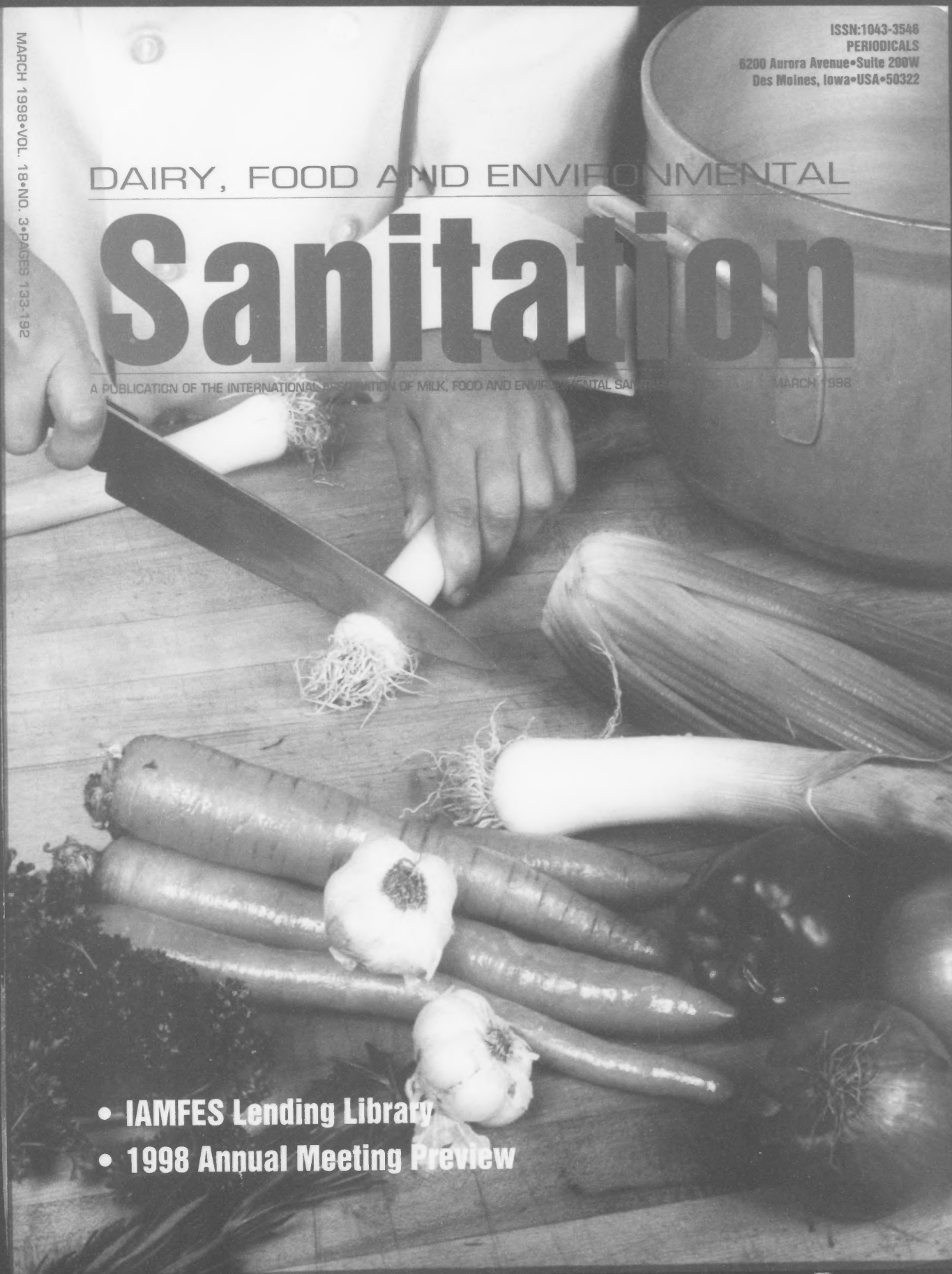
DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS MARCH 1998



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For more information contact:

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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC.

Articles

Association News

EDITOR'S NOTE:

The photograph used for the cover of January's issue of *Dairy, Food and Environmental Sanitation* was not properly credited. The photograph was courtesy of Hardy Diagnostics. We would like to thank Hardy Diagnostics for their support. We apologize for this oversight.

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AWARD

The International Association of Milk, Food and Environmental Sanitarians and the National Food Processors Association welcome your nominations for a new award to be presented annually at the IAMFES Annual Meeting. You do not have to be an IAMFES member to nominate a deserving candidate, nor does the nominee have to be an IAMFES member.

The award consists of a $3,000 honorarium and a plaque.

PURPOSE: To honor an individual (IAMFES member or nonmember) or a group or organization for preeminence in and outstanding contributions to the field of food safety.

ELIGIBILITY: Individuals or organizations may be from industry (including consulting), academia, or government. International nominations are encouraged. The nominee must have a minimum of 10 years of service in the food safety arena. Achievement may be measured by sustained contributions in research, education and information transfer over several years; the development of an innovative and effective strategy to promote a safer food supply; the solution to a significant food safety problem; etc. Nominations may not come from members of the selection panel, nor can an individual self-nominate. An individual can nominate the organization for which the individual works.

To request nomination forms, contact:

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By E-mail: iamfes@iamfes.org

Nominations deadline is March 31, 1998. Nomination forms must be received at the IAMFES office by this date.

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DAIRY, FOOD AND ENVIRONMENTAL

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In Memory of...

John H. Nelson
Madison, WI

Arthur J. Maurer
Madison, WI

We extend our deepest sympathy to the families of John Nelson and Arthur Maurer who recently passed away.

IAMFES will always have sincere gratitude for their contributions to the Association and the profession.

COMMENTS

FROM YOUR PRESIDENT

By GALE PRINCE
IAMFES President

"Plan now"

The Program Advisory Committee met in Nashville January 30–31,1998. A long but fruitful weekend was spent with the 14-member committee reviewing 133 submitted abstracts and 17 proposed symposia. Members of the committee came together from industry, academia, and regulatory under the chairmanship of Dr. Susan Sumner, Virginia Tech, as a team to analyze and create a final product – The Program for the 1998 IAMFES Annual Meeting. I am proud to say that once again the Program Advisory Committee has done an excellent job in constructing a top-notch program for 1998.

It's also important to remember that in order for the Program Advisory Committee to do its job well, we rely on the authors who submit their abstracts and the organizers who volunteer their time to develop and coordinate the speakers for the symposia. It's the efforts of these people and the Program Advisory Committee that allow for excellent IAMFES programs year after year.

The Meeting as planned, will have three technical sessions which include topics on Food Safety and Quality of Meat and Poultry, Microbiological Methods, and Food Safety Education and Safety and Quality of Produce. Poster sessions will cover Foodborne Pathogens, Microbiological Methods, and General Food Microbiology. Symposia for the 1998 Meeting will also provide a little something for everyone. Topics range from Factors Affecting Bacterial Attachments to Meat Surfaces to Bringing Science to the Restaurant Inspection and From Farm to Table: Ecology of Pathogens Associated with Poultry, as well as Viral and Parasitic Foodborne Disease Associated with Produce to Leading Edge of Foodborne Disease Surveillance. There are two and one-half days of sessions devoted to dairy. A more complete listing of the program will appear in the April issue of *DFES*.

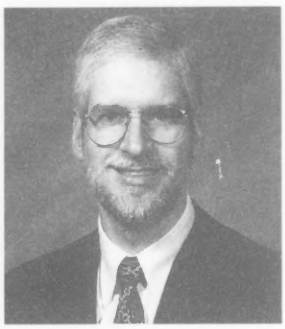
Hats off to the members of the Program Advisory Committee for giving up their weekend to work on the 1998 IAMFES Annual Meeting Program! The submitters and organizers provided excellent materials to work with in planning this year's program. The Program Advisory Committee is an example of how IAMFES members work together in sharing knowledge and expertise for a better tomorrow around the world. I feel honored as an IAMFES member to be associated with such caring individuals.

With the 1998 program in place, it is time to start thinking about the 1999 IAMFES Annual Meeting Program. After reading about what is going to take place for this year, you need to start thinking about ideas for symposia topics for next year? We want to hear from you. A Call for Symposia will appear in the May and June issues of *DFES*. You can use this as your guide for developing a symposium, then plan to attend the Program Committee meeting on Sunday, August 16 at the Annual Meeting. If you can't make the meeting, send your ideas to Carol Mouchka at IAMFES. The more ideas and people we have helping to plan the program, the better the program.

As always, I ask for your input, ideas, and comments. Let me know what we can do to keep the IAMFES Annual Meeting on the leading edge of food safety. You can call or E-mail me at 513.762.4209 or gprince@kroger.com.

COMMENTARY

FROM THE EXECUTIVE DIRECTOR



By DAVID W. THARP
IAMFES Executive Director

$100,000 in 2000!

Let's talk about the IAMFES Foundation and what programs the Foundation supports. Last September in this column, we discussed the goal of "$100,000 in 2000" which means the Foundation is working to raise the balance of the Fund to $100,000 by the end of 2000. To accomplish this goal, the oversight group for the Foundation has established a silent auction to be held in Nashville at this year's Annual Meeting.

We are looking for items to be donated by our affiliate associations, supporting companies, universities, or individuals. Look around your office or work locations for ideas of items that could be added to our silent auction. Or join together with other associates and purchase something to donate. No matter how large or small, consider giving an item to help strengthen the IAMFES Foundation. Some ideas that have been discussed are memorabilia from universities, something specific to your state or province, educational materials (reference manuals, textbooks, etc.), equipment (small or large), artwork, travel or trips; almost anything will work. Keep in mind that in order to establish this as a premier event, your donated item should be able to bring a minimum bid of $20.

IAMFES will auction at least one registration to the 1999 IAMFES Annual Meeting. We are confident that our members will come through for us and that you will want to participate either by giving an item or by bidding on items. This will be a fun event for everyone involved so please join us! If you or your company is interested in donating an item (or more than one), please contact Harry Haverland, our Foundation Fund Chairperson. Harry's phone number is 513.851.1810; he would be so pleased to hear from you!

The Foundation works hard to support the mission of IAMFES – "To provide food safety professionals worldwide with a forum to exchange information on protecting the food supply." The most visible program the Foundation supports is our Lending Library of training and educational videotapes. There are over 75 titles in our Lending Library listing and we hold over 300 tapes, which are available for our Members' use, free of charge! If you have not used the Lending Library, do you know what you are missing?

Travel funds are also provided by the Foundation to support speakers' attendance at our Annual Meeting. This program is used when an urgent need is demonstrated and has enabled many speakers to present their research at our Annual Meeting. Also at the Annual Meeting, our Ivan Parkin Lecturer is supported by the Foundation. We have been fortunate to attract many well-known leaders in the arena of food safety and protection. Without the Foundation's support, this would be much more difficult.

Other programs supported by the Foundation Fund include the Developing Scientist Competition for food science students, shipment of excess Journals to developing countries, and the Crumbine Award presented to a local health unit demonstrating excellence in food protection.

One should not mention the Foundation Fund without giving recognition to the backbone of the Foundation, our Sustaining Members. A portion of the Sustaining Membership dues goes directly to the Foundation to support its efforts. We are fortunate to have the support of so many fine organizations who have joined together as our Sustaining Members. In addition, we receive contributions directly from our Members and Affiliates.

In ending for this month, please consider donating an item to the Foundation's silent auction. I believe you can see how much the Foundation can do with so little. It is the synergy of so many entities coming together that has enabled the Foundation to thrive as it does today!

THANK YOU!

IAMFES THANKS THE FOLLOWING INDIVIDUALS FOR THEIR SUPPORT OF THE IAMFES FOUNDATION

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Dairy, Food and Environmental Sanitation, Vol. 18, No. 3, Pages 146-148

The Good Old Days???

Kermit M. McKemie

SUMMARY

If we know more about food sanitation in its historical perspective, it will help us understand and appreciate today's high standards. Several colorful accounts of the "consumer activists" of the times are shared, including the fight for milk pasteurization.

INTRODUCTION

Were the "good old days" the days of "milk and honey" or the days when milk would be called "sky blue from the iron-tailed cow" (water pump) and when the public feared undulant fever, typhoid and milk sick?

Probably more the latter. In those days we had no food safety professionals to give us confidence in our food supply. Food production and delivery conditions were often primitive and insanitary. Many chemicals were used to disguise food spoilage or hide the inferior quality of food. Bread was not enriched nor did milk contain added vitamins A and D. Malnutrition and foodborne illnesses were frequent in those days.

Harold McGee, in *On Food and Cooking (7),* describes the situation as follows: "...there never really were any good old days when food was fresh and pure, and adulteration and additives were only gleams in the chemist's eye. If anything, conditions are much better today than they have been since the cities arose, thanks to the modern technologies of canning and refrigeration, medical science, and government oversight...The fact that we expect better is a sign that our standards are very high."

SKY-BLUE MILK

Adulteration of milk, butter, and cheese was rather common in early England. In London the milk was not only skimmed, but thinned to sky blue with water from the iron-tailed cow (pump). Some recipes of the time recognized that milk would be diluted with water and identified this ingredient as "blue milk."

Cream was adulterated with milk (or water), thickened with starch, and given a richer color with turmeric powder. Inferior butter was adulterated by adding a large quantity of salt to absorb more water and increase weight; annatto, turmeric, and carrot juice were used as dyes to enhance appearance. Red lead gave Gloucester cheese an attractive but deadly color.

One writer *(2)* in 1877 laments that we "are bound to admit that we live in an age of adulteration; and should it be your fate, therefore, to make melted butter from butter adulterated with fat, the blame of failure will not be yours, but the widespread dishonesty of the age in which we live. I firmly believe that before long, unless some more stringent laws are passed, successful trade will be incompatible with honesty. Tens of thousands of children die annually in this country from the slow but deadly poison of adulteration."

HYGIENE AND HOT WATER

Reay Tannahill, writing in *Food in History (8),* does not have kind words for London's milk: "The thin and watery fluid which was all they could coax out of their ill-nourished and sickly animals was carried through the streets in buckets open to all the germs and dirt of the air, all the mud and manure of the roadways, and was frequently diluted with hot water to support the claim that it came 'warm from the cow.'"

In his novel, *Humpry Clinker (11),* Tobias G. Smollett, M.D., has this gross account of early London milk handling: "...milk...the produce of faded cabbage-leaves and sour draff, lowered with hot water, frothed with bruised snails, carried through the streets in open pails, exposed to foul rinsings, discharged from doors and windows, spittle, snot, and tobacco-quids from foot-passengers, overflowing from mud-carts, splatterings from coach-wheels, dirt and trash chucked into it by roguish boys for joke's sake...and, finally, the vermin that drops from the rags of the nasty drab that vends this precious mixture, under the respectable denomination of milk-maid."

SWILL MILK IN THE UNITED STATES

Before the era of food laws, dairy products were often adulterated and

Figure 1. Pumping water into milk (1845 Engraving by George Cruikshank, London)

unsafe in the United States. "Swill milk should be branded with the word 'poison,'" admonished Frank Leslie's Illustrated Newspaper *(4)* in May, 1858, after reporters investigated appalling conditions in so-called distillery, or "swill," dairies. About two-thirds of New York City's milk came from these sordid places, in which distillery waste was fed to closeted cows.

Some believed that the city's high rate of infant mortality – 13 percent higher than London, which had the worst slums in the world – was related to swill milk consumption. In 1848, a committee of the New York Academy of Medicine found country milk to contain approximately 3.5% butterfat, but swill milk only 1.5%, suggesting a significant water dilution. The committee also reported that swill milk is "a probable cause of many fatal diseases" *(5)*.

CREAM FIRST, HORSEHAIR LAST

The handling of milk in early America had a poor reputation. Gordon Taylor *(9)* reports that milk "was usually delivered from door-to-door in metal milk cans and dipped unsanitarily from the can with a common dipper into the container provided by the customer. This meant the first customers of the day were the luckiest, as they secured a high percentage of cream with their dipperfull. The ones at the end of the line got mostly horsehairs from the delivery wagon and skim milk after a long day of separation in the milk can."

One day in 1883, Dr. Henry G. Thatcher, who was in line to purchase milk from an itinerant milk dealer, saw a little girl accidentally drop her dirty rag doll into the open bulk can of milk. Nonplused, the seller reached into the can, removed the soiled doll, shook it off, and handed it back to the little girl. He then continued serving as if nothing had happened. Dr. Thatcher later became one of the early leaders in the movement to promote milk sanitation; he also invented an improved milk bottle *(5)*. Another innovator in the "good old days" was Gail Borden, who introduced a sanitary condensed milk in 1856. Mr. Borden's new and improved product initially got the brush-off from New York customers, who according to writer James Trager *(10)*, were "accustomed to watered milk doctored with chalk to make it white and molasses to make it seem creamy."

DR. BRUCE: NO MALTA MILK

In 1887 Dr. David Bruce, working on the island of Malta where many British troops were ill with "Malta fever," isolated the causative organism from cadavers and determined that the island's 20,000 goats were excreting it in their milk. By excluding the goats' milk and cheese from the base, he stopped the epidemic of "Malta fever," more commonly known as brucellosis, or undulant fever *(3)*, and advanced our scientific knowledge of foodborne disease.

THE PROGRESS OF SCIENCE AND LAW

Scientific findings on dirty milk helped promote pasteurization and improved sanitation. When ice cream was examined under a microscope in Victorian England, the London County Medical Officer discovered cocci, bacilli, torulae, cotton fiber, lice, bed bugs, bug's legs, fleas, straw, human hair, and cat and dog hair *(13)*. *Scientific American* in July, 1896, reported as many as 135,000, 000 germs per ounce in Boston's milk supply.

The series of Leslie *(4)* articles, which included illustrations such as a picture of a sick cow (possibly tuberculosis infected) being milked while supported with a sling system, caused public outrage and, with government follow-up, regulation. A New York law of 1864 stated "Any milk that is obtained from animals fed on distillery waste, usually called swill, is hereby declared to be impure and unwholesome." Other states followed New York's lead. California's March 12, 1870 law for the control of milk adulteration had an interesting provision: "One half of such fine shall be paid to the informer or prosecuting witness and the other half to the School Fund of the county."

Despite new knowledge on milk-borne diseases such as undulant fever, scarlet fever and typhoid, pasteurization was fiercely resisted by the milk industry *(3, 5, 6)*. Some opponents declared that it was better to consume "live" bacteria than those in a "dead" form brought about by the heat treatment of pasteurization! In strong refutation, New York

A quart of Milk, good mon, I'll take
'Tis for my little dark-eyed doughter,
But Tell me, sir, for her sweet soke
Ah! tell me 'Tis not Milk ond Woter!

community leader and philanthropist Nathan Straus in 1898 demonstrated the value of this process by using mortality statistics at an orphanage *(3, 5)*.

The U.S. Public Health Service, established in 1870 as a national health agency, and the U. S. Department of Agriculture reviewed the purity of the milk supply utilizing new laboratory science and field studies. With the implementation of Robert Koch's tuberculin test on cattle herds and the removal of sick cows, the rate of bovine tuberculosis in humans decreased *(6)*. It took longer for the new pasteurization technology to be accepted. Demonstration projects, including one at the Colombian Exposition in Chicago in the year 1892, highlighted this new technology *(5)*.

President Theodore Roosevelt requested the Public Health Service to study the milk problem. Findings were that pasteurization "prevents much sickness and saves many lives." The New York City Milk Committee reviewed the situation and reached similar conclusions *(5)*.Other groups, such as the American Medical Association, joined in support, and by 1917 pasteurization was required in most large cities in the United States. The first model regulations, "Standard Milk Ordinance," published in 1924, underwent a number of revisions and is now known as FDA's *Pasteurized Milk Ordinance (1, 6, 12)*.

Today we enjoy a high level of confidence in the quality and safety of our dairy products, for which we must give due credit to our many dedicated local, state and federal regulatory officials. Thanks to them, and to our very professional group of industry and university dairy scientists, the "Good Old Days" are gone forever!

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Hand Washing for Retail Food Operations — A Review

O. Peter Snyder

SUMMARY

This article reviews and discusses the physiology and microbiology of the skin surface, the hand-washing process, and the variables associated with correct hand washing.

Because of inadequate hand washing by individuals who prepare, process, and handle food in the retail food system, foodborne illness caused by fecal-oral transfer of microorganisms continues to be a problem. As a result, many consumers are demanding that employees in the food service industry wear plastic gloves when serving or preparing food items. The perceived purpose of glove use by food preparation and food production personnel is to prevent the transfer of pathogenic microorganisms that may remain on the surface of fingertips when individuals do not wash their hands and fingertips at all, or wash them inadequately, after using the toilet or after touching other highly contaminated surfaces or objects.

A simple hand-washing program that is adequate for preventing the transfer of pathogenic microorganisms must be used. Employees must be trained to use this hand-washing program so that the removal of transient pathogenic microorganisms from hands and fingertips is assured, with or without the use of gloves. Employees must be given positive reinforcement and in-service training so that hand-washing techniques improve and hand washing becomes habitual.

INTRODUCTION

In the 1840s, the significance of hand transfer of pathogenic bacteria was recognized when Ignaz Semmelweiss and Oliver Wendell Holmes asserted that physicians carried the agent of "childbed fever" (Group A beta-hemolytic streptococcus) on their hands. However, hand washing and disinfection to prevent spread of disease and illness was not practiced until the latter part of the 19th century, when it became the practice because of the efforts of Pasteur and Lister *(13)*. Knowledge of the role of unclean hands in the spread of disease has led to studies and procedures in health care settings (e.g., surgery, patient contact, etc.) that minimize contamination and prevent the transfer of life-threatening pathogenic microorganisms from one individual to another *(2, 32)*. Many of these studies have involved hand-washing techniques and hand-washing devices, as well as different soaps, detergents, and antimicrobial preparations *(4, 55, 58, 59, 60, 61, 62, 85)*. It has also become a standard practice, in the past 15 years, for health care personnel to wear gloves in order to protect themselves from blood-transmitted diseases as well as to prevent transmission of pathogens *(17, 54)*.

It has also been established that unwashed hands can transmit pathogens, especially fecal pathogens, to food products after a food worker uses the toilet *(12, 18, 19, 20, 24)*. When consumed in food, these

pathogens can cause illness and disease *(16, 33)*. The purpose of this review is to discuss critical issues in hand washing and present the most effective protocol to assure "safe hands" for food production, preparation, and service personnel.

In 1986, the Centers for Disease Control (CDC) *Guidelines for Hand Washing and Hospital Environmental Control (37)* recommended the following procedure to prevent transmission of infectious diseases in hospitals: For routine hand washing, vigorously rub together all surfaces of lathered hands for at least 10 seconds, followed by a thorough rinsing under a stream of water. Plain soap can be used. If bar soap is used, it should be kept on racks that allow drainage of water. If liquid soap is used, the soap container should be replaced when empty because of the possible introduction during refilling and growth of pathogens in the liquid soap. These recommendations were designed to prevent transfer of infectious organisms from one person to another in health care settings.

Hand-washing procedures used by food workers must be adequate to eliminate pathogenic microorganisms from hand surfaces. The 1997 FDA Food Code *(34)* recommends the following:

> *§ 2-301.11 Cleaning Condition*
>
> *Food Employees shall keep their hands and exposed portion of their arms clean.*
>
> *§ 2-301.12 Cleaning Procedure*
>
> *Food Employees shall clean their hands and exposed portions of their arms with a cleaning compound in a lavatory that is equipped as specified—by vigorously rubbing together the surfaces of their lathered hands and arms for at least 20 seconds and thoroughly rinsing with clean water. Employees shall pay particular attention to the areas underneath the fingernails and between the fingers.*

However, in the author's opinion, the most effective hand-washing procedure for food workers to use to ensure removal of pathogenic microorganisms (such as those from fecal sources) from fingertips and hand surfaces is a "double" hand-washing procedure. This hand-washing procedure utilizes a fingernail brush to produce lather on fingertips and hand and arm surfaces during an initial hand wash. The hands are then rinsed, relathered (without using the nail brush) by vigorously rubbing together hand and arm surfaces, and thoroughly rinsed again with a large volume of clean, warm, flowing water. Hands are then dried completely by using clean, disposable paper towels. All employees in food production and foodservice facilities should use this double hand wash when they begin a shift and after they use the toilet. A "single" hand-wash method that does not require the use of a nail brush is adequate during normal food-handling operations for the removal of most transient pathogenic bacteria acquired by routine hand contact with food.

In most food production and foodservice operations, food workers receive little or no training concerning the need and correct procedures for hand and fingertip washing. Regulatory authorities check to see if there is a hand-wash sink in the food preparation/production/service area, if this area is supplied with soap, and if the sink functions properly. However, checking operational hand-washing facilities provides no verification that employees are washing their hands sufficiently to reduce fecal pathogens on their hands and fingertips to a safe level. Therefore, it becomes management's responsibility to train food workers and require them to use proper methods of hand washing when handling or preparing food.

Through many media sources, American consumers have become aware of the danger of pathogen transmission in food. Consumers are concerned that food workers may not be washing their hands after using the toilet or touching contaminated items. Because consumers have no way of knowing if food workers have washed their hands, they are demanding that foodservice personnel wear plastic gloves. People assume that if food workers wear plastic gloves when handling food, food products are safe to consume. This logic is based on the presumption that gloves prevent transmission of microorganisms on hands and fingertips to food. However, this is not the case, because microorganisms found on hands and fingertips contaminate both exterior and interior glove surfaces when gloves are put on, unless hands and fingertips have been washed thoroughly *(83, 93)*. Plastic gloves used in foodservice operations may also have pinholes or other defects that allow microorganisms from hands and fingertips to escape through the glove surfaces *(52)*.

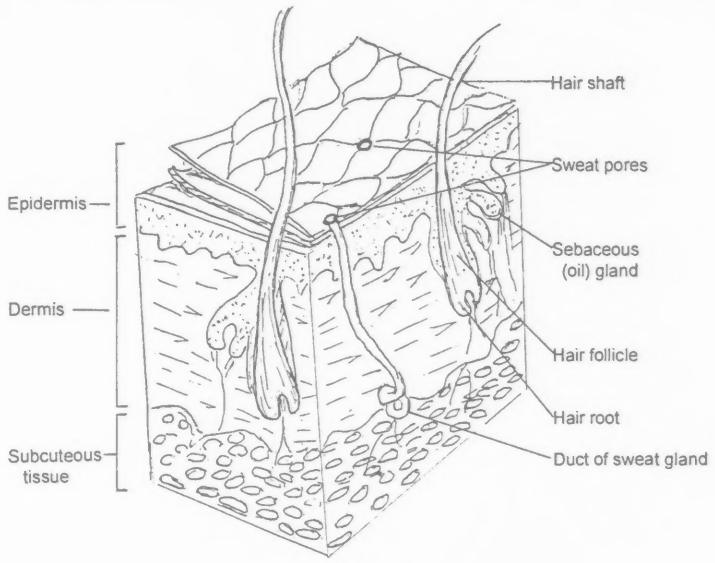
PHYSIOLOGY OF THE SKIN

To understand the principles of safe hand washing, one must understand the physiology of the skin. The skin is the largest and most accessible organ of the human body. Skin provides protection by serving as an impenetrable barrier between bacteria-free tissues of the body and an environment that is contaminated with all types of microorganisms *(98)*. When a cross-section of human skin is examined under the microscope, it can be seen that it is basically composed of two layers, the epidermis and dermis, which lie atop the subcutaneous layer of tissue. The dermis and subcutaneous tissue are free of microbial flora *(98)*. However, bacteria are on and within the epidermis and can become established in hair follicles and in sweat and sebaceous glands *(75, 76)*.

Although skin appears smooth, the epidermis actually contains many cracks, crevices, and hollows, which can trap and provide favorable growth areas for bacteria *(75, 76)*. The outer surface (stratum corneum) of the skin is also covered with a protective, waxy cuticle or sebum that enables microbes to adhere.

The average human skin has an area of about 1.75 m^2 and is composed of a mosaic of about 10^9 flat, pavement-like cells known as

Figure 1. Illustration of cross-section of human skin



skin scales, or squames. The cells are about 25µm square and 3 to 5µm thick. Cells are lost in the process of desquamation, a complete layer being lost every 1 to 4 days *(75)*. These microscopic dead cells are lost in a shower or bath, deposited in clothing, and scattered into the air. The loss of this outer layer is important in the distribution of both transient and resident microflora. The greater the body movement, the more cells will be dispersed in the air *(21, 87)*. Routine bathing and hand washing have a direct influence on the microflora of the stratum corneum and determine the kinds and amount of microorganisms that remain or are dispersed with the dead cell fragments.

MICROFLORA OF THE SKIN

Microorganisms carried on the skin of the human body have been divided into two distinct populations: resident and transient *(61, 62, 85)*. Resident microorganisms are considered as permanent inhabitants of the skin of most people and are found on the superficial skin surface (epidermis). However, 10 to 20% of the total resident flora are found within the epidermal layer of skin and in skin crevices, where skin oils and hardened skin make their removal difficult and complete sterilization of skin impossible *(90, 96)*. The impossibility of completely removing all microflora from the skin, even with a surgical scrub, is one reason surgeons wear gloves. The other reason is to protect themselves from pathogens of patients.

Resident microorganisms include the coagulase-negative staphylococci; members of the *Coryuebacterium*, *Propionibacterium*, and *Acinetobacter* species; and certain members of the *Enterobacteriaceae* family *(36, 96)*. Corynebacteria and oxygen-requiring, coagulase-negative staphylococci comprise the majority of the resident microflora *(13, 96)*. The anaerobic bacterium *P. acnes*, which causes acne, particularly in oily parts of the skin, is also a member of the resident flora. Low populations of yeast (*Pityrosporum*) are also present as resident bacteria *(77)*. Types and numbers of resident microorganisms vary from individual to individual and in different regions of the body *(77)*. Most resident microflora do not cause foodborne illness.

Some, but not all, individuals carry *Staphylococcus aureus* on their skin. About 35% of normal adults carry *S. aureus* in the anterior nostrils of the nose and are particularly susceptible to infection when the normal protective skin barrier is broken *(77)*. However, the population of *Staphylococcus epidermidis* significantly outnumbers *S. aureus* on healthy skin *(61, 85)*. *S. aureus* (which causes staphylococcal food poisoning) is the only true pathogenic organism included in the skin's resident microflora group. It is generally considered safe to consume 1,000 *S. aureus* per gram of food. Staphylococcal foodborne illness is due to ingestion of a sufficient amount of illness-producing toxin that is produced when there are 10^6 or more *S. aureus* per gram of food *(33, 74)*.

The presence of resident microorganisms on the skin aids in preventing pathogenic microorganisms from becoming attached and causing their specific illnesses or diseases *(92)*.

Transient microorganisms. As the name implies, transient organisms may be found on and within the epidermal layer of skin, as well as other areas of the body, where they do not normally reside. Almost all disease-producing microorganisms belong to this category *(96)*. They are organisms that may take advantage of some disturbance in the normal resident microflora to gain a foothold and cause infections and symptoms of disease or illness. Transient microorganisms are deposited on the skin through direct contact or by aerosol.

The Association for Professionals in Infection Control (APIC) Guidelines for Infection Control Practice *(54)* defines transient flora ("contaminating or noncolonizing flora") as "microorganisms isolated from the skin but not demonstrated to be consistently present in the majority of persons." Transient microflora are of concern in health care settings and food operations because of the likely transmission of this type of microflora by hands. Unless transient microorganisms are removed from hands by washing with soap and water, using mechanical friction, or are reduced by the application of some antiseptic hand rub, spread of pathogenic microorganisms and food spoilage microorganisms, such as *Pseudomonas* spp., can occur.

TABLE 1. Foodborne illness hazards: threshold and quality levels

Agent	Healthy person (Estimated illness dose)*
Bacteria	**(Number of microorganisms)**
Vegetative Bacteria	
Escherichio coli	10^6 to >10^{10} CFU (dose)[26]
Escherichio coli O157:H7	10 to 100 CFU (dose)[16, 33]
Compylobocter jejuni	≥ 500 CFU (dose)[88]
Solmonello spp.	1 to 10^9 CFU (dose)[16]
S. onotum	10^5 to >10^8 CFU (dose)[66] [o]
S. boreilly	10^5 to >10^6 CFU (dose)[67] [o]
S. derby	10^7 CFU (dose)[67] [o]
S. meleogridus	10^7 CFU (dose)[65] [o]
S. newport	10^5 CFU (dose)[66] [o]
S. pullorum	10^9 to >10^{10} CFU (dose)[68] [o]
S. typhi	10^4 to >10^8 CFU (dose)[45] [o]
Shigello spp.	10^1 to 10^6 CFU (dose)[16]
S. flexneri	10^2 to >10^9 CFU (dose)[27, 28]
S. dysenterioe	10^1 to >10^4 CFU (dose)[57]
Stophylococcus oureus	10^5 to >10^6 CFU./g [toxin level][33, 43, 74] [b]
Vibrio choleroe	10^3 CFU (dose)[16, 46]
Vibrio porohoemolyticus	10^6 to 10^9 CFU (dose)[16, 97]
Yersinio enterocolitico	3.9×10^7 CFU (dose)[72] [c]
Listerio monocytogenes	>10^3[33] to >10^5[31] CFU (dose)
Parasites	
Cryptosporidium porvum	< 30 cysts[16]
Toxoplosmo gondii	1 cyst[16]
Trichinello spirolis	1 to 500 lorvoe[16]
Viruses	
Hepotitis A virus	unknown, probobly <100[16]
Norwolk virus	unknown, probobly <100[16]
Rotoviruses	10-100 virus porticles[33]

* Number in porentheses indicotes references.
CFU = Colony forming units

[o] Results from feeding studies. Doto from outbreoks indicote lower volues.

[b] Indicotes number of pothogenic bocterio necessory to produce sufficient omount of illness-producing toxin.

[c] Probobly lower.

Transient microorganisms (bacteria, yeast, molds, viruses, and parasites) can be of any type, from any source with which the body has had contact and are found on the palms of hands, on fingertips, and under fingernails *(77, 80)*. Pathogens that may be present on the skin as transient types include *Escherichia coli*, *Salmonella* spp., *Shigella* spp., *Clostridium perfringens*, *Giardia lamblia*, Norwalk virus, and hepatitis A virus. High levels of transient microorganisms (bacteria, viruses, and parasites) attach to hand, fingertip, and fingernail surfaces when:

1. fecal contamination remains on hands and fingertips of a person who has used the toilet, changed diapers, or cleaned up after pets at home,
2. contaminated raw products (e.g., raw meat, poultry, fish, unwashed fruits and vegetables) are touched, or
3. infected cuts and boils are touched or picked, or a person has an infected fingernail.

Table 1 is a list of pathogens of fecal origin that can be transmitted by hands and have been implicated in foodborne and waterborne disease or illness outbreaks, and the dosage or population of microorganisms necessary to cause illness. When the number of pathogens or toxins produced by pathogenic microorganisms in food or water is less than that required to cause illness or disease, the risk of consuming the food is acceptable.

It becomes evident by examining Table 1 that transfer of relatively small populations of *Shigella* spp., *E. coli* O157:H7, and viruses from hands to food represents the greatest threat for causing illness if these pathogens are not removed by adequate hand washing.

Differences in hand microflora of food workers and non-food workers

The type and number of microorganisms found on hands are also a function of the work environment *(23, 44, 55, 87)*. Table 2 lists the

TABLE 2. Microbial populations of pre-washed workers hands in food and non-food industries*

Food industry	Number of persons	Totol no. bacterio (log_{10})	% of workers honds with Enterobocterioceoe (log_{10})	*Solmonella*	*E. coli*	*S. oureus*
Chicken slaughterhouse	14	6.20	3.53	36	86	100
Cattle sloughterhouse	20	7.30	3.90	5	100	65
Pig slaughterhouse	20	6.78	3.38	30	95	95
Egg products I	20	6.28	3.59	25	60	55
Egg products II	20	5.81	2.08	0	30	70
Fish	19	6.28	2.62	0	15	45
Doiry plont	26	5.81	1.98	0	19	54
Deep-frozen foods	18	6.28	2.49	0	50	50
Dried vegetables	14	5.97	2.34	0	7	29
Biscuit foctory	28	6.26	2.34	0	11	46
Chocolate factory	28	5.63	1.76	0	4	29
Non-food industries						
Wool factory	15	5.31	2.06	0	80	53
Glass foctory	14	5.95	1.74	0	0	64
Can factory	15	5.68	1.14	0	0	60

* Adapted from deWit, J. C. 1985. *(23)*

types of bacteria found and differences in populations on the hands of food workers and non-food workers.

Pether and Gilbert *(84)* reported isolating *E. coli* from the fingertips of 13 of 110 butchers soon after they left the meat line at a meat products plant. However, *E. coli* was not detected on the fingertips of 100 volunteers from a public health laboratory. Kerr et al. *(49)* reported that food workers are significantly more likely to carry *Listeria* spp. than clerical workers. Of the 87 food workers found not to carry *Listeria* spp. on their hands, 54 (62%) were considered to have washed their hands adequately. Of the 12 people carrying *Listeria* spp. on their hands, only one individual was believed to have used adequate hand washing. The authors emphasized the importance of good hand-washing techniques for food workers, particularly in establishments where raw food, potentially contaminated with *Listeria monocytogenes*, and cooked/ready-to-eat products are handled.

Survival of transient microorganisms on the skin

The areas around and under the fingernails provide a micro-environment that is quite conducive to microbial growth. It is this area of the hand that often harbors the microbial population that is the largest and the most difficult to remove *(69, 73)*. Resident microorganisms will always be present and survive on skin. Transient microorganisms remain or are destroyed by the skin's environment at a rate determined by the skin characteristics of each individual *(92)*.

Pether and Gilbert *(84)* reported that salmonellas and *E. coli* can survive on the fingertips for a few hours. Casewell and Phillips *(15)* reported that *Klebsiella* spp. survived on artificially inoculated hands for 150 minutes. Coates et al. *(18)* reported that survival time for campylobacters (suspended in 0.1% peptone solution) on hands ranged from less than 1 minute to slightly more than 4 minutes. However, the campylobacters survived on the hands for longer periods of time when suspended in chicken liquor or blood and up to an hour when suspended in horse blood.

Filho et al. *(35)* reported a study of the survival of cultures of *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Serratia marcescens*, *E. coli*, and *S. aureus* when applied to the fingertips and hands of 4 volunteers. Over 99% of the bacteria died within 2 minutes after application, but about 10^5 cells (0.01%) remained on the fingers for up to 90 minutes.

When suspended in saline, *L. monocytogenes* survived up to one hour on fingertips, but survival

times were greatly extended (up to 5 hours) when the inoculum was suspended in milk *(92)*. Survival time was apparently affected by skin lipids, the skin's normal flora, or the fat content of the milk. Different serotypes displayed similar results for the percentage persistence over a 2-hour period when suspended in milk, except for an isolate of *L. monocytogenes* serotype 7, which had a greater percentage survival than other organisms tested. In contrast, *E. coli* failed to survive for 1 hour under the same conditions. Hand washing with either soap or a water-based chlorhexidine hand cleanser usually failed to decontaminate fingertips completely after an inoculum of 10^4/CFU per fingertip suspended in milk had been applied, but a solution of chlorhexidine gluconate in methanol was found to be effective.

In 1988, Ansari et al. *(7)* reported the survival of rotavirus on the finger pads of hands for up to 1 hour.

PERSONAL HYGIENE

Management must train employees to know the importance of good personal hygiene and to use this knowledge in preparation for work. This includes bathing daily, using deodorants, and keeping fingernails clean and clipped short (to 1/16 inch).

Many people use a deodorant soap for bathing or showering. A study reported by Bibel *(11)* indicated that there was no significant difference in the number of skin microorganisms of individuals using deodorant soap compared to those using plain soap. However, it was noted that the resident bacterial population of the skin was changed when deodorant soaps were used. More *S. epidermidis* was seen when plain soap (Ivory®) was used, while washing with deodorant soap (Dial®) seemed to favor *Acinetobacter calcoaceticus* and *Micrococcus luteus*.

IMPORTANCE OF HAND WASHING

Management must teach food production workers and foodservice personnel to wash hands and fingertips correctly in preparation for work and must also teach them why adequate hand washing is necessary. Currently, regulatory authorities do not require food workers to use a fingernail brush for hand washing. However, correct use of a fingernail brush to wash hands and fingertips is the best way to assure removal of transient microorganisms *(94)*.

Hand washing is critically important in preventing transfer of pathogenic microorganisms in homes and day care operations as well as in foodservice and food production operations. Black et al. *(12)* reported a study that demonstrated a decline in diarrheal illnesses due to *Shigella*, *Giardia*, and rotavirus when employees in day care centers were taught to use good hand-washing procedures. The incidence of diarrhea in two day care centers with a hand-washing program was half that of two control centers for an entire 35-week study period. Employees in the hand-washing program washed their hands before handling food and after arriving at the day care center, helping a child use the toilet, or using the toilet themselves. When children entered the day care center, used the toilet, were diapered, or prepared to eat, employees washed their hands using bar soap and paper towels. However, the authors did not specify what constitutes a good hand-washing procedure.

Because *Shigella* infection is associated with poor hygiene, the effectiveness of the simple intervention of hand washing with soap and water in preventing the spread of shigellosis was investigated. Khan *(50)* demonstrated that secondary infection rates within families in Bangladesh due to transfer of pathogenic bacteria (*Shigella*) decreased when people were taught to wash their hands after defecation and before eating. These results suggest that hand washing has a positive interrupting effect, even in unsanitary environments.

Lack of effective fingertip and hand washing by people in the United States

In 1996, a national survey was conducted to assess hand-washing behavior of adults in the United States *(3)*. More than 7,000 people participated in the two-part survey, which was conducted by an international research firm. Participants were most likely to say they washed their hands after changing a diaper (78%) and before handling or eating food (81%). However, most people said they did not wash up after petting an animal (48%), coughing or sneezing (33%), or handling money (22%).

This study *(3)* also reported the observed hand-washing behavior of adults in public restrooms located in 5 major cities (New York City, Chicago, San Francisco, Atlanta, and New Orleans). Of 2,129 people observed using a restroom in Penn Station in New York, only 60% washed their hands. Chicagoans washed their hands most often (78% of adults observed) after going to a public restroom, followed by adults in New Orleans (71%), San Francisco (69%), and Atlanta (64%). Across all cities, women washed their hands more often than men (74% vs. 61%).

While hand washing is a simple and easy task, studies have indicated that personnel in both health care and foodservice industries have incorrect hand-washing habits. Sixty percent of foodservice personnel in one study were reported not to wash their hands *(24)* as required for people in these types of positions. "The food handler is one link in the complex multiphase process of contaminated food – infection – enteric disease." *(90)*

Of greatest concern is contamination of hands and forearms by transient microorganisms from feces. Clothing can become contaminated from pieces of fecal matter collected on the hairs around the anal region *(65)*. When people use the toilet, their hands or forearms may become contaminated with intestinal microorganisms which include *C. perfringens*, shigellae, salmonellae, hepatitis A virus, and other enteric bacteria *(38)*. Thus, these contaminated hands and forearms can transfer intestinal microbes to foods, equipment, and other workers in the food storage and preparation areas unless correct per-

sonal hygiene and adequate hand-washing procedures are followed.

A study that monitored restroom hand-washing compliance by foodservice workers at a managed care facility and two commercial foodservice operations *(29)* showed that workers at the managed care facility had the better compliance. This was thought to be due to the emphasis on hand washing by management personnel as well as the training and continued in-service instruction of employees. The study *(29)* also monitored the number of daily hand washings for each employee in the kitchen area. The results of this study indicated that monitoring hand-washing was beneficial for increasing and maintaining employee compliance with hand-washing requirements.

Horwood and Minch *(47)* reported the numbers and types of bacteria obtained from 34 hand-washing samples collected in 22 foodservice establishments (cafeterias, lunchrooms, drug stores, and restaurants) in the Cambridge and Boston, Massachusetts, areas. The range in total plate count was 6,200 to 16,000,000,000 per ml. *E. coli* was found in 13 of the 34 samples. Twenty-nine of the 30 samples showed hemolytic staphylococci, 19 showed hemolytic streptococci, and 19 showed a mixture of both hemolytic streptococci and staphylococci. The number of aerobic spore-forming bacilli ranged from 4 to 400 per ml. When this research was done, over 45 years ago, the authors concluded that the hands of food handlers must be kept clean. This report stressed that food handlers must be given instruction and that management must assume the responsibility for daily education and enforcement of hand-washing requirements.

Test for effectiveness of fingertip washing

The results of the study by Horwood and Minch *(46)*, indicate that *E. coli* can be used as a measure of effective fingertip washing. Employee hand-washing compliance can be easily assessed by using *E. coli* Petrifilm™ (3M, St. Paul, Minnesota). To accomplish this, foodservice and food production personnel can be asked to rinse their fingers in a small plastic bag containing 10 ml letheen broth. A 1-ml sample of this "fingertip rinse" can then be plated and incubated on *E. coli* Petrifilm™. While there may be a small background count of *E. coli* from handling food, an *E. coli* count of more than 20 per ml indicates inadeqate hand and fingertip washing.

Effectiveness of toilet paper

In less-developed nations of the world, toilet paper is considered extremely expensive; hence, it is not used by a large portion of the world's population. These people use one hand to wipe themselves after defecating and then wipe their hands on some leaves or rinse their hands in water from a pitcher. When they eat or cook, they use the other hand. When these people immigrate to countries that routinely have toilet paper available, they must learn to use toilet paper and be taught the importance of washing their hands with soap and flowing water after defecating.

The use of toilet paper was not common in the United States until after the early 1900s. The problem today is that there is a total reliance on toilet paper to keep fecal matter from contacting the fingertips, but there are no performance standards for toilet paper *(70)*. Consumer Reports *(5)* reviewed toilet paper performance and found a wide variation among samples in wet strength, tear resistance, and absorbency. As long as there are no performance standards or standards for use, no one should assume that toilet paper provides an effective barrier to keep fingertips free of fecal pathogens.

COMPARISON OF HAND DISINFECTANTS AND UNMEDICATED HAND SOAPS AND DETERGENTS

Most research studies on hand washing and hand disinfectants have been done with personnel in health care settings (surgeons, nurses, and other health care workers) who work with patients who are immunocompromised or at high risk of wound, surgical, or burn infection.

Sprunt et al. *(95)* studied the effectiveness of hand-washing agents in removing infant-acquired organisms from the hands of personnel working in a hospital nursery. The following preparations were used: 3% hexachlorophene (Phiso-Hex) in liquid saponified coconut oil; 7.5% providone-iodine, 0.75% iodine (Betadine); a 70% ethyl alcohol emulsion; and Ivory® soap bars and tap water. The results of this study indicated that all agents were equally effective when followed by drying with a paper towel.

Results of a research study by Bannan and Judge *(9)* indicated that hand washing with bar soap (Ivory®) reduced a population of 2×10^9 *Serratia* spp. to 6.2×10^5 (a 99.97% reduction in bacteria). The hand-washing method used in this study did not use a nail brush or a double wash, but did use a large volume of flowing water. Mahl *(63)* found that many commercial hand-wash products containing antimicrobial agents do not rapidly reduce numbers of inoculated bacteria in fingernail regions any more than non-antimicrobial hand washes.

In another study of acceptable methods of washing hands for hospital procedures, Ayliffe et al. *(8)* described research in which fingertips were inoculated with cultures of *S. aureus*, *Staphylococcus saprophyticus*, *E. coli*, and *Pseudomonas aeruginosa*. Bacterial counts from the fingertips were made after disinfection with various antiseptic detergents, alcoholic solutions, or unmedicated soap. There was less than a 100-to-1 reduction in all cases. A preparation containing 70% alcohol with chlorhexadine was the most effective preparation. Antiseptic detergents were only slightly more effective than plain soap against gram-negative bacteria. Ayliffe et al. *(8)* suggested that soap and water were adequate for general hand-washing procedures and that germicidal agents should be required only for aseptic procedures.

Alcohols, usually 60 to 90% ethyl or isopropyl, inactivate both the resident and transient microorganisms on the skin surface but have no persistent effect and do not remove fecal microorganisms completely. Alcohol removes surface oils from the skin and has a drying effect. Newer emollient-containing formulations are more acceptable to users but still have a tendency to dry the skin. Isopropyl alcohol is a toxic chemical that, if used in any food production area, must be carefully monitored and stored so that it cannot get into food. The 1997 FDA Food Code *(34)* does not consider the replacement of hand washing with soap and water by washing with alcohol, alcohol formulations, or alcohol wipes to be effective for cleaning hands in food production and food preparation areas. Even when alcohol is used as a hand antiseptic, hands must be washed with soap and water before the alcohol is applied. Unpublished studies by the author have shown that soap and water produce as much or more reduction in hand microorganisms as alcohol. Because even alcohol preparations with emollients dry the skin and cause dermatitis, there appears to be no justification for food handlers' use of alcohol for hand disinfection if there is an adequate water supply for hand washing.

A discussion of the use of antibacterial agents in hand soaps and detergents for use by food workers is presented by Paulson *(81, 82)*. Chlorhexidine gluconate (CHG), a common antimicrobial ingredient in antibacterial soaps, will reduce resident bacteria when used repeatedly over a long period of time. CHG does not act as rapidly as do alcohols, and several applications of CHG are required to produce a reduction of microflora comparable to that caused by alcohol application. However, CHG is milder than alcohols (an important factor in frequent washings) and has some residual chemical activity on the skin (an advantage when gloves are worn). Paulson *(82)* suggests its use at levels of 2% or lower, because higher concentrations tend to irritate the skin.

Iodophors, which are also used as antimicrobial ingredients in antibacterial soaps, have an immediate and persistent effect and are capable of removing both normal and contaminant organisms *(82)*. They are commonly used for surgical scrubs. However, these products are harsh to the skin and produce stains when spilled on clothing, counter surfaces, and floors.

Dilute sodium hypochlorite (household bleach) is antimicrobial to both resident and transient skin microorganisms as well as bacterial spores *(82)*. It is sometimes used as a chemical sanitizing solution or "hand dip" after hands have been washed thoroughly. In these instances, the chlorine hand-dip solution must be maintained clean and have a strength equivalent to 100 mg/l *(33)*. However, continued use of chlorine solutions is very irritating to the skin surfaces of hands.

Because a foodservice or food production unit is not an aseptic environment, the use of plain soap by food workers for hand washing should be adequate for removing transient microflora from the hands of food workers. By using plain soap for hand washing, the excessive destruction of beneficial resident microflora, as well as the excessive drying and skin irritation on hands that can lead to dermatitis, are avoided.

Quantity of soap

Larson et al. *(56)* reported a study on the quantity of soap necessary for hospital personnel to use for effective hand washing. Subjects using 3-ml amounts of antiseptic soap on uninoculated hands in a single wash with no fingernail brush had slightly greater reductions in bacterial counts than those using 1 to 3 ml of plain liquid soap or 1-ml amounts of antiseptic soap, as would be expected. It was concluded that personnel should use 3 to 5 ml of soap to remove both transient and superficial resident microorganisms from hand surfaces. From this study, it is apparent that employees must use enough soap on their hands to produce a good lather.

The standard for how long to wash hands is then governed by removal of the soapy lather. When the lather is gone and the fingertips are "squeaky clean" (less than 20 seconds), the population of transient microorganisms has been effectively reduced.

Detergency or lathering ability

There are no performance standards for the detergency (lathering ability) of soaps or hand detergents. This important factor in removing transient microorganisms from hand surfaces is influenced by type and amount of soil and mineral content of the water *(39)*. A soap product or liquid detergent with high detergency is necessary to remove a large amount of fat, protein, or other types of organic soil that bind transient microflora. Water with high amounts of calcium, magnesium, or iron is "hard" and requires high-detergency products for lathering and emulsification ability. Hand soaps or detergents must be user-tested in specific food operation facilities with local water to determine which products lather sufficiently to clean hands in the easiest, most acceptable manner. This means that a national foodservice company should not dictate the use of one hand soap for all locations throughout the country. Hand soaps or detergents must be matched to type of water at the location of use.

Skin irritation

"In healthy skin, a thin film of water repellent substance is secreted by sebaceous glands within the skin. This keeps the skin supple and helps prevent the ingress of water and dirt. The removal of this layer by irritating chemical compounds quickly leads to intense inflammation of the skin" *(39)*. For example, some antibacterial soaps, alcohol and alcohol preparations, and chlorine and iodine solutions or soaps may irritate the skin of some individuals and cause it to become excessively dry, rough, and red. When the epidermal layer of hands becomes irritated, people do not wash their hands as often or as well. Hence, it is recommended that

employees involved in routine food handling and food production be provided with regular bar or liquid soap (not an antibacterial product) for routine hand washing. "An acceptable hand soap motivates hand washing by making hand washing pleasant" *(79)*.

Contaminated bars of soap

It has been demonstrated that bacteria from contaminated bars of soap (without antibacterial additives) are not transferred from person to person during common use *(9, 42)*. These studies demonstrate that bar soap is inherently antibacterial and will not likely support the growth of bacteria. The Association for Professionals in Infection Control and Epidemiology *(54)* recommends that if bar soap is used, it should be provided in small bars that can be changed frequently, with soap racks to promote drainage.

Liquid hand soaps or detergents

Many regulatory agencies forbid the use of bar soaps for employee hand washing and have mandated the use of liquid hand soaps or detergents for hand washing. This is not necessary. The use of liquid soap has not been demonstrated to be better for removing transient microorganisms than the use of plain bar soap for washing hands and fingertips.

Liquid soap products are frequently available in dispenser containers or bottles. Hospital studies have shown that *Pseudomonas* spp., a pathogen of concern in many health care facilities, can grow and multiply in some liquid hand soap and detergent products. This is another reason many manufacturers add disinfectants to their liquid soaps. Many health care facilities now recommend or mandate that liquid soap dispensers be replaced and not refilled.

The data collected from hand-washing research studies indicate that regular hand soap or detergents (bar or liquid) are effective for hand washing for personnel in most food production or foodservice facilities. In aseptic food production facilities where food with a very low pathogen count or total plate count must be prepared (e.g., infant formula, tube feedings), sterile gloves should probably be used after the hands are properly washed.

Fingernail brushes

Fingernail brushes are necessary to dislodge the accumulation of debris from under and around fingernails. It is this subungual area that contains the highest number of microorganisms on hand surfaces *(69, 73)*. The tips of the fingernail brush are used to produce lather on hand surfaces, particularly around the fingertips and fingernails, during the first part of the double hand-wash method. However, excessive or too-frequent use of the fingernail brush or use of a nail brush that is too stiff will loosen too much of the epidermal layer on the tips of the fingers, causing the fingers to crack and bleed.

To ensure removal of fecal pathogens, the double hand-wash method, although no longer a recommendation of the 1997 FDA Food Code *(34)*, should be required when employees begin a shift and after they use the toilet. Single hand washing, which does not require use of a nail brush, is adequate during normal food handling operations for removal of most transient pathogenic bacteria acquired by routine hand contact with food.

Effective hand washing

In 1975, Crisley and Foter *(19)*, stated that the primary goal of hand washing by food workers is the removal of surface soil (oil and debris) on hands and hence, the removal of transient pathogenic microorganisms. This can be accomplished by washing hands with soap or detergent and water. By increasing the friction during hand washing by rubbing the hands together, or by using a nail brush, ordinary soaps and detergents can reduce a high level of transient bacteria as well as remove a minor portion of resident bacteria.

Pether and Gilbert *(84)* reported results of research that showed that hand washing with soap and water, followed by drying with paper towels, reduces the risk of transient skin carriage of salmonellas. "Good and simple hygienic practice (correct hand washing and drying) will stop the chain of transmission from feces to fingers to food."

Vesley et al. *(101)* described a method (collection of wash effluent) that compared the removal of transient microorganisms from hands by washing hands in an 8-second cycle of a hand-washing machine and by a conventional 15-second Ivory® soap hand wash. There was no statistically significant difference in the percent removal of transient flora by the two methods (48.8% from the machine vs. 45.1% from the Ivory® soap wash). When the hand-washing machine pressure was set at 32 lb/in^2, the Ivory® soap wash recovered 60.3% of the transient microorganisms, whereas the machine recovered 45.1%. Paulson *(81)* reported similar results when hand washing in Ivory® soap was compared to machine hand washing with 2% chlorhexidine gluconate. These studies indicate that the hand-washing machine is no more effective, and sometimes less effective, than a conventional Ivory® soap hand wash.

Thus, the basic microbiological concept that dictates the necessity for hand washing is one of loosening transient microorganisms on the surface of skin with hand soaps or detergents and mechanical action, and removing the microorganisms through dilution and elution with flowing water so they can be reduced to a safe number on washed hands and fingertips.

DRYING HANDS

After hands are washed and rinsed, they must be thoroughly dried. Blow dryers should not be used, because they accumulate microorganisms from toilet aerosols and can contaminate hands as they are dried by the dryer *(51, 86)*. It is also apparent that many individuals do not dry their hands thoroughly when using a blow dryer; hence, moisture, which is conducive to microbial growth, remains on hands, or people finish drying their hands on their clothing.

In a hand-drying study reported by Redway et al. *(86)*, standard techniques were used to identify and count the bacteria associated with hand washing and drying under natural conditions. Average bacterial counts were reduced when towels (either cloth or paper) were used to dry hands, the most significant decrease being with paper towels. Hot air dryers produced a highly significant increase in all bacteria on hands (a 436% rise in some skin bacteria and enterobacteria, indicative of fecal contamination of the hands). In a further study, Redway et al. *(86)* reported that bacteria were isolated from swabs taken from the air flow nozzle and air inlet of 35 hot air dryers in 9 types of locations (including hospitals, eating places, railway stations, public houses, colleges, shops, and sports clubs). Bacteria were relatively numerous in the air flows and on the inlets of 100% of dryers sampled and in 97% of the nozzles. *Staphylococci* and *micrococci* (probably from skin and hair) were blown out of all the dryers sampled for these types of bacteria, and 95% showed evidence of the potential pathogen *S. aureus*. At least 6 species of enterobacteria were isolated from the air flows of 63% of the dryers, indicating fecal contamination. The authors concluded that hot air dryers have the potential for depositing pathogenic bacteria onto the hands and body and that bacteria could also be inhaled as they are distributed into the general environment whenever dryers are running. It was suggested that the use of hot air dryers should be carefully considered on health grounds, especially in sensitive locations.

Cloth roller towels are not recommended, because they become common-use towels at the end of the roll and can be a source of pathogen transfer to clean hands. Brodie *(14)* demonstrated that staphylococci can be transmitted by use of a communal towel for drying hands after washing and recommended that paper towels be used for drying hands. The use of roller towels for drying hands in food production facilities is banned by most regulatory agencies.

In 1987, Coates, et al. *(18)* showed that *Campylobacter jejuni* could survive hand washing with soap and water if hands were not dried thoroughly with paper towels. Thus, drying hands completely with single-use, disposable paper towels is the preferred method of hand drying in foodservice and food production facilities.

Hand lotions

Hands may become dry and irritated with frequent hand washing, and personnel therefore tend to want to use hand lotions. However, the use of hand lotions is discouraged in food production and food service units, as in health care units, because of possible contamination of these products *(10, 71)*. If hand lotions are allowed, their use should be monitored, and only small packets or small bottles of lotion that are frequently replaced should be allowed on the premises.

WHEN MUST HANDS BE WASHED TO CONTROL HAZARDS?

The following is a list of situations that may lead to hazardous contamination of foods:

- Touching the body, human contact
  - Touching anywhere on the head (ears, nose, eyes, mouth, pimples)
  - Shaking hands with people
  - Using a nose tissue, handkerchief
- Touching selected raw food (particularly raw meat, fish, and poultry products)
- Touching bottoms of boxes that could be contaminated by meat and poultry juices on the floor of the delivery truck

Foodservice and food production personnel should be trained and encouraged to wash their hands at any time if there is any possibility of cross-contamination. Hand-washing facilities in food preparation, food production, and food service facilities must be accessible and maintained. Food service personnel should always minimize bare hand and arm contact with ready-to-eat food by preparing and mixing food with clean, sanitized equipment and utensils and by serving food with deli tissues, spatulas, tongs, or other dispensing equipment.

GLOVE USE

Laws of some states, such as New York *(40)*, and local or city ordinances *(6)* have made glove wearing by food workers mandatory, in spite of the fact that there is no documented evidence that food prepared and served by people wearing gloves is safer than food prepared by people who use effective hand-washing procedures. No regulatory agency has been able to force the food industry through regulation and inspection to ensure that all food workers wash their hands, because they have no way to measure if hands have been washed. Therefore, some regulatory agencies have chosen to enforce glove use by food workers to prevent transfer of fecal or oral pathogens.

When retail food personnel use gloves to prepare and serve food, they must be trained to realize that microorganisms adhere to the surfaces of gloves and that gloves can therefore be sources of cross-contamination, just as unwashed hands can. Disposable gloves must be changed frequently. However, at this time, there are no data or government rules on how long gloves should be worn. The 1997 FDA Food Code *(34)* recommends the following:

> §3-304.15 *Gloves, Use Limitation*
>
> *(A) If used, single-use gloves shall be used for only one task such as working with ready-to-eat foods or with raw animal food, used for no other purpose, and discarded when damaged or soiled or when interruptions occur in the operation.*

Establishing guidelines for the frequency of changing gloves thus

becomes very difficult, because one must consider length of time that gloves are worn, type(s) of food being handled, material and thickness of gloves, fit, type of work being done, and chemicals coming in contact with gloves.

The environment created on the hand covered by a glove is very conducive to the multiplication of pathogenic microorganisms such as *S. aureus* and *E. coli (82, 83)*, because the skin surface of the gloved hand is moist, warm, and protected. Any hole, tear, slit, or puncture of a glove allows the entrance and exit of pathogenic microorganisms. Many inexpensive plastic gloves are porous *(22)*. Korniewicz et al. *(52)* reported tests of procedure gloves from five manufacturers as follows:

> Vinyl gloves – 4% had defects, 34% allowed penetration of bacteria, and 53% failed in use.
>
> Latex gloves – 2.7% had defects, 20% allowed penetration of bacteria, and 3% failed in use.

There is a high probability that pathogenic microorganisms from gloved hands will be transferred to food and other contact surfaces. Paulson *(82, 83)* and Snyder *(93)* have demonstrated that if individuals do not wash their hands before putting on gloves, both the interior and exterior of the gloves become contaminated with surface microorganisms on the hand, a condition that has also been recognized by health care professionals *(13, 30, 53)*. In retail food operations, the concern is that many employees wearing gloves in a foodservice facility have not been trained to wash and dry their hands before putting on gloves and do not know when to change gloves (failing to change gloves even after touching contaminated objects).

Hands must be washed and dried as soon as gloves are removed, as well as before gloves are put on, to eliminate high levels of microorganisms on the hand surfaces *(37)*. This means that if employees are to use gloves correctly, the government must require that specific procedures be taught by management so that enforcement can be objective.

There have been many inquiries concerning the advisability and feasibility of washing gloved hands. However, at present, regulations concerning washing of gloved hands and reuse of gloves by workers in food production and foodservice have not been defined. It has been demonstrated that microorganisms adhere to the surface of gloves and are not easily washed off, despite friction, cleansing agents, and drying *(1, 25)*. The Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens Standard prohibits the washing and decontamination of disposable gloves for reuse by health care professionals *(78)*.

Based on the information above, it can be concluded that wearing gloves to prepare and serve food does not prevent cross-contamination of food and foodborne illness and disease for the following reasons:

1. If people do not wash their hands and fingertips adequately or at all after using the toilet or touching highly contaminated items such as raw meat and poultry products and before putting gloves on, pathogenic microorganisms can contaminate both the inside and outer surfaces of gloves.
2. Glove wearers continue to touch their faces, eyes, environmental surfaces, and contaminated raw food, inoculating the glove surfaces with microorganisms. In many instances, because of inadequate training, personnel wearing gloves assume that wearing gloves makes it unnecessary to wash their gloved hands or even change gloves.
3. Oils adhere to gloves and promote the subsequent adherence of microorganisms.
4. Makulowich *(64)* reported that gloves are porous and can allow entrance of viruses. Hence, it can be concluded that the porosity of gloves will also allow exit of viruses carried on hands within gloves (e.g., hepatitis viruses, Norwalk virus, and others).
5. Korniewicz et al. *(52)* found that when 480 examination gloves were stressed at the highest stress level, 63% of 60 vinyl gloves leaked a selected bacteriophage, compared with 7% of 60 latex gloves. At lower-use level, there was no statistically significant difference in leakage. Gloves may become punctured during use, and the inside may become wet with perspiration, encouraging an increase in bacteria on the skin surface *(41)*. When gloves are removed, hands must be washed thoroughly to reduce high populations of microorganisms in the moist environment on hands inside of gloves.
6. It must be emphasized that gloved hands touch as many contaminated objects and surfaces as ungloved hands and must be changed or washed frequently. However, at this time, there are no reliable data on how long gloves should be worn. No government agency has done any studies on glove contamination.
7. Some people develop contact dermatitis from wearing gloves. The causes have been traced to allergic reactions to powders within the gloves and the chemical composition of both latex and synthetic gloves themselves *(100)*.

The sensitivity of some people to latex is recognized by the medical profession. Latex allergy is a type I reaction to natural rubber latex proteins with clinical manifestations ranging from contact dermatitis to fatal anaphylaxis *(48, 99)*. People with a latex sensitivity cannot wear latex gloves without causing extreme skin irritation to both the hands and adjacent skin areas. A recent report

(89) has also traced adverse allergic reactions in sensitized individuals to consumption of sandwiches and salads prepared by food handlers wearing latex gloves.

Mandatory use of plastic gloves by food workers is not the solution for protecting the health of the public against contaminated hands. Management must train and mandate employees to use effective hand-washing procedures, whether or not they use gloves to prepare or serve food. Enforcement of the policy on use of these procedures is the only solution.

SUMMARY

Ensuring the removal of transient pathogenic microorganisms from hands requires correct scientific knowledge, management leadership, and employee training. Regulatory authorities must insist that management have an employee training program for hand and fingertip washing. When retail food industry personnel, both management and on-line employees, are properly educated and trained, hand washing will be accomplished when required, and food will be safer.

The critical control in hand washing is to reduce high levels of pathogenic microorganisms, such as fecal and oral pathogens on hands, to a safe level. This requires use of a fingernail brush with soft bristles, short fingernails, and a supply of warm, flowing water to wash off the pathogens loosened by the use of a nail brush and soap or detergent. Hand washing repeated once again, without the fingernail brush, further reduces the pathogen count. This "double" wash procedure should be used by food personnel after using the toilet or after any contact with other highly contaminated surfaces or objects. A "single" hand wash without the use of a fingernail brush (as needed) is sufficient for reducing pathogen transmission by workers in food production, food preparation, and food service areas.

A successful program requires a committed manager. If management is not concerned about hand washing, employees will not be concerned. Recognition should be given to employees who adhere to personal hygiene principles. There must be a strictly enforced management policy for those who ignore or forget hand-washing policies. Management must view the problem in the same manner as stealing cash or intentionally hurting a customer. If employees continue to disregard hand-washing procedures after being trained, management should consider their dismissal.

Instruction regarding the importance of hand washing, proper methods of hand washing, and management commitment to the hand-washing policy must become a part of new employee orientation and continuing employee education. People learn best if their efforts are recognized. Owners and managers should:

1. compliment employees for using correct hand-washing procedures.
2. provide clean, well-maintained personal hygiene facilities in restroom areas.
3. provide clean, well-maintained hand sink(s) in food production and food service areas as required, and
4. share customer and health department compliments with employees.

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Bacterial Foodborne Outbreaks Revisited — A Food History Lesson

Over the years, Mississippi has experienced a number of significant foodborne outbreaks. Some were associated with large, multi-state outbreaks; others were smaller, localized incidents. The following will examine a few of these outbreaks to see what has been learned about food safety.

An early example was a huge, multi-state episode of enteritis occurring between June 11 and July 29, 1982. The first indication of the outbreak was from a vigilant Mississippi hospital that noted an unusual number of appendectomies. Using what were at the time cutting-edge methods, their laboratory obtained isolates that were tentatively identified as *Yersinia enterocolitica* from some of these patients. The cultures were referred to the State Public Health Laboratory (PHL), for confirmation and identification. Additional reports from Arkansas and Tennessee initiated an intensive epidemiologic investigation by CDC and the involved states.

One hundred seventy-two culture confirmed cases were eventually identified, and the statistical data indicated more than 850 cases in Greenwood, Mississippi alone, with a total over the three-state area in the thousands – the largest outbreak of yersiniosis ever reported in the U.S.

Food surveys in Greenwood implicated milk from a single day's production in a Memphis processing plant as a source of infection. No milk was available for culture, and *Y. enterocolitica* was not isolated from subsequent lots, a finding not at all unusual in delayed-onset foodborne infections.

On February 13, 1989, eleven people attending a state university reported to the student health service with complaints of nausea, vomiting, cramps, and diarrhea. Nine required hospitalization. The health service reported this incident to the local and state health departments. An epidemiologic investigation was initiated, and interviews, including food histories, were made with hundreds of students. A total of 21 cases were associated with consumption of a breakfast meal at the school cafeteria. From the interviews, investigators were able to pinpoint the outbreak, first to a specific food line, then to the omelet line. Numerous items were submitted to the PHL for examination. All tested negative for typical foodborne pathogens.

Epidemiological investigation provided the answer. The onset of nausea and vomiting within 1 to 3 hours of the meal suggested *Staphylococcus aureus* intoxication. Further interviews with victims implicated mushrooms – canned mushrooms. Few laboratories can test for *S. aureus* toxin, so a sample of the mushrooms was sent to the Food and Drug Administration (FDA) laboratory where the presence of staphylococcal enterotoxin was confirmed. The reason the toxin was present but no viable *S. aureus* was isolated became clear. The mushrooms were contaminated prior to or during processing; the bacteria grew, produced toxin, but were killed by the heat of canning. Since *S. aureus* toxin is extremely heat-stable, it survived the canning process in sufficient concentration to cause illness.

FDA picked up the investigation and found that the canned mushrooms were from a lot of an estimated 1,900 cases of large cans (4 lb. 4 oz.) imported from a foreign country and subsequently distributed by a

Influenza A Confirmed in Mississippi

A culture obtained from a child in early December, in Ocean Springs, has been confirmed as Type A Influenza. The isolate has not been subtyped, but nationally the predominant strain is A(H3N2). The state sentinel reporting system indicates that influenza-like illness is occurring, with most of the activity in the southern half of the state. The MSDP thanks Dr. D'Ette Lorio for culturing and reporting this case.

commercial food supplier to at least five states. A recall was initiated. Anecdotally, there were other reports of similar illnesses associated with this source of canned mushrooms. FDA eventually entered into an agreement with the country of origin to inspect the canning facilities, and made recommendations for correcting any problems noted.

Several years ago, a civic club in a small Mississippi town held a fund-raiser by selling BBQ pork dinners. Almost immediately there were widespread reports of illness marked by profuse vomiting shortly after eating the pork. Dozens of people became ill, some requiring hospitalization. No problems with diagnosis here – a sample of pork grew copious quantities of *S. aureus*. An investigation indicated the meat was held at improper temperature for several hours.

Has anything been learned? Earlier this year a large company picnic was catered by a reputable and popular food establishment. More than 600 people ate BBQ pork. Within a very short period, most were ill with symptoms of violent vomiting. More than 125 people were treated at the local hospital emergency room, with a number of latecomers ill in the parking lots. Several samples of pork grew large numbers of *S. aureus* and *Bacillus cereus*, another notorious toxin producer. A likely cause, the sheer size of the picnic and the amount of pork required. Pork cooked and pulled often contains insignificant numbers of *S. aureus* and *B. cereus*, not enough to cause illness. But, if warm meat is stored or transported in bulk quantities the temperature in the center of the meat can remain at a level conductive to bacterial growth, and both *B. cereus* and *S. aureus* can form enormous amounts of toxin under these conditions.

Last October the MSDH received reports of a *Salmonella* outbreak in a metro-area day-care center, along with several patient stool isolates of *Salmonella typhimurium* from local hospitals. Subsequently, the PHL isolated *S. typhimurium* from two day care employees. By inference, food was suspected as the vehicle, but due to the delayed-onset nature of *Salmonella* infections, the only foods available were milk, frozen hamburger and fish. All tested negative for *Salmonella*. The exact cause of the outbreak is still undermined.

And finally, a classic – the "Christmas Ham Incident." Several years ago, a person brought a sample of baked ham to the PHL for testing per the instructions of an emergency room physician at a local hospital. A large family had bought and prepared the ham, and several were ill. Cultures were positive overnight for *S. aureus*, and the report was called to the family member submitting the sample. A day later, another person brought in a similar sample of ham, which also rapidly grew large numbers of *S. aureus*. In reporting, it was discovered that this was the same family back in the ER, with more of the same ham. The story pieced together was that ham had been cooked and left out on the table at room temperature to snack on for several days, and that although the PHL had reported it was contaminated, it was a big ham, and they just couldn't bring themselves to throw it away. The result – two trips to the ER. An unusual postscript, the family appeared several days later to pickup an official copy of the lab report. They were on their way to an attorney, intent on suing the grocery where they bought the ham!

Foodborne outbreaks can occur due to mishandling anywhere down the line from the producer, to the manufacturer to the consumer. The importance of properly handling, preparing, and holding foods at the correct temperature cannot be overemphasized. General reminders for commercial and household food handlers include:

Utensils (including the cutting board) should not be shared between foods, especially between raw and cooked foods.

Eggs and meats (especially ground beef) should be thoroughly cooked before eating.

When large quantities of food are prepared for later consumption, it should be refrigerated in shallow containers, so that the appropriate temperature can be reached quickly. Finished foods should be touched only with utensils, gloved hands, or scrupulously clean hands.

SAMPLE SUBMISSION INFORMATION

The MSDH can quantitatively and qualitatively culture food specimens for specific pathogenic bacteria, and is prepared to receive specimens which have been handled appropriately for testing. However, the laboratory will not test raw food, except in very rare and unusual circumstances, because most raw food will have bacteria on it, which should have been destroyed if the food was cooked. Food that is not kept refrigerated between the time it is eaten and when it is made available for testing (i.e., dug out of the garbage) will also not be tested, as any minute amounts of bacteria will have overgrown, or new bacteria may have contaminated the food in the interim. Usually, a food item that one person has eaten before becoming ill, when that person is the only ill person, will not be tested. There is always viral gastroenteritis which could have caused the symptoms in that person, and even if that one individual did not have a foodborne illness, the last food eaten was not necessarily the cause. Pathogenic foodborne bacteria have incubation periods which range from a few hours to many days. The ideal situation for testing is one in which a foodborne outbreak is suspected, the health department is alerted early so it can obtain specimens quickly from the suspect meal. The food items would then be labeled and sent, in a cooler, via the health department courier system to the MSDH laboratory.

The PHL is also available to perform culturing of stool and/or vomitus specimens from patients with suspected foodborne illnesses. These stool specimens should be sent to the PHL where they can be cultured for specific pathogens not routinely tested for in most clinical laboratories.

Submitted by: Joe O. Graves, Ph.D., Director, Mississippi Public Health Laboratory, Mississippi State Department of Health.

	Public Health District									State Totals*			
	I	II	III	IV	V	VI	VII	VIII	IX	Nav. 1997	Nov. 1996	YTD 1997	YTD 1996
Sexually Transmitted Diseases													
Primary and secandary syphilis	4	4	1		4	5				18	34	370	773
Other syphilis	3		5	3	11	2	2	1		27	94	924	1390
Ganacaccal infections	50	77	127	64	229	67	47	56	71	794	1084	8525	5844
Chlamydia	75	60	107	48	259	50	31	91	57	783	1007	9112	3897
AIDS cases			2	1	2	1			1	7	31	236	363
Other HIV infections	3		4	2	16		2		1	28	30	468	447
Mycobacterial Diseases													
Pulmonary tuberculosis (TB)	1		2			2	1		1	7	17	191	185
Extrapulmonary TB					2				2	4	1	41	29
Mycabacteria other than TB	1			2	6			2	1	12	NA	187	NA
Vaccine Preventable Diseases													
Diphtheria										0	0	0	0
Pertussis										0	1	11	11
Tetanus										0	0	0	0
Poliomyelitis										0	0	0	0
Measles										0	0	0	0
Mumps				1			1	1		3 0	13	15	
Viral Hepatitis													
Hepatitis A	1	1			3			1	1	7	27	65	218
Hepatitis B (acute)		2	1	2	1	3	2		2	13	29	132	207
Hepatitis C (Nan-A, Nan-B)			1						3	4	19	74	114
Enteric Diseases													
Salmanellasis	1	3	3	7	5	5	6	4	3	37	63	370	518
Shigellosis	3						1			4	24	97	170
Campylobacter disease	1		1		1	2	2	2	1	10	21	148	193
Giardiasis	1			1	1	1			3	7	17	125	154
Other Conditions of Public Health Significance													
Meningococcal infections										0	0	2	0
Invasive *H. influenzae* disease										0	2	24	50
Rocky Mountain spotted										0	1	31	29
Blastomycosis						1				1	2	16	26
Outbreaks													
Animal rabies										0	0	5	5
Matar vehicle deaths**										NA	NA	NA	NA
Spinal cord Injuries				6	1	1			4	12	16	176	204
Hazardous chemical releases	1			1	1	1			2	6	9	105	107

* Totals include morbidity not reported from a specific district and from the Department of Corrections

** Statistics abtained fram Department af Public Safety

* NA - Nat available (tempararily)

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Reynoldsburg

Bart Fox
Portion Pac, Inc., Mason

OREGON

David J. Dzurec
Oregon Institute of Technology
Klamath Falls

Dennis W. Finnell
Graziano Pro., Portland

PENNSYLVANIA

Frederick M. Kent
Honeywell Inc.
Fort Washington

SOUTH CAROLINA

Sherry Davis
W R Grace & Co.
Duncan

TENNESSEE

Christopher A. Kiefer
University of Tennessee
Knoxville

TEXAS

Glynn McGee
Southwest Foods Ice Cream
Tyler

Garry D. Schanke
Owens Country Sausage
Richardson

VIRGINIA

Stacey Zawel
United Fresh Fruits
& Vegetables Assn.
Alexandria

WASHINGTON

Robert Hennes
USPHS-FDA, Seattle

Jane E. Soudah
Health Community International
Gig Harbor

WISCONSIN

Todd C. Hannah
Silgan Containers Corporation
Oconomowoc

Eva Heim
Stainless Steel Fabricating Inc.
Columbus

VENEZUELA

William E. Blanco
Conc. Carabobo, Valencia, Carabobo

New Members

CANADA

JoAnne Allen
Kraft Canada, Cobourg, Ontario

Fred W. Comer
Red Star Bioproducts
Cornwall, Ontario

Paula Dall'Osto
Peel Health Dept., Brampton

Elaine I. Dribnenky
Red Deer, Alberta

Doug E. Everett
Stettler Community Health Services
Stettler, Alberta

Robert Gillespie
Premier's Choice Gourmet Entrees
Mississauga, Ontario

Mark Klassen
Troval Meats, Acme, Alberta

Alain Lanouette
Groupe Lactel, Boucherville, Québec

Doug J. McPhee
University of Guelph
Guelph, Ontario

Johanna M. Neubert
Bouvry Exports Calgary Ltd.
Calgary, Alberta

CHINA

Luey Kit-Yee
Hong Kong Government, Hong Kong

SLOVAKIA

Daniela Fetecauova
RaOS a.s., Hlohovec

UNITED KINGDOM

Lyn King
Borthwicks Flavours
Wellingborough, Northants

UNITED STATES

ALABAMA

Arthur Hinton, Jr.
USDA-ARS, Auburn

ARIZONA

Brock Harlin
Arizona Dept. of Health Services
Phoenix

CALIFORNIA

Eden Y. Bellenson
Cal-Poly, San Luis Obispo

James T. Boldt
Jafra Cosmetics, Westlake Village

Larry Conly
County of San Diego, San Diego

Louis S. Deneau
Delimex, San Diego

Sheri McIntyre
The National Food Laboratory
Dublin

COLORADO

Robert J. Delmore
Colorado State University
Fort Collins

Debbie Moritz
Safeway Stores, Inc., Denver

CONNECTICUT

Ed Krysinski
Pepperidge Farm, Norwalk

FLORIDA

Charles M. Papa
Triarc Restaurant Group
Fort Lauderdale

ILLINOIS

Steve Berne
Prepared Foods Magazine
Des Plaines

Bob Brewster
Dupage Co. Health Dept., Wheaton

Donna Rosenbaum
Food Safety Partners, Northbrook

Ellen M. Vestergaard
Silliker Laboratories, Hinsdale

INDIANA

Helen M. Piotter
Indiana State Board
of Animal Health, Macy

MAINE

Pamela J. Fischer
Fresh Samantha, Saco

Linda Stahlnecker
Maine Dept. of Agriculture, Augusta

MASSACHUSETTS

John E. Blanchard
The Foxboro Co., Foxboro

MICHIGAN

Daniel A. Sandahl
Mid-MI District Health Dept., Stanton

Brad S. Smith
Dist. Health Dept. #10, Lake City

MINNESOTA

Ann N. Burns
Sunny Fresh Foods, Monticello

Janis M. Hughes
Honeymead Products Co.
Mankato

Ruth Iyorbo
Sandoz Nutrition, Minneapolis

Jane Johnson
Gold'n Plump Poultry, Cold Spring

Susan G. Johnson
Ecolab, Inc., St. Paul

Jeri M. Kaczmarek
E. A. Sween, Eden Prairie

Donna Knaeble
St. Louis Co. Health Dept.
Virginia

MISSOURI

Russell K. Robbins
Dairy Farmers of America
Springfield

Christopher A. Whipple
Morrison Health Care, St. Louis

MONTANA

Daryl S. Paulson
BioScience Laboratories, Inc.
Bozeman

NEW HAMPSHIRE

Mary Ellen E. Tufts
Plaistow Health Dept., Plaistow

NEW JERSEY

Janice Flesher
Lawrenceville

Stacy A. Kimmel
Nutrinova, Somerset

Kelly A. Stevens
Campbell Soup Co., Camden

Robert Vanderbilt
M & M/Mars, Hackettstown

NEW YORK

Jon Delaharpe
Applied Microbiology, Inc.
Tarrytown

Cecelia Marshall
Rich Products Corp., Buffalo

James G. Murphy
The Dannon Co., Ossining

Jeanne L. Thomson
Thomson & Thomson
Rexville

Hugh Trenk
Kraft Foods, Tarrytown

Randy Worobo
Cornell University, Geneva

Kevin I. Zimmerman
Onondaga Co. Health Dept.
Syracuse

NORTH CAROLINA

Roger W. Fortman
State of North Carolina-dehnr
Raleigh

Walker Rayburn
PPCC District Health, Elizabeth City

OHIO

James R. Agin
Ohio Dept. Agriculture
Reynoldsburg

Bart Fox
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Christopher A. Kiefer
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Southwest Foods Ice Cream
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Columbus

VENEZUELA

William E. Blanco
Conc. Carabobo, Valencia, Carabobo

UpDates

William C. Haines, Ph.D. Named Vice President

As Dairy Management Inc.'s Vice President of Business to Business Marketing, Bill Haines oversees the organization's new comprehensive campaign promoting the use of whey and nonfat dry milk as ingredients. In addition, he works closely with the six organization-funded Dairy Foods Research Centers and other university-based programs conducting research involving dairy products. The goal of these efforts is to support DMI's mission of developing and executing an industry-wide, market-driven business plan that invests resources in a strategic manner and provides the best possible economic advantage to dairy farmers.

Before joining DMI, Bill served as the Director of the Food Industry Institute at Michigan State University in East Lansing and as a Professor of food science and food industry management at the school.

Previously, he was Vice President of Research and Development for Ridgeview Industries (now DMV USA), a dairy ingredient supplier in LaCrosse, WI. Bill began his career at Schrieber Foods of Green Bay, WI, working in product and process development.

Bill earned both his Ph.D. in food science and his bachelor's degree in chemistry from Michigan State University. He was recognized as a distinguished university scholar and as a member of the Phi Kappa Phi scholastic honor society, the Sigma Xi research society and the Gamma Sigma Delta agricultural society.

Microbiologist Melissa Martens Joins Elgin Dairy

Elgin Dairy Foods, Inc. has announced the appointment of Microbiologist Melissa Martens as Senior Lab Technologist in its quality control, testing and research and development laboratory. Her responsibilities include microbiological and Mojonnier testing, state and environmental sampling, completing certificates of analysis, evaluating products for functionality and specifications, maintaining Kosher Certifications and testing and calibrating all laboratory equipment.

Ms. Martens is a graduate of Indiana University, where she majored in biology. She was a Microbiologist at Silliker Laboratories prior to joining Elgin.

Amy R. Skovsende Named Director of Technology Marketing

In her position at Dairy Management Inc., Amy is responsible for providing dairy foods product research and technology information to dairy processors, co-ops, food manufacturers and food technologists. She creates and executes programs to promote the dairy industry's ongoing research and technology initiatives.

She previously served in a similar capacity as Director of Technology Transfer at the Dairy Research Foundation in Elk Grove Village, IL. This organization became part of DMI in 1995.

Prior to that, Amy was Assistant Manager of Marketing and Technical Services at American Xyrofin, Inc., a division of Cultor, Inc., based in Schaumburg, IL. She was responsible for technical sales and communications activities for the firm's line of sugar alcohols marketed to the confections, pharmaceutical, flavor and food processing industries.

While earning her B.S. degree in food science and technology from the University of Nebraska-Lincoln, Amy joined the Food Processing Center as a Marketing Assistant. The center, a university-affiliated operation, assists Nebraska food companies with product development, packaging, labeling and other aspects of marketing their products.

Adrian Rischmiller Appointed Sales Manager

Adrian A. Rischmiller has been appointed as Corporate Sales Manager for General Resource Corp. GRC is a Hopkins Minnesota-based manufacturer of commercial and industrial ventilation, fume and dust control products.

Adrian is a highly experienced sales professional with an extensive background in sales and sales management. He has sold industrial products, and capital equipment to the mining and construction industries. He has lived and sold products for many years in North America, and major markets throughout the world.

Mr. Rischmiller received a Bachelor of Arts degree in Business Administration from Hilsea College, England.

Strouts Promoted to Director of Experimental Baking

Brian Strouts has been promoted to the position of Director of Experimental Baking in the research department. His promotion is part of a general reorganization of research department functions.

Strouts has been the Director of the Biscuit Products Technical Assistance for the past four years. With this change, all experimental baking and cookie and cracker activities have been merged into one group.

Strouts will have oversight over both of AIB's experimental baking labs, including monitoring finances as well as developing new seminars and programs.

The Experimental Baking group will continue to be responsible for cookie/cracker seminars which had previously been Strout's main responsibility.

Reorganization of the baking groups also includes merging Jeff Zeak into the experimental baking team as a supervisor. Zeak was previously assigned to the Biscuit Products Group. Theresa Sutton will continue in her position as a Lab Supervisor. Renee Boeckman, Senior Baking Technologist; Brian Glaser, Baking Technologist; and Dee Forge, Baking Technologist make up the rest of the Experimental Baking Team.

A Manager to coordinate the day-to-day activities of the experimental bakeries will be hired in 1998.

Jane Langemeier has been moved back into the Cereal Chemistry Group as a Cereal Research Chemist. Another cereal science position will be added in 1998. That person will coordinate AIB efforts in the possible uses of rapid analysis and other new technologies for possible future use by the baking industry.

Dr. Robert L. Buchanan Appointed as a Senior Scientist for Presidential Food Safety

The Food and Drug Administration announced that Dr. Robert (Bob) L. Buchanan will be joining the agency's Center for Food Safety and Applied Nutrition as a Senior Scientist for the President's National Food Safety Initiative and a member of the U.S. Public Health Service's Senior Biomedical Research Service.

The Food Safety Initiative was announced in January 1997 by President Clinton. It directs and provides funding for the Food and Drug Administration and other government food-safety agencies to take steps to reduce the number of U.S. foodborne illnesses. As a senior FDA scientific authority for the initiative, Dr. Buchanan will have oversight for development of science-based policies implemented under the initiative. His appointment is another step forward in assembling a senior team to tackle this important issue. He began his duties on January 18.

Dr. Buchanan is a leading authority on food microbiology and quantitative risk assessment for microbial foodborne pathogens. He has conducted extensive research in food safety microbiology, bacterial physiology, and mycotoxicology.

Dr. Buchanan currently is a Senior Investigator with the U.S. Department of Agriculture's Agricultural Research Service (ARS), stationed at the ARS Eastern Regional Research Center in Philadelphia, PA. He has served in various positions in USDA including Deputy Administrator for Science and Technology for the Food Safety and Inspection Service.

Prior to his USDA career, Dr. Buchanan served as an Associate Professor at Drexel University. He is the recipient of numerous professional awards including the University of Wisconsin Fraiser Award, the Institute of Food Technologist's Bauermann Award, and the ARS Outstanding Scientist of the Year Award. He is a Fellow of the American Academy of Microbiology and a member of both the National Advisory Committee on Microbiological Criteria for Foods and the International Commission for Microbiological Specifications for Foods. He is also a member of numerous professional organizations and serves as a Contributing Editor for Food Microbiology and a member of the Board of Editors for the *Journal of Food Safety* and the *Journal of Food Protection*.

Dr. Buchanan received his Ph.D. in microbiology from Rutgers University, and post-doctoral training at the University of Georgia.

Natural Chicken Processors Take Lead in Testing Ozone as a Food Safety Solution

Cyclopss Corp. announced it has signed two agreements to pilot test its Eco-Pure Food Safety System(1) with a New York-based all natural chicken processor, Murray's Chickens Inc., and, New York-based prepared foods company, Gold Farm Natural Foods Inc.

The Food Safety and Inspection Service ("FSIS"), an agency of the United States Department of Agriculture ("USDA"), requires the in-plant pilot testing if the chicken processors are to use an ozone technology. These pilot tests follow President Clinton's directive to food processors to better ensure the end customer that every step is being taken to provide a safer product. The pilot tests demonstrate that Murray's Chickens and Gold Farm Natural Foods is leading the industry in going the extra mile to investigate new, more natural technologies now being made available to the food processing industry.

Ozone is generated by nature when lightning strikes and sends electrical charges through the air; and leaves the air smelling fresh. The same effect can be produced in controlled environments and can rid foods of microorganisms such as *E. coli* O157, *Campylobacter, Salmonella*, and the like.

In fact, ozone kills *E. coli* more than 3,000 times faster than does chlorine and unlike, chlorine, it leaves no chemical residue behind, making it a more natural, consumer-friendly answer to food safety issues. After ozone is introduced to food, it quickly reverts back to its close cousin, oxygen.

The pilot tests will occur simultaneously in Murray's Chickens' South Fallsburg, N.Y. plant and in Gold Farm Natural Foods' co-packers plant in Troy, N.Y. The initial pilot tests begin in Cyclopss' Salt Lake City laboratory facility. Then, the tests progress to an in-plant phase once FSIS approves Cyclopss-submitted detailed protocols. All testing is expected to take three months.

Once concluded, the data (including an independent lab's analysis of more than 600 samples) will be sent to the USDA (FSIS) as part of the protocols submitted for approval prior to a full-scale installation at the plant locations. Test chickens will be pulled off the production line and will be used for test purposes only. Test chickens will not be sold. New York State Electric & Gas Corp. (NYSEG), the electric utility that serves Murray's Chickens, will finance a portion of the tests.

Meat Industry Continues Food Safety Improvements; New HACCP Requirements Help; More Education and Research Needed Washington

Consumer demand has triggered many improvements in the safety of U.S. meat and poultry over the past five years, according to the American Meat Institute. The industry, the government and consumers have stepped up their efforts to produce, inspect and handle meat and poultry products with greater vigilance for food safety than ever before. As 1998 begins, with a major new meat and poultry inspection requirement starting January 26, the industry says it is proud of its food safety improvements to date and remains committed to continued improvements in the future.

The meat and poultry industry strongly supports Hazard Analysis Critical Control Points (HACCP) as the best known method for producing safe food. The industry is ready, willing and able to meet the government's new requirement: to produce all meat and poultry products in large plants according to HACCP plans. In fact, many plants of all sizes have been producing foods according to HACCP plans for years. The new government requirement is part of the Pathogen Reduction/HACCP Rule published by USDA in July 1996. "We believe HACCP can improve food safety by reducing contamination at every stage of food production," said American Meat Institute (AMI) President J. Patrick Boyle. Boyle said consumers can expect more foods in the future to be produced under HACCP plans at every stage of production, from "farm to fork."

In recent years the meat and poultry industry has developed new techniques to prevent contamination and destroy pathogens, thus helping to protect consumers. Treating beef carcasses with superheated steam, for example, reduces *E. coli* O157:H7 and a host of other harmful bacteria. It is estimated that most beef produced in the U.S. will soon undergo this steam treatment. Rinsing beef carcasses with hot water and acidic solutions also reduces pathogens. Irradiation has also been proven effective in destroying *Salmonella*, *Campylobacter* and *E. coli* O157:H7 in meat and poultry. Irradiation was approved for red meats by the Food and Drug Administration in December 1997; a USDA regulation on packaging and labeling is required before the technology can be used.

Thousands of meat and poultry plant workers have already been

trained to use HACCP plans to produce safer products. Tens of thousands of other food industry employees have also learned how to use HACCP, resulting in improved food handling vigilance in supermarkets and restaurants, which is further protecting consumers. Perishable products like meat and poultry are being handled with greater care for sanitation, proper chilling, packaging, storage and cooking in commercial food production, distribution and retail operations. Livestock management practices are being developed that will help reduce any potentially harmful contamination. Research is ongoing to find new ways to reduce human pathogens in and on livestock. Consumers are also getting better education through the new Fight BAC!™ public health education campaign sponsored by the federal government, consumer and industry organizations. The campaign teaches consumers to clean, chill, cook and store foods properly. It was launched in October 1997 by Agriculture Secretary Dan Glickman, Health and Human Services Secretary Donna Shalala, and other industry and consumer representatives.

AFFI Welcomes USDA's Action on Organics

The American Frozen Food Institute (AFFI) praised the United States Department of Agriculture's (USDA) publication in the *Federal Register* of a proposed rule to establish national standards for organic foods. AFFI indicated it would participate actively in the debate on the proposal and would urge the inclusion of biotechnologically derived foods among those which may be marketed as "organic."

"AFFI has long advocated national standards for organic food products, which it believes will facilitate the marketing of organic products, enhance communication with consumers and strengthen the hand of United States companies seeking to export organic products," said Steven C. Anderson, AFFI's President and Chief Executive Officer.

AFFI's priority in the development of a final rule will be to ensure a level playing field for processors of biotechnologically derived products. Such products can be compatible with the principles of organic farming, and must be included if the standards are to be science-based and even-handed.

The proposed rule published in the *Federal Register* left open for debate the treatment of biotechnologically derived products; or genetically engineered organisms (GEOs). USDA did note, however, the policy of the United States Government that GEOs and their products should be regulated based on risk, not on how they are produced.

USDA proposed the rule under the *Organic Foods Production Act of 1990*, which required the establishment of national standards governing the marketing of organic food products.

Osmonics Acquires Purification Products Company

Osmonics, Inc. announced the completion of its acquisition of Purification Products Company (PPC), located in San Marcos, CA.

PPC was a subsidiary of Sybron Chemicals, Inc., of Birmingham, N.J., an international specialty chemical company supplying the environmental and textile wet processing industries. PPC manufactures a line of reverse osmosis (RO) membrane elements and related products for purifying home drinking water and producing high-quality water for other applications.

PPC membrane elements use two types of media manufactured by Osmonics. The cellulose triacetate (CTA) membrane element business will be relocated to Osmonics' Syracuse, New York, operation, while the thin-film composite membrane element business will be integrated into Osmonics' Vista, California, facility.

PPC also manufactures an ultraviolet sterilization unit for point-of-use applications, and a unit that automatically measures silt density index (SDI)—a common feedwater quality test used in reverse osmosis desalting applications. Both products are expected to be manufactured at Osmonics' Phoenix location.

IAFIS Opens Canadian Office

The International Association of Food Industry Suppliers (IAFIS) has announced the opening of its Canadian office, located in Apple Hill, Ontario, a suburb of Ottowa. The office, which is staffed by Mr. Robin Flockton, opened January 1, 1998.

IAFIS President Charlie Bray commented, "By having a home-base in Canada, our members have better access to Canadian members, branches of the Canadian Federal and Provincial Governments, Canadian food industry associations, Canadian food industry media, and more importantly, these groups will have direct access to IAFIS and its' members. Flockton will also be expected to promote participation in Worldwide Food Expo '99, as well as assist in the development of new IAFIS programs."

Flockton will be responsible for maintaining a Canadian library of food industry reference material, promoting 3-A Sanitary Standards, and assisting with the Collegiate Dairy Products Evaluation Contest, which is to be held in Toronto in 1998. He will also be providing a Canadian-perspective column for the *IAFIS Reporter* newsletter.

The Canadian IAFIS office is located at: P.O. Box 152 Apple Hill, Ontario, K0C 1B0, Phone: 613.525.0263; Fax: 613.525.4328; E-mail: iafis@fisc.ca.

Drew Industrial Announces Web Site Technical Forum

Ashland Chemical Company's Drew Industrial Division has established a technical forum at its Web site (www.ashchem.com/di.html). The forum is provided as a vehicle for visitors to the Web site to pose questions which are answered by Drew Industrial's technical staff. It also contains previously submitted questions along with Drew Industrial's response.

Visitors to the forum can choose from 8 main categories: Cleaners; Coating Additives; Fuel Treatment; Improvers and Ash Deposit Modifiers; Pulp and Paper Process Additives; Water Treatment Chemical Additives; Analysis and Testing; and Water and Wastewater Chemical Treatment. After choosing a category, visitors have the option of submitting a question to Drew Industrial's technical staff or viewing previously submitted questions with their corresponding answers. Obviously, as they submit questions, they will be increasing the value of this database for everyone.

Communicating Food Safety Messages to the Press: Tell the Truth — Avoid the Hype, Says One Reporter

The 90s will be known as the decade of food safety, says Marian Burros, food columnist for the *New York Times*, maintaining that the best way for the food-producing industry to effectively communicate food safety messages to the press is by "telling the truth."

"Industry seems more willing to accept responsibility for food safety in recent years," Burros offered at the January meeting of AHI's Food Safety Network. This acknowledgment signifies a tremendous step forward and will only help strengthen relations between industry, the press, and the public — "so long as the public is told the truth," she said.

According to a McNeil Lehrer study of top news story coverage last year, "The number one story topic was Princess Diana; number two was food safety."

Burros explored a number of food safety-related topics in her presentation, including an important yet controversial issue which she believes will remain "hot" throughout 1998: irradiation. Citing the approval of irradiation for poultry and FDA's recent approval of this process for beef, Burros said, "Industry has decided irradiation may be a panacea... I suggest that maybe you should watch out, because you may get what you wish for."

Burros reiterated her emphasis on being truthful in communicating food safety messages, noting that part of her concern about irradiation stems from too much industry "hype." Despite opposing remarks from audience members, she claimed that industry views irradiation as a "cure-all" food safety measure, not merely an additional safety step. "Almost all of the press releases that come across my desk" convey this message, she said.

So how can industry overcome potential media skepticism when dealing with issues like these? "If you as a reporter have had good experience with a particular group and you haven't been misled, or even lied to, then you won't be as skeptical of them," Burros said.

"Don't say irradiated meat smells fine when it doesn't," Burros continued. "Don't hire public relations firms and lawyers when food safety-related problems arise; instead, use epidemiologists and technicians to provide the scientific facts on the situation." Burros voiced her support of one epidemiologist in particular, Dr. Michael Osterholm, of the Minnesota Department of Health, who she calls "the voice of the future" and whose views concerning antibiotic use in animals have been published in numerous national publications and television broadcasts.

During her presentation, Burros also noted that industry must continue to communicate food safety messages, such as hygiene and proper food preparation, to the public because these types of messages have not been conveyed strongly enough in the past. With the launching of Sputnik, she said, science-based courses became the popular subject matter in schools, and home economics classes were left behind. As a result, kids have not been learning about proper hygiene as they should be, she noted.

"If you don't keep repeating messages about washing hands and keeping food preparation areas clean, over and over again, people will continue to do stupid things," Burros remarked.

Finally, Burros provided her thoughts on what she expects to be the big food-related news stories for the upcoming year, warning that the year's top stories may come as a surprise. She cited irradiation as a top story: "There's going to be a big push to get people to understand what irradiation is all about," she said.

Another top story for 1998, according to Burros, may involve the Centers for Disease Control's "sentinel sites," set up around the country to monitor potential outbreaks of foodborne illness. As we hear more and more reports from these sentinel sites, food safety stories will continue to top the news, she said. Lastly, the push to combine existing government food safety agencies into a single agency

might emerge as another "hot" issue this year, according to Burros. If the idea is deemed a high priority by Congress, she said, "maybe we'll see it happen."

Chromagar Announcement

Becton Dickinson, through its Microbiology Systems Division headquartered in Baltimore, MD, U.S.A. announces the conclusion of a Worldwide Licensing agreement with Chromagar, Paris, France for the supply and technology transfer of chromogenic media. The agreement also enables the expected further development of chromogenic applications in microbiology.

Chromagar has been a pioneer of chromogenic media technology and this alliance will serve to enhance the Becton Dickinson Culture Media offering to customers worldwide. This agreement brings together Chromagar's technology with Becton Dickinson's capability to serve both Clinical and Industrial Microbiologists. Chromogenic media provides value to the microbiologist in providing more information on bacterial isolates through the differential coloring of different bacterial species, thus saving time and money in the laboratory.

Columbian Steel Tank Announces ISO 9001 and API Q1 Certification

Columbian Steel Tank Company, Kansas City, KS announces their ISO 9001 and API Q1 certification. Both certifications are natural extensions of Columbian's long time commitment to consistency and quality in their products.

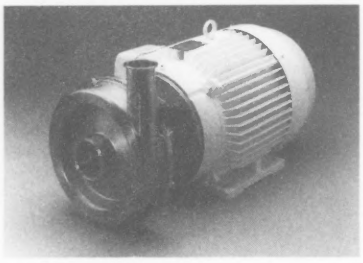
ISO 9001 certification establishes documentation of their adherence to a stringent quality assurance program. The API Q1 certification further identifies Columbian Steel Tank as a manufacturer capable of producing products that consistently conform to the American Petroleum Institute's specifications for quality programs.

U.S. Filter Corporation Announces Acquisition of Stranco, Inc.

U.S. Filter Corporation has announced the acquisition of Stranco, Inc., Bradley, IL, a leader in polymer dosing technologies for municipal and industrial water and wastewater treatment. Stranco's POLYBLEND® polymer feed systems are used extensively for industrial processing, water and wastewater treatment, and biosolids management. Separate feeder designs for liquid and dry polymers enable customers to combine features and custom design systems to control costs.

"We are delighted to now be teamed with such a significant global player," said Stanco President and CEO Frank Strand. "There is today significant industry recognition of Stranco's new technologies for disinfection and separation control. What is now needed for these breakthrough technologies is the firepower of a much stronger, strategically-positioned marketing organization."

IndustryProducts



G & H Products Corp.

G&H Products Introduces GHH-70 to Round Out Line of Centrifugal Pumps

The new GHH-70, the newest addition to the GHH line from G&H Products, combines higher flow rates and discharge pressures.

The GHH-70 has a front-loaded, externally-balanced mechanical seal that includes a conical spring, eliminating the need for the notch in the rotating seal. This enables service people to change the seal from the front of the back plate, saving valuable service time. Its low NPSH requirement means that lower inlet pressure is needed to operate the pump. And, off-set loads are eliminated with the GHH-70's balanced design through self-centering compression coupling.

Some of the other features of this new centrifugal pump include: unique, modular design, heavy-duty construction, high efficiency, extended service intervals and easy maintenance, gentle product treatment, low power consumption, authorized to carry the 3-A symbol.

G & H Products Corp., Pleasant Prairie, WI

Reader Service No. 364

New Cleaning System Enhances HACCP Program Application

DuBois, an innovator in sanitation chemical programs, has developed the new design concept of Localized Central Cleaning Systems. The new design, displayed at the World Wide Food Expo '97 in Chicago received gleaming acceptance from processors. The system is the perfect tool in HACCP program application. Accuracy, consistency, ease of use and simplicity in design make it the ideal for controlling and verifying correct chemical use.

This new line of chemical dispensers eliminates set up time and reinforces the safety standard set by the DuBois Color Code Program. Designed to be affordable, the Localized Central Cleaning Systems effectively replace tank and eductor style foamer and sanitizer units. They provide use dilution cleaning chemical simultaneously to multiple locations at the correct concentrations without employee handling of concentrates. The Sanitizer system, when used with the appropriate DuBois EPA no rinse sanitizer, provide an easy medium for hand, glove, utensil and area 'disinfection' during production.

DuBois, Cincinnati, OH

Reader Service No. 365

New Clean-Roll™ Combines the Benefits of a High-Speed Door with a Complete Hygienic Package

The Clean-Roll™, Rytec's newest high-speed rolling door, is the first door ever to combine the requirements for a hygienic/clean-room door with the benefits of a high-speed door. Rytec designed the Clean-Roll for food processors, especially firms in the meat, poultry, dairy and seafood industries, to help them meet high standards for cleanliness, save energy and increase productivity.

The Hazard Analysis and Critical Control Point (HACCP) rule has put more burden on food processors to ensure that purchased equipment adheres to strict hygienic standards. Rytec designed the door to comply with requirements from USDA, NSF, FDA, and ISO standards and protocol.

Airborne microorganisms that infiltrate plant processing and packing areas represent a serious threat to product quality and safety. According to a study commissioned by The American Society of Heating, Refrigerating, and Air Condi-

tioning Engineers (ASHRAE) and conducted by Dr. A. J. Heber of Purdue University's Department of Agriculture and Biological Engineering, these bioaerosol emissions may be carried throughout a processing plant via air flow caused by openings such as doorways.

An additional benefit to the speed of the Clean-Roll door is increased productivity as vehicle and pedestrian traffic is allowed to enter and exit more quickly and with greater efficiency.

In addition to the Clean-Roll's high-speed and hygienic benefits, Blue said its Break-Away™ bottom bar dramatically reduces maintenance costs by allowing the door to withstand the impact of a forklift and be reset, without tools, in seconds.

The Clean-Roll is very low-profile, requiring minimal side and head room clearance. The modular bolt-together design provides for quick and easy installation.

Rytec Corporation, Jackson, WI

Reader Service No. 366

Ecolab's New Pest Elimination Program is Best Defense for Food and Beverage Industry

The best offense is a good defense, especially in the war against pests.

With that in mind, the pest elimination division of Ecolab Inc. created its new ECOPRO™ Integrated Pest Elimination Program for the food and beverage industry. ECOPRO utilizes a proactive approach to preventing pest infestations, rather than simply reacting to problems once they occur.

ECOPRO safely delivers superior performance through an innovative combination of intensive inspection, prevention, and sanitation. The process begins with a thorough facility inspection from the outside-in to determine where pests might enter and identify actual or potential pest problems. Ecolab's expertly trained and certified service specialist then develops an individualized plan of action to alter the environment and prevent infestations.

ECOPRO's technology guarantees results, utilizing the most effective products and state-of-the-art equipment developed by Ecolab's Research & Development team. Ecolab innovations include the *Checkpoint™ Rodent Bait Station*; *Stealth™ Maxima* and *Decora*, an essential part of Ecolab's Flying Insect Defense Program; and the new *ECO2000 Bait System™*, a powerful new weapon in the war against cockroaches.

Pesticides are used only when and where necessary. When applications are made, they are precisely and safely dispensed through *The Eliminator* Precision Pesticide Applicator in accordance with government and customer specifications.

Ecolab also provides personnel with on-site training using the latest instruction materials to ensure optimum results.

Ecolab Inc., St. Paul, MN

Reader Service No. 367

Filtron Brand Centrifugal Devices Now Available From Pall Gelman Sciences

Filtron brand centrifugal devices for ultrafiltration and microfiltration are now available from Pall Gelman Sciences. Nanosep®, Microsep™, Macrosep®, and Jumbosep™ centrifugal devices facilitate rapid processing of volumes ranging from <100 µL to 60 mL. Membranes are offered from 1 kD to 0.8 µm, and each device is color-coded by MWCO or pore size for easy visual identification.

Omega™ polyethersulfone ultrafiltration membranes combine high flow rates and low non-specific protein and nucleic acid binding for maximum sample recoveries.

The membrane seal is designed without an O-ring, which prevents solution bypass and sample loss. Devices are available with a built-in deadstop to prevent spinning to dryness. In addition to smaller packaging quantities, Nanosep, Microsep, and Macrosep devices can be ordered in convenient bulk packs of 100 and 500 devices.

Centrifugal devices can replace separation techniques such as column chromatography, preparative electrophoresis, alcohol or salt precipitation, dialysis, and gradient centrifugation.

Pall Gelman Sciences, Ann Arbor, MI

Reader Service No. 368

E. coli O157 Testing: Rapid Results with Culture Confirmation

Dynabeads® anti-E. coli O157 is designed for rapid, immunomagnetic selective enrichment of *E. coli* O157 directly from pre-enrichment broths. The rapid and simple protocol (less than 60 minutes) results in the isolation of *E. coli* O157 colonies in 24 hours. Thus, saving at least 24 hours of valuable confirmation testing time required in presumptive tests and reducing false positive results.

Dynabeads® anti-E. coli O157 are uniform, superparamagnetic microspheres with affinity purified antibodies on their surface. When incubated with a sample, Dynabeads® will bind their target bacterium forming a bacterium: magnetic bead complex. This complex is separated from the

heterogeneous sample by performing the test in a magnetic test tube rack. The isolated and concentrated bacterium:bead complex can then be cultured on any selective culture medium.

This highly sensitive system will detect as few as 100 organisms/ml of pre-enriched sample. With isolated colonies at 24 hours, false positive results are eliminated and confirmation can be completed sooner. Other features include simple protocols, shelf-stable reagents, no requirement for shakers during pre-incubation or a 42°C incubator, and a significantly lower cost per test. The versatility provided by this methodology will allow testing of many different sample types while achieving excellent recovery of this important pathogen.

Dynal, Inc., Lake Success, NY

Reader Service No. 369

Product Shelf Life and Stability Testing Facilitated with New Laboratory Module

LabSystems, has just introduced a new WINDOWS™-based module to analyze and test product stability over time.

New Stability v3.2 is a highly specialized shelf-life analysis tool, which is available as a module for fully integrated use with Sample Manager LIMS, LabSystems' client/server LIMS.

Thermo LabSystems Inc.

This new Windows release of Stability is an Extended Functionality Module, which has been developed initially to meet the scientists' needs for a user-friendly Graphical User Interface for shelf-life testing, designed to a specification determined by existing LabSystems' customers.

Its simple-to-use interface also makes Stability the ideal LIMS solution for shelf-life and stability testing in manufacturing and agrochemical industries.

The new Stability v3.2 offers additional features: Reporting is available through 3rd party applications such as common word processors, full right mouse button control is in line with office applications, and inventory control management functionality is also available.

Thermo LabSystem Inc., Beverly, MA

Reader Service No. 370

Container-Testing Programs Available

In the Dairy Industry, sanitation is serious. The best CIP systems are purchased for cleaning equipment, the milk is tested upon arrival and again after processing, and caution is taken to ensure the proper temperature of milk products in storage and transportation. But is your pasteurized milk going into containers that are free of bacteria? According to the Pasteurized Milk Ordinance, all single containers should be free of coliform organisms. Whether buying containers or fabricating them in the dairy plant, sampling and testing programs are critical. Packaging is the last possible area for post-pasteurization contamination–monitor it.

ESS Laboratories, Culpeper, VA

Reader Service No. 371

Select Concepts, HACCP for Foodservice

Select Concepts, a company offering training and consulting for the foodservice industry, is best known for its Food Protection Management Training Programs (certification and recertification). These programs were the first to be accredited by the Texas Department of Health. A newly added workshop covers prerequisite programs, HACCP Principles and suggestions for getting started.

Select Concepts, Dallas, TX

Reader Service No. 372

Reader Service Card Available on Page 189.

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ADVERTISING INDEX

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IAMFES Lending Library

DAIRY

- **The Bulk Milk Hauler: Protocol & Procedures**—(8 minute videotape). Teaches bulk milk haulers how they contribute to quality milk production. Special emphasis is given to the hauler's role in proper milk sampling, sample care procedures, and understanding test results. (Iowa State University Extension–1990)
- **Causes of Milkfat Test Variations and Depressions**—(30 minute–140 slides–tape–script). This set illustrates the many factors involved in causing milkfat test variations or depressions in your herd, including feeding, management, stage of lactation, age of samples, handling of samples, and testing procedures. The script was reviewed by field staff, nutritionists, laboratory personnel and county extension staff. It is directed to farmers, youth and allied industry. (Penn State–1982)
- **Cold Hard Facts**—This video is recommended for training personnel associated with processing, transporting, warehousing, wholesaling and retailing frozen foods. It contains pertinent information related to good management practices necessary to ensure high quality frozen foods. (National Frozen Food Association–1993)
- **Ether Extraction Method for Determination of Raw Milk**—(26 minute videotape). Describes the ether extraction procedure to measure milkfat in dairy products. Included is an explanation of the chemical reagents used in each step of the process. (CA–1988)
- **The Farm Bulk Milk Hauler**—(30 minute–135 slides–tape–script). This set covers the complete procedure for sampling and collecting milk from farms. Each step is shown as it starts with the hauler entering the farm lane and ends when he leaves the milk house. Emphasis is on universal sampling and automated testing. Funds to develop this set were provided by The Federal Order #36 Milk Market Administrator. (Penn State–1982)
- **Frozen Dairy Products**—(27 minute videotape). Developed by the California Department of Food and Agriculture. Although it mentions the importance of frozen desserts, safety and checking ingredients; emphasis is on what to look for in a plant inspection. Everything from receiving, through processing and cleaning and sanitizing is outlined, concluded with a quality control program. Directed to plant workers and supervisors, it shows you what should be done. (CA–1987) — Reviewed 1997.
- **The Gerber Butterfat Test**—(7 minute videotape). Describes the Gerber milkfat test procedure for dairy products and compares it to the Babcock test procedure. (CA–1990)
- **High-Temperature, Short-Time Pasteurizer**—(59 minute videotape). Provided by the Dairy Division of Borden, Inc. It was developed to train pasteurizer operators and is well done. There are seven sections with the first covering the twelve components of a pasteurizer and the purpose and operation of each. The tape provides the opportunity for discussion after each section or continuous running of the videotape. Flow diagrams, processing and cleaning are covered. (Borden, Inc.–1986) — Reviewed 1997.
- **The How and Why of Dairy Farm Inspections**—(15 minute–110 slides–tape–script). 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 videotapes). 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–1993)
- **Milk Plant Sanitation: Chemical Solution**—(13 minute videotape). This explains the proper procedure required of laboratory or plant personnel when performing chemical titration in a dairy plant. Five major titrations are reviewed... alkaline wash, presence of chlorine and iodophor, and caustic wash and an acid wash in a HTST system. Emphasis is also placed on record keeping and employee safety. (1989)
- **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**—(16 minute videotape). This tape provides a summary of the public health reasons for pasteurization and a nonlegal definition of pasteurization. The components of an HTST pasteurizer, elements of design, flow-through diagram and legal controls are discussed. (Kraft General Foods–1990)

- **Pasteurizer Operation**—(11 minute videotape). This tape provides a summary of the operation of an HTST pasteurizer from start-up with hot water sanitization to product pasteurization and shut-down. There is an emphasis on the legal documentation required. (Kraft General Foods–1990)
- **Processing Fluid Milk**—(30 minute–140 slides–script–tape). It was developed to train processing plant personnel on preventing food poisoning and spoilage bacteria in fluid dairy products. Emphasis is on processing procedures to meet federal regulations and standards. Processing procedures, pasteurization times and temperatures, purposes of equipment, composition standards, and cleaning and sanitizing are covered. Primary emphasis is on facilities such as drains and floors, and filling equipment to prevent post-pasteurization contamination with spoilage or food poisoning bacteria. It was reviewed by many industry plant operators and regulatory agents and is directed to plant workers and management. (Penn State–1987) — Reviewed 1998.
- **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 minute videotape). A video which was developed to make people in the dairy and food industries aware of the 3-A program and its objectives.
- **10 Points to Dairy Quality**—(10 minute videotape). Provides in-depth explanation of a critical control point in the residue prevention protocol. Illustrated with on-farm, packing plant, and milk-receiving plant scenes as well as interviews of producers, practicing veterinarians, regulatory officials and others. (Dairy Quality Assurance–1992)

FOOD

- **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.)
- **Egg Handling and Safety**—(11 minute videotape). Provides basic guidelines for handling fresh eggs which could be useful in training regulatory and industry personnel. (American Egg Board–1997)
- **Food Irradiation**—(30 minute videotape). Introduces viewers to food irradiation as a new preservation technique. Illustrates how food irradiation can be used to prevent spoilage by microorganisms, destruction by insects, overripening, and to reduce the need for chemical food additives. The food irradiation process is explained and benefits of the process are highlighted. (Turnelle Productions, Inc.)
- **Food Safe–Food Smart–HACCP and Its Application to the Food Industry**—(2-16 minute videotapes). (1)–Introduces the seven principles of HACCP and their application to the food industry. Viewers will learn about the HACCP system and how it is used in the food industry to provide a safe food supply. (2)–Provides guidance on how to design and implement a HACCP system. It is intended for individuals with the responsibility of setting up a HACCP system. (Alberta Agriculture, Food and Rural Development)
- **Food Safe–Series I**—(4-10 minute videotapes). (1) "Receiving & Storing Food Safely," details for food-service workers the procedures for performing sight inspections for the general conditions of food, including a discussion of food labeling and government approval stamps. (2) "Food-service Facilities and Equipment," outlines the requirements for the proper cleaning and sanitizing of equipment used in food preparation areas. Describes the type of materials, design, and proper maintenance of this equipment. (3) "Microbiology for Food-service Workers," provides a basic understanding of the microorganisms which cause food spoilage and foodborne illness. This program describes bacteria, viruses, protozoa, and parasites and the conditions which support their growth. (4) "Food-service Housekeeping and Pest Control," emphasizes cleanliness as the basis for all pest control. Viewers learn the habits and life cycles of flies, cockroaches, rats, and mice. (Perennial Education–1991)
- **Food Safe—Series II**—(4-10 minute videotapes). Presents case histories of foodborne disease involving (1) *Staphylococcus aureus,* (sauces) (2) *Salmonella,* (eggs) (3) *Campylobacter,* and (4) *Clostridium botulinum.* Each tape demonstrates errors in preparation, holding or serving food; describes the consequences of those actions; reviews the procedures to reveal the cause of the illness; and illustrates the correct practices in a step-by-step demonstration. These are excellent tapes to use in conjunction with hazard analysis critical control point training programs. (Perennial Education–1991)
- **Food Safe—Series III**—(4-10 minute videotapes). More case histories of foodborne disease. This set includes (1) Hepatitis "A", (2) *Staphylococcus aureus* (meats), (3) *Bacillus cereus,* and (4) *Salmonella* (meat). Viewers will learn typical errors in the preparation, holding and serving of food. Also included are examples of correct procedures which will reduce the risk of food contamination. (Perennial Education–1991)
- **Food Safety: An Educational Video for Institutional Food Service Workers**—(10 minute videotape). Provides a general discussion on food safety principles with special emphasis on pathogen reductions in an institutional setting from child care centers to nursing homes. (U.S. Department of Health & Human Services–1997).
- **Food Safety is No Mystery**—(34 minute videotape). This is an excellent training visual for food-service workers. It shows the proper ways to prepare, handle, serve and store

food in actual restaurant, school and hospital situations. A policeman sick from food poisoning, a health department sanitarian, and a food-service worker with all the bad habits are featured. The latest recommendations on personal hygiene, temperatures, cross-contamination, and storage of foods are included. (USDA–1987). Also available in Spanish. — Reviewed 1998.

- ❑ **Food Safety: For Goodness Sake, Keep Food Safe**—(15 minute videotape). Teaches foodhandlers the fundamentals of safe food handling. The tape features the key elements of cleanliness and sanitation, including: good personal hygiene, maintaining proper food product temperature, preventing time abuse, and potential sources of food contamination. (Iowa State University Extension–1990)
- ❑ **Food Safety: You Make the Difference**—(28 minute videotape). Through five food workers from differing backgrounds, this engaging and inspirational documentary style video illustrates the four basic food safety concepts: handwashing, preventing cross-contamination, moving foods quickly through the danger zone, and hot/cold holding (Seattle-King County Health Department–1995)
- ❑ **GMP Basics — Employee Hygiene Practices**—(20 minute videotape). Through real-life examples and dramatization, this video demonstrates good manufacturing practices that relate to employee hygiene, particulary hand washing. This video includes a unique test section to help assess participants' understanding of common GMP violations. (Silliker Laboratories–1997).
- ❑ **GMP: Personal Hygiene and Practices in Food Manufacturing**—(14 minute videotape). This video focuses on the personal hygiene of food-manufacturing workers, and explores how poor hygiene habits can be responsible for the contamination of food in the manufacturing process. This is an instructional tool for new food-manufacturing line employees and supervisors. It was produced with "real" people in actual plant situations, with only one line of text included in the videotape. (Penn State–1993)–(Available in Spanish and Vietnamese)
- ❑ **GMP: Sources and Control of Contamination during Processing**—(20 minute videotape). This program, designed as an instructional tool for new employees and for refresher training for current or reassigned workers, focuses on the sources and control of contamination in the food-manufacturing process. It was produced in actual food plant situations. A concise description of microbial contamination and growth and cross-contamination, a demonstration of food storage, and a review of aerosol contaminants are also included. (Penn State–1995)
- ❑ **HACCP: The Hazard Analyses & Critical Control Points System**—(20 minute videotape). Provides a comprehensive overview of HACCP for food processing professionals. Should become "required viewing" for professionals implementing or reviewing HACCP for their food plant. (AgriFood Canada–1996).
- ❑ **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 food-service operation. A leader's guide is provided as an adjunct to the tape. (The Canadian Restaurant & Foodservices Association–1990)
- ❑ **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**—(13 minute videotape). A promotional video that explores the wide variety of foods and beverages produced by the Canadian food industry. General in nature, this tape presents an overview of Canada's food industry and its contribution to the world's food supply. (Ternelle Production, Ltd.)
- ❑ **Proper Handling of Peracidic Acid**—(15 minute videotape). Introduces paracidic acid as a chemical sanitizer and features the various precautions needed to use the product safely in the food industry.
- ❑ **Purely Coincidental**—(20 minute videotape). A parody that shows how foodborne illness can adversely affect the lives of families that are involved. The movie compares improper handling of dog food in a manufacturing plant that causes the death of a family pet with improper handling of human food in a manufacturing plant that causes a child to become ill. Both cases illustrate how handling errors in food production can produce devastating outcomes. (The Quaker Oats Company–1993.) Also available in Spanish.
- ❑ **On the Front Line**—(18 minute videotape). A training video pertaining to sanitation fundamentals for vending service personnel. Standard cleaning and serving procedures for cold food, hot beverage and cup drink vending machines are presented. The video emphasizes specific cleaning and serving practices which are important to food and beverage vending operations. (National Automatic Merchandising Association–1993)
- ❑ **On the Line**—(30 minute videotape). This was developed by the Food Processors Institute for training food processing plant employees. It creates an awareness of quality control and regulations. Emphasis is on personal hygiene, equipment cleanliness and good housekeeping in a food plant. It is recommended for showing to both new and experienced workers. (Available in Spanish)
- ❑ **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.–1987)
- ❑ **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 videotape). This videotape gives a clear, concise and complete illustration of the principles set down in the Food, Drug and Cosmetic Act and in the Good Manufacturing Practices, as well as supporting legislation by individual states. (American Institute of Baking–1993)
- ❑ **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) — Reviewed 1997.
- ❑ **Safe Food: You Can Make a Difference**—(25 minute videotape). A training video for food-service workers which covers the fundamentals of food safety. An explanation of proper food temperature, food storage, cross-contamination control, cleaning and sanitizing, and handwashing as methods of foodborne illness control is provided. The video provides an orientation to food safety for professional foodhandlers. (Tacoma–Pierce County Health Department–1990). — Reviewed 1998.
- ❑ **Safe Handwashing**—(15 minute videotape). Twenty-five percent of all foodborne illnesses are traced to improper handwashing. The problem is not just that handwashing is not done, the problem is that it's not done properly. This training video demonstrates the "double wash" technique developed by Dr. O. Peter Snyder of the Hospitality Institute for Technology and Management. Dr. Snyder demonstrates the procedure while reinforcing the microbiological reasons for keeping hands clean. (Hospitality Institute for Technology and Management–1991)
- ❑ **Sanitation for Seafood Processing Personnel**—(20 minute videotape). A training video suited for professional foodhandlers working in any type of food manufacturing plant. The film highlights Good Manufacturing Practices and their role in assuring food safety. The professional foodhandler is introduced to a variety of sanitation topics including: 1) foodhandlers as a source of food contamination, 2) personal hygiene as a means of preventing food contamination, 3) approved food storage techniques including safe storage temperatures, 4) sources of cross-contamination, 5) contamination of food by insects and rodents, 6) garbage handling and pest control, and 7) design and location of equipment and physical facilities to facilitate cleaning.
- ❑ **Sanitizing for Safety**—(17 minute videotape). Provides an introduction to basic food safety for professional foodhandlers. A training pamphlet and quiz accompany the tape. Although produced by a chemical supplier, the tape contains minimal commercialism and may be a valuable tool for training new employees in the food industry. (Indiana–1990)
- ❑ **Seafood Q & A**—(20 minute videotape). Anyone who handles seafood, from processor to distributor to retail and food service, 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**—(4-20 minute videotapes). This video series illustrates and reinforces important food safety practices in an informative and entertaining manner. The material is presented in an easy to understand format, making it simpler for employees to learn and remember this essential information. Each video includes a leader's guide that provides all the information managers need to direct a productive training session. (Educational Foundation of the National Restaurant Association–1993)
- ❑ **SERVSAFE® Serving Safe Food Second Edition**—(6-10 minute videotapes). The program still covers all the major areas of food safety training, but there is an added emphasis on training employees to follow HACCP procedures. The second edition program includes an Employee Guide, Leader's Guide and six instructional videos. (Educational Foundation of the National Restaurant Association–1993)
- ❑ **Supermarket Sanitation Program–"Cleaning and Sanitizing"**—(13 minute videotape). Contains a full range of cleaning and sanitizing information with minimal emphasis on product. Designed as a basic training program for supermarket managers and employees. (1989)
- ❑ **Supermarket Sanitation Program–"Food Safety"**—(11 minute videotape). Contains a full range of basic sanitation information with minimal emphasis on product. Filmed in a supermarket, the video is designed as a basic program for manager training and a program to be used by managers to train employees. (1989)
- ❑ **Take Aim at Sanitation**—(8 minute videotape). This video features tips on food safety and proper disposal of single service items. Also presented is an emphasis on food contact surfaces as well as the manufacture, storage and proper handling of these items. (Foodservice and Packaging Institute, Inc.–1995)
- ❑ **Wide World of Food-Service Brushes**—(18 minute videotape). Discusses the importance of cleaning and sanitizing as a means to prevent and control foodborne illness. Special emphasis is given to proper cleaning and sanitizing procedures and the importance of having properly designed and constructed equipment (brushes) for food preparation and equipment cleaning operations. (1989)
- ❑ **Your Health in Our Hands–Our Health in Yours**—(8 minute videotape). For professional foodhandlers, the tape covers the do's and don'ts of foodhandling as they relate to personal hygiene, temperature control, safe storage and proper sanitation. (Jupiter Video Production–1993)

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 Association–1991)
- **Acceptable Risks?**—(16 minute videotape). Accidents, deliberate misinformation, and the rapid proliferation of nuclear power plants have created increased fears of improper nuclear waste disposal, accidents during the transportation of waste, and the release of radioactive effluents from plants. The program shows the occurrence of statistically anomalous leukemia clusters; governmental testing of marine organisms and how they absorb radiation; charts the kinds and amounts of natural and man-made radiation to which man is subject; and suggests there is no easy solution to balancing our fears to nuclear power and our need for it. (Films for the Humanities & Sciences, Inc.–1993)
- **Air Pollution: Indoor**—(26 minute videotape). Indoor air pollution is in many ways a self-induced problem… which makes it no easier to solve. Painting and other home improvements have introduced pollutants, thermal insulation and other energy-saving and water-proofing devices have trapped the pollutants inside. The result is that air pollution inside a modern home can be worse than inside a chemical plant. (Films for the Humanities & Sciences, Inc.)
- **Asbestos Awareness**—(20 minute videotape). This videotape discusses the major types of asbestos and their current and past uses. Emphasis is given to the health risks associated with asbestos exposure and approved asbestos removal abatement techniques. (Industrial Training, Inc.–1988)
- **Down in the Dumps**—(26 minute videotape). Garbage is no laughing matter. The fact is that we are running out of space to dump the vast amounts of waste we create each day. Since many of the former methods of disposal are environmentally unacceptable, what are we to do? The program examines the technological approaches to the garbage dilemma, including composting, resource recovery, and high-tech incinerators, and public reaction to the creation of new waste treatment facilities. (Films for the Humanities & Sciences, Inc.)
- **EPA Test Methods for Freshwater Effluent Toxicity Tests (using Ceriodaphnia)**—(22 minute videotape). Demonstrates the Ceriodaphnia 7-Day Survival and Reproduction Toxicity Test and how it is used to 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. (1989)
- **EPA Test Methods for Freshwater Effluent Toxicity Tests (Using Fathead Minnow Larva)**—(15 minute videotape). A training tape that teaches environmental professionals about the Fathead Minnow Larval Survival and Growth Toxicity Test. The method described is found in an EPA document entitled, "Short Term Methods for Estimating the Chronic Toxicity of Effluents & Receiving Waters to Freshwater Organisms." The tape demonstrates how fathead minnow toxicity tests can be used to monitor and evaluate effluents for their toxicity to biota and their impact on receiving waters and the establishment of NPDES permit limitations for toxicity. (1989)
- **Fit to Drink**—(20 minute videotape). This program traces the water cycle, beginning with the collection of rain-water in rivers and lakes, in great detail through a water treatment plant, to some of the places where water is used, and finally back into the atmosphere. Treatment of the water begins with the use of chlorine to destroy organisms; the water is then filtered through various sedimentation tanks to remove solid matter. Other treatments employ ozone, which oxidizes contaminants and makes them easier to remove; hydrated lime, which reduces the acidity of the water; sulfur dioxide, which removes any excess chlorine; and floculation, a process in which aluminum sulfate causes small particles to clump together and precipitate out. Throughout various stages of purification, the water is continuously tested for smell, taste, titration, and by fish. The treatment plant also monitors less common contaminants with the use of up-to-date techniques like flame spectrometers and gas liquefaction. (Films for the Humanities & Sciences, Inc.–1987)
- **Food-Service Disposables: Should I Feel Guilty?**—(12 minute videotape). The video, produced by the Foodservice & Packaging Institute, Inc., national trade association of manufacturers and suppliers of single service articles for food service 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.–1991)
- **Garbage: The Movie**—(25 minute videotape). A fascinating look at the solid waste problem and its impact on the environment. Viewers are introduced to landfills, incinerators, recycling plants and composting operations as solid waste management solutions. Problems associated with modern landfills are identified and low-impact alternatives such as recycling, reuse, and source reduction are examined. (Churchill Films)
- **Global Warming: Hot Times Ahead?**—(23 minute videotape). An informative videotape program that explores the global warming phenomenon and some of the devastating changes it may cause. This program identifies greenhouse gases and how they are produced by human activities. Considered are: energy use in transportation, industry and home; effects of deforestation, planting of trees and recycling as means of slowing the build-up of greenhouse gases. (Churchill Films–1995)

- **Kentucky Public Swimming Pool and Bathing Facilities**—(38 minute videotape). Developed by the Lincoln Trail District Health Department in Kentucky and includes all of their state regulations which may be different from other states, provinces and countries. This tape can be used to train those responsible for operating pools and waterfront bath facilities. All aspects are included of which we are aware, including checking water conditions and filtration methods. (1987)
- **Putting Aside Pesticides**—(26 minute videotape). This program probes the long-term effects of pesticides and explores alternative pest-control efforts; biological pesticides, genetically-engineered microbes that kill objectionable insects, the use of natural insect predators, and the cross-breeding and genetic engineering of new plant strains that produce their own anti-pest toxins. (Films for the Humanities & Sciences, Inc.)
- **Radon**—(26 minute videotape). This program looks at the possible health implications of radon pollution, methods homeowners can use to detect radon gas in their homes, and what can be done to minimize hazards once they are found.
- **RCRA–Hazardous Waste**—(19 minute videotape). This videotape explains the dangers associated with hazardous chemical handling and discusses the major hazardous waste handling requirements presented in the Resource Conservation and Recovery Act. (Industrial Training, Inc.)
- **The New Superfund: What It is & How It Works**—A six-hour national video conference sponsored by the EPA. Target audiences include the general public, private industry, emergency responders and public interest groups. The series features six videotapes that review and highlight the following issues:
  - **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 implementa tion. 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 Requirments**—(48 minute videotape). The removal process is a short-term action and usually an immediate response to accidents, fires and illegall 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 land owner 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 minute video-tape). 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 minute videotape). 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 minute videotape). An important new mandate of the new Superfund is the technical provisions for research and development to create more permanent methods in handling and disposing of hazardous wastes and managing hazardous substances. This segment discusses the SITE (Superfund Innovative Technology Evaluation) program, the University Hazardous Substance Research Centers, hazardous substanc 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 hand-washing in health care institutions. Uses strong imagery to educate hospital personnel that handwashing is the single most important means of preventing the spread of infection. (The Brevis Corp.–1986)
- **Waste Not: Reducing Hazardous Waste**—(35 minute videotape). This tape looks at the progress and promise of efforts to reduce the generation of hazardous waste at the source. In a series of company profiles, it shows activities and programs within industry to minimize hazardous waste in the production process. Waste Not also looks at the

obstacles to waste reduction, both within and outside of industry, and considers how society might further encourage the adoption of pollution prevention, rather than pollution control, as the primary approach to the problems posed by hazardous waste. (Umbrella films)

OTHER

- Diet, Nutrition and Cancer—(20 minute videotape). Investigates the relationship between a person's diet and the risk of developing cancer. The film describes the cancer development process and identifies various types of food believed to promote and/or inhibit cancer. The film also provides recommended dietary guidelines to prevent or greatly reduce the risk of certain types of cancer.
- Eating Defensively: Food Safety Advice for Persons with Aids—(15 minute videotape). While HIV infection and AIDS are not acquired by eating foods or drinking liquids, persons infected with the AIDS virus need to be concerned about what they eat. Foods can transmit bacteria and viruses capable of causing life-threatening illness to persons infected with AIDS. This video provides information for persons with AIDS on what foods to avoid and how to better handle and prepare foods. (FDA/CDC–1989)
- Ice: The Forgotten Food—(14 minute videotape). This training video describes how ice is made and where the critical control points are in its manufacture, both in ice plants and in on-premises locations (convenience stores, etc.); it documents the potential for illness from contaminated ice and calls on government to enforce good manufacturing practices, especially in on-premises operations where sanitation deficiencies are common. (Packaged Ice Association–1993)
- Legal Aspects of the Tampering Case—(25 minute videotape). This was presented by Mr. James T. O'Reilly, University of Cincinnati School of Law at the fall 1986 Central States Association of Food and Drug Officials Conference. He emphasizes three factors from his police and legal experience–know your case, nail your case on the perpetrator, and spread the word. He outlines specifics under each factor. This should be of the greatest interest to regulatory sanitarians, in federal, state and local agencies. (1987)
- Personal Hygiene & Sanitation for Food Processing Employees—(15 minute videotape). Illustrates and describes the importance of good personal hygiene and sanitary practices for people working in a food processing plant. (Iowa State–1993)
- Psychiatric Aspects of Product Tampering—(25 minute videotape). This was presented by Emanuel Tanay, M.D. from Detroit, at the fall 1986 conference of CSAFDA. He reviewed a few cases and then indicated that abnormal behavior is like a contagious disease. Media stories lead to up to 1,000 similar alleged cases, nearly all of which are false. Tamper-proof packaging and recalls are essential. Tampering and poisoning are characterized by variable motivation, fraud and greed. Law enforcement agencies have the final responsibilities. Tamper proof containers are not the ultimate answer. (1987)
- 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 or Fax to: IAMFES, Lending Library, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863. (Material from the Lending Library can be checked out for two weeks only so that others can benefit from its use.)

IAMFES MEMBERS ONLY Date Mailed: _____

Name: _____

Company: _____

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Country: _____ Daytime Phone No.: _____

Fax No.: _____ Date Needed: _____

PLEASE LIMIT YOUR REQUEST TO FIVE VIDEOS.

IAMFES 85th Annual Meeting
August 16-19, 1998
Nashville, Tennessee

Preview Program*

Symposia Topics:

- The Leading Edge of Foodborne Disease Surveillance
- Sensory Characteristics of Dairy Products
- Risk Management of Food from Farm to Fork
- Seafood HACCP Reflection – One Year After Implementation
- Basic Dairy Field Workshop I and II
- Moving Meat Inspection into the Future
- Potential Foodborne Pathogens Associated with Pork
- Farm to Table: Ecology of Pathogens Associated with Poultry
- Bringing Science to Restaurant Inspection
- Factors Affecting Bacterial Attachment to Meat Surfaces
- Food Worker Hand Hygiene: A Factor in Foodborne Illness
- Microbiological Issues Associated with Pork
- Change and Unintended Microbial Consequences Along the Farm to Fork Continuum
- Current Perspectives on the Use of Antibiotics in Animal Production Systems
- Viral and Parasitic Foodborne Disease Associated with Produce: Epidemiology, Dectection, and Control
- Pest Control as We Approach 2000
- Computerized Process Control and Record Keeping in the Dairy Industry

Technical & Poster Sessions:

- Technical Sessions: Microbiological Methods, Food Safety & Quality of Meat and Poultry, and Food Safety Education/Safety & Quality of Produce
- Poster Sessions: General Food Microbiology, Foodborne Pathogens, and Microbiological Methods

REGISTER TODAY! See registration information on the following pages.

*Program subject to change.

IAMFES 85th Annual Meeting
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Nashville, Tennessee

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- Poster Sessions: General Food Microbiology, Foodborne Pathogens, and Microbiological Methods

REGISTER TODAY! See registration information on the following pages.

*Program subject to change.

GENERAL INFORMATION

IAMFES 85th ANNUAL MEETING AUGUST 16-19, 1998 NASHVILLE, TENNESSEE

IMPORTANT! Please read this information before completing your registration form.

■ Meeting Information

Register today to obtain valuable information on advancing food protection worldwide through the most contemporary methods of food microbiology, processing, safe handling, and current regulatory aspects of food safety. Registration fee includes all technical sessions; symposia; poster presentations; a Cheese and Wine Reception; admittance to the exhibit hall; and a program and abstract book containing general program information and abstracts of symposia, technical papers, and posters. Appropriate dress for the Meeting is business casual.

■ Registration Information

Please mail the registration form with payment today. Registrations post-marked after July 15, 1998 must pay the late registration fee. Checks should be made payable to: IAMFES, Inc., 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863, U.S.A. For faster service, use your credit card and call 800.369.6337, or fax the completed registration form with credit card information to 515.276.8655.

■ Refund/Cancellation Policy

Requests for cancellations must be received in writing no later than July 31, 1998 (registration fee less a $50 processing charge will be refunded). Cancellations received after July 31, 1998 will not receive a refund, but the registration may be transferred to a colleague with written notification.

■ New Membership Fees

$ 75.00 *Dairy, Food and Environmental Sanitation*

$ 120.00 *Dairy, Food and Environmental Sanitation* and *Journal of Food Protection*

$ 37.50 *Student Membership with *Dairy, Food and Environmental Sanitation* or *Journal of Food Protection*

$ 60.00 *Student Membership with *Dairy, Food* and *Environmental Sanitation* and *Journal of Food Protection*

**Full-time student verification required.*

SHIPPING CHARGES: OUTSIDE THE U.S.
SURFACE RATE – $ 22.50 per journal title
AIRMAIL – $ 95.00 per journal title

TICKET INFORMATION

■ Cheese and Wine Reception (August 16, 1998)

Share in what has become an IAMFES tradition for Annual Meeting attendees and guests. The Cheese and Wine Reception begins immediately following the Ivan Parkin Lecture on Sunday evening in the IAMFES exhibit hall. Enjoy conversation with exhibitors, colleagues, and friends.

■ Monday Night Social Event Hot Country Night — (August 17, 1998)

There's no time like a good time, and the Wildhorse Saloon is just the place to find it. The evening includes dinner, music, dancing, and a few surprises. Children ages 14 and under must be accompanied by an adult.

■ Awards Banquet — (August 19, 1998)

The IAMFES Annual Meeting concludes with an evening of recognition for deserving food safety professionals. A reception opens the evening outside the banquet hall. Dinner is served in an elegant setting prior to the award presentations. Additional tickets are available. Business attire is requested for this special evening.

■ Other Events

Grand Ole Opry — Saturday, 8/15
IAMFES Golf Tournament — Sunday, 8/16
Music City Sites — Sunday, 8/16
Historic Nashville — Monday, 8/17
Jack Daniel's Distillery — Tuesday, 8/18
Children's Banquet — Wednesday, 8/19

HOTEL INFORMATION

For reservations, contact the hotel directly and identify yourself as an IAMFES attendee to receive a special rate of $116 per night, single or double.

Renaissance Nashville Hotel
611 Commerce Street
Nashville, Tennessee 37203
Phone: 615.255.8400; Fax: 615.255.8163

CHILD CARE

Adult supervised activities for children ages 4 to 12 will be available Monday through Wednesday, 8:30 a.m. to 12:00 p.m. and 1:30 p.m. to 5:00 p.m. A pre-registration fee of $20.00 per day for each child is required; snacks will be provided. The room is subject to a minimum attendance. Participants will be notified if cancellation is necessary by July 24, 1998.

REGISTRATION FORM

❒ Please register me for the IAMFES 85th Annual Meeting – Nashville, Tennessee – August 16-19, 1998

FOR OFFICE USE
Member # _____ First initial _____ Last name _____
Registration # _____ DFES

First Name (please print — will appear on badge) M.I. Last Name

Title Employer

Mailing Address (Please specify: ❒ Home ❒ Work)

City State/Province Country Postal/Zip Code

Telephone # Fax # E-mail

❒ Please indicate here if you have a disability requiring special accommodations.

Status (Please check applicable boxes)

❒ 20 Yr. Member ❒ 30 Yr. Member ❒ 50 Yr. Member ❒ Past President ❒ Speaker ❒ Honorary Life Member ❒ Sustaining Member

REGISTER BY JULY 15, 1998 TO AVOID LATE REGISTRATION FEES

REGISTRATION:	MEMBERS	NONMEMBERS	AMOUNT
Registration (Awards Banquet included)	$ 230 ($280 late)	$335 ($385 late)	
Student	$ 35 ($ 45 late)	Not Available	
Retired IAMFES Member	$ 35 ($ 45 late)	Not Available	
One Day Registration: ❒ Mon. ❒ Tues. ❒ Wed.	$ 115 ($140 late)	$150 ($170 late)	
Spouse/Companion (Name): _____	$ 35 ($ 35 late)	$ 35 ($ 35 late)	
Children (15 & Over, Names): _____	$ 25 ($ 25 late)	$ 25 ($ 25 late)	
Children (14 & Under, Names): _____	FREE	FREE	
Child Care (Ages 4 to 12): ❒ Mon. ❒ Tues. ❒ Wed.	$ 20 per child/per day		
OTHER EVENTS:			
Grand Ole Opry (Sat., 8/15)	$ 25	_____	
IAMFES Golf Tournament (Sun., 8/16)	$ 80 ($ 95 late)	_____	
Music City Sites (Sun., 8/16)	$ 28 ($ 33 late)	_____	
Historic Nashville (Mon., 8/17)	$ 41 ($ 46 late)	_____	
Hot Country Night (Mon. Night Social, 8/17)	$ 36 ($ 41 late)	_____	
Children's Rate (14 & Under)	$ 21 ($ 26 late)	_____	
Jack Daniel's Distillery (Tues., 8/18)	$ 29 ($ 34 late)	_____	
IAMFES Awards Banquet (Wed., 8/19)	$ 40 ($ 45 late)	_____	
Children's Banquet (Wed., 8/19)	$ 20 ($ 25 late)	_____	

JOIN IAMFES TODAY AND SAVE!!! (Attach a completed membership application) _____

TOTAL AMOUNT ENCLOSED _____
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EXHIBITORS DO NOT USE THIS FORM

ComingEvents

APRIL

·**1-2, Introduction to Microbiological Criteria and Sampling Plans,** in Las Vegas, NM. For further information, contact Silliker Laboratories, Phone: 800.829.7879: Fax: 708.957.8405.

·**2, UK Dairy Industry—3rd Annual Conference,** London. For further information, contact Agra Europe (London) Ltd, 25 Frant Road, Tunbridge Wells, Kent, TN2 5JT, England; Phone: 44 (0)1892 511807 or Fax: 44 (0)1892 527758/544895.

·**2-3, Applied Sensory Evaluation Techniques,** New Brunswick, NJ. This course is designed to familiarize food and pharmaceutical industry professionals with the essential basic and advanced applied sensory evaluation techniques needed to develop high quality products for today's marketplace. For further information, contact Keith Wilson at Phone: 732.932.9271; Fax: 732.932.1187; or E-mail: ocpe@aesop.rutgers.edu.

·**2-4, Introduction to Statistical Methods for Sensory Evaluation of Foods,** University of California-Davis, Davis, CA. This course introduces statistical analysis to the beginning sensory scientist with little or no statistical background and demonstrates how to perform the tests and provides a solid basis of understanding for sensory analysis. To register call 800.752.0881; after November 1, 1997, call 530.757.8777. For program information, contact Michael O'Mahony, at 916.752.6389; E-mail: maomhony@ucdavis.edu.

·**6-9, Seoul Food '98,** Korea Exhibition Center, (Koex), Seoul, Korea. For additional information, contact Sue Na, International Trade Specialist, Korea Machinery Information Center, 111 E. Wacker Dr., Suite 2229, Chicago, IL 60601, U.S.A.; Phone: 312.644.4323; Fax: 312.644.4879.

·**8-9, Microbiological Techniques for Dairy Quality Control,** offered by the University of Wisconsin-Madison, Dept. of Food Science. This course will teach entry-level laboratory personnel the basis of routine microbiology analyses used in the dairy industry. For further information, contact Steve Ingham at 608.265.4801.

·**15-16, The Food Industry: Pennsylvania's Opportunities for the New Millennium,** Eden Resort Inn and Conference Center, Lancaster, PA. Sponsored by Penn State Dept. of Food Science. Invited to attend are R&D food scientists and engineers, marketing and plant managers from food processing and manufacturing companies. For more information, contact Dr. Hassan Gourama, Food Science Dept., Penn State-Berks Campus, Phone: 610.396.6121; E-mail: hxg7@psu.edu.

·**17-19, HACCP Workshop,** sponsored by the Food Processors Institute. This course is designated to meet the educational requirements cited in both the FDA regulation requiring HACCP for seafoods and the USDA rule on pathogen reduction and HACCP. For more information, contact Valente Alvarez at 614.292.6281.

·**20-21, Food Micro '98,** Holiday Inn Select in Old Town Alexandria, VA. The workshop will focus on methods of controlling microbial foodborne illness, with speakers to include experts from universities, government agencies, and the food industry in general. The workshop is presented by the National Food Processors Association and is sponsored by the Food Processors Institute. For registration information, call Eric A. Forste, Program Coordinator, Phone: 202.393.0890; E-mail: eforste@nfpafood.org.

·**24-29, Conference for Food Protection,** Swissotel, Boston, MA. To receive additional information, contact Leon Townsend, CFP Executive Secretary, 110 Tecumseh Trail, Frankfort, KY 40601; Phone: or Fax: 502.695.0253; E-mail: leontown@dcr.net.

·**27-28, Getting Ready for HACCP,** Edmonton. An introduction to Agriculture & Agri-Food Canada's Food Safety Enhancement Program with a focus on HACCP Prerequisities and a HACCP case study. This workshop will take a "train the trainer" approach to teaching microbial hazards and food plant sanitation to your personnel. For additional information, contact Guelph Food Technology Centre, 88 McGilvray St., Guelph, Ontario, N1G 2W1; Phone: 519.767.5036; Fax: 519.836.1281.

·**28-30, Seafood Processing Europe,** Brussels Exhibition Centre, Brussels, Belgium. For more information, contact Brad MacCachran at 207.842.5504.

MAY

·**7-8, HACCP for Foodservice,** offered by Select Concepts, Dallas, TX. This 2-day workshop covers prerequisite programs and HACCP principles. For more information, contact Leslie Wisniewski, Select Concepts, 3701 W. Northwest Hwy., Suite 169C, Dallas, TX 75220; or Phone: 214.350.8644.

·**18-19, PAMFES 1998 Annual Meeting,** at the Nittany Lion Inn, State College, PA. For additional information, contact Gene Frey at 717.397.0719.

·**19-21, Principles of Food Microbiology,** Philadelphia, PA. For further information, contact Silliker Laboratories, Phone: 800.829.7879; Fax: 708.957.8405.

·**20-21, Applied Dairy Chemistry,** offered by the University of Wisconsin-Madison, Dept. of Food Science, Madison, WI. This course will cover the chemistry of milk and milk products as they relate to specific dairy processing and control functions. For further information, contact Dr. Bill Wendorff at 608.263.2015.

JUNE

·**3-5, Practical HACCP for Food Processors,** Chicago, IL. For further information, contact Silliker Laboratories, Phone: 800.829.7879; Fax: 708. 957.8405.

·**7-12, 4th World Congress Foodborne Infections and Intoxications,** in Berlin. The continued increase of foodborne diseases and the emergence of new or newly recognized agents of diseases all over the world underline the importance of the congress. For further information, contact Congress Office 4th World Congress, Federal Institute for Health Protection for Consumers and Veterinary Medicine, Diedersdorfer Weg 1, D-12277 Berlin; Phone: 49. 30.8412.2158; Fax:49.30.8412. 2957;E-mail: 4.wkoffice@bgvv.de.

·**8-10, Mykotoxin Workshop,** in Detmold, Germany. The workshop is organized by the Institute for Biochemistry of Cereals and Potatoes, Federal Centre for Cereal, Potato, and Lipid Research, Schutzenberg 12, D-32756 Detmold, Germany. For information, contact Dr. Wolff at Phone: 49.5231.741.121 (131); Fax: 49. 5231.741.130 (100); E-mail: betsche. bagkf@t-online.de.

·**16-18, Hazard Analysis & Development of Your HACCP Plan,** Guelph. A practical, business approach to help you in designing your own HACCP plan. You'll build product descriptions, conduct a hazard analysis, determine critical limits and control measures—all on your own processing line. For additional information, contact Guelph Food Technology Centre, 88 McGilvray St., Guelph, Ontario, N1G 2W1; Phone: 519.767.5036; Fax: 519. 836.1281.

JULY

· **10-11, 18th International Workshop on Rapid Methods and Automation in Microbiology,** at Kansas State University, Manhattan, KS. Hands-on experiments, demonstrations, lectures, colloquium, scientific poster sessions and competition will occur. For scientific content, contact: Daniel Y. C. Fung, Director; Phone: 785.532.5654; Fax: 785.532. 5681; E-mail: dfung@oz.oznet.ksu. edu. For registration information, contact: Janice Nikkel, U.S. Phone: 800.432.8222; Outside the U.S. 785.532.5575; Fax: 785.532.5637; E-mail: ksucon@ dce.ksu.edu.

·**27-31, Laboratory Methods in Food Microbiology,** South Holland, IL. For further information, contact Silliker Laboratories, Phone: 800. 829.7879; Fax: 708.957.8405.

AUGUST

·**16-19, IAMFES Annual Meeting,** in Nashville, Tennessee at the Renaissance Nashville Hotel. Registration information available in this issue of *DFES* on pages 186-187 or contact Julie Cattanach at Phone: 800.369. 6337; 515.276.3344; Fax: 515.276.8655; E-mail: jcattanach@iamfes.org.

·**24-28, The 10th International Conference on Production Diseases in Farm Animals,** Utrecht, The Netherlands. For additional information, contact the Congress Secretariat: Royal Netherlands Veterinary Association, P.O. Box 14031, 3508 SB Utrecht, The Netherlands; Phone: 31 30 251 01 11; Fax: 31 30 251 17 87; E-mail: knmvd@pobox.ruu.nl; Internet: http://www.knmvd.nl.

The International Association of Milk, Food and Environmental Sanitarians, Inc.
6200 Aurora Avenue, Suite 200W • Des Moines, Iowa 50322-2863 • 515.276.3344 or 800.369.6337

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IAMFES Booklets

Quantity	Description	Member or Gov't. Price	Non-Member Price	Totol
	Procedures to Investigate Waterborne Illness–2nd Edition	$8.00	$16.00	
	Procedures to Investigate Foodborne Illness–4th Edition	6.00	12.00	
	Procedures to Investigate Arthropod-borne and Rodent-borne Illness	6.00	12.00	
	Procedures to Implement the Hazard Analysis Critical Control Point System	6.00	12.00	
	*Pocket Guide to Dairy Sanitation (minimum order of 10)	.50	.75	
	*Before Disaster Strikes...A Guide to Food Safety in the Home (minimum order of 10)	.50	.75	
			Shipping/Handling (See Below)	
			Booklet Total	

Multiple copies available at reduced prices.
Phone our order desk for pricing information on quantities of 25 or more.

3-A Sanitary Standards

Quantity	Description	Member or Gov't. Price	Non-Member Price	TOTAL
	Complete Set 3-A Dairy & Egg Standards	$70.00	$140.00	
	Five-year Update Service on 3-A Dairy & Egg Standards	95.00	190.00	
			Shipping/Handling (See Below)	
			3-A Sanitary Standards Total	
			Total Order Amount	

Mail order to the IAMFES address listed above, or
call 515.276.3344, 800.369.6337 (U.S. and Canada);
or **fax** your order to 515.276.8655.

Method of Payment

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❑ MASTERCARD ❑ VISA ❑ AMERICAN EXPRESS

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PAYMENT MUST BE ENCLOSED FOR ORDER TO BE PROCESSED

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Within U.S.
First booklet $2.00
Each additional booklet $1.00
*Guide Booklets–per 10 ..... $2.50

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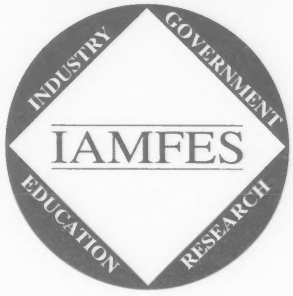
First booklet $4.00
Each additional booklet $1.00
*Guide Booklets–per 10 ..... $3.50

3-A Sanitary Standards
Within U.S. (each item) $6.25
Outside U.S. (each item) $10.25

Prices effective through August 31, 1998



Your Invitation to Join

The International Association of Milk, Food and Environmental Sanitarians, founded in 1911, is a non-profit educational association of food safety professionals with a mission *"to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply."*

✻ Who are IAMFES Members?

The Association is comprised of a diverse membership of 2,800 from 50 nations. IAMFES Members belong to all facets of the food protection arena including: Industry, Government and Academia.

✻ What are your Benefits as an IAMFES Member?

Dairy, Food and Environmental Sanitation — A reviewed monthly publication that provides practical and applied research articles and association news, updates, and other related information for food safety professionals. All IAMFES Members receive this publication as part of their membership.

Journal of Food Protection — An international, refereed scientific journal of research and review papers on topics in food science and food aspects of animal and plant sciences. This journal is available to all individuals who request it with their membership.

The IAMFES Lending Library — Provides quality training videos dealing with various food safety issues. IAMFES Members are allowed free use of these videos.

The IAMFES Annual Meeting — Is a unique educational event; three days of technical sessions, symposia and exhibits provide attendees with over 200 presentations on current topics in food protection. IAMFES Members receive a substantially reduced registration fee.

✻ To Find Out More...

To learn more about IAMFES and the **many** other benefits and opportunities available to you as a Member, please call 515.276.3344 or 800.369.6337; Fax: 515.276.8655; E-mail: iamfes@iamfes.org.

International Association of Milk, Food and Environmental Sanitarians

MEMBERSHIP APPLICATION

MEMBERSHIP

☐ Membership with JFP and DFES $120.00
(12 issues of the *Journal of Food Protection* **and** *Dairy, Food and Environmental Sanitation*)

◀ **BEST VALUE**

☐ Membership with DFES $75.00
(12 issues of *Dairy, Food and Environmental Sanitation*)

☐ Check here if you are interested in information on joining your state/province chapter of IAMFES

SUSTAINING MEMBERSHIP

☐ Membership with BOTH journals $525.00
(Includes exhibit discount, Annual Meeting issue advertising discount, company monthly listing in both journals and more)

STUDENT MEMBERSHIP*

☐ Membership with JFP and DFES $60.00

☐ Membership with *Journal of Food Protection* $37.50

☐ Membership with *Dairy, Food and Environmental Sanitation* $37.50

*FULL-TIME STUDENT VERIFICATION MUST ACCOMPANY THIS FORM

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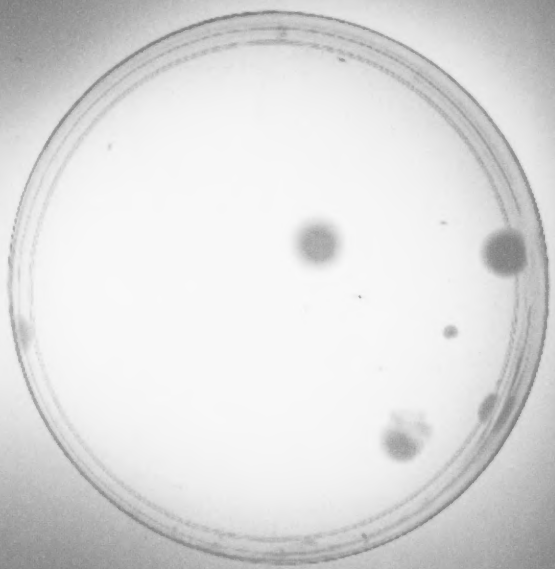
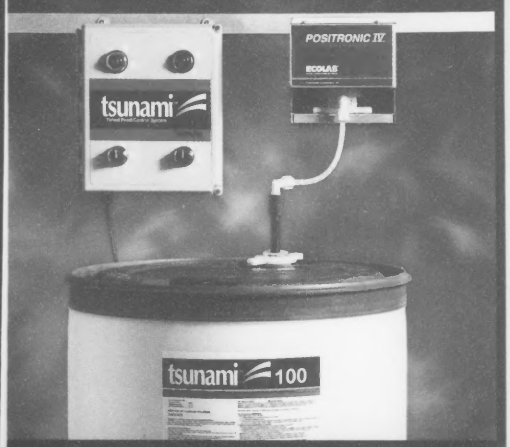
YOU CAN SEE WHICH FLUME TREATMENT WORKS BETTER. GUESS WHICH ONE PROMOTES WORKER SAFETY.

Chlorine Dioxide Performance



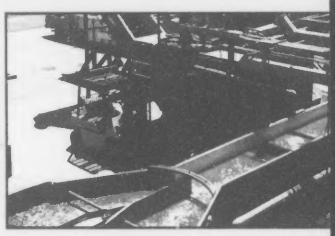
Tsunami™ Performance

In tests indicative of plant environments, Tsunami consistently provides a 2 to 3 log reduction in aerobic plate counts when compared to chlorine dioxide performance. Tests results available upon request.



Tsunami is a liquid, single product, ready-to-feed directly from the shipping container with no precursor chemicals or on-site generation equipment required.

The answer is Tsunami, a new flume water additive that provides superior microbial control and a safer working environment. Compared to traditional chlorine-based treatments, Tsunami is completely soluble in flume waters at use concentration, eliminating any potential for off-gassing.



In various processing applications, Tsunami has proven effectiveness in reducing flume water and product surface microbial species. And Tsunami will favorably impact plant economics by reducing labor and water costs, and enhancing end product quality.

It's time to change your flume treatment to Tsunami. To find out more about how this revolutionary new product can work for you, call **1-800-793-0248.**

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