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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC. JULY 1999

- **IAMFES 86th Annual Meeting Issue**

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Advancing Food Safety Worldwide

ABOUT THE COVER...

Photo courtesy of the Metropolitan Detroit Convention & Visitors Bureau. A scenic view of downtown Detroit.

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Articles

EDITOR'S NOTE:

We extend our sincere apologies to Spiral Biotech, Inc. for incorrectly describing the June cover of *DFES*. The description "About the Cover..." gave credit to Hardy Diagnostics but should have credited Spiral Biotech, Inc. See page 526 for a copy of June's cover and the correct description. We apologize for any inconvenience this may have caused.

Association News

Departments

Extras

THE BLACK PEARL AWARD

RECOGNITION FOR CORPORATE EXCELLENCE IN FOOD SAFETY AND QUALITY

Black Pearl Award Recipients

1999 Caravelle Foods
Brampton, Ontario, Canada

1998 Kraft Foods, Inc.
Northfield, Illinois

1997 Papetti's of Iowa Food Products, Inc.
Lenox, Iowa

1996 Silliker Laboratories Group, Inc.
Homewood, Illinois

1995 Albertson's, Inc.
Boise, Idaho

1994 HEB Company
San Antonio, Texas

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International Association of Milk, Food and Environmental Sanitarians

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IAMFES Annual Meetings

1999

August 1-4

Hyatt Regency
Dearborn
Dearborn, Michigan

2000

August 6-9

Hilton Atlanta
and Towers
Atlanta, Georgia

2001

August 5-8

Hilton Minneapolis
and Towers
Minneapolis, Minnesota

2002

June 30–July 3

Hyatt Regency
San Diego
San Diego, California

DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

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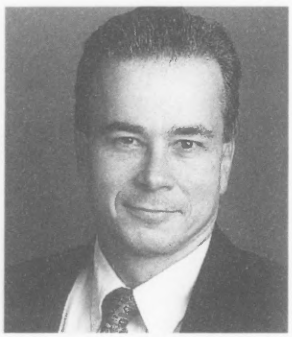
VIEWS

FROM YOUR PRESIDENT



By ROBERT E. BRACKETT
IAMFES President

"An opportunity for positive change"

Well, the IAMFES 86th Annual Meeting is upon us. As mentioned in a previous column, this year's Meeting looks like a real winner. Typically, Members find the scientific sessions of most interest, although the social functions can be equally valuable, both professionally and personally. Although not highlighted as the most fun or scientifically enriching event, the business meeting is nevertheless another very important component of the Annual Meeting. A main purpose of the business meeting is to inform Members of the state of their Association. However, it also provides Members the opportunity for direct input on important decisions affecting the future direction of their Association. In fact, certain important decisions can ONLY be made with input of Members attending the business meeting. This year, several important resolutions will require your input in the form of a vote. By the time you read this, each of you should have received a letter from me explaining these issues.

The primary issue to be discussed at this year's business meeting will focus on changing the Association's name to **International Association for Food Protection**. To do this, however, we must also change our Constitution and Bylaws to reflect this change, a separate but related issue that will require your approval. The decision to recommend a name change has been unanimously approved by your Executive Board after extensive discussion and research. In this month's column, I would like to summarize some reasons for recommending the name change.

The main function of a name should be to reflect and project the identity and mission of its Membership. The present name no longer accomplishes this. Several years ago, your Executive Board commissioned a survey of the Membership and potential members to determine the Association's composition and attitudes regarding the Association's name. The results were quite informative. We found that the Membership of the Association is quite different than some had perceived. The Membership is no longer predominantly comprised of individuals working in the dairy industry or employed as sanitarians. Rather, it is almost equally comprised of Members working with virtually every food commodity. Likewise, the Membership includes representatives from education, private industry, and government and are involved in a variety of jobs including quality and safety assurance, research, regulatory compliance, teaching, and sales. However, the survey respondents all had one thing in common: an interest in maintaining and promoting a safe food supply. It became readily apparent that although the current name encompasses certain aspects of food protection, it no longer reflects the breadth of expertise and interests of the Membership. Hence, a new name that better described the organization is needed. Our Association's history shows that this is not the first time such a change was needed.

Many Members assume that our name has always been IAMFES. However, this is not the case. During its 89-year history, our Association has changed its

name three times, each time to better reflect the identity of the organization. Our original name was changed in 1938 from the International Association of Dairy and Milk Inspectors to the International Association of Milk Sanitarians. Twelve years later, the name was again changed, this time to International Association of Milk and Food Sanitarians. Finally, in 1966, the name was expanded to its present form. Each time, the name was broadened to reflect the growing importance and interest in overall food safety. The proposed name of **International Association for Food Protection** continues this tradition.

The survey as well as market research also revealed an interesting paradox. Non-members (that is, potential new members) interested in food protection overwhelmingly indicated recognition and respect for our flagship publication, *Journal of Food Protection* but did NOT recognize the name of IAMFES nor realize it was the publishing association. Clearly, many potential new members were being lost because they do not recognize the connection between our best-known "product" (*Journal of Food Protection*) and our Association. Permit me to relate a personal anecdote that illustrates this point. Several years ago a former student of mine, then working for a government agency directly involved with food protection, was denied permission to attend our Annual Meeting because IAMFES was deemed "irrelevant" to the agency's mission. When this individual informed her superior that the Meeting was for the association that publishes *Journal of Food Protection*, the response was "Oh, I didn't realize that. Then there's no problem" and the individual was given permission to attend. Such situations together with our survey data indicate a "public relations" problem and clearly indicate that it is time for a change if we as an association are to survive and grow.

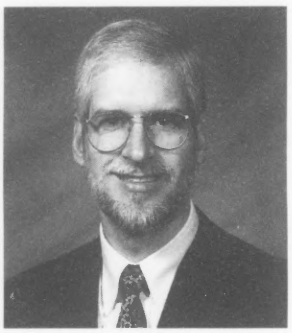
Comments and suggestions from both Members and non-members alike have supported the need for a name change. A sampling of these reasons include:

- The current name is too long and cumbersome (this was a common theme)
- Most Members are not sanitarians
- The term *sanitarian* is not universally or internationally recognized or understood
- The current name is too restrictive
- The current name is antiquated. We need a more contemporary name
- The current name does not tell who we are or what we do

Never has food protection been such a high priority with consumers, government and private industry. If there was ever a time when our Association should be widely recognized for the great contributions it has and will continue to make toward protecting the world's food supply, it is now. **International Association for Food Protection** distinctly and accurately reflects who we are, what we do, and what we produce. Now is the time for change. I strongly urge you to attend this year's business meeting and support this change.

COMMENTARY

FROM THE EXECUTIVE DIRECTOR



By DAVID W. THARP
IAMFES Executive Director

"What does it take to prepare for the IAMFES Annual Meeting?"

What does it take to prepare for the IAMFES Annual Meeting? How many years in advance do preparations begin? It just depends upon which aspect of the Meeting that you might ask about. The location for the Annual Meeting is discussed and selected about five years in advance of the date of the Meeting with the hotel property being firmed up between three and four years prior to the Meeting. More detailed work begins with the Local Arrangements Committee of the host Affiliate organization about two years before the Meeting and the Program Committee begins their preparations one year in advance of each Annual Meeting. Most details for the Annual Meeting are finalized within a year of the actual Meeting.

The IAMFES Executive Board oversees the whole process with coordinating help from the IAMFES staff. Of course our staff deals with the contractual arrangements prior to each Meeting and the Board gives input and direction related to the Annual Meeting. Each year we strive to make improvements based on the success of past Meetings. Last year we held a reception in the Exhibit Hall after the completion of Monday's sessions. This reception was well attended and we will repeat the event again this year. For 1999, we added a dinner option for Tuesday evening and a new Member reception on Saturday afternoon to orient new Members and first-time attendees to our Meeting and to familiarize them with our Committee process.

Just a note here to remind you that anyone may attend Committee, Professional Development Group (PDG), or Task Force meetings at the Annual Meeting. All such meetings are open meetings and your participation is welcome. Committees actually have Members who are appointed to serve on the Committee, but interested individuals may attend any Committee meeting. PDGs are groups formed to discuss specific topics and many times, develop symposium for the following year's Annual Meeting. PDG membership is open to all interested Members and nonmembers. You may join a PDG simply by attending the PDG meeting of your choice and expressing interest. If you are unable to attend the Annual Meeting, contact the Chairperson of the PDG that interests you.

Back to preparations for each year's Meeting. For this year's Meeting, we began working with the Local Arrangements Committee of the Michigan Environmental Health Association (MEHA) more than two year's ago. Co-Chairpersons Terry Anderson and Chuck Lichon have worked very hard in coordinating the volunteer staff for our Dearborn Meeting. MEHA Members will be very visible throughout the Meeting at the registration desk, in the session rooms, at all social events and providing directions and hospitality during the Annual Meeting. Please join me in giving a huge "thank you" to Chuck, Terry and the entire MEHA staff of volun-

teers for their contribution to the success of the 1999 IAMFES Annual Meeting. They have put forth a great number of hours of their time to assist in the smooth operation of this Meeting!

Another group that deserves recognition is the Program Committee. Each year the Program Committee spends countless hours reviewing submitted symposia and technical abstracts; analyzing and discussing the merits of each to arrive at the final educational program for our Meeting. This year, Chairperson Jeff Farber has done an excellent job of guiding the Committee and working with our office to formulate the program. Again, a "thank you" to Jeff and the Committee is warranted.

Over the past few years, we have more openly solicited sponsorship monies for the Annual Meeting. Last year, we were quite pleased with the response we generated from a very limited number of contacts made. This year has grown nicely and we are certainly fortunate to have the support of so many fine companies and organizations. On behalf of IAMFES Members everywhere, I want to pass on our thanks to these companies and organizations. They will be recognized by name in our Program and Abstract Book and I encourage you to express your thanks to them also.

Lastly, I want to recognize the efforts of the IAMFES staff. Upon completion of each Annual Meeting, we immediately begin planning for the next one. We review the completed Meeting and record suggestions to improve for next year. Our staff is dedicated to providing a professional atmosphere in which to conduct the IAMFES Annual Meeting. We have an excellent staff of 12 individuals who work year-round on your behalf. It is rewarding to receive your comments, both oral and written and I'll again encourage you to express your thanks to our staff members. Personally, I am extremely proud of the work of the IAMFES staff and the teamwork that comes together to enable us to conduct the Annual Meeting. Keep up the great work!

I hope that in this small amount of time you are able to gather a feeling of what it takes to stage an event the size of the IAMFES Annual Meeting. The number of people all pulling together to ensure a first class Meeting is truly amazing. If you have been involved with past IAMFES Annual Meetings, you know what it takes to accomplish success. If you will be helping with future Annual Meetings, learn all that you can from each Meeting preceding yours. These Annual Meetings are a great example of how a group working in unison can achieve more than might be expected. To everyone involved with the 1999 IAMFES Annual Meeting, please accept my sincere thanks for your contribution to its success!

Official Notice

for Members of the International Association of Milk, Food and Environmental Sanitarians

A vote will be taken at the IAMFES Business Meeting on the proposed name change and related revisions to the Constitution and Bylaws.

Tuesday, August 3, 1999 - 4:00 p.m.

Dearborn, Michigan

The proposed name is:

International Association for Food Protection

Dairy, Food and Environmental Sanitation, Vol. 19, No. 7, Pages 470-476

Dairy CIP – A South African Review

C.J.M. Graz* and D.G. McComb

ABSTRACT

Current chemical cleaning techniques used in the dairy industry are expensive, energy consuming, hazardous to operators, and, to compound the problem, increasingly restricted by legislation. The processes employ solutions of sodium hydroxide and nitric acid at concentrations of 0.5-2.0% and 0.5-1.0%, at temperatures of 70-80°C and 60-65°C, respectively. In South Africa, phosphoric acid-based chemicals containing non-ionic surface active agents have been used to reduce wash time and wash temperatures in raw milk silos and road tankers while reducing the chemical loading of the plant effluent. An even newer approach to cleaning-in-place uses proteolytic enzymes under mildly alkaline conditions. Compared with chemical agents, enzymes are more specific with respect to breakdown of milk proteins and are possibly more effective in specific soil removal in dairy production systems. The main impediments to the use of biological cleaning systems are the cost of enzyme production and the extended time required for the cleaning process.

INTRODUCTION

Today's consumer is increasingly aware of nutritional and sanitary requirements and has a desire for high quality, value-for-money products. A dairy, while trying to provide an inexpensive product, must deal with extensive cleaning and sanitation programs in their processing plants *(12, 31)*.

Cleaning and sanitizing in the dairy industry is currently a three-step process based on an initial water rinse, cleaning with sodium hydroxide and nitric acid, and sanitizing with peroxide-based sanitizer. The three steps are necessary because cleaning may involve chemical and/or physical removal of soils; if this is not achieved before the sanitizing agent is applied, the sanitizer could be consumed before it could act on the residual microbial population. Cleaning and sanitation techniques are energy consuming, hazardous to operators, and, to compound the problem, increasingly restricted by legislation. Dairies face a serious dilemma: to improve their CIP systems cost efficiency while maintaining high sanitation standards and reducing effluent outputs. One possible solution is to use burst rinses, which use low volumes of water to flush product or chemicals out of the lines, rather than extended rinses, which use large volumes of water. Effective use of chemicals and sanitizers requires use of the correct materials, at the

correct concentration and temperature, applied in the correct sequence at the required time, and cost effectiveness requires that this be carried out with minimal waste.

Partial reclaim CIP systems minimize waste by recovering up to 80% of sodium hydroxide and nitric acid after the cleaning process. This is achieved by use of conductivity probes, which measure chemical concentration, and control valves, which either allow the reclaim of the chemical or, once the solution drops below a set concentration, discharge the cleaning solution into the plant's effluent stream. Sanitizer is always fluxed to the drain. During the reclaim process, the cleaning chemicals are diluted by the rinse water. The concentration of chemicals in the bulk balance tanks for CIP must therefore be maintained by use of conductivity probes mounted in the bulk tanks which control the dosing equipment and which maintain the bulk tank concentration at the supplier-recommended concentration.

There is a serious need in South Africa to improve the quality of industrial effluents *(36)*. A possible method to improve effluent by reducing its organic loading, which is not used in South Africa at present, is to rinse all equipment prior to washing so as to collect the product residues from which dairy solids can be extracted for further processing or conversion to swine fodder. Further, effluent treatment plants are being suggested as a means of improving the quality of effluent dumped. Effluent treatment plants will be expensive with respect to capital outlay as well as costs incurred in running these plants (Van Vuuren, personal communication, 1997). Therefore, a paradigm shift away from caustic agents and acid in dairy cleaning and sanitation is needed to avoid excessive costs that will inevitably rise as an environmentally conscious society demands stricter legal limitations on effluent discharge. However, only this can occur if the efficiency of new technologies is equal to or greater than that of the currently applied techniques.

The aim of this paper is to consider the conventional chemically based CIP systems currently employed in South African dairies and to suggest new technologies, including the use of one-step products and enzymatic cleaning regimes, as possible alternatives.

GENERAL ASPECTS OF SOILING AND CHEMICAL CLEANING

A chemical cleaning reaction is a heterogenous reaction between a chemical solution and the fouling layer, soil or biofilm *(43)*. According to Tragadh *(43)*, a cleaning reaction can be divided into six stages: (1) Bulk reaction of the chemical solution; (2) Transport of the chemical solution to the soiled surface; (3) Transport of the chemical into the soil; penetration of the chemical into the soil allows chemical activity to occur at the soil-surface interface for optimum soil removal; (4) The physico-chemical transformations and chemical reaction resulting from interaction between the chemical and the soil; (5) Transport of the reaction products to the surface of the soil; and (6) Transport of the soils away from the product contact surface.

The composition of dairy soils must be understood in order to choose the correct cleaning agents and cleaning program. Regardless of the soil type, the sooner cleaning takes place after deposition, the easier it will be to remove.

The most common dairy soil component, the carbohydrates, are the easiest to remove. Carbohydrates include polysaccharides, sugars, starches, and cellulose, all of which are at least partially water soluble, as well as pectate, xylanate, and some celluloses, which are water insoluble *(26)*. Complex carbohydrates currently being used as "fat replacers" in fat-free products also fall into this class. Heating, which will alter the structure of these, makes them more difficult, but still relatively easy to remove compared with other soils. All of these soil types can easily be removed with an alkaline cleaner at temperatures between 40 and 80°C at a pH of 7-12.

Proteins are probably the most difficult dairy soils to remove from surfaces. Proteins consist of linear polypeptides, which may be folded into specific secondary and tertiary structures that make them functional *(17)*. Changes in temperature and pH change the ionic characteristics of the amino acids that make up the protein, thereby changing the bonding that maintains the secondary and tertiary protein structures. This leads to the unfolding, or denaturation, of the molecule. Having lost their original structure, the proteins are linear, and this change in conformation together with the binding of the proteins to other molecules leads to irreversible coagulation of the proteins *(26)*.

Strongly alkaline or chlorinated alkaline chemicals (at pH 10-13) are usually used to clean areas soiled by proteinaceous materials. The drastic change in pH leads to a loss of protein structure and cleavage of peptide bonds, resulting in smaller peptides with increased water solubility. Acidic chemicals denature proteins through decreasing pH but are not able to cleave peptide bonds as alkaline chemicals can *(6)*.

Lipid soils are not water soluble and are thus more difficult to remove than carbohydrates or water-soluble proteins *(26)*. Because lipids are able to increase the adherance of other soils onto surfaces, it is extremely important to remove lipid soils *(22)*. Elevated temperatures are generally used for efficient cleaning of lipid-containing soils, as lipids are known to melt at higher temperatures. Excessive temperatures may result in the polymerization of lipids to form larger globules, which are more difficult to remove. Nevertheless, elevated temperatures are generally used for efficient cleaning *(26)*. Alkaline chemicals are able to saponify lipids, creating soluble soaps that are easily washed away. Surfactants are added to help wet the surfaces and soils.

Mineral salts constitute for the inorganic component of dairy soils. Hard water salts and inorganic components in the product being processed may precipitate onto equipment, especially heated surfaces. Scale formation is common in areas with hard water supplies. Thus, the cleaning agent used must be able to chelate the hard water salts to facilitate effective cleaning. Minerals such as calcium or magnesium can come from the product or the processing water. Scale and other mineral deposits are removed with acid cleaners.

DAIRY SOILS AND THEIR REMOVAL

Dairy soils can vary greatly in composition depending on the product, processing conditions, and the geographical area from which the milk came. The major components in milk are water, sugar, lipids, proteins and minerals.

Two different types of deposits (A and B) are found in a dairy environment *(7)*. These depend largely on the temperature to which the milk in the heat exchanger is exposed. Type A consists mainly of whey proteins. The deposit is characterized by a protein-rich outer layer and a sub-layer, rich in calcium and phosphorous, directly attached to the heating surface. This type of soiling is commonly formed at temperatures between 70 and 90°C *(42)*. Type B is composed mostly of casein entrapped in a calcium phosphate matrix *(22)*. This type of soiling is found at temperatures between 110 and 140°C *(7)*. Milk soils can further be classified according to the part of the process in which they are found.

"Cold milk" soils contain a large amount of lactose and lipids, whereas hot soils contain only traces of these. Because both sugars and lipids become more soluble with increasing temperature, they are found in higher proportions in cold milk soils than in pasteurized milk soils. Thus the cleaning regime used for cold milk soils must be able to cope with increased levels of carbohydrates and fats.

Because lipids melt at higher temperatures, they are less likely to de-emulsify onto surfaces in hot milk soils. Proteins are a major component of both hot and cold milk soils because of their large size and ability to combine with minerals, sugars and lipids. There are two major proteins in milk: Whey proteins are water soluble but begin to denature when heated above 65°C; casein is not water-soluble and is easily precipitated by minerals, enzymes, or heat. Minerals are an important component of both hot and cold soils because of their relative insolubility. Calcium is less soluble at elevated temperatures whereas magnesium is more soluble at elevated temperatures. It has been proposed that they are the first component to deposit onto surfaces, forming the foundation for other deposits *(40)*.

"Hot milk" soils exhibit different characteristics depending on processing temperature and holding time at elevated temperatures. Soiling is generally greater in the hotter parts of processing equipment than in non-heated parts. As processing temperature increases, the concentration of minerals in the soil increases while the lipid content is reduced. In addition, calcium precipitates more readily at higher temperatures. The minerals can then combine with proteins (as in Type B soils), making them extremely difficult to remove. As previously indicated, proteins denature when the temperature is above 65°C, increasing the potential for deposit on product contact surfaces and resulting in protein-based soils that are difficult to remove. Soils found in the pasteurizer are mainly mineral, with some protein, and are more difficult to remove than soils in other areas of the equipment *(22)*.

A newer technology currently available includes the use of a phosphoric acid-based chemical sanitizer that contains a blend of EPA-approved anionic surface active agents and a sequestrant. Although, this technology is allowed in South Africa, it may not be used in this way in the United States on food contact surfaces. This new technology in dairy CIP is being applied to minimize the cleaning chemical loading (especially sodium) in the plant effluent and to reduce cleaning time. This technology is effective only against "cold milk" soils, as it contains little chemical activity and thus is able to solublilize soils only slightly. The product is effective in reducing both energy input, because it is used at 40°C, and washing time, as it is used in a single pass situation based on a single rinse and subsequent wash to drain. The effect of the treatment on the coagulation of casein, which coagulates at pH 4.6, is as yet unknown. A major role player in the South African dairy market has indicated that use of this technology for raw milk silo and road tanker washing has reduced the total cost of cleaning by up to 40% for those sections of the plants where it is being applied (R. van Vuuren, personal communication).

Whatever the soil composition, the mineral components and proteins appear to be responsible for the degree of difficulty of removal of the soil. The change in the structure of proteins upon heating, and the increased ability of the altered proteins to interact with the surface and with minerals, are responsible for this. A major problem in dairy production systems is the deposit of milkstone (a precipitate of calcium and magnesium salts), a deposit that imparts a roughness to the surface of the stainless steel vessels and tubing used in dairies. This roughness promotes adhesion/adsorption of microbes to the soil, depending on the environmental factors associated with the solution flowing through the vessel *(30, 45)*.

Milkstone can be found on all surfaces of milk processing equipment as the result of inadequate removal of minerals during previous cleaning procedures. Acid chemicals must be used to remove milkstone, as the decrease in pH changes the

ionic interaction between minerals, proteins and the processing surfaces, resulting in an increase in solubility and release of the minerals into the washing solution. A chelating agent could also be used, not only to prevent milkstone formation but also to remove milkstone deposits.

The soils resulting from other dairy products are different from raw milk soils because production to the additional processing procedures involved. Butter production will require increased temperatures and higher concentrations of wetting agents in the chemical cleaners. In the production of cheese, as the protein structure is changed, these soils become more difficult to remove. Cultured dairy products such as yogurt contain microorganisms and consequently microbial by-products that alter the composition of the soil. Additives such as fruits and nuts in frozen desserts and yogurts may increase the particulate debris and the complex carbohydrate content.

Bacterial biofilms can develop on almost any surface in any environment in which viable microorganisms are present *(2, 9, 10)*. The tendency of bacteria to adhere to and colonize on inert dairy contact surfaces is a concern in the dairy processing industry *(28)* because of the significant health consequences that arise if even low numbers of potentially pathogenic microorganisms remain on these surfaces after cleaning *(3, 18)*.

Biofilms play a more direct influence in the South African milk industry, where equipment is often older and often not adequately rnaintained. Corrosion, particularly among the sulphate-reducing bacteria found in the anaerobic zone at the biofilm/metal interface, results in irregularities such as roughness, crevices and pits that increase bacterial adherence by promoting bacterial cell attachment and decreasing removal of attached cells by cleaning *(3)*. Post pasteurization contamination also occurs. Costerton et al. *(9, 10, 11)* suggests that the planktonic mode of growth is favored for dissemination and persistence of the dormant form, while the biofilm mode is favored for growth. Attached spoilage and pathogenic bacteria may increase in number and detach on their own or by physical movement of product through a pipeline *(31)*. This process, called "sloughing," is a major concern with respect to product quality as well as a potential health hazard *(5)*.

The microbial exopolysaccharide layer provides protection against phagocytosis and against prophylactic agents such as sanitizers, antibiotics, preservatives and antibodies *(2)*. Sanitizers are unable to penetrate the glycocalyx matrix and contact the bacterial cells in order to destroy them *(31)*. Austin and Bergeron *(3)* found that extensive bacterial biofilms may develop on gaskets and tubing in various areas of dairies even after regular CIP procedures. Contact surfaces of milk pipelines and processing equipment have been suggested to be a direct source of postpasteurization contamination *(25)*. In severe cases of soiling where the soil is not removed completely by the CIP process, a dramatic decrease in sanitizer efficacy is observed. Classical methods to test the antimicrobial efficacy of commercial sanitizers rely mainly on kill tests using planktonic cultures. Subsequent evaluations have shown that sanitizers currently employed reduced planktonic cultures by the accepted standard South African (99.999% reduction per minute, which is less stringent than the EPA requirement of 99.999% per half minute) but did not affect the sessile organisms *(27)*.

The daily cleaning of dairy production equipment by chemical CIP cannot be avoided, as milk solids will always be deposited on processing equipment during processing.

Processing costs as described by Sandu and Singh *(37)* that may be influenced by cleaning and sanitation include: (a) increased capital costs as a result of oversizing of the heat transfer equipment; (b) installation of parallel units as an alternative processing route during cleaning and early replacement of equipment because of the shortening of technical lifetime; (c) increased energy costs as a result of a decreasing heat transfer coefficient during operation; (d) an increasing pressure drop during operation and cleaning at elevated temperatures to remove deposit; (e) high maintenance costs due to the use of cleaning chemicals and water and treatment of cleaning effluent before disposal; (f) costs for production losses as a result of product remaining on the wall of the heat exchanger; (g) product losses during plant shutdown for cleaning and start-up procedures and downtime for cleaning, during which no production can take place; and (h) costs for the recycling of product (not applicable to South Africa to date).

BIOCATALYSIS AS AN ALTERNATIVE FOR DAIRY CIP

The synthetic industrial chemicals available today have good cleaning power as a result of the numerous technical improvements since the advent of extensive use of these chemicals in the dairy industry 50 years ago *(16, 20)*. The cleaning power of chemicals seems to have peaked; most chemicals contain the same ingredients (at more or less the same concentrations) and are based on the same detergency mechanisms. In each case, the soil that has adsorbed onto a surface is removed by surfactants and other builders, which lower the surface tension at the interface and enhance the repulsive forces between the surface and the soil, resulting in removal of the soil. New detergents include enzyme mixtures incorporated into products for household and industrial use *(29)*. The use of enzymes for industrial or domestic applications is part of what is called biocatalysis *(13, 19)*.

Although enzymes are relatively expensive components of cleaning mixtures, compared with chemically based CIP products, an enzyme-based CIP product: (a) would

be more energy efficient, as reactions could take place at biological temperatures (25°-42°C rather than 65°-80°C which is used with chemically based CIP); (b) would be more cost effective, as there is currently no legislation on the discharge of biological effluent in South Africa; (c) would be safer to work with; (d) could be more effective in dealing with soiling, as enzymes are the most efficient catalysts known, increasing rates of chemical reactions by factors of 10^9 to 10^{12}; as the majority of enzymes are distinguished by the specificity of their action, enzyme function can be regulated, which means that simple changes in the environment can alter enzyme fatiction from their most active to their inactive forms *(26)*; (e) can continually be improved, as an increased use of genetic and chemical engineering has proved to be a powerful influence in the production of industrially stable and novel enzymes *(33)*.

Currently, two products for enzymatic CIP are being marketed in South Africa by two of the world leaders in industrial cleaning and sanitation. Both products are applied in a process that to date has not been shown to be truly efficient. The process includes an initial rinse as is found in all sanitation programs, a wash with an alkaline builder to increase the pH of the system and saponify the lipids, and a final wash with the enzyme mixture to remove the protein residues.

The process of enzymatic CIP harbors challenges that must be overcome before true biological cleaning can be achieved. For dairy CIP, two types of enzymes could be used. These enzymes exhibit proteolytic or lipolytic characteristics and would be able to remove the bulk of milk soils at biological temperatures (25°-42°C). Another method could be a combination of a proteolytic enzyme and a non-ionic surfactant, combining biocatalysis and chemical cleaning technologies.

Proteases are enzymes that catalyse the cleavage of peptide bonds, resulting in the release of individual amino acids or peptide subunits from peptide chains *(4)*. The largest current application for microbial enzymes is the use of proteases in detergents *(8)*.

Enzymes exhibiting lipolytic activity, or lipases (triacylglycerol acylhydrolases, EC 3.1.1.3), are produced by various microorganisms *(15)*, either alone or together with esterases (carboxylic-ester hydrolases, EC 3.1.1.1) *(24)*. Lipases act at the interface generated by a hydrophobic lipid substrate in a hydrophilic aqueous medium *(21)*. A characteristic property of lipases is interfacial activation, which is distinguished by a sharp increase in lipase activity when the substrate forms an emulsion. As a result, the kinetics of the lipase reaction do not conform to the classical Michaelis-Menton model *(14)*. Esterase activity is a function of substrate concentration as described by Michaelis-Menton kinetics, with the maximal reaction rate being reached long before the solution becomes substrate saturated *(21)*.

A major challenge to be overcome with respect to the use of enzymes in CIP is that the products used to clean the system could lead to degradation of the product. Heat resistant proteases (1) ideally should be avoided because of the chance of possible product spoilage (degradation), but this enzyme could be used effectively in a cleaning regime including high temperature enzyme mixtures which could be far more effective and specific than the chemicals in present use. Less than 30% of psychrotrophic bacteria (bacteria that grow at low temperatures), in refrigerated raw milk produced lipolytic taints *(32)*. However, the possible use of enzymes from these bacteria (in cleaning) and the danger of them (in contaminating) lie in their heat-resistance *(41)*. Certain extracellular lipases from *Pseudomonas*, *Achromobacter* and *Serratia* species are heat resistant, while those of *Alcaligenes* and *Flavobacterium* species have been shown to be heat sensitive *(40, 41)*. Kishonti *(23)* found that 40% of the psychrotrophic bacteria produced enzymes that retained 75% of their activity after heating for 2 min at 90°C. Considering that commercially sold milk is high-temperature-short-term (HTST) pasteurized at 72°C for 15 s *(35, 44)*, there is a danger that the enzyme solution used for cleaning will be a source of milk degradation during normal processing if the milk was contaminated. The problem of cleaning enzyme carryover must be considered a minor problem compared with the presence of often heat-stable enzymes produced by spoilage organisms, which will reduce milk quality.

A further challenge that must be addressed is the fact that not all enzyme-based cleaners are effective under use conditions and thus not all are able to cleave proteins into smaller fragments that can be rinsed away from soiled surfaces *(38, 39)*. Hydrolysis of milk proteins by other enzyme-based cleaners is incomplete in the time currently considered adequate for cleaning with enzyme-based products *(39)*. Thus there is still a need to develop a better understanding of the activity of enzymes destined for use as biologically based CIP products.

Furthermore, if a two-enzyme system is used rather than a product combining biocatalysis and chemical cleaning technologies, the order of enzyme application would have to be considered carefully. Because enzymes are protein in nature, the lipases would always have to be applied first so that they can act on the lipid soils before they are degraded by the action of the proteases.

Enzyme-based cleaning has been shown to be ineffective in reducing microbial numbers from surfaces *(39)*, and thus sanitizing of surfaces after enzyme-based cleaning is essential.

The need for effective biological CIP cleaners can be met because of the tremendous increase in screening for novel microbial enzymes for industrial use. Biofilms are now being recognized as a

tremendous resource for use of these microbes and their enzymes *(34)*. The main advantages of the enzyme detergents would be energy and cost efficiency, safety, and greater efficacy due to specificity. With currently available recombinant techniques, the manufacture and isolation of crude, durable (heat and pH stable) enzyme solutions is not only feasible but relatively inexpensive, considering the costs involved in current chemical CIP process.

Dairies are being pressured into stepping up effluent considerations, with heavy penalties an unavoidable reality. Installing treatment plants is only a temporary alternative, as the restrictions on acids, bases and heavy metals in water effluent will inevitably rise as the total potable water supply decreases in quality. Biological soil removal appears to be the best alternative to meet the cleaning needs of the dairy industry in the next millennium.

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REFERENCES

1. Adams, D. M., J. T. Barach, and M. L. Speck. 1975. Heat resistant proteases produced in milk by psychrotrophic bacteria of dairy origin. J. Dairy Sci. 58:828–834.
2. Allison, D. G., and P. Gilbert. 1992. Bacterial biofilms. Science Progress. 76:301–321.
3. Austin, J. W., and G. Bergeron. 1995. Development of bacterial biofilms in dairy processing lines. J. Dairy Res. 62:509–519.
4. Barret, A. J. 1994. Classification of peptidases. Met. Enz. 244:1–15.
5. Blenkinsopp, S. A., and J. W. Costerton. 1991. Understanding bacterial biofilms. Tibtech 9:138–143.
6. Bohner, H. M., and R. L. Bradley. 1992. Effective cleaning and sanitizing of polysulfone ultrafiltration membrane systems. J. Dairy. Sci. 75:718–724.
7. Burton, H. 1968. Deposits from whole milk in heat treatment plant – A review and discussion. J. Dairy Res. 35:317–330.
8. Cheetham, P. S. J. 1987. Screening for novel biocatalysts. Enz. Microb. Technol. 9:194–293.
9. Costerton, J. W., G. G. Geesey, and K. Cheng. 1978. How bacteria stick. Sci. Am. 238:86–95.
10. Costerton, J. W., K. Cheng, G. G. Geesey, T. I. Ladd, and N. C. Nickel. 1987. Bacterial biofilms in nature and disease. Ann. Rev. Microb. 41:435–464.
11. Costerton, J. W., Z. Lewandowski, D. E. Caldwell, D. R. Korber, and H. M. Lappinscott. 1995. Microbial Biofilms. Ann. Rev. Microb. 49:711–745.
12. Cousin, M. A. 1982. Presence and activity of psychrotrohic microorganisms in milk and in dairy products: A Review. J. Dairy Prot. 45:172–207.
13. Demain, A. L., and N. A. Solomon. 1981. Industrial microbiology. Sci. Am. 245:43–51.
14. Desnuelle, P. 1961. Pancreatic lipase. Adv. Enz. 23:129–161.
15. Eddy, B. P. 1965. Microbial spoilage. p.489-506. *In* C. Rainbow and A. H. Rose (ed.). Biochemistry of industrial microorganisms. Academic Press. London.
16. Eveleigh, D. E. 1981. The microbial production of industrial chemicals. Sci. Am. 245:120–130.
17. Fersht, A. 1977. Enzyme structure and mechanism, 2nd ed. W. H. Freeman and Co. New York.
18. Flint, S. H., P. J. Bremier, and A. D. Brooks. 1997. Biofilms in dairy manufacturing plant equipment. Current concerns and methods of control. Biofouling. 11:81–97.
19. Fogarty, W. M., and C. T. Kelley. 1980. Microbial enzymes and bioconversions. Academic Press. New York.
20. Hoshino, E., and S. Ito. 1997. Application of alkaline cellulases that contribute to soil removal in chemicals. p. 149-174. *In* van Ee, J. H., O. Misset and E. J. Baas. Enzymes in Detergency. Marcel Dekker, Inc. New York.
21. Jaeger, K. E., S. Ransac, B. W. Dijkstra, C. Colson, M. Van Heuvel, and O. Misset. 1994. Bacterial lipases. FEMS Microb. Rev. 15:29–63.
22. Jeurnink, T. J. M., and D. W. Brinkman. 1994. The cleaning of heat exchangers and evaporators after processing milk or whey. Int. Dairy J. 4:347–368.
23. Kishonti, E. 1992. Influence of heat resistant lipases and proteases in psychrotrophic bacteria on quality control. Int. Dairy Fed. Ann. Bull. 36:121–124.
24. Kouker, G., and K. E. Jaeger. 1987. Specific and sensitive plate assay for bacterial lipases. Appl. Env. Microb. 53:211–213.
25. Koutzayiotis, C. 1992. Bacterial biofilms in milk pipelines. S.A. J. Dairy Sci. 24:19–22.
26. Lehninger, A. L., D. L. Nelson, and M.M. Cox. 1993. Principles of biochemistry, 2nd ed. Worth Publ.
27. Lindsay, D. 1997. Sanitizers and dairy spoilage bacteria. S.A. Food Rev. 24: 39.
28. Mattila-Sanholm, T., and G. Wirtanen. 1992. Biofilm formation in the industry. A Review. Dairy Rev. Int. 8:573–603.
29. May, S. W. 1991 Biocatalysis in the 90's: A perspective Enzym Microb. Technol. 14:80–84.
30. McCoy, W. F., J. D. Bryers, J. Robbins, and J. W. Costerton. 1981. Observations of fouling biofilm formation. Can. J. Microb. 27:910–917.
31. Mosteller, T. R., and J. R. Bishop. 1993. Sanitizer efficacy against attached bacteria in a milk biofilm. J. Dairy Protect. 56:34–41.
32. Muir, D. D., J. D. Phillips, and D. G. Dalgleish. 1979. The lipolytic and proteolytic activity of bacteria isolated from blended raw milk. J. Soc. Dairy Technol. 32:19–23.
33. Neidleman, S. L. 1994. New applications of biocatalysts. Current Opinion in Biotechnol. 5:206–211.

34. Phaff, H. J. 1982. Industrial Microorganisms. Sci. Am. 245:53-65.
35. Prescott, L. M., J. P. Harley, and D. A. Klein. 1996. Microbiology, 3rd ed. WCB Publishers. Dubuque, IA.
36. Reid, R. 1997. Shortage looming in the production of milk. S. A. Dairy Review 24:38.
37. Sandu, C., and R. K. Singh. 1991. Energy increase in operation and cleaning due to heat exchanger fouling in milk pasteurization. Food Technol. (December:) 84-91.
38. Smith, K. E., and R. L. Bradley. 1987. Activity of four enzyme-based cleaners for ultrafiltration systems against proteins in skim milk and whey. J. Dairy. Sci. 70:243-251.
39. Smith, K. E., and R. L. Bradley. 1987. Evaluation of efficacy of four commercial enzyme-based cleaners of ultrafiltration systems. J. Dairy. Sci. 70:1168-1177.
40. Stadhouders, J., and H. Mulder. 1960. Lipid hydrolysis and cheese flavour. IV. Lipid hydrolysis in cheese from pasteurised milk. Neth. Milk Dairy J. 14:141-147.
41. Thomas, S. B., R. G. Druce, and A. Davies. 1966. The significance of psychrotrophic bacteria in raw milk. Dairy Ind. 31:27-32.
42. Tissier, J. P., and M. Lalande. Experimental device and methods for studying milk deposit formation on heat exchange surfaces. Biotechnol. Prog. 2:218-229.
43. Tragadh, G. 1989. Membrane cleaning. Desalination. 71:325-339.
44. Van Denmark, P. J., and B. L. Batzing. 1987. The microbes – An introduction to their nature and importance. The Benjamin/Cummings Publishing Company.
45. Van Holy, A. 1987. New approaches to microbially induced corrosion. Water Sewage Effl. 38-44.

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Food Temperature Variations Along the Stem of the Bimetallic-coil Thermometer

O. Peter Snyder, Jr.

SUMMARY

This article discusses the use and limitations of bimetallic-coil thermometers for measuring food temperature that are important to cooks in foodservice units and homes. Labels on raw meat and poultry products imply that bimetallic-coil thermometers should be used to measure pasteurization or doneness temperature for these raw products to ensure food safety. Simple experiments with food items indicate that the bimetallic-coil thermometer can be considered an accurate temperature-measuring device only if the temperature of the food is absolutely uniform across the length of the stem. If a bimetallic-coil thermometer is not positioned correctly in a cooking hamburger, for instance, it is impossible to obtain an accurate temperature reading to determine whether this ground meat product has been cooked to an adequate pasteurization temperature. This can jeopardize public health, particularly the health of the young, elderly, and immune-compromised portion of the population, and may possibly lead to a foodborne illness outbreak. If bimetallic-coil thermometers are to be used to measure food temperature, manufacturers of these temperature-measuring devices need to provide instructions for their use so as to guarantee correct assessment of food temperature.

INTRODUCTION

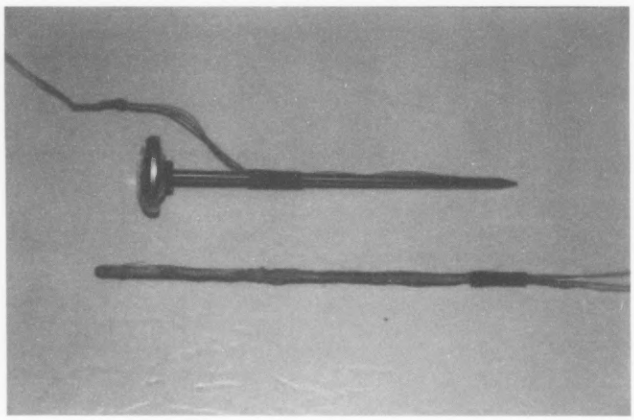
The purpose of this study was to determine the typical variability of temperatures within food as measured with 36-gauge thermocouples and to compare these temperature measurements with readings from a bimetallic-coil thermometer. The temperature-sensing zone of most bimetallic-coil thermometers is the distance from about 3/8 inch from the tip end to about 2 1/2 inches up the stem *(3, 5)*, although this zone varies depending on design differences among manufacturers. A bimetallic coil within the stem of the thermometer responds to the average temperature across the coil and causes the pointer in the dial to show the average temperature across the length of the coil. For example, when the food-contact temperature at the upper end of the coil within the thermometer stem is 100°F, and the food-contact temperature of the coil at the tip end is 200°F, the thermometer dial registers a temperature of 150°F.

TABLE 1. Temperature of rehydrated instant mashed potatoes* at various time intervals as measured by thermocouples and bimetallic-coil thermometer

Bimetallic-coil Thermometer Dial Reading (°F)	Thermocouples				
	Tip (°F)	1 Inch from Tip (°F)	2 Inches from Tip (°F)	Mean $\bar{x}$ (°F)	Range $\bar{R}$ (°F)
166	179	168	161	169	18
(dowel stick)	173	173	154	167	19
166	173	171	153	166	20
152	158	157	137	151	21
(dowel stick)	146	155	145	149	10

* Approximately 2 1/2 cups

Figure 1. Bimetallic-coil thermometer with 3 attached thermocouples, 1/8-inch wooden dowel with 3 attached thermocouples. The thermocouples were positioned to measure the temperature of food 1/8 inch from the tip, 1 inch up the stem, and 2 inches up the stem of the thermometer



PROCEDURE

A bimetallic-coil thermometer, Ekco Instant Read Bimetallic Coil Thermometer, (Franklin Park, IL) was modified to have thermocouples (36-gauge, type K) soldered at the tip, 1 inch from the tip, and 2 inches from the tip. The points at which the thermocouple junctions were attached to the stem of the bimetallic-coil thermometer indicated the actual food temperature at those points. Figure 1 shows the bimetallic-coil thermometer with attached thermocouple wires. The picture also shows a wooden dowel to which thermocouple wires were attached in exactly the same positions as on the bimetallic-coil thermometer. A wooden dowel with thermocouple wire attachments was also used to detect any major heat transfer by the stainless steel stem of the bimetallic-coil thermometer. Figure 2 is a picture of the thermocouple meters, DualLogR; Type K (Barnant Co., Barrington, IL) and the five-channel, printer temperature-recording unit, Model 50, (Electronic Controls and Design, Milwaukie, OR).

RESULTS

Experiment 1. Rehydrated instant mashed potatoes were used as the heat transfer medium (Fig. 3). The potatoes were reconstituted and rethermalized in a microwave oven to create a product with non-uniform temperatures. Upon removal from the microwave unit, the bimetallic-coil thermometer with attached thermocouples was inserted into them. The dial on the thermometer read 166°F. The thermocouple readings were 179, 168, and 161°F. Therefore, the mean temperature was 169°F, and the temperature range (R) of the potatoes was 18°F between the tip and 2 inches up the stem. When temperature was remeasured after 1 minute, thermocouple readings indicated that the bottom of the potatoes had cooled to 173°F, the middle had warmed to 171°F, and the surface of the potatoes had cooled rapidly (to 153°F). The temperature average of the thermocouple readings corresponded to the dial reading of the bimetallic-coil thermometer. The temperature range of the potatoes was 20°F between the tip and 2 inches from the tip of the thermometer. The temperature of the potatoes was measured once again, at which time the bimetallic-coil thermometer read 152°F and the range of temperatures between the tip and 2 inches from the tip was 21°F. Table 1 is a tabulation of the results of thermocouple readings attached to the bimetallic-coil thermometer and the wooden dowel, and dial readings on the bimetallic-coil thermometer.

TABLE 2. Temperature of turkey roll* at various time intervals as measured by thermocouples, bimetallic-coil thermometer, and thermocouple thermometer.**

Cooking Time	Placement of Tip	Bimetallic-coil Thermometer Diol Reading (°F)	Thermocouples Tip (°F)	Thermocouples 1 Inch from Tip (°F)	Thermocouples 2 Inches from Tip (°F)	Mean $\bar{x}$ (°F)	Range $\bar{R}$ (°F)
45 min.	bottom	105	129	101	117	115	12
60 min.	bottom	126	147	122	126	132	21
62 min.	middle	118	129	118	82	110	47
1 hr. 15 min.	bottom	145	172	145	136	151	36
1 hr. 15 min.**			170		145		25
1 hr. 35 min.	bottom	168	189	163	145	166	44
1 hr. 35 min.	other end	162	184	164	142	163	42
1 hr. 35 min.	stroight up, middle	155	181	160	109	150	72

* Stort temperoture 28°F

** Atkins thermocouple thermometer: temperoture meosured ot bottom ond top of turkey roll

Figure 2. Thermocouple meters and five-channel printer temperature-recording unit

The data in Table 1 show that the thermocouple wires positioned on the wooden dowel stick, which has very low thermal conductivity, gave approximately the same temperature readings as the thermocouple wires attached to the stainless steel stem of the bimetallic-coil thermometer.

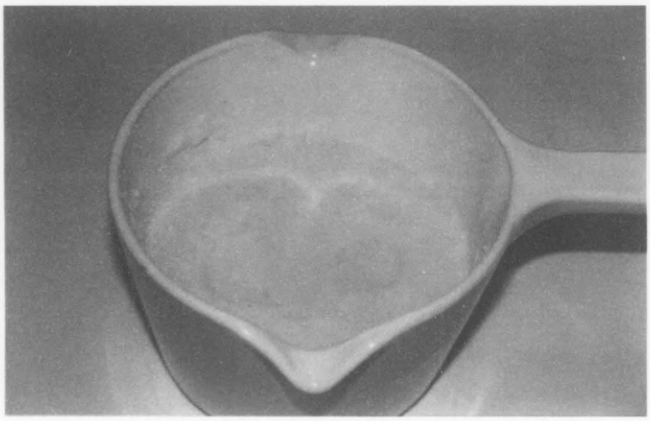
Experiment 2. To measure food temperature of a thick food item, a 2-lb turkey roll, 2 inches thick (Fig. 4) was selected. Temperature data were collected at various times as the product was heated in a conventional electric oven at 325°F; the turkey roll was removed from the oven for temperature measurements. These temperature measurements are tabulated in Table 2.

At 45 minutes, the bimetallic-coil thermometer read 105°F; the average thermocouple temperature

TABLE 3. Temperature of ground beef (steakette) patty at various time intervals as measured by thermocouples and bimetallic-coil thermometer

Time	Bimetallic-coil Thermometer Dial Reading (°F)	Thermocouples Tip (°F)	Thermocouples 1 Inch from Tip (°F)	Thermocouples 2 Inches from Tip (°F)	Mean $\bar{x}$ (°F)	Range $\bar{R}$ (°F)
13 min.	160	171	158	166	165	13
14 min. 40 sec.	155	166	153	151	157	15
15 min. 30 sec.	162	162	163	164	163	2
16 min. 45 sec.	161	158	162	151	157	11
18 min.	160	163	156	157	159	7

Figure 3. Reconstituted, instant mashed potatoes, 2 1/4 inches deep



reading was 115°F, and the range was 12°F. At 60 minutes, the range was 21°F. At 62 minutes, the position of the tip was changed to the middle of the turkey roll, and the range was 47°F between the tip and 2 inches from the tip. Note that, invariably, the top of the food was much cooler because of evaporative cooling.

After 1 hour 35 minutes of cooking, the turkey roll was approaching the endpoint. The bimetallic-coil thermometer read 168°F. Thermocouple temperatures ranged from 189°F (tip) to 145°F (2 inches from the tip or surface), giving a range of 44°F. When the thermometer was placed straight down into the turkey roll, the dial temperature reading changed from 168°F to 155°F, because part of the thermometer was at the surface where the temperature as indicated by the thermocouple was only 109°F, because of evaporative cooling. The actual range of temperatures between the tip and 2 inches from the tip was 72°F. This experiment demonstrates that temperature variability within food is not accurately determined with a bimetallic-coil thermometer.

Experiment 3. A critical hazard control is to ensure that raw ground meat and poultry products are heated to temperatures for times necessary to ensure pasteurization of these food items and reduction of pathogenic microorganisms such as *E. coli* O157:H7 and/or *Salmonella* spp. to a safe level. Accurate measurement of the temperature of thin foods (those less than 3/8 inch thick) with a bimetallic-coil thermometer is not possible. However, consumers are given the impression, through display of a USDA illustration of a bimetallic-coil thermometer on packages of raw meat and poultry products, that this type of temperature-measuring device can be used to measure temperature of these foods to ensure safety and doneness *(4)*.

To illustrate problems of assessing temperature in a thin food item with a bimetallic-coil thermometer, a 1/3-lb ground beef (steakette) patty, 3" × 4 3/4" × 3/4" thick (uncooked), was used. (At the end of cooking, the patty was 3 1/2" × 2 1/2" × 1" thick.) Figure 5 shows the patty before cooking. Figure 6 shows the patty cooking in the pan. Figure 7 shows the cooked steakette with the bimetallic-coil thermometer inserted into the side (length-

Figure 4. Turkey rall, appraximately 2 1/4 inches thick, after heating in a canventianal, electric aven for abaut 1 1/2 haurs

Figure 5. Graund beef patty (steakette), before cooking (1/3 lb, 3" × 4 1/2" × 3/4" thick)

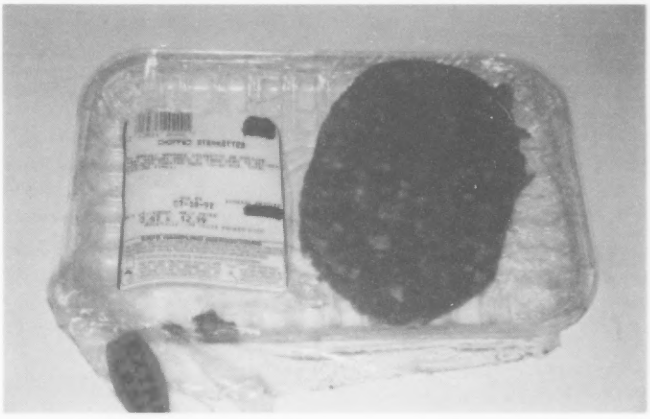


Figure 6. Graund beef patty (steakette) pan frying at medium-high electric burner setting

wise) of the patty. Figure 8 shows the inside of the patty, which reveals the hole left by the bimetallic-coil thermometer and the interior appearance of the patty. Thick ground meat patties such as this require adequate time to reach temperatures that ensure destruction of pathogenic bacteria. This patty was getting quite brown on the outside but did not reach sufficient internal temperature until after about 13 minutes. The tabulation of temperature readings of the bimetallic-coil thermometer and thermocouples are listed in Table 3.

The data show that it was difficult to assess when the hamburger was done without the use of a thermocouple. [To ensure the safety of comminuted meat products, the FDA 1999 Food Code recommends that these products should be heated to a temperature of 155°F for 15 seconds *(1)*.] It is neither practical nor advisable to remove the meat from the pan repeatedly to measure its temperature with a bimetallic-coil thermometer in order to stop cooking after a center temperature of 155°F has been reached. When the ground beef patty was transferred from the pan to the cutting board and the thermometer inserted into it at 13 minutes, the dial on the bimetallic-coil thermometer registered the temperature as 160°F. Actually, the average temperature was 165°F, and the range of temperatures along the stem was 13°F.

When the patty was allowed to equilibrate and the bimetallic-coil thermometer was manipulated, the temperature rose slightly, and the dial on the bimetallic-coil thermometer actually did not change much for almost 5 minutes. The thermocouples indicated the same results. At 18 minutes after the cooking had begun, the bimetallic-coil thermometer read 160°F, and the temperature readings of the thermocouples averaged 159°F. The range of temperatures across the stem, inserted into the middle of the patty, was 7°F. (See Fig. 7.)

Figure 7. Graund beef patty (steokette) with thermocouple-madified, bimetallic-cail thermameter, inserted lengthwise

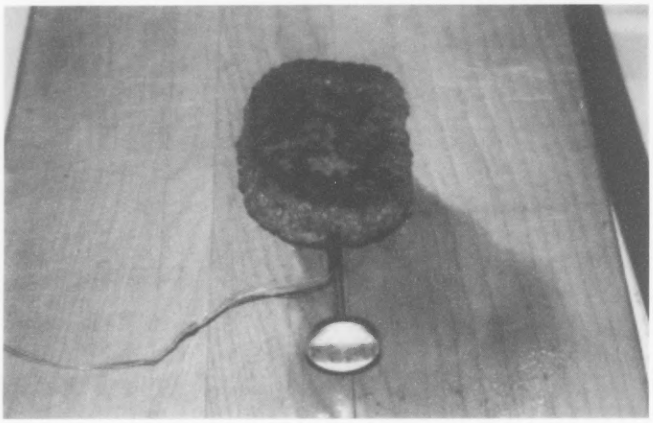
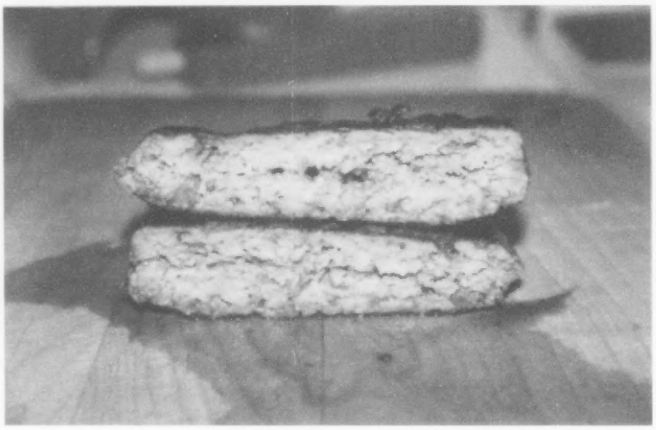


Figure 8. Ground beef patty (steakette) after caaking. This picture indicates orea of insertian mode by the thermacauple-modified, bimetallic-cail thermameter, as well as finol color



DISCUSSION

Scientists who understand the principles of heat transfer that occur when foods are cooked, and who also understand the construction and limitations of bimetallic-coil thermometers, may be able to use these temperature-measuring devices to estimate high and low temperatures in food. However, when the typical cook, working under operating conditions in foodservice units or cooking food at home, uses a bimetallic-coil thermometer to measure food temperature, this temperature-measuring device will normally provide an inaccurate indication of actual food temperature. Most cooks are unlikely to be aware of the inaccuracy of the reading.

Metal-stem roasting (meat) thermometers that are constructed with the same bimetallic coils extending up from the tip about 3 inches give the average temperature of the center 3 inches of a prime rib of beef if the bimetallic coil is positioned in the middle of the meat. Cooks should receive information and training if these thermometers are used to measure doneness of meat, in order to assure temperature measurement accuracy. This type of thermometer does not accurately assess the temperature in a roasting turkey if the tip is against a bone in the carcass and the other end of the 3-inch coil extends outside the surface of the turkey.

How much accuracy is needed? Today, both the USDA and FDA use salmonellae as the target organisms for destruction through cooking/pasteurization of meat and poultry products. The typical *Salmonella* bacterium is assumed to have a z-value of 10°F. At 150°F, 1 decimal reduction (10 to 1 reduction) of salmonellae requires 10.37 seconds *(2)*. For 5 decimal reductions (100,000 to 1 reduction), the time required at 150°F is 51.9 seconds. [The FDA 1999 Food Code *(1)* recommends cooking hamburger for 1 min at this temperature.] A 7-decimal reduction is 72.3 seconds at 150°F. Because of the exponential nature of destruction, and considering the z-value of 10°F, if the temperature measurement is 3°F in error, the time changes dramatically. Based on 51.4 seconds for a 5-decimal reduction in hamburger at 150°F, the time required is only 25 seconds (at 153°F), while 103 seconds are required (at 147°F). When raw meat or poultry is pasteurized by heating, there is little tolerance for the typical error of a bimetallic-coil thermometer; a small error results either in unsafe food or a serious loss of quality because of unnecessary cooking.

There is also a question of reliability when bimetallic-coil thermometers are used to measure food temperature. These units must be calibrated in slush ice water at 32°F virtually every time before being used. Only units that can be calibrated by the cook should be used to check temperature of foods. The units can be calibrated by immersing the stem 4 or more inches into crushed ice with just enough water to come to the top of the ice. If only ice cubes in water are used, the temperature of the water is often 4 to 6°F above 32°F. It is very important

that there is a stiff friction fit between the stem and the dial; otherwise, the next time the thermometer is used, the dial is likely to have slipped. Because there is no way to adjust the friction, the only choice is to dispose of the thermometer when the friction fit is reduced.

A bimetallic-coil thermometer can be purchased for $6.00 to $8.00, but usually can be expected to last only a week or two for cooks who use this device 8 to 10 times a day. A thermocouple thermometer with attached probe (e.g., Atkins 33040), which sells for about $140.00, requires no calibration over its lifetime of at least 10 years. Its guaranteed accuracy is ±0.9°F over a range of 32 to 410°F. Considering the liability of undercooking hamburger or poultry, the highly reliable thermocouple thermometer seems to be the proper thermometer to use.

CONCLUSION

These simple experiments indicate that the bimetallic-coil thermometer can be considered an accurate temperature-measuring device only when there is zero temperature deviation in the food. For example, it is possible to obtain a reasonable reading if food temperature from the tip to 2 or 3 inches up the stem does not vary more than 0.5°F (e.g., in a pot of soup or gravy). However, when there is a food temperature differential across the stem of the thermometer, the bimetallic-coil thermometer will give only an average temperature reading.

If a bimetallic-coil theromeeter is not positioned exactly at the cold spot of a cooking hamburger, for instance, it is impossible to obtain an accurate temperature reading to indicate whether the food has been cooked to a pasteurization temperature. This can jeopardize public health, particularly the health of the young, elderly, and immune-compromised portion of the population, and may possibly lead to a foodborne illness outbreak. Bimetallic-coil thermometers should not be used to validate the safety of cooked raw meat and poultry products until extensive cooking tests are conducted with some inoculated foods, such as *E. coli* O157:H7 in ground beef and *Salmonella enteritidis* in scrambled eggs. If bimetallic-coil thermometers are used to measure food temperature, manufacturers of these temperature-measuring devices need to provide instructions for the use of bimetallic-coil thermometers that guarantee correct assessment of food temperature. This information will enable cooks (in foodservice units or in homes) to obtain more reliable food temperature measurements for both safety and quality, as well as to recognize the limitations of the use of these temperature-measuring devices.

REFERENCES

1. FDA. 1999. Food Code. U.S. Public Health Service, U.S. Dept. of Health and Human Services. Pub. No. PB99-115917. Washington, D.C.
2. Goodfellow, S. J., and W. L. Brown. 1978. Fate of *Salmonella* inoculated into beef for cooking. J. Food Prot. 41:598–685.
3. Snyder, O. P. 1996. Limitations of bimetallic-coil thermometer in monitoring food safety in retail food operations. Dairy Food Environ. Sanit. 16:300–304.
4. USDA-FSIS. 1996. Have you seen this label? The Food Safety Educator. 1(3):1.
5. USDA-FSIS. 1997. Kitchen thermometers. Technical Information from FSIS. Oct. Washington, D.C.

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IAMFES Name Change Survey

Jenny Scott
IAMFES Vice President

What do IAMFES Members think about changing the name of the Association to the International Association for Food Protection (IAFP)? Naturally, your Board wanted to find out. So last November we took a random survey of approximately 10% of the Membership to get some feedback on issues related to the name change. We randomly selected 300 Members, 200 from a list of Members from which the employer category (government, academia, industry) was known, and 100 from a list where it was not. Of those polled, 96 (32%) returned the written survey. Most provided information on their employer category: 15.2% from education, 22.8% from government, 54.4% from industry, and 7.6% from other employer types. Thus we feel we received input from a good cross-section of our Membership. The results of the survey will be presented in more depth at the upcoming Annual Meeting in Dearborn, Michigan, but I want to take the opportunity to present some of the highlights here.

When asked how well the current name (IAMFES) fits the organization's mission, 72% of the Members said "more or less," "not very well," or "not at all" (Fig. 1). However, 75% said the proposed name (IAFP) reflects the mission "perfectly" or "fairly well" (Fig. 2). When asked "How good an alternative do you think the 'International Association for Food Protection' is," 71% of the respondents answered "excellent" or "good."

Figure 1. How well does the name "IAMFES" fit the overall mission?

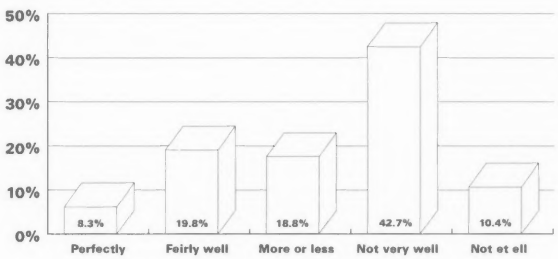
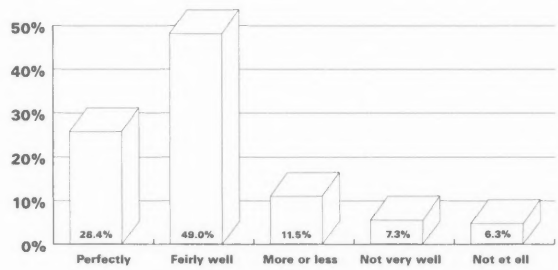


Figure 2. How well does the alternative (International Association for Food Protection) fit or reflect the mission?



We were interested in knowing if different segments of the Membership held differing views on the name change, so we looked at the responses based on years of Membership in IAMFES as well as field of work. In general, all Members except those who had been IAMFES Members for more than 25 years rated the proposed name higher than the current name (Table 1). The difference was especially pronounced for those who have been Members for less than one year and for those who have been Members for 21 to 25 years. Thus, both new Members and long-time Members believe that IAFP better fits the mission of the Association than does the name IAMFES.

Members who identified themselves as working in the field of dairy foods preferred the current name over the proposed, but by a small margin. On the other hand, those who work with multiple foods overwhelmingly prefer the proposed name (data not shown).

Many respondents made the request for a name with an acronym that could be verbalized. As many of you know, Washington, D.C. is a city where acronyms abound, and people find all kinds of ways to verbalize an acronym, as we have done for I-AM-FES. However, I also work for an association that uses an acronym that cannot be verbalized: NFPA. It seems that as long as the acronym is 4 letters or less, people can live with spelling the acronym.

The Board found these results very interesting. In addition to specific questions, the survey provided the opportunity for respondents to comment on their impressions about the two names. These comments suggest that many Members believe that the current name is limiting and that the Association has moved beyond the name. This is the sentiment of the Board, and we hope that the majority of Members will agree and vote for a new name – International Association for Food Protection – when we meet in Dearborn this year.

TABLE 1. Responses to name change by years of Membership

Years a Member	Number of responses	Name IAMFES fits mission[a]	Name IAFP fits mission[a]	How good an alternative IAFP is[b]
Less than 1	10	2.30	4.10	4.30
1 to 5	23	3.04	3.96	3.83
6 to 10	26	2.62	3.69	3.62
11 to 15	9	2.44	3.56	3.44
16 to 20	12	2.92	3.92	4.40
21 to 25	5	2.00	4.44	4.40
More than 25	4	3.00	3.00	3.00
No response	7	3.14	3.57	3.43

[a] 5 = perfectly; 1 = not at all

[b] 5 = excellent; 1 = very poor

Lecturer: Dr. Fritz Käferstein, FDA/USDA, Joint Institute for Food Safety and Applied Nutrition at the University of Maryland, College Park, Maryland.

Ivan Parkin Lecture

Global Food Safety in the 21st Century

Sunday, August 1, 1999

Opening Session — 7:00 p.m.

In 1986, IAMFES established the Ivan Parkin Lecture to honor Ivan Parkin, a Dairy Extension Specialist at Pennsylvania State University. Dr. Parkin was IAMFES President from 1954 to 1955 and remained active in the Association for many years following. He served as an example to others as a loyal Member, a professional, an educator dedicated to protecting the food supply, and is remembered by those who knew him as a kind and warm person.

The Ivan Parkin Lecture is to honor those individuals who have had a significant impact on the field of food safety. This year, Dr. Fritz Käferstein, FDA/USDA, Joint Institute for Food Safety and Applied Nutrition at the University of Maryland will deliver the lecture. Dr. Käferstein received his veterinary degree in 1962 from the University of Giessen, after studying at the veterinary schools in Giessen and Berlin (West), Germany. He obtained his doctorate of veterinary medicine in 1964 for a thesis on the identification and significance of the presence of antibiotic residues in meat. At that time he worked as Research Assistant at the Veterinary Faculty of the University of Giessen.

Dr. Käferstein worked for the New Zealand Department of Agriculture as a Supervising Veterinarian in the meat industry from 1968 to 1972. He joined the German Federal Health Office, first as Chief of the Food Safety Unit in the Robert-von-Ostertag-Institut and later as Director and Professor of the Center for Monitoring and Health Evaluation of Environmental Chemicals in Food. Dr. Käferstein also directed the WHO Collaborating Center for Food Contamination Monitoring and collaborated closely with various groups in WHO. In 1980, WHO established the Food Safety Program and he was appointed as the Program Manager. Dr. Käferstein retired as Director of the Program on Food Safety and Food Aid with WHO in July 1998. Dr. Käferstein began with the FDA/USDA, Joint Institute for Food Safety and Applied Nutrition at the University of Maryland, College Park, Maryland in November 1998 as Distinguished Visiting Scientist.

New Members

AUSTRALIA

Lynette H. Percy
Ambrosia Quality Foods Pty. Ltd.
Perth

CANADA

Albert F. Chambers
Monachus Consulting
Ottawa, Ontario

Jim Cushing
Ontario Ministry of Agric.,
Food and Rural Affairs
Guelph, Ontario

Michael T. S. Heald
Canadian Food Inspection Agency
St. John's, NewFoundland

Molly Gibbs
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Arlene Robertson
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Satender Toor
National Meats
Toronto, Ontario

IRELAND

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Tralee, Co., Kerry

JAPAN

Yoshikazu Nishikawa
Osaka City University, Osaka

KOREA

Jae-Hyung Mah
Graduate School of Biotechnology
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Malaysia Dairy Industries Pty. Ltd.
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Nonthaburi

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C. Vince Gerris
Purac America, Lincolnshire

Christine M. Janson
Tropicana, Bradenton

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Country Pure Foods, Deland

Jerry A. Waxer
Insurance Office of America
Altamonte Springs

Sally K. Williams
University of Florida
Gainesville

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Stork Food and Dairy Systems, Inc.
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Jeffrey D. DeCicco
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Richard J. Mathews
SteriGenics International
Gurnee

Nari R. Nayini
Praxair, Inc.
Burr Ridge

LOUISIANA

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Louisiana State University
Baton Rouge

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Beilei Ge
University of Maryland, College Park

Brian P. Stack
Perdue Farms, Inc., Salisbury

Robert L. Sydler, Jr.
University of Maryland
College Park

Shana Wagger
Aspen Publishers, Inc.
Gaithersburg

MASSACHUSETTS

Robert E. Grottenthaler
Allied Domecq Retailing USA
Braintree

MICHIGAN

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Oakland County Health Division
Southfield

Ronald J. Miller
St. Clair Co. Health Dept.
Port Huron

MINNESOTA

Art B. Davis
Sholl Group, Minnetonka

NEBRASKA

Erin S. Dormedy
University of Nebraska-Lincoln
Lincoln

NEVADA

Robert Yates
Clark Co. Health District
Las Vegas

NEW JERSEY

Patrick J. Brown
Pathmark Stores Inc.
Carteret

Andreas M. Keller
Lipton, Englewood Cliffs

Pratika D. Munsaf
Papetti's Hygrade Eggs
East Brunswick

NEW YORK

Debbie A. Portka
Steuben Foods
Elma

Brian D. Sauders
NYSDOH, Glenmont

William F. Wilson
Anderson Instrument Co.
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NORTH CAROLINA

Trisha L. McBride
Kay Chemical Co.
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OHIO

Carol Rouillard
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PENNSYLVANIA

Frank M. Anonia
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USDA-ARS-NAA-ERRC
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The University of Tennessee
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The Steritech Group Inc.
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UTAH

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Debe Nagy-Nero
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Vancouver

Craig Wilson
Costco Wholesale, Issaquah

WISCONSIN

Willard D. Holland
Holland Manufacturing, Inc.
Kenosha

Theresa Hurd
Alto Dairy Cooperative
Waupun

Eric Pinch
Alto Dairy, Black Creek

New IAMFES Sustaining Member

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Anderson Instrument Co.
Fultonville, New York

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Purac America, Lincolnshire

Christine M. Janson
Tropicana, Bradenton

Frank A. Tranchilla
Country Pure Foods, Deland

Jerry A. Waxer
Insurance Office of America
Altamonte Springs

Sally K. Williams
University of Florida
Gainesville

GEORGIA

Robbet Terhaar
Stork Food and Dairy Systems, Inc.
Gainesville

ILLINOIS

Jeffrey D. DeCicco
Illinois Institute of Tech., Chicago

Richard J. Mathews
SteriGenics International
Gurnee

Nari R. Nayini
Praxair, Inc.
Burr Ridge

LOUISIANA

Roland A. Thompson
Louisiana State University
Baton Rouge

MARYLAND

Beilei Ge
University of Maryland, College Park

Brian P. Stack
Perdue Farms, Inc., Salisbury

Robert L. Sydler, Jr.
University of Maryland
College Park

Shana Wagger
Aspen Publishers, Inc.
Gaithersburg

MASSACHUSETTS

Robert E. Grottenthaler
Allied Domecq Retailing USA
Braintree

MICHIGAN

Keith L. Krinn
Oakland County Health Division
Southfield

Ronald J. Miller
St. Clair Co. Health Dept.
Port Huron

MINNESOTA

Art B. Davis
Sholl Group, Minnetonka

NEBRASKA

Erin S. Dormedy
University of Nebraska-Lincoln
Lincoln

NEVADA

Robert Yates
Clark Co. Health District
Las Vegas

NEW JERSEY

Patrick J. Brown
Pathmark Stores Inc.
Carteret

Andreas M. Keller
Lipton, Englewood Cliffs

Pratika D. Munsaf
Papetti's Hygrade Eggs
East Brunswick

NEW YORK

Debbie A. Portka
Steuben Foods
Elma

Brian D. Sauders
NYSDOH, Glenmont

William F. Wilson
Anderson Instrument Co.
Fultonville

NORTH CAROLINA

Trisha L. McBride
Kay Chemical Co.
Greensboro

OHIO

Carol Rouillard
DiverseyLever
Sharonville

PENNSYLVANIA

Frank M. Anonia
Papettis Hygrade Egg Products Inc.
Klingerstown

Kimberly M. Brobst
USDA-ARS-NAA-ERRC
Emmaus

SOUTH CAROLINA

Patrick Cauller
DiverseyLever, Hilton Head Island

TENNESSEE

Brandy L. Knox
The University of Tennessee
Louisville

Danny Ripley
The Steritech Group Inc.
Nashville

UTAH

Thomas Leitner
Cyclopss Corp.
Salt Lake City

VIRGINIA

David Rasmussen
Virginia Tech., Blacksburg

WASHINGTON

Debe Nagy-Nero
The Holland, Inc.
Vancouver

Craig Wilson
Costco Wholesale, Issaquah

WISCONSIN

Willard D. Holland
Holland Manufacturing, Inc.
Kenosha

Theresa Hurd
Alto Dairy Cooperative
Waupun

Eric Pinch
Alto Dairy, Black Creek

New IAMFES Sustaining Member

William F. Wilson
Anderson Instrument Co.
Fultonville, New York

UpDates

Osmonics Names Ed Fierko as General Manager of Two Global Business Units

Osmonics has announced that Edward J. Fierko, former President and CEO of EcoWater International, Inc., will join the company as Vice President and General Manager of the Global Business Units (GBU) for Fluid Controls and Valves, and Standard Equipment and Pumps. Fierko brings more than three decades of experience in general management, finance, marketing and strategic planning, as well as a deep background in manufacturing and marketing water treatment products.

Fierko served as President and CEO of EcoWater International Inc, based in Glasgow, DE. In his role, Fierko oversaw 15 individual manufacturing companies with total sales in excess of $200 million which designed, developed, produced, and marketed water treatment products to worldwide residential, commercial, institutional, industrial, and utility customers.

Before he joined EcoWater in 1987, Fierko was with General Electric Company for 23 years. He served as General Manager of the Power Systems Management Division, and held a variety of management positions at GE.

Fierko is a former President of the Water Quality Association. He received his bachelor's degree in accounting from LaSalle University in Philadelphia, and has completed management programs at Harvard Business School and Michigan University. In addition to his responsibilities as GBU General Manager, Fierko will serve as a Corporate Vice President.

Walker Stainless Announces Michael Kays as President

Walker Stainless Equipment Co., Inc. is pleased to announce the appointment of Michael Kays as President. Mr. Kays will oversee Walker's Stationary Products Group, Carlisle Barrier Systems, and the Transportation Products Group.

Kays comes to Walker Stainless from Carlisle Container Manufacturing Company in Jacksonville, FL, where he served as President.

John Barsanti, previously President at Walker, has been promoted to Chief Financial Officer at Carlisle Companies, Inc., Walker's parent company. Barsanti returns to Carlisle where he previously served as V.P. of Administration.

Alfa Laval Flow Inc. Names Application Engineer

Nadejda Szfranski, of Kenosha, WI, has accepted a position with Alfa Laval Flow Inc. as Application Engineer for the G&H and Industrial Pump Divisions.

Szfranski previously worked for the City of Leningrad, Russia, where she was a project/task manager for the civil engineering department. She has experience designing and preparing specifications and construction plans for water purification plants and pumping stations. Szfranski's responsibilities will include handling technical service inquiries and developing AutoCAD drawings.

Blakely and Davis Elected by ADPI

Dr. Lee E. Blakely, Land O'Lakes, Inc. Western Region, Tulare, CA, was elected President of the American Dairy Products Institute (ADPI) during the association's annual meeting held in Chicago. Blakely, a member of the ADPI Board of Directors since 1989, has served on the Institute's executive committee since 1990; and has served as ADPI Vice President in 1997 and 1998. Blakely succeeds Dr. Larry L. Claypool, Dairy Farmers of America, Inc., Springfield, MO.

Elected as Vice President was Mark Davis, Davisco International, Inc., Le Sueur, MN. Davis was first elected a director of the American Dairy Products Institute in 1992 and has been a member of the ADPI executive committee since 1996.

Other officers elected to head the association were: Secretary, Walt Wosje, Michigan Milk Producers Assn., Novi, MI and Treasurer, Phillip Dale Smith, Leprino Foods, Denver, CO.

Elected to serve as members of the Institute's executive committee were the above-named Officers and Directors Donald L. Brick, Sets Valley Farms Co., Davenport, IA; Larry L. Claypool, Dairy Farmers of America, Inc., Springfield, MO; Michael P. Fronk, Land O'Lakes, Inc., Minneapolis, MN; Bob L. Hall, O-AT-KA Milk Products Cooperative, Inc., Batavia, NY; John A. Hardy,

Foremost Farms USA, Baraboo, WI; Harlan H. Mammen, Associated Milk Producers, Inc., New Ulm, MN; William J. Merrick, III, Merrick's, Inc., Middleton, WI; Harold Schild, Tillamook County Creamery Association, Tillamook, OR; Lonnie D. Spurgeon, Dairy Farmers of America, Inc., Kansas City, MO; Richard W. Stammer, Agri-Mark, Inc., Lawrence, MA; and John F. Underwood, Darigold, Inc., Seattle, WA.

Wilson Appointed Editor of Animal Science Journal

Lowell Wilson, Professor Emeritus of Animal Science in Penn State's College of Agricultural Sciences, has been selected as Editor-in-Chief of the *Professional Animal Scientist*, published quarterly by the American Registry of Professional Animal Scientists (ARPAS). Wilson's three-year term began June 1.

Wilson retired recently after 32 years at Penn State, where his primary research focused on beef cattle breeding and forage utilization, with emphasis on the interpretation and reporting of research results from Penn State and other institutions to producer groups and industry media. His recent research has centered on the handling and transportation of animals, public and producer perceptions of farm animal production practices, recycling of agricultural and other byproducts as livestock feed, and the effects of growth promotants on animal performance and carcass characteristics.

Wilson has taught undergraduate and graduate courses at Penn State and has designed and taught courses in the Pennsylvania Governor's School for the Agricultural Sciences. He was instrumental in establishing the Pennsylvania Beef Council, Pennsylvanians for the Responsible Use of Animals, the Pennsylvania Beef Expo, Pennsylvania Cattlemen's Association Summer Field Days and other educational activities.

IAMFES Vice President Jenny Scott Visits the Korean Association of Dairy, Food and Environmental Specialists

IAMFES Vice President Jenny Scott receives a plaque from the Korean Association of Dairy, Food and Environmental Specialists (KOAMFES) President Choong-il Chung commemorating her presentation at the Korean Affiliate meeting held June 4th and 5th in Seoul, South Korea. To the right of Dr. Chung is Kook Hee Kang, who was selected as the incoming President for KOAMFES.

Jenny Scott meets with the Korean Association.

Dr. Michael Brodsky, Leading Food Scientist, Joins Silliker Laboratories of Canada, LTD.

Silliker Laboratories of Canada announces the recent appointment of Dr. Michael H. Brodsky as General Manager of the Mississauga, Ontario facility. Dr. Charles M. Davidson, who headed the laboratory since its 1978 inception, retired in March following a 35-year career in the food testing and processing industries. Dr. Davidson will continue to consult with Silliker of Canada and its clients.

Dr. Brodsky's food science career spans three decades, a majority of which was spent as Chief of Environmental Microbiology with the Ontario Ministry of Health. As a leading proponent of food safety and laboratory quality systems, he has successfully interwoven his regulatory responsibilities with an outstanding record of professional service.

In addition to serving on numerous Canadian food safety committees, Dr. Brodsky is currently President-Elect of AOAC International and Chairman of AOAC's Advisory Task Force for Microbiological Proficiency Testing. He is also a Past President of the International Association of Milk, Food and Environmental Sanitarians and Ontario Food Protection Association. In 1997, the Ontario Ministry of Health honored Dr. Brodsky with the Amethyst Award in recognition of his 26 years of outstanding contributions to public health.

"We conducted an extensive search for someone with exceptional skills and foresight to lead our Canadian lab into the new millennium. We are extremely delighted to bring aboard an internationally known and respected figure in Michael Brodsky," stated Dr. Russell S. Flowers, President and Chief Executive Officer of Silliker Laboratories Group, Inc.

NEWS

Dr. Brodsky is excited to lead Silliker into a new and exciting era of growth. "We are adding to the tradition of accurate, responsive service that we established over the past 21 years. Presently, we are critically reviewing every aspect of our sample receiving, data handling, testing methods, reports, and client services. Our goal is to utilize ongoing advances in computer technology, such as LIMS, to improve our efficiency and accuracy in all of these areas," Dr. Brodsky said.

Beuchat Gives Frazier Memorial Lecture

Dr. Larry R. Beuchat gave the 8th Annual Frazier Memorial Lecture at the University of Wisconsin-Madison on May 19, 1999. Beuchat is a Professor of Food Microbiology at the Center for Food Safety and Quality Enhancement at the University of Georgia, Griffin and also is a Scientific Editor of the *Journal of Food Protection*. The lecture entitled, "Advances in Food Mycology Methodology," was given in conjunction with the 53rd annual meeting of the Food Research Institute.

In his presentation, Beuchat described (a) use of molecular techniques to quantify yeasts and molds, to distinguish among species and to determine the ability of these microorganisms to produce toxins; (b) an electronic nose to detect filamentous fungi through volatile compounds they produce; (c) media made selective by added dyes and minerals and useful to detect toxigenic molds; and (d) selective media useful to detect aciduric and osmophilic/xerophilic yeasts.

The Frazier Memorial Lecture was established to annually bring to the University a noted food microbiologist and also to honor the late Dr. William C. Frazier, a pioneering food/dairy microbiologist at the University of Wisconsin.

Lake County, Illinois Wins 1999 Crumbine Award

The winner of the 1999 Samuel J. Crumbine Consumer Protection Award is the Lake County Health Department in Waukegan, IL.

The Crumbine Award, named for one of this century's most renowned public health sanitarians, is presented each year to the local public health agency that demonstrates excellence in food protection. Agencies that win the Crumbine Award become model programs for other local public health agencies across the nation. Among environmental health and public professional circles, the Crumbine Award is the most prestigious recognition that a public health agency can receive.

"When evaluating a program for the Crumbine Award, the first criteria for the jury is quantifiable evidence of a program's progress in achieving its goals and objectives in solving food safety problems," said Chris Wiant, Executive Director of the Englewood, CO Tri-County Health Department and Chairman of the 1999 Crumbine jury. "The Lake County program has indeed done that in innovative ways."

Wiant said that the jury recognized Lake County's program

for its "forward-thinking approach," "hands-on commitment to education and training," "strong relationship with the foodservice community," "state-of-the-art computer system" and its "24-hour foodborne illness hotline."

The Lake County Health Department will receive the Crumbine Award at the Annual Meetings of the International Association of Milk, Food and Environmental Sanitarians (IAMFES), the National Association of County and City Health Officials (NACCHO), and the National Environmental Health Association (NEHA).

In addition to IAMFES, NACCHO, and NEHA, other sponsors of the Crumbine Award program include American Academy of Sanitarians, Association of Food & Drug Officials, Conference for Food Protection, Foodservice & Packaging Institute, Inc., International Food Safety Council, National Sanitarians Foundation International, Public Health Foundation Enterprises, Inc., and Underwriters Laboratories, Inc.

Australian Meat Safety Enhancement Program (MSEP) Approved

The US Department of Agriculture's Food Safety and Inspection Service (FSIS) has made a determination that the Australian Quarantine and Inspection Service's (AQIS) new inspection system for slaughter establishments that export meat to the United States, known as the Meat Safety Enhancement Program (MSEP), is equivalent to the US inspection system

FSIS reviewed the final MSEP with particular emphasis on two criteria: (1) Does the MSEP meet all USDA requirements for the import of meat and meat products to the United States; and (2) Does the MSEP afford American consumers the same level of public health protection provided by USDA domestic slaughter inspection? FSIS found that the criteria are met by the MSEP and that the AQIS Meat Safety Enhancement Program is equivalent. Under MSEP, AQIS government inspectors will provide oversight of company employee functions, carcass-by-carcass verification, and oversight and verification that plant hazard control systems are resulting in safe and wholesome product.

"The process by which FSIS and AQIS worked together so that FSIS could find MSEP equivalent is an excellent example of how two countries can work together to carry out their obligations under the World Trade Organization agreements," said Tom Billy, Administrator of the Food Safety and Inspection Service.

A notice announcing the Equivalence Decision will be published in the Federal Register.

Foodborne Illness Peaks in Summer — Why?

Year after year, we hear and read the same advice: Handle food carefully in the summer because foodborne illness – also known as "food poisoning" – is more prevalent in warmer weather. Do foodborne illnesses increase during the summer months? If so, why?

The Food Safety and Inspection Service (FSIS) looked at the data collected for the first 3 years of the Foodborne Diseases Active Surveillance Network (FoodNet) project to help answer some of these questions. The FoodNet project was developed to better characterize, understand, and respond to foodborne illnesses in the United States. It is a collaborative project between the Centers for Disease Control and Prevention, the US Department of Agriculture, and the Food and Drug Administration.

Together with state and local health departments in seven selected sites, these agencies work together to collect data on the incidence and causes of foodborne diseases in the United States. FoodNet conducts active surveillance to identify confirmed cases of seven targeted pathogenic bacteria (*Campylobacter*, *Escherichia coli* O157:H7, *Listeria*, *Salmonella*, *Shigella*, *Vibrio*, and *Yersinia*). Data collection has been completed for 3 years – 1996, 1997, and 1998.

Review of the 1996 through 1998 FoodNet data showed an increase in laboratory-confirmed infections caused by *E. coli* O157:H7, *Campylobacter*, and *Salmonella* during the summer months (June through August). But why? The answer appears to be two-fold.

First, there are the natural causes. Bacteria are present throughout the environment in soil, air, water, and in the bodies of people and animals. These microorganisms grow faster in the warm summer months. Most foodborne bacteria grow fastest at temperatures from 90 to 110°F. Bacteria also need moisture to flourish, and summer weather is often hot and humid. Given the right circumstances, pathogenic bacteria can quickly multiply on food to large numbers. When this happens, someone eating the food can get sick.

Second, there are the "people" causes for the upswing in summertime foodborne illnesses. Outside activities increase. More people are cooking outside at picnics, barbecues, and on camping trips. The safety controls that a kitchen provides – thermostat-controlled cooking, refrigeration, and washing facilities – are usually not available.

Fortunately, people seldom get sick from contaminated food because most people have a healthy immune system that protects them not only from bacteria on food, but from other harmful organisms in the environment. At the same time, FSIS, other government agencies, and food

producers go to great lengths to keep food safe. And, of course, consumers can protect themselves at home with proper refrigeration and thorough cooking of perishable foods.

We know foodborne illness increases in warm weather. We also know that consumers can follow four simple steps to safer food in the summertime.

Clean: Wash Hands and Surfaces Often: Unwashed hands are a prime cause of foodborne illness. Whenever possible, wash your hands with hot, soapy water before handling food and after using the bathroom, changing diapers, and handling pets.

Separate: Don't Cross-Contaminate: Cross-contamination during preparation, grilling, and serving food is a prime cause of foodborne illness.

Wash plates, utensils, and cutting boards that held the raw meat or poultry before using again for cooked food.

Cook: Cook to Proper Temperatures: Food safety experts agree that foods are properly cooked when they are heated for a long enough time and at a high enough temperature to kill harmful bacteria that cause foodborne illness. Take your thermometer along. Meat and poultry cooked on a grill often browns very fast on the outside, so be sure that meats are cooked thoroughly. Check them with a thermometer.

Cook meat and poultry completely at the picnic site. Partial cooking of foods ahead of time allows bacteria to survive and multiply to the point that subsequent cooking cannot destroy them.

Chill: Refrigerate Promptly: Holding food at an unsafe temperature is a prime cause of foodborne illness. Keep foods cold! Cold refrigerated perishable foods like luncheon meats, cooked meats, chicken, and potato or pasta salads should be kept in an insulated cooler packed with several inches of ice, ice packs, or containers of frozen water. Keep the cooler out of the trunk and place in the shade or shelter, out of the sun, whenever possible to help keep foods cold.

Take-out foods: If you don't plan to eat take-out foods within 2 hours of purchase, plan ahead and chill the food in your refrigerator before packing for your outing.

Leftovers? Food left out of refrigeration for more than 2 hours may not be safe to eat. At 90°F or above, food should not be left out over 1 hour. Play it safe; put leftover perishables back on ice once you finish eating so they do not spoil or become unsafe to eat. If you have any doubts, throw it out.

FSIS Announces Strategy to Control *Listeria monocytogenes* in Ready-to-Eat Meat and Poultry Products

The Food Safety and Inspection Service announced several short-term steps to help industry control *Listeria monocytogenes* in ready-to-eat products and thus better protect public health. First, FSIS is publishing a notice in the Federal Register advising plants to reassess their HACCP preventive control plans to ensure they are adequately addressing the pathogen. Second, the agency is providing guidance to industry recommending environmental and end-product testing. And third, FSIS is carrying out extensive educational efforts targeted to "at risk" consumers.

The prevention-oriented Hazard Analysis and Critical Control Points (HACCP) system requires plants to identify critical points along their production lines and ensure that practices at those points minimize or prevent the likelihood of bacterial contamination or growth. The Federal Register notice indicates that, based on the outbreak of listeriosis in late 1998 and early 1999, recent recalls, and other information on the pathogen, *Listeria monocytogenes* is a hazard reasonably likely to occur in ready-to-eat meat and poultry products. The agency advises plants to re-examine their HACCP plans to determine if they adequately address *Listeria*.

To assist industry, FSIS is at the same time providing guidance to producers of ready-to-eat products recommending environmental and end-product testing. Because a number of trade associations have developed guidelines that cover areas such as sanitation, the handling of raw materials, and employee hygiene, FSIS is complementing those materials by focusing on testing by plants to verify that their HACCP plans and sanitation procedures are producing pathogen-free product.

FSIS recommends that plants: conduct environmental testing for general *Listeria* species; test product contact surfaces for general *Listeria* species; and test end-products for the pathogen *Listeria monocytogenes*.

"As summer begins, Americans need to be able to grill hotdogs or pack sandwiches for a picnic with confidence that their food is safe," said Tom Billy, FSIS Administrator. "Working together with industry and consumers, we can take steps to better protect the public from foodborne illness."

Consumption of food contaminated with *Listeria monocytogenes* can cause listeriosis, an uncommon but potentially fatal disease. Healthy people rarely become seriously ill after exposure to *Listeria monocytogenes*.

However, listeriosis can cause miscarriages and stillbirths. The most common manifestation of listeriosis is meningitis, which produces high fever, severe headache, neck stiffness, and nausea, as well as serious and

sometimes fatal infections in those with weak immune systems, infants, the frail or elderly, and persons with chronic disease, HIV infection, or taking chemotherapy.

FSIS also has the following four longer-term initiatives: * First, the agency is drafting a protocol to study the post-production growth of *Listeria monocytogenes* in a wide variety of ready-to-eat products and will ask USDA's Agricultural Research Service to conduct the study during FY 2000.

* Second, FSIS is developing an in-depth verification protocol that can be used to evaluate plants' HACCP plans for ready-to-eat products, particularly regarding *Listeria monocytogenes*.

* Third, a risk assessment of *Listeria monocytogenes* in conjunction with the Food and Drug Administration is underway that will focus on all foods, but in particular refrigerated, ready-to-eat foods.

And, fourth, FSIS is developing food safety standards for ready-to-eat products that will address the need to control all pathogens, including *Listeria monocytogenes*

Beef Industry Food Safety Council Identifies Priorities for Research Funding

Research projects targeted toward gaining a better understanding of the biology and ecology of *E. coli* O157:H7 and the application of irradiation in certain ground beef products were identified as the top funding priorities by the Beef Industry Food Safety Council (BIFSCo).

During its spring meeting, the BIFSCo Steering Committee, a coalition of leaders from all segments of the beef and food industries dedicated to preventing *E. coli* O157:H7 in beef, reviewed the status of the Council's industry-wide plan for research, industry education and consumer information.

Efforts of BIFSCo have resulted in industry partners, agencies and organizations focusing on one research plan to address *E. coli* O157:H7, resulting in increased federal funding for beef safety research targeted to BIFSCo priorities. Additionally, through the Council, consumer information materials are being distributed through retail partners, and health organizations.

"Persistence is beginning to pay off. We are excited with the progress sparked by BIFSCo," said Charles P. Schroeder, BIFSCo Chairman and CEO of the National Cattlemen's Beef Association.

"There is broad consensus among BIFSCo members that we need to continue gathering as a council to further coordinate priorities and fundraising for future advances to prevent *E. coli* O157:H7 in beef," continues Schroeder. "It is critical that the industry work together on this issue. There is nothing more essential than food safety."

In addition to raising funds for the research priorities, the Council will work to coordinate efforts to harmonize global food safety standards and regulatory response; explore ways to alleviate legal liabilities associated with *E. coli* O157:H7 research so that development of new intervention technologies can be accelerated; expand distribution of beef safety information to industry, government and universities partners; continue to support national and international partnerships to educate consumers about safe handling and cooking of food; and expand the awareness of tools available to the industry during recalls and foodborne outbreaks to minimize confusion in the marketplace.

The next meeting of the Beef Industry Food Safety Council is planned for late summer.

Inventors of New Safety Technology Receive Highest Award from FDA

The creators of COX Technologies' (OTC BB: COXT) FreshTag received the FDA Award of Merit, the Food & Drug Administration's highest honor in June.

Last year, Dr. Dwight Miller and Dr. Jon Wilkes invented the new food safety technology at the FDA's National Center for Toxological Research (NCTR). FreshTag* is a product that can detect early decomposition in seafood.

Miller and Wilkes received the award from the Commissioner of Food and Drugs, Dr. Jane E. Henney. The two scientists were commended "for significant and exceptional performance benefiting the public by designing and building a product that is a simple, quick and inexpensive method for determining the decomposition of food products."

COX Technologies of Belmont, NC, a time-temperature management system for perishable commodities, acquired the FreshTag* technology last year from the NCTR lab in Jefferson, AR. COX has also developed a new Rapid Detection Kit to be used in conjunction with the tag to enable a quantity of food to be tested using only a small sample. "The applications of this technology are greater than just testing for the freshness of seafood," said Cox. "We are exploring the full range of applications in other protein products for processing, inspection, and eventual consumer packaging."

How it works: FreshTags* are small adhesive labels (about the size of a quarter) attached to the outside of seafood packaging. Applicators create a hole on the reverse side of the label, allowing

vapors generated on the inside of the packaging to diffuse into the tag. Volatile compounds produce a gradual color change in the tag. A bright pink color is eventually revealed on the visible surface of the tag, warning of impending decomposition of the seafood product. The sensitivity of the tags can be "tuned" to show exactly the signal needed for taking the right action with a certain type of seafood package.

FAO Urges Better Control of Animal Feed Contamination Problems

The widening Belgian cancer scare from dioxin contaminated animal products is another clear warning that animal feeds can have a direct impact on the quality and safety of foods, according to a UN Food and Agriculture Organization (FAO) statement. The latest food contamination incident follows the outbreak of Bovine Spongiform Encephalopathy (BSE) or Mad Cow Disease in the United Kingdom, which health authorities suspect may be linked to a variant of Creutzfeldt Jakob disease in humans. FAO is urging its members –175 countries and the European Community – to immediately take further steps to assure good quality and safe animal feed as well as foods for human consumption. FAO has produced a draft Code of Practice for Good Animal Feeding containing a series of steps that can help to prevent feed contamination problems. The draft FAO Code is being considered for adoption by the joint FAO/World Health Organization Codex Alimentarius Commission, the body that sets international food standards.

The draft Code covers good animal feeding practices and promotes the use of good practices in the procurement, handling, manufacturing, storage and distribution of commercially produced feeds for food producing animals. It provides guidance on general management of production processes, handling of preproduction ingredients and postproduction storage and distribution practices. The draft Code was the result of a March 1997 expert consultation called by FAO to discuss animal feed problems. FAO warns that in addition to BSE and dioxins, many other substances can contaminate animal feed. They include mycotoxins, agricultural and industrial chemicals, microbial pathogens, veterinary drug residues and heavy metals.

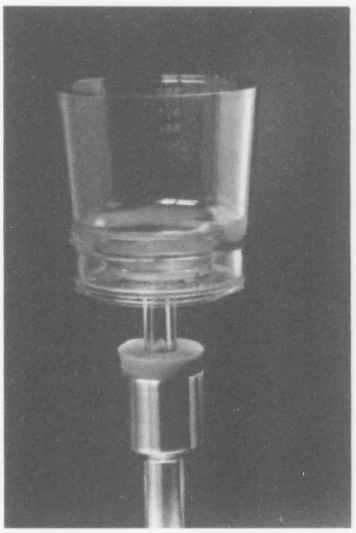
On several occasions the FAO/WHO Codex Committee on Food Additives and Contaminants (CCFAC) has discussed the establishment of a maximum limit for dioxins in foods. At its last session in March 1999, the CCFAC decided that more information was needed before it could recommend a limit for low levels of dioxin contamination. It asked Codex member countries to collect information on dioxin contamination foods of animal origin, fish, and fish oil. Dioxins tend to be absorbed in animal and human fatty tissue and have been shown to cause cancer in several animal species. Dioxins are not produced commercially, but are formed as by-products in other industrial chemical production processes. They can contaminate farm land and water, usually at low levels, and they are extremely resistant to chemical and biological clean-up processes. While it is not possible to eliminate dioxin contamination of foods entirely, FAO has urged that even very low levels of dioxin be carefully controlled.

Reducing the Risks of Airborne Contamination of Food Products

Prevention of contamination of food products from airborne microorganisms is of major importance to food processors, especially those involved with "high-risk" products such as chilled foods, ready meals and sandwiches.

However, there is only limited information on the relationship between the numbers and nature of airborne microorganisms and the risk of product contamination; industry spends considerable sums of money on clean air systems without fully understanding this relationship. In a new project at CURA, factors affecting the risk of contamination are being investigated; mathematical models will be developed to predict this risk and so enable food processors to concentrate on areas of potential concern.

A preliminary study has indicated that electrostatically charged aerosols could represent an increased risk of contamination. Further work will also look at the effects of exposure levels, time, and air movement characteristics on the risk of product contamination; the methods used and the study findings will be verified in factory situations.



Osmonics

New Reusable Laboratory Funnel from Osmonics

Osmonics has announced a new, reusable analytical funnel for their laboratory customers. The Osmonics® Gravi-Seal™ analytical funnel is especially designed for microbiological testing and general filtration applications. This analytical flannel combines a number of key features from other products into one unit. For ease of use, the Gravi-Seal funnel has only two pieces. There are no clamps or locking devices to manipulate. The patented (Pat. No. 5,695,639), gravity seal design allows for one-handed operation without danger of filter by-pass or sample leakage. A raised lip on the base ensures the filter remains perfectly centered. Four forceps access points allow for quick, easy filter recovery. The funnel is stable and very solid with no costly replacement parts, making the Gravi-Seal funnel the easiest and most cost-efficient analytical funnel available.

The Gravi-Seal funnel is manufactured of polysulfone that is autoclavable, extremely durable, and chemically resistant. It is also available in polypropylene for use with more aggressive solutions. Graduations up to 350 mL with 50 mL intervals are available. The #8 silicone rubber stopper mounts in a standard one-liter filtering flask for individual tests or in three- and six-place stainless steel manifolds for multiple tests running concurrently.

The Gravi-Seal analytical funnel competes with glassware and stainless steel funnel offerings. Glassware requires two hands to manipulate a clamp to seal the membrane, and is expensive to replace when it breaks. Stainless steel funnels cost as much as five times more than Gravi-Seal funnels. They also require two hands to align and seal the membrane in place, and replacement parts are extremely expensive. The Gravi-Seal analytical funnel is easier to use and very cost-effective.

Osmonics, Westborough, MA

Reader Service No. 280

Updated "Pathogen Reduction and HACCP Guide" Now Available from Silliker Laboratories

Many meat and poultry processors are facing the constant challenge of staying abreast of revised guidelines in the USDA's "Pathogen Reduction and HACCP Rule." To assist processors with this time-consuming task, Silliker Laboratories is offering a new, updated "Pathogen Reduction and HACCP Guide."

Using an easy-to-follow Q&A format, the free 16-page publication features a new section on prerequisite programs covering good manufacturing practices (GMPs), standard sanitation operating procedures (SSOPs) employee hygiene practices, process controls, and equipment maintenance. The guide also covers the following: an extensive overview of Hazard Analysis and Critical Control Point systems; microbiological testing requirements for *Salmonella* and *Escherichia coli*; and a comprehensive listing of professional and regulatory resources.

Silliker Laboratories Group, Inc., Homewood, IL

Reader Service No. 281

ASTM Thermometers for ISO Quality Systems

Brooklyn Thermometer Company has introduced sets of NIST traceable certified glass

thermometers. Suitable for use in your ISO System each thermometer in the set is factory certified at all test points specified for Precision Thermometers by ASTM.

Each set includes nine yellowback glass thermometers covering the full range of -36 to 405°C or -36 to 761°F with precision fractional degree accuracy. Each thermometer has a unique serial number. ASTM Thermometers are calibrated for total immersion. Convenient to use partial immersion thermometers are calibrated for 108 mm (4.25") immersion.

The NIST traceable factory certificates show the observed corrections at five temperature test points across the scale range of each thermometer. Certificates also show the scale range, immersion, and serial number of the thermometer. Available individually or in sets mounted in sturdy cushioned storage case.

Brooklyn Thermometer Co. Inc., Farmingdale, NY

Reader Service No. 282

New Cost-Effective, Aluminum-Safe, Foam Cleaner for Food and Beverage Plants

Oakite Products Inc.'s FiSan-ACF is a liquid, aluminum-safe, chlorinated foam cleaner, specifically formulated to tackle difficult cleaning problems in food and beverage plants. The USDA authorizes FiSan-ACF for use in federally inspected meat and poultry plants.

A well-balanced blend of superior soil removing, high foaming and chlorine release agents, FiSan-ACF performs well at energy saving ambient temperatures. The product can be used in concentrations as low as 2 percent by volume of water, through foam generating equipment, making it an extremely economical cleaner. FiSan-ACF generates rich foam that clings to surfaces such as stainless steel and aluminum processing equipment, walls, floors, overhead piping and other hard to reach areas, cleaning them thoroughly and rendering them odor-free. It is safe enough to be used manually or in a soak application on aluminum pans and parts. FiSan-ACF is ideal for use in meat and fish packaging plants, canneries, dairies, soft drink plants, breweries, wineries, bakeries, and other food and beverage processing facilities.

Oakite Products, Inc., Berkeley Heights, NJ

Reader Service No. 283

Universal Thermometer is the Fastest and Most Accurate for Food Quality Assurance

This food Quality Assurance thermocouple thermometer will get you world-beating accuracy of ±1F° including both probe and instrument, between -115° and 500°F in 0.1° (or C° equiv.). By permanently connecting the thermocouple, then accomplishing the final instrument calibration, the manufacturer calibrates out errors in the probe. No other thermocouple thermometer matches this high standard.

The probe tip design is the food industry's most popular as a "Universal Fine-tip". It can be used for a 2-second response in food testing due to the extremely small 0.043-inch diameter tip. The short tip length and thicker stem give durability and a full 3.5 inches reach into the food. The universal uses include liquids, soft-solids, and air (shielded if needed). Only hard-frozen foods should be avoided.

Designed for the food industry, the housing is sealed with "O" rings, and the probe cable entrance is watertight, allowing

All Quality Assurance Products, Inc.

use in wet areas. By simply wrapping the probe cable around the instrument and clicking the probe handle in place, your probe storage problem is solved. The digital reading display has back lighting for use in dark areas, and a reading "hold" button to allow you to safely reach into tight places and later note and record the data.

All Quality Assurance Products, Inc., Gainesville, FL

Reader Service No. 284

US Filter Introduces HP5 High Performance Microfiltration Membrane

United States Filter Corporation has recently introduced the HP5 High Performance Microfiltration Membrane System, which is designed to provide quality treatment of high flow, low suspended solids in water and wastewater.

The 0.5-inch tubular cross-flow membranes, developed by US Filter's Memtek Products subsidiary, are resistant to oxidizers such as chlorine and ozone over the full pH range. The high-strength filter tube design allows for maximum filtration performance and high-pressure operation from 40 psig up to 150 psig.

The HP5 Microfiltration System is designed for applications that require consistent and reliable solid/liquid separation, including: lime softening; reverse osmosis pretreatment; cooling tower side stream filtration and/or blow down recycle; filter backwash recovery; groundwater; and tertiary treatment. The system can also be used to treat wastewater from the microelectronics, pulp and paper, and chemical industries.

US Filter, Palm Desert, CA

Reader Service No. 285

World Dryer

Improve Food Safety with the World Wash Station

Now, foodhandlers in restaurants, grocery stores, hotels and convenience stores can improve food safety every time they use the automatic Wash Station from World Dryer. Featuring a unique "logic system," the Wash Station has sensors that provide a complete soap and water wash, activating water only after soap has been applied, and preventing a "water only" wash. Once rinsed, hands are immediately dried under the touchless warm air nozzle. These hands-off features ensure sanitary cleansing with no risk of contamination. With handwashing requirements posted right on the machine, foodhandlers can't make a mistake!

The compact Wash Station easily fits into the same area required by hand sinks, and can be installed using existing water and electrical lines. Other features which make the Wash Station so easy to use include lighted low-soap indicator, on-off switch for cleaning the fixture without triggering the sensors, and a "no-use" warning light. The manufacturer also has a model that meets ADA requirements and models that dispense paper towels.

World Dryer, Berkeley, IL

Reader Service No. 286

Monitoring Made Easy with Infrared Technology from Ryan Instruments

Ryan Instruments introduces its latest in temperature instrumentation, the Non-Contact Thermometer.

The Non-Contact Thermometer provides instantaneous response to surface temperature measurement of an object or area. It's the ideal tool for Quality Assurance and HACCP inspection of products, and for equipment and facility maintenance. The unit comes in two models, the laser guided model for pinpointing the exact location of measurement and the non-laser guided model for measuring larger areas. With a wide temperature range, -67° to 260°F (-55° to 126°C), an accuracy of ± 2% of full scale, and a 1 second response time, the Non-Contact Thermometer has a world of applications. If you are involved in food preparation, the Thermometer can be used in many areas including rotary cooker temperatures, mixers, baking ovens and infrared ovens. Often the food service/restaurants/fast food chains use the unit to check meat cooking temperatures, grill/griddle temperatures, and soups and beverages. General uses of the Non-Contact Thermometer include monitoring of HVAC systems, boiler hot spots, refrigerator coils, and hot bearings to name a few.

Ryan Instruments, Redmond, WA

Reader Service No. 287

Introducing the Enviromizer™

Environmizer Systems Corporation of Atlantic Highlands, New Jersey is offering its Enviromizer Product Line to the Dairy and Food Processing industries. These USDA approved stainless steel devices using magnetohydrodynamic technology (MHD®) are employed in removing scale and soil build-up in process equipment using heat transfer technology such as multi-effect evaporators, heat exchangers, separators, presses, pasteurizers, chillers, and compressors.

The Enviromizer has been installed and in continuous operation in excess of 24 months on heat exchange and processing equipment in some of the largest dairy processing plants within the US and has proven its capability in generating significant energy, labor, and chemical savings by preventing and reversing scale build-up on these heat transfer surfaces.

These devices are supplied with standard ferruled fittings for ease of installation and inspection, require no outside electrical energy, are cleanable vis a vis CIP and AOAC protocols, contain no moving parts and are guaranteed to perform for a minimum of 24 months. These units are designed for installation in equipment with flows ranging from 30 to 1000 gpm, and with processed fluids containing from 4 to 50% total solids.

Analysis of end products such as skim milk powder and cheese were evaluated by local and state licensed analytical laboratories and the data shows the product processed through the Enviromizer is not affected and all constituents retain their original physical, chemical, and biological properties.

Environmizer Systems Corp., Atlantic Highlands, NJ

Reader Service No. 288

BusinessExchange

Services/Products

Employment Opportunities

USDA Food Safety Research Information Office (FSRIO)

Salary range – GS-13 position ($58,000 to $75,000)

As Project Manager for the FSRIO, located at the National Agricultural Library in Beltsville, MD, you will have full responsibility for the development and maintenance of this newly established office which will serve as the central source for information on publicly and privately funded food safety research. Skills in evaluating, organizing, accessing, and disseminating information in an electronic environment are desired. Experience in working with information technology and the ability to plan, organize, and manage a national program and negotiate with individuals is required. The ideal candidate, who has experience in the food safety field, will be a highly motivated, self-starting, hands-on individual.

For additional information:

All interested candidates should check application requirements before applying. Contact Mary Byrd at (301) 504-1333 or search under Technical Information Specialist, Announcement #ARS-X9E-9152-BP at http://www.usajobs.opm.gov/a9ag.htm on the USDA Web site.

To learn more detailed information about the position, contact: Dr. James Lindsay (E-mail: jal@ars.usda.gov)

Position closure date is **August 16, 1999**. USDA is an equal opportunity provider and employer.

Preliminary Program
of the IAMFES 86th Annual Meeting

SUNDAY EVENING — AUGUST 1, 1999

Opening Session

- Welcome Comments
- Presentation of the IAMFES Fellows Awards
- Ivan Parkin Lecture – "Global Food Safety in the 21st Century" presented by Dr. Fritz Käferstein, FDA/USDA, Joint Institute for Food Safety and Applied Nutrition at the University of Maryland, College Park, Maryland.

Cheese and Wine Reception will follow in the Exhibit Hall.

MONDAY MORNING — AUGUST 2, 1999

S1 Science-based Criteria for Harmonizing Food Safety Regulations

(Sponsored by ILSI-N.A.)

Dearborn Ballroom

Co-Convenors: J. Stanley Bailey and Paul A. Hall

8:30 • Welcoming Remarks – ALEX MALASPINA, ILSI, Washington, D.C., USA

8:40 • Scientific Basis for Setting Performance Standards – JEAN-LOUIS JOUVE, European Commission, Brussels, Belgium

9:10 • Harmonization of *Listeria* Tolerance Limits – The European Experience – PAUL TEUFEL, Institute for Hygiene and Food Safety, Kiel, Germany

9:40 • Harmonization of Acceptance Criteria for Microbiological Methods – RUSSELL S. FLOWERS, Silliker Laboratories Group, Inc., Chicago, IL, USA

10:10 • Break – *Coffee, Pastries, and Dairy Products available in the Exhibit Hall*

10:30 • Equivalence of Food Safety Systems: An Emerging Concept in the International Trade of Foods – CATHERINE W. CARNEVALE, FDA, Washington, D.C., USA

11:00 • Why Microbiological Criteria for Entero-hemorrhagic *Escherichia coli* and Not Shiga Toxin-producing *E. coli* in Foods? – MICHAEL P. DOYLE, University of Georgia, Griffin, GA, USA

11:30 • Panel Discussion

S2 Fruits and Vegetables: Are They Safe Enough?

Springwells Ballroom

Co-Convenors: Frank Yiannas and Ewen Todd

8:30 • Outbreaks Associated with Produce – ARTHUR P. LIANG, CDC, Atlanta, GA, USA

9:00 • Risk Management Strategies at the Farm – NANCY NAGLE, Nagle Resources, Pleasanton, CA, USA

9:30 • Assuring the Safety of Unpasteurized Juices – ROBERT BUCHANAN, FDA, Washington, D.C., USA

10:00 • Break

10:30 • Interventions to Reduce the Risk of Pathogens Associated with Alfalfa Sprouts – LARRY BEUCHAT, University of Georgia, Griffin, GA, USA

11:00 • Quantitative Risk Assessment of *E. coli* O157 and *L. monocytogenes* in Fresh-cut Produce – EWEN TODD, Health Canada, Ottawa, Ontario, Canada

11:30 • Microbiological Issues Associated with Packaged Produce – E. JEFFREY RHODEHAMEL, Cryovac North America, Duncan, SC, USA

S3 Mini Workshop for Dairy Plant Employees and Regulators

Regency B-C

Convenor: Tom Gilmore

8:30 • Plant Regulatory Inspection – CHARLES PRICE, SR., FDA, Chicago, IL, USA

8:50 • Employee G.M.P.'s – GAYLORD SMITH, Mohawk Assoc., Inc., Schenectady, NY, USA

9:10 • Standards Pertaining to Product Quality, Part 1 – RUTH FUQUA, Quality Creek Dairies, Inc., Mt. Juliet, TN, USA

10:00 • Break – *Coffee, Pastries, and Dairy Products available in the Exhibit Hall*

10:30 • Sanitary Design & Installation of Equipment – DON GRAHAM, Graham Sanitary Design Consulting, Chesterfield, MO, USA

11:00 • Standards Pertaining to Product Quality, Part 2 – RUTH FUQUA, Quality Creek Dairies, Inc., Mt. Juliet, TN, USA

Microbiology of Meat and Poultry – Technical Session

Regency E-K

Co-Convenors: Randy Phebus and Peter Bodnaruk

8:30 T1 • Reduction of *E. coli* O157:H7 Concentrations in Ruminal Contents In Vitro; Bacteriocidal Effect of Sodium Chlorate – DAVID J. NISBET, R. C. Anderson, S. A. Buckely, R. B. Harvey, and L. H. Stanker, USDA, ARS, College Station, TX, USA

8:45 T2 • Incidence of *E. coli* O157:H7 in Frozen Beef Patties Produced Over an Eight Hour Shift – W. PAYTON PRUETT, JR., T. Biela, R. S. Flowers, P. Mrozinski, C. Lattauada, B. Rose, A. M. McNamara, J. O. Reagan, D. Theno, and W. Osborne, Silliker Laboratories Group, Inc., Homewood, IL, USA

9:00 T3 • Commercial Evaluation of Multiple-Sequential Interventions for Decontamination of Beef Carcasses – R. TODD BACON, J. N. Sofos, K. E. Belk, J. O. Reagan, and G. C. Smith, Colorado State University, Fort Collins, CO, USA

9:15 T4 • Verification of the Effectiveness of a Second Generation Steam Pasteurization™ System for Decontaminating Pre-rigor Beef Carcass Sides in a Commercial Slaughter Facility – R. K. PHEBUS, D. D. Retzlaff, S. B. Sporing, M. D. Schafer, and S. A. Rueger, Kansas State University, Manhattan, KS, USA

9:30 T5 • Effectiveness of Potassium Lactate and Lactic Acid against *Campylobacter* on Chicken Breasts – DAVID D. RASMUSSEN, S. S. Sumner, C. R. Hackney, J. E. Eifert, M. L. Eckhoff, and B. T. deVegt, Virginia Tech, Food Science and Technology, Blacksburg, VA, USA

9:45 T6 • Chlorination of Chill Tanks Reduces Salmonellae on Processed Broiler Carcasses – J. STAN BAILEY, N. A. Cox, and N. J. Stern, USDA, Athens, GA, USA

10:00 • Break - *Coffee, Pastries, and Dairy Products available in the Exhibit Hall*

10:30 T7 • Cross-contamination Model for *Salmonella* in Poultry Chilling Process – HONG YANG, Y. Li, and M. G. Johnson, University of Arkansas, Fayetteville, AR, USA

10:45 T8 • A Computer Software Application of Assessing the Risk and Severity of *Salmonella* and *Campylobacter* Infections from Poultry Products – THOMAS P. OSCAR, USDA, ARS, Princess Anne, MD, USA

11:00 T9 • Changes in the Native Microflora, Weight, and pH of the Ceca of Turkeys Subjected to Feed Withdrawal – ARTHUR HINTON, JR., R. J. Buhr, and K. D. Ingram, PPMQ, ARS, USDA, Athens, GA, USA

11:15 T10 • Use of Whey-based Film Containing Antimicrobial Agents to Inhibit *L. monocytogenes* in Frankfurters – CRYSTAL R. MCDADE, S. M. Zutara, E. Ryser, C. W. Donnelly, and H. Chen, University of Vermont, Burlington, VT, USA

11:30 T11 • Levels of Microbiological Contamination of Pork Carcasses during Slaughter – HENRY N. ZERBY, K. E. Belk, M. Hardin, J. N. Sofos, and G. C. Smith, Colorado State University, Fort Collins, CO, USA

11:45 T12 • Extent of Microbiological Contamination on Pork Variety Meats – HENRY N. ZERBY, K. E. Belk, M. Hardin, W. Lloyd, J. N. Sofos, and G. C. Smith, Colorado State University, Fort Collins, CO, USA

Rapid Methods and Miscellaneous – Poster Session

Great Lakes Center - Exhibit Hall

Co-Convenors: Robert Williams and Charity Lakins

(10:00 a.m. - 1:00 p.m.)

(Authors present 10:30 a.m. - 12:30 p.m.)

P1 • Modification of Some Selective Media for the Rapid Detection of *Salmonella* Using Impedance-splitting Method – PRAVATE TUITEMWONG, T. Hongdusit, and K. Tuitemwong, King Mongkut's University of Technology Thonburi, Bangkok, Thailand

P2 • Use of Membrane Fraction and Selective Motility for the Rapid Screening of *L. monocytogenes* – PRAVATE TUITEMWONG, J. Wongchavalit, and K. Tuitemwong, King Mongkut's University of Technology Thonburi, Bangkok, Thailand

P3 • Evaluation of the BAX for Screening/Genus *Listeria* Method for Testing Environmental Sponges – JOSEPH D. MEYER, K. B. Mikkelson-Baldus, A. C. Borger, W. M. Barbour, and P. A. Hall, Kraft Foods, Oscar Mayer Division, Madison, WI, USA

P4 • Immunoassay-based Test for Detection of Peanuts in Food Products – MOHAMED M. ABOUZIED, S. A. Askegard, P. S. Satoh, S. L. Hefle, J. A. Nordlee, and S. L. Taylor, Neogen Corporation, Lansing, MI, USA

P5 • Detection of Egg Contamination in Food Products by Immunoassay-based Test – MOHAMED M. ABOUZIED, C. J. Fetzner, P. S. Satoh, S. L. Hefle, E. Jeanniton, and S. Taylor, Neogen Corporation, Lansing, MI, USA

P6 • Accuracy of *Salmonella* Detection in Food Using Commercially Available *Salmonella* ELISA Tests – CATHERINE SMITH, K.W. Doherty, and C.-M. Chen, Idexx Laboratories, Westbrook, ME, USA

P7 • Rapid Preparation of PCR Samples from Food Combined with Shortened PCR Cycles for the Detection of *E. coli* – WILLIAM K. SHAW, JR., and L. A. McLandsborough, University of Massachusetts, Amherst, MA, USA

P8 • Enumeration of *Campylobacter jejuni* and *C. coli* within 36 H by Immunoblotting from Modified Blood Agar Medium – RAMA NANNAPANENI, R. Story, and M. G. Johnson, University of Arkansas, Dept. of Food Science, Fayetteville, AR, USA

P9 • A Single Medium for the Quantitative Screening of Three Foodborne Pathogens – R. VICTOR LACHICA, U.S. Army Natick Labs, Natick, MA, USA

P10 • Comparison of Microbial Identification Methods – MARLENE CELIS, J. Deabel, V. Gangar, and M. Curiale, Silliker Laboratories Research Corp. Center, South Holland, IL, USA

P11 • A PCR-ELISA for Detecting Shiga Toxin-producing *E. coli* in Food – BEILEI GE, J. Meng, and S. Zhao, University of Maryland, College Park, MD, USA

P12 • Evaluation of the TECRA® Unique™ Test for Rapid Detection of *Salmonella* in Food: A Collaborative Study – DENISE HUGHES, A. Dailianis, and L. Hill, TECRA Diagnostics, Roseville, Australia

P13 • Rapid 24 H Multiplex Detection of Four Pathogens in Food from a Single Enrichment – ANNE DAVIES, R. Owen, D. Nelson, B. Wicks, L. Parsons, C. Hamill, R. Mackee, and B. Thomas, Celsis, Inc., Evanston, IL, USA

P14 • Rappaport-Vassiliadis Enrichment Procedure for Use with DNA Hybridization Assays for Detection of *Salmonella* spp. in Foods – MARK A. MOZOLA and G. W. Durbin, GENE-TRAK Systems, Hopkinton, MA, USA

P15 • Differentiation between Types and Strains of *Clostridium botulinum* by Riboprinting – GUY E. SKINNER, G. A. Fingerhut, S. M. Gendel, and H. M. Solomon, USFDA/NCFST, Summit-Argo, IL, USA

P16 • Evaluation of Clearview™ and Bax™ for the Detection of *Listeria* sp. and *L. monocytogenes* – MARIA T. DESTRO and D. A. Rodrigues, FCF/USP, Sao Paulo, SP, Brazil

P17 • Comparison of Different Dye Indicators for Early Detection of Microbial Growth – *E. coli* O157:H7 Using Biosys 32 – ADALGISA M. MORA, S. L. Archie, N. E. Allen, and A. P. Dessai, Tuskegee University, Tuskegee, AL, USA

P18 • The Influence of Pre-enrichment Media on the Detection of *E. coli* O157:H7 with a Fluorogenic DNA-based Assay – ROBERT L. GREEN, M. Matsuura, L. A. Yagi, and P. A. Foxall, PE Biosystems, Foster City, CA, USA

P19 • Comparison of BAX® and Organon Teknika® *Salmonella*-Tek to Standard Selective Enrichment Method for the Detection of *Salmonella* in Food – THEODORA MORILLE-HINDS, H. Trenk, and P. A. Hall, Kraft Foods, Tarrytown, NY, USA

P20 • Isolation of Foodborne *Salmonella* Using Dyna-beads® Anti-*Salmonella* and Oxoid S.P.R.I.N.T. *Salmonella* Medium – KOFITSYO S. CUDJOE, R. Krona, M. Ron, and A. Campbell, Dynal AS, Norwegian College of Vet. Medicine, Oslo, Norway

P21 • Collaborative Testing of a Prototype Automated IMS System for Rapid Detection of *Salmonella* and *E. coli* O157 Using Dynabeads® – KOFITSYO S. CUDJOE, R. Krona, M. Ron, and A. Campbell, Dynal AS, Norwegian College of Vet Med., Oslo, Norway

P22 • The Use of Rapid Methods to Assess the Incidence and Public Health Risk of *S. aureus* in Food and Food Production Environments – JILL GEBLER, Murray Goulburn Co-operative Co. Ltd., Victoria, Australia

P23 • Evaluation of the Rapid SimPlate™ Yeast and Mold Test for Various Food Bar Products – Y. JENNIFER LEE, S. D. Allard, and D. J. Yonker, Amway Corporation, Ada, MI, USA

P24 • Comparison of Two ELISA Tests against Standard Method for the Detection of *Listeria* Species in Food Samples – HAOYI GU, K. Osborne, and C. M. Chen, Idexx Laboratories, Inc., Westbrook, ME, USA

P25 • *Salmonella* Detection in Food: Study of a Two-step Enrichment Protocol Combined with an ELISA – PATRICE ARBAULT and S. Poumerol, Diffchamb S.A., Lyon, France

P26 • Cleaning Validation in Food Retail Environments by a New Protein Assay – BRIAN ECKENROTH and E. Ehrenfeld, IDEXX Laboratories, Westbrook, ME, USA

P27 • A Comparative Media Analysis of Newspaper Coverage of Microbial Food Safety Issues in Canada, the US, the UK and Australia, 1994-1998 – AMANDA WHITFIELD, K. Vandenberg, J. Seib, S. Grant, and D. A. Powell, University of Guelph, Guelph, Ontario, Canada

P28 • Statistical Process Monitoring and Fault Diagnosis in a Continuous Dairy Pasteurization Process – F. KOSEBALABAN, J. E. Schlesser, and A. Cinar, Illinois Institute of Technology, Chicago, IL, USA

P29 • Cleaning Validation of Food Processing Equipment: A Comparison between a New Ultrasonic Apparatus and Swab Method – NADIA OULAHAL-LAGSIR, A. Martial, E. Marquis-Boistier, and M. Bonneau, Raliment: Rhone Alpes Food Research Center, France

P30 • A Comparative Evaluation of the Cleaning Performances of a Range of Seven Floors in Food Industry – NADIA OULAHAL-LAGSIR, E. Marquis-Boistier, and J. P. Larpent, Raliment/ Alimentec Recherche, Hygiene and Quality, France

P31 • Indicative Microbes on Processed Shrimp before Implementation of US FDA's HACCP Regulations – CUSTY F. FERNANDES, C. D. Veal, D. L. Marshall, and K. R. Cadwallader, Mississippi State University, Pascagoula, MS, USA

P32 • Evaluation of HACCP Program for Deli Food Service Managers – JULIE A. ALBRECHT, D. L. Peters, and S. S. Sumner, University of Nebraska, Lincoln, NE, USA

MONDAY AFTERNOON — AUGUST 2, 1999

S4 Globalization of Foodborne Disease

Dearborn Ballroom

Co-Convenors: Ewen Todd and Trish Desmarchelier

1:30 • Types of Foodborne Outbreaks in Developing Countries – EWEN TODD, Health Canada, Ottawa, Ontario, Canada

2:00 • The Prevention of Spread of Foodborne Disease from a WHO Perspective – YASMINE MOTARJEMI, WHO, Geneva, Switzerland

2:30 • The Americas – ELLEN MORRISON, FDA, Washington, D.C., USA

3:00 • Break - *Coffee and Dairy Products available in the Exhibit Hall*

3:30 • Trade with and within Europe – L. M. CRAWFORD, Georgetown University, Washington, D.C., USA

4:00 • Japan – HIROSHI TAKAHASHI, National Institute of Infectious Disease, Shinjuku, Toyko, Japan

4:30 • Australia and New Zealand – TRISH DESMARCHELIER, CSIRO, Tingalpa, Queensland, Australia

S5 Manure and Water: Produce Safety Implications

(Sponsored by the IAMFES Foundation Fund)

Springwells Ballroom

Co-Convenors: Jeff Farber and Linda Harris

1:30 • Water and Manure Safety Issues for the Next Millennium – DEAN O. CLIVER, University of California-Davis, Davis, CA, USA

2:00 • Water Quality and Safety – JOAN ROSE, University of South Florida, St. Petersburg, FL, USA

2:30 • Developing Manure Management Controls for Conventional and Organic Farming – TREVOR SUSLOW, University of California-Davis, Davis, CA, USA

3:00 • Break - *Coffee and Dairy Products available in the Exhibit Hall*

3:30 • Field Sanitation/Worker Hygiene Issues – FRANCES PABRUA, California Strawberry Commission, Watsonville, CA, USA

4:00 • FDA Voluntary Good Agricultural Practices – MICHELLE SMITH, FDA, Washington, D.C., USA

4:30 • Panel Discussion

S6 Dairy Plant Quality and Safety Programs

Regency B-C

Convenor: Gary Trimner

1:30 • Preventive Maintenance in Dairy Plants – CHRIS NEWCOMER, New-Tech Consulting, Inc., Cincinnati, OH, USA

2:00 • Dairy Plant Perspective on FDA HACCP Pilot Program – DEAN SOMMER, Alto Cheese, Waupun, WI, USA

2:30 • Implementing a HACCP Program – To be announced

3:00 • Break - *Coffee and Dairy Products available in the Exhibit Hall*

3:30 • Designing a HACCP Plan – RANDY DOUGHERTY, National Sanitation Foundation, Ann Arbor, MI, USA

4:00 • Report from the NCIMS HACCP Committee – CLANDIA COLES, Washington State DPA, Olympia, WA, USA

4:30 • Dairy Plant Prerequisites – STEVE SIMS, M.S.B., Washington, D.C., USA

General Food Microbiology – Technical Session

Regency E-K

Co-Convenors: Donald Schaffner and Ann Draughon

1:30 • T13 Modeling the Growth Boundary of *Staphylococcus aureus* for Risk Assessment Purposes – CYNTHIA M. STEWART, M. B. Cole, J. David Legan, D. Schaffner, L. Slade, and M. Vandeven, Nabisco Inc., E. Hanover, NJ, USA

1:45 • T14 Response Surface Models for Effects of Previous Sodium Chloride and Temperature on Growth Kinetics of *Salmonella typhimurium* on Cooked Chicken Breast – THOMAS P. OSCAR, USDA, ARS, Princess Anne, MD, USA

2:00 • T15 Bacteriophage Activity against *E. coli* O157:H7 and *Salmonella* spp. – ANANTA P. DESSAI, L. R. Chery, and S. L. Archie, Tuskegee University, Tuskegee, AL, USA

2:15 T16 • Effect of Chlorine Treatment on Heat Inactivation of *E. coli* O157:H7 – JAMES P. FOLSOM and J. F. Frank, University of Georgia, Athens, GA, USA

2:30 T17 • Application of Treatments to Reduce Contamination of Pork Variety Meats – HENRY N. ZERBY, K. E. Belk, M. Hardin, W. Lloyd, J. N. Sofos, and G. C. Smith, Colorada State University, Fort Collins, CO, USA

2:45 T18 • Inactivation of *E. coli* O157:H7 and *L. monocytogenes* on Apples Using Ozone, Chlorine Dioxide, Sodium Hypochlorite and Peracetic Acid – STEPHANIE L. RODGERS, J. N. Cash, and E. T. Ryser, Michigan State University, East Lansing, MI, USA

3:00 • Break - *Coffee and Dairy Products available in the Exhibit Hall*

3:30 T19 • Microbial Reduction of Laboratory Inoculated Produce Surfaces by Rinsing and Wiping with Paper Towels and Comparison to 200 PPM Chlorine Dip – BARRY MICHAELS, V. Gangar, E. Meyers, H. Johnson, and M. S. Curiale, Georgia Pacific Corporation, Palatka, FL, USA

3:45 T20 • Efficacy of Ultraviolet Light to Eliminate *E. coli* O157:H7 in Unpasteurized Apple Cider – JIM R. WRIGHT, S. S. Sumner, C. R. Hackney, and M. D. Pierson, Virginia Tech Food Science and Technology, Blacksburg, VA, USA

4:00 T21 • Inhibition of Growth and Aflatoxin Production of *Aspergillus parasiticus* by Korean Soybean Paste (Doen-jang) and Identification of the Active Component – JONG-GYU KIM, Y. W. Lee, P. G. Kim, W. S. Roh, and H. Shintani, Keimyung University, Taegu, Korea

4:15 T22 • Critical Role of *Pediococcus* sp. Cytoplasmic Membrane in Thermal Resistance – BASSAM A. ANNOUS, USDA, Wyndmoor, PA, USA

4:30 T23 • Antibiotic Resistance of Gram-negative Enteric Pathogens Isolated from Retail Meats – ROBERT L. SUDLER JR., J. Meng, D. T. Ingram, and L. Liu, University of Maryland College Park, College Park, MD, USA

4:45 T24 • Distribution and Role of Integrons in Multiresistant *Salmonella* – LANCE F. BOLTON, L. C. Kelley, and P. J. Fedorka-Cray, USDA-ARS-PMSRU, Athens, GA, USA

Microbiology of Meat, Poultry, and Produce – Poster Session

Great Lakes Center – Exhibit Hall

(3:00 p.m. – 6:00 p.m.)

(Authors present 3:30 p.m. – 5:30 p.m.)

Co-Convenors: Michael Kayes and Brandy Knox

P33 • Growth of Salmonellae in Previously Irradiated Ground Beef – JAMES S. DICKSON and D. G. Olson, Iowa State University, Ames, IA, USA

P34 • Reduction of Bacterial Contamination on Hog Carcasses with Hot Water and Organic Acid Rinses – JAMES S. DICKSON, L. Eggenberger-Solorzano, S. E. Niebuhr, R. J. Huber, M. Hardin, and G. R. Acuff, Iowa State University, Ames, IA, USA

P35 • Dissemination of *L. monocytogenes* in a Brazilian Frozen Chicken Nuggets Processing Line – MARIA T. DESTRO and D. A. Rodrigues, FCF/USP, Sao Paulo, SP, Brazil

P36 • Production of Mortadella: Behavior of *L. monocytogenes* under Commercial Manufacturing and Storage Conditions – MARIA T. DESTRO and L. S. Bersot, FCF/USP, Sao Paulo, SP, Brazil

P37 • Enumeration of *E. coli* in Poultry Carcass Rinse Using SimPlate and Petrifilm Methods – PURNENDU C. VASAVADA, D. E. Townsend, and G. Eaton, University of Wisconsin River Falls, River Falls, WI, USA

P38 • Sensitivity of *Salmonella typhimurium* DT104 to Irradiation – STEVEN E. NIEBUHR, R. J. Huber, K. T. Rajkowski, D. W. Thayer, and J. S. Dickson, Iowa State University, Ames, IA, USA

P39 • Fate of *Salmonella* Enteritidis in Hard-cooked Eggs – WALAIRUT CHANTARAPANONT and L. R. Beuchat, University of Georgia, Griffin, GA, USA

P40 • Survival of Multidrug-resistant *Salmonella typhimurium* DT104 in Egg Powders as Affected by Water Activity and Temperature – YONGSOO JUNG and L. R. Beuchat, University of Georgia, Griffin, GA, USA

P41 • Consumer Acceptability and Microbial Inactivation in Home-style Beef Jerky Produced by Various Methods – JUDY A. HARRISON, M. A. Harrison, R. A. Rose-Morrow, and R. L. Shewfelt, The University of Georgia, Athens, GA, USA

P42 • Evaluation of Environmental Microflora in a Korean Meat Plant for HACCP Application – DONG KWAN JEONG and J. S. Lee, Kosin University, Pusan, Korea

P43 • Reduction of Normal Flora by Irradiation and Its Effect on Multiplication of *L. monocytogenes* on Ground Turkey at 7°C in a Modified Atmosphere – DONALD W. THAYER and G. Boyd, USDA, ARS, ERRC, Wyndmoor, PA, USA

P44 • Microbiological Contamination Baselines of Beef Carcasses, Wholesale Cuts and Retail Cuts – MINDY L. KAIN, J. N. Sofos, K. E. Belk, J. O. Reagan, G. C. Smith, D. R. Buege, W. P. Henning, J. B. Morgan, T. P. Ringkob, and G. R. Bellinger, Colorado State University, Fort Collins, CO, USA

P45 • Therapeutic Anti-idiotypic Antibodies to *E. coli* K88 as an Alternative to Antibiotic Use in Meat Industry – ZIAD WAHEED JARADAT and R. R. Marquardt, University of Manitoba, Winnipeg, Manitoba, Canada

P46 • *E. coli* O157:H7 Risk Assessment for Production and Cooking of Blade Tenderized Beef Steaks – SARAH B. SPORING, R. K. Phebus, J. L. Marsden, D. D. Retzlaff, M. D. Schafer, C. B. Chandler, and A. L. Truax, Kansas State University, Manhattan, KS, USA

P47 • Reduction of *Salmonella* Contamination on Pork Products Using Radiant Wall Oven Heating – MARK A. HARRISON, S. Lively, and R. Toledo, The University of Georgia, Athens, GA, USA

P48 • The Occurrence of *Campylobacter* spp. in Swine Carcass Dressing Operations – SAMUEL A. PALUMBO, J. E. Call, B. S. Marmer, and L. S. Yu, USDA, ARS, Wyndmoor, PA, USA

P49 • Automated Real Time CCP Monitoring of External Cooked Sausage Temperature Utilizing Infrared Sensors and Statistical Process Monitoring – JEFFREY DECICCO, A. Cinar, J. E. Schlesser, and B. Verdorn, Illinois Institute of Technology, Chicago, IL, USA

P50 • Extending the Shelf Life of a Cooked Ham Product Using L-glucose and D-tagatose – DERRICK A. BAUTISTA, P. J. Shand, and R. B. Pegg, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

P51 • Microbial Population of Ready-to-Serve Salads in Tekirdog, Turkey – TUNCAY GUMUS, M. Arici, and O. Simjek, Trakya University, Tekirdog, Turkey

P52 • A Quantitative Assessment of the Risk of *E. coli* O157:H7 in Apple Cider – SIOBAIN DUFFY and D. Schaffner, Cook College, Rutgers University, New Brunswick, NJ, USA

P53 • Nature of *E. coli* O157:H7 Attachment to Lettuce Leaves and the Effect of Chlorine Disinfection – KAZUE TAKEUCHI and J. F. Frank, University of Georgia, Athens, GA, USA

P54 • Sodium Chloride and Sodium Bicarbonate Washing Solution for Removal of Entero-hemorrhagic *E. coli* O157:H7 from the Surfaces of Chopped Lettuce – MARLENE E. JANES, R. Nannapaneni, L. Howard, and M. G. Johnson, University of Arkansas, Fayetteville, AR, USA

P55 • Survival of *E. coli* O157:H7 in Bovine Feces Applied to Lettuce and Effectiveness of Chlorine as a Disinfectant – LARRY R. BEUCHAT, University of Georgia, Griffin, GA, USA

P56 • Survival of *E. coli* O157:H7 and *Salmonella* spp. on Fresh Strawberries – DAWN M. KNUDSEN and L. J. Harris, University of California, Davis, CA, USA

P57 • Recovery of Generic *E. coli* from Juice – DAVID E. TOWNSEND and S. Higgins, IDEXX Laboratories, Inc., Westbrook, ME, USA

P58 • Inactivation of *E. coli* O157:H7 and *Salmonella* spp. in Unpasteurized Apple and Orange Juice by High Pressure Processing – GUODONG WANG, E. Raghubeer, and E. Ting, National Food Processors Association, Dublin, CA, USA

P59 • Cold Shock Decreases the Thermal Tolerance of Bacterial Pathogens in Apple and Orange Juice – DARRELL O. BAYLES, USDA, ARS, NAA, ERRC, Wyndmoor, PA, USA

P60 • Use of pGFP to Determine the Survival of *E. coli* O157:H7 and *Salmonella typhimurium* in Manure Applied to Soil – GENEVIEVE JOHNSON, J. J. Churey, and R. W. Worobo, Cornell University, Geneva, NY, USA

P61 • Keeping Quality of Sprouts after Irradiation and D Radiation Values for *Salmonella* and *E. coli* O157:H7 – KATHLEEN T. RAJKOWSKI, USDA, ARS, ERRC, Wyndmoor, PA, USA

P62 • Bacterial Decrease of Vegetable Juice by Ozone and Gamma Ray Irradiation – KOOK HEE KANG and S. C. Kwon, Sungkyunkwan University, Suwon, Korea

P63 • The Study on Safety and Crisp Property of Pickled Peeled-hot Chili – MING CHANG WU, National Pingtung University of Science and Technology, Nei Pu, Pingtung, Taiwan

P64 • Microbial Analysis of Lettuce Used in Ready-to-Eat Salads – NEDRA E. ALLEN, A. P. Dessai, A. M. Mora, and S. L. Archie, CAENS, Tuskegee, AL, USA

TUESDAY MORNING — AUGUST 3, 1999

Produce and Sanitation – Technical Session

Dearborn Ballroom

Co-Convenors: Susan Sumner and Randy Worobo

8:30 T25 • Development, Implementation and Analysis of an On-farm Food Safety Program for the Ontario Greenhouse Vegetable Grower's Marketing Board – MAURICIO B. RUIZ and D. A. Powell, University of Guelph, Guelph, Ontario, Canada

8:45 T26 • Microbial Colonization with Biofilm Formation on Packaging Film and Vegetable Tissue of Ready-to-Use Packaged Spinach – SUSAN ABRAHAM, H. Schraft, and M. A. Tung, University of Guelph, Guelph, Ontario, Canada

9:00 T27 • Effect of Microwave Cooking on the Recovery of *Cryptosporidium oocysts* from Spinach – MILDRED M. CODY, T. Arcaro, V. O'Leary, S. Roman, J. Rau, and R. Cordell, Georgia State University, Atlanta, GA, USA

9:15 T28 • Survey of Production Practices Used by Virginia Apple Cider Processors – JIM R. WRIGHT, S. S. Sumner, C. R. Hackney, and M. D. Pierson, Virginia Tech, Blacksburg, VA, USA

9:30 T29 • Science, Society, and Cider: A Comparative Analysis of Integrative Food Safety Risk Management in Canada and the US – JEFF SMITH, S. E. Grant, and D. A. Powell, University of Guelph, Guelph, Ontario, Canada

9:45 T30 • A Quantitative Risk Assessment for Determining the Efficacy of Various Hand Washing Practices – REBECCA MONTVILLE and D. Schaffner, Cook College, New Brunswick, NJ, USA

10:00 • Break – *Coffee, Pastries, and Dairy Products available in the Exhibit Hall*

10:30 T31 • The Dynamics of Surface Cleaning and Sanitization – BARRY MICHAELS, V. Gangar, A. Roering, and M. S. Curiale, Georgia Pacific Corporation, Palatka, FL, USA

10:45 T32 • Occurrence of *L. monocytogenes*, *Salmonella*, *E. coli* O157:H7 and Other Shiga-like Toxin-producing *E. coli* in Retail Fresh Vegetables and Ground Beef – W. MARK BARBOUR, M. Samadpour, P. Yang, F. Buck, S. Ammerman, G. Depavia, E. Mazengia, and D. Alfi, Qualicon, Inc., Wilmington, DE, USA

11:00 T33 • Behavior of *E. coli* O157:H7 on Alfalfa Sprouts during the Sprouting Process as Influenced by Treatments with Various Chemicals – PETER J. TAORMINA and L. R. Beuchat, University of Georgia, Griffin, GA, USA

11:15 T34 • Outbreaks of Viral Gastroenteritis Associated with Imported Raspberries – COLETTE GAULIN, D. Ramsay, P. Cardinal, and M. A. D'Halevyn, Public Health Center of Quebec City, Beauport, Canada

S7 Problems and Possible Solutions for the Development of Pathogen Resistance to Traditional Processing

(Sponsored by ILSI-N.A.)

Springwells Ballroom

Co-Convenors: Kathleen A. Glass and Laurie S. Post

8:30 • Critical Role of Membranes in Bacteriocins, Antibiotics, and Preservative Resistance – THOMAS J. MONTVILLE, Rutgers, The State University of New Jersey, New Brunswick, NJ, USA

9:00 • Potential for Emergence of Resistance to Antimicrobials Used in the Food Industry – P. MICHAEL DAVIDSON, University of Tennessee, Knoxville, TN, USA

9:30 • Problems and Solutions to Development of Pathogen Resistance to Thermal Processing – ALEJANDRO S. MAZZOTTA, National Food Processors Assn., Washington, D.C., USA

10:00 • *Break – Coffee, Pastries, and Dairy Products available in the Exhibit Hall*

10:30 • F-ATPases, Adaptive Acid Tolerance and Coupled Oxidative Stress Resistance in Lactic-acid Bacteria – ROBERT E. MARQUIS, University of Rochester, Rochester, NY, USA

11:00 • Sanitizers/Disinfectants – LYNNE M. SEHULSTER, CDC, Atlanta, GA, USA

11:30 • Microbial Resistance and Food Irradiation – ELSA A. MURANO, Texas A&M University, College Station, TX, USA

S8 Overview of Dairy Plant Regulations

(Sponsored by the IAMFES Foundation Fund)

Regency B-C

Convenor: Gaylord Smith

8:30 • Overview of Agencies and Jurisdictions – CARY FRYE, IDFA, Washington, D.C., USA

9:00 • USDA Responsibilities as It Pertains to Plant Regulations – PHILIP WOLFF, USDA, Washington, D.C., USA

9:30 • OSHA and EPA's Role in Plant Regulations – JOHN WOLGEMUTH, J. W. Safety Management and Training, Hummelstown, PA, USA

10:00 • *Break – Coffee, Pastries, and Dairy Products available in the Exhibit Hall*

10:30 • 1999 IMS Conference: From a State Perspective – PAUL HOGE, PDA, Harrisburg, PA, USA

11:00 • Bureau of Weights and Measures: Role in Plant Regulation – MICHAEL PINAGEL, Michigan Department of Agriculture, Williamston, MI, USA

11:30 • Viewpoint: Codex/International Standards – ROB BYRNE, NMPF, Arlington, VA, USA

Microbiological Methods and Miscellaneous – Technical Session

Dearborn Ballroom

Co-Convenors: Vijay Juneja and Elaine Barry

8:30 T35 • An Epidemiological Study of *Pseudomonas aeruginosa* Strains Associated with Mastitis among Dairy Animals and Human Infections Based on Automated Ribotyping with the Restriction Enzyme *Pvu*II – JAMES L. BRUCE, A. L. Rivas, M. Bodis, R. Klein, and K. Anderson, Qualicon, Inc., Wilmington, DE, USA

8:45 T36 • Fate of *L. monocytogenes* and *E. coli* O157:H7 in Dairy Foods – FATHY E. EL-GAZZAR and S. Farrag, University of Assiut, Egypt

9:00 T37 • Biochemical Comparison of *L. lactis* spp. *Lactis biovar.* diacetylactis WRP297 and WRP298, Phage Resistant Variants, with Original Sensitive Culture Used for Cheese Manufacture – R. PIRABHAKARAN and R. Chand, National Dairy Research Institute, Karnal, India

9:15 T38 • A Comparative Study of a Colorimetric ATP Measurement Test, ATP Bioluminescence and Protein Detection for Hygiene Monitoring – MARK CARTER, R. Pirzad, J. Baker, D. Ferguson, P. Meighan, and P. Grant, Celsis, Inc., Evanston, IL, USA

9:30 T39 • An Isolation and Detection System for *L. monocytogenes* Using Fluorogenic and Chromogenic Substrates for Phosphatidylinositol-specific Phospholipase C – LAWRENCE RESTAINO, E. W. Frampton, R. M. Irbe, G. Schabert, and H. Spitz, R & F Laboratories, West Chicago, IL, USA

9:45 T40 • Detection and Tracking of *L. monocytogenes* in Smoked Fish Plants – MARTIN WIEDMANN, D. Norton, M. McCamey, K. Gall, and K. J. Boor, Cornell University, Ithaca, NY, USA

10:00 • *Break – Coffee, Pastries, and Dairy Products available in the Exhibit Hall*

10:30 T41 • Effects of Cryogenic Cooling and Traditional Cooling on *Salmonella* Enteritidis Population in Table Eggs – LAVONDA A. HUGHES, D. E. Conner, P. A. Curtis, and K. M. Keener, Auburn University, Auburn, AL, USA

10:45 T42 • The Impact of Training on Grocery Store Seafood Employees' Food Safety and Sanitation Knowledge, Practices, and Department Profitability – TORI L. STIVERS and K. W. Gates, University of Georgia Marine Extension Service, Peachtree City, GA, USA

11:00 T43 • Microbiological Monitoring of "Bobby" Calf Slaughter and Dressing: The Need for a Stand-alone Program Design – ROGER COOK, C. Esquerra, M. Biss, and S. Hathaway, Ministry of Agriculture & Forestry Regulatory Auth., Wellington, New Zealand

11:15 T44 • Species and Strain Differentiation of *Pseudomonas* spp. by Ribotyping – KATHRYN J. BOOR, M. Weidmann, J. W. Czakja, D. Weilmeier, S. Dineen, and R. Ralyea, Cornell University, Ithaca, NY, USA

11:30 T45 • A Single-step Polymerase Chain Reaction for Combined Gene Detection and Epidemiological Typing (COGEDET) of *L. monocytogenes* Strains – JEFFREY M. FARBER, E. Daley, and D. Medeiros, Health Canada, Ottawa, Ontario, Canada

11:45 T46 • Development of a Hybridoma Cell Line for the Production of a Monoclonal Antibody to the Pesticide Bromacil – SUNG J. KANG, J. S. Kang, and D. H. Chung, Gyengsang National University, Chinju, Gyangnam, Korea

General Food Microbiology – Poster Session

Great Lakes Center – Exhibit Hall

(10:00 a.m. – 1:00 p.m.)

(Authors present 10:30 a.m. – 12:30 p.m.)

Co-Convenors: Paul Angelino and Chris Kiefer

P65 • Development of a Standard Method for Assessing the Sanitizing Efficacy of a Prototype "GRAS" Produce Wash on Tomatoes – LINDA HARRIS, L. R. Beuchat, T. M. Kajs, C. H. Taylor, and T. E. Ward, University of California, Davis, CA, USA

P66 • Assessment of the Microbial Efficacy of a Prototype GRAS Produce Wash on Alfalfa Seeds, Sprouts, and Selected Salad Vegetables – LARRY R. BEUCHAT and T. E. Ward, University of Georgia, Griffin, GA, USA

P67 • Control of *E. coli* O157:H7 in Milk Using a Natural Antimicrobial Agent-Bacteriophage – STEPHANIE ARCHIE, A. M. Mora, N. E. Allen, C. Davis, and A. P. Dessai, Tuskegee University, Tuskegee, AL, USA

P68 • Effect of Starter Culture and Fermentation Temperature on Survival of *E. coli* O157:H7 and *L. monocytogenes* during Fermentation and Storage of Soy Yogurt – MICHAEL M. KAYES, B. Saeng-On, D. A. Goiden, and J. L. Collins, The University of Tennessee, Knoxville, TN, USA

P69 • Effect of Packaging Atmosphere and Storage Temperature on Survival of *L. monocytogenes* on Culture Media Containing Elevated NaCl and Lactic Acic – ROBERT C. WILLIAMS and D. A. Golden, The University of Tennessee, Knoxville, TN, USA

P70 • Occurrence of *L. monocytogenes* in Mexican Cheeses – JORGE A. SALTIJERAL O., C. E. Solano L., V. B. Alvarez, B. Garcia F., and H. Hernandez S., Ohio State University, Columbus, OH, USA

P71 • Effect of Simulated Gastric Fluid and Bile on Survival of *Vibrio vulnificus* and *Vibrio vulnificus* Phage – JAHEON KOO, A. DePaola, and D. L. Marshall, Mississippi State University, Mississippi State, MS, USA

P72 • In Vitro Evaluation of the Effects of Nitrite and NaCl on the Antimicrobial Activity of Lysozyme, Nisin and EDTA Combination Treatments – ALEXANDER O. GILL and R. A. Holley, University of Manitoba, Winnipeg, Manitoba, Canada

P73 • Fate of pGFP-bearing *E. coli* O157:H7 in Ground Beef at 2° and 10°C, and Effects of Lactate, Diacetate, and Citrate – SRILATHA AJJARAPU and L. A. Shelef, Wayne State University, Detroit, MI, USA

P74 • Use of Extracts of *Nigella sativa* (NS) to Inhibit Spoilage and Pathogenic Microorganisms in Rainbow Trout – MONA ELGAYYAR and F. A. Draughon, The University of Tennessee, Knoxville, TN, USA

P75 • Inhibition of *E. coli* O157:H7 by Herbal and Spice Essential Oils – MONA ELGAYYAR, F. A. Draughon, D. A. Golden, and J. R. Mount, The University of Tennessee, Knoxville, TN, USA

P76 • Membrane Bio-catalysts as Growth Stimulator of *L. monocytogenes* in Enrichment Media – PRAVATE TUITEMWONG, J. Wongchavalit, K. Tuitemwong, and D. Y. C. Fung, King Mongkut's University of Technology Thonburi, Bangkok, Thailand

P77 • Combined Effect of Antibiotic and Competitive-Exclusion Treatment on *Salmonella* Enteritidis Fecal Shedding in Molted Laying Hens – KUN-HO SEO, P. S. Holt, C. L. Hofacre, and R. K. Gast, Southeast Poultry Research Laboratory, USDA, ARS, Athens, GA, USA

P78 • Mechanisms of Antibacterial Activity of Allyl Isothiocyanate – CHIA-MIN LIN and C. -I. Wei, University of Florida, Gainesville, FL, USA

P79 • Enhanced Inhibitory Effect of *E. coli* O157:H7 by Chitooligosaccharide and Monolaurin – DEOG-HWAN OH, M. K. Lee, and B. K. Park, Kangwon National University, Chunchon, Kangwon, Korea

P80 • Effect of Balsam Apple Extract on Bacteria – CHUNG-YI HUANG, C. H. Lai, P. Y. Peng, F. C. Chao, H. L. Liang, and D. K. Kan, I-Lan Institute of Technology, I-Lan, Taiwan R.O.C.

P81 • Water Activity pH and Potassium Sorbate Concentration Effects on the Growth/No Growth Interface of *Saccharomyces cerevisiae* – AURELIO LOPEZ-MALO, S. Guerrero, and S. M. Alzamora, Universidad de las Americas-Puebla, Puebla, Mexico

P82 • Synergistic Effect of Vanillin and Potassium Sorbate Combinations to Inhibit Mold Growth – AURELIO LOPEZ-MALO, B. Matamoros-Leon, and A. Argaiz, Universidad de las Americas-Puebla, Puebla, Mexico

P83 • Modeling and Simulating Growth of *Clostridium botulinum* at Varying Inoculum Size, Temperature, pH, and Salt Concentration – LIHUI ZHAO, Rutgers University, New Brunswick, NJ, USA

P84 • Modeling the Bacterial Spoilage of Ready-to-Drink Beverages – ALYCE STILES-BATTEY and D. Schaffner, Kraft Foods, Inc., Tarrytown, NY, USA

P85 • Use of *Bacillus megaterium* Spore Germination and Cell Parameter Distributions to Predict Spoilage Times at Low Inoculum Size and Differing Environmental Conditions – MARISA L. CAIPO and D. W. Schaffner, Rutgers University, New Brunswick, NJ, USA

P86 • Survival of *E. coli* O157:H7 in Dried Beef as Affected by Water Activity, Sodium Chloride, and Temperature – J.-H. RYU, Y. Deng, and L. R. Beuchat, University of Georgia, Griffin, GA, USA

P87 • Critical Temperatures to Inhibit *Zygosaccharomyces bailii* Growth in Mango Puree Preserved by Combined Factors – ENRIQUE PALOU, X. Castanon, J. Welti-Chanes, and A. Lopez-Malo, Universidad de las Americas-Puebla, Puebla, Mexico

P88 • Growth and Recovery of Selected Gram Negative Bacteria in Reconditioned Wastewater – KATHLEEN T. RAJKOWSKI and E. Rice, USDA, ARS, NAA, ERRC, Wyndmoor, PA, USA

P89 • Contamination Ways of Cold-smoked Fish with *L. monocytogenes* – MARIELLE GAY, ASEPT, Laval Cedex 9, France

P90 • The Effect of Temperature on the Survival of *Shigella flexneri* at Low pH – LAURA L. ZAIKA and J. S. Fanelli, USDA, ARS, NAA, ERRC, Microbial Food Safety RU, Wyndmoor, PA, USA

P91 • Models for Growth of *Zygosaccharomyces bailii* in High-acid Foods – PHYLLIS JENKINS, P. G. Poulos, M. B. Cole, M. Vandeven, and J. D. Legan, Nabisco, Inc., E. Hanover, NJ, USA

P92 • Survival of *E. coli* O157:H7 in Margarine, Reduced Fat Spreads and Liquid Water-in-Oil Toppings – MICHAEL C. CIRIGLIANO, A. M. Keller, R. B. Zemser, and P. J. Rothenberg, Lipton, Cresskill, NJ, USA

P93 • Growth Response of *L. monocytogenes*, *Salmonella* Enteritidis and *Salmonella typhimurium* DT104 in Pasteurized and Raw Liquid Whole Egg Held at Chill Abuse – MICHAEL C. CIRIGLIANO and R. T. McKenna, Lipton, Cresskill, NJ, USA

P94 • Modulation Effects of Antioxidant Vitamins on Ochratoxin A-induced Oxidantic Toxicity in Mice – JUNG HYEON PARK, S. J. Kang, and D. H. Chung, Gyengsand National University, Chinju, Gyangnam, Korea

P95 • Dry Rehydratable Film Method for the Rapid Enumeration of *Staphylococcus aureus* in Foods: 3M Petrifilm Rapid *S. aureus* Count Plates – PATRICK A. MACH, K. Lindberg, and D. McIntyre, 3M Microbiology Products, St. Paul, MN, USA

P96 • Microrestriction Fingerprinting: A New Tool for Studying the Molecular Epidemiology of *E. coli* O157:H7 – MANSOUR SAMADPOUR, D. Alfi, and L. Grimm, University of Washington, Seattle, WA, USA

P97 • Model for the Implementation of HACCP in the Food Industry of Developing Countries, JAIRO ROMERO, T Tecn De Alimentos, Bogota, Colombia

TUESDAY AFTERNOON — AUGUST 3, 1999

S9 General Session — Anatomy of a Multi-state USA Listeriosis Outbreak: Issues, Insights and Take-home Messages

Hubbard Ballroom

Co-Convenors: Bob Brackett and Jeff Farber

1:30 • Molecular Typing of *Listeria monocytogenes* in US Outbreak, MARTIN WIEDMANN, Cornell University, Ithaca, NY, USA

2:00 • Epidemiology of *Listeria* Outbreak, PAUL MEAD, CDC, Atlanta, GA, USA

2:30 • Industry Perspective of *Listeria* Outbreak, DANE BERNARD, National Food Processors Association, Washington, D.C., USA

3:00 • Panel Discussion

3:30 • Break – *Coffee and Dairy Products available in the Hubbard Foyer*

4:00 • IAMFES Business Meeting

WEDNESDAY MORNING — AUGUST 4, 1999

S10 USDA Risk Assessment of *E. coli* O157:H7 in Ground Beef

Dearborn Ballroom

Convenor: Mark Powell

8:30 • An Overview and Scope of the USDA Risk Assessment of *E. coli* O157:H7 in Ground Beef – MARK POWELL, USDA/FSIS/OPHS/ERAD, Washington, D.C., USA

8:40 • Production Module – ERIC EBEL, USDA/FSIS, Fort Collins, CO, USA

9:00 • Slaughter Concentration Variables – TANYA ROBERTS, USDA/ERS, Washington, D.C., USA

9:20 • Slaughter Product Fraction Variables – PETER COWEN, USDA/FSIS/OPHS/ERAD, Washington, D.C., USA

9:40 • Slaughter Simulation Model – CLARE NARROD, USDA/FSIS/OPHS/ERAD, Washington, D.C., USA

10:00 • *Break – Coffee, Pastries, and Dairy Products available in the Hubbard Foyer*

10:30 • Preparation Module – WAYNE SCHLOSSER, USDA/FSIS, Fort Collins, CO, USA

10:50 • Public Health Module – PEG COLEMAN, USDA/FSIS/OPHS/ERAD, Washington, D.C., USA

11:10 • Risk Communication – PETER COWEN, USDA/FSIS/OPHS/ERAD, Washington, D.C., USA

11:30 • Panel Discussion

S11 Animal Waste Management and Its Relationship to Food Safety

(Sponsored by ILSI-N.A.)

Springwells Ballroom

Co-Convenors: William R. Aimutis and Marguerite A. Neill

8:30 • Microbes and Manure: Animal and Human Health Concerns – ALICE N. PELL, Cornell University, Ithaca, NY, USA

9:00 • Overview of Dairy, Swine, Poultry and Beef Waste Management Systems and Options in the United States – ROBERT T. BURNS, University of Tennessee, Knoxville, TN, USA

9:30 • Persistence of Pathogenic Bacteria in Animal Waste – CAROLYN HOVDE BOHACH, University of Idaho, Moscow, ID, USA

10:00 • *Break – Coffee, Pastries, and Dairy Products available in the Hubbard Foyer*

10:30 • Persistence of Viruses in Animal Waste – DEAN O. CLIVER, University of California-Davis, Davis, CA, USA

11:00 • Presence of Microbial Pathogens in Processed Animal Waste Used as Animal Feed – JAMES S. CULLOR, University of California, Tulare CA, USA

11:30 • Animal and Waste Water Management: Who's Minding the Store? – EMILIO ESTEBAN, CDC, Atlanta, GA, USA

S12 New Emerging Pathogens — *Mycobacterium* spp.

Regency B-C

Co-Convenors: Jeff Farber and Yvonne Taylor

8:30 • Overview of *Mycobacterium* spp. and Their Role as Foodborne Pathogens – LUCIA MUTHARIA, University of Guelph, Guelph, Ontario, Canada

9:00 • Survival of *M. paratuberculosis* in HTST Milk – JUDITH R. STABEL, National Animal Disease Center, Ames, IA, USA

9:30 • *Mycobacterium* spp. as Environmental Pathogens – YVONNE TAYLOR, University of Ottawa, Ottawa, Ontario, Canada

10:00 • *Break – Coffee, Pastries, and Dairy Products available in the Hubbard Foyer*

10:30 • Crohn's Disease and the Link to Foodborne Pathogens: Fact or Fallacy – DAVID ACHESON, NIH, Tufts University, Boston, MA, USA

11:00 • Methods to Detect and Identify *Mycobacterium* spp. in Environmental Samples – SANDY SMOLE, Boston VA Healthcare System, Boston, MA, USA

11:30 • Panel Discussion

S13 HACCP in Retail Operations

Regency E-K

Co-Convenors: O. Peter Snyder, Jr. and Frank Yiannas

8:30 • FDA Retail HACCP– JEANETTE B. LYONS, FDA, Washington, D.C., USA

8:55 • Retail HACCP in Florida – DEBRA K. WILLIAMS, State of Florida, Tallahassee, FL, USA

9:20 • The Maryland Voluntary Retail HACCP Program – LISL D. WILKINSON, Maryland Hospitality Education Foundation, Baltimore, MD, USA

9:45 • *Break – Coffee, Pastries, and Dairy Products available in the Hubbard Foyer*

10:15 • HACCP in Hotel Food Service – DONALD B. GRIM, Marriott International, Inc., Washington, D.C., USA

10:40 • HACCP in Food Markets – FREDRICK W. REIMERS, H-E-B Grocery Company, San Antonio, TX, USA

11:05 • HACCP in Restaurants – DEE CLINGMAN, Darden Restaurants, Inc., Orlando, FL, USA

11:30 • Integrating FDA Fisheries, USDA, FDA Industrial, and FDA Retail HACCP into One Set of National Industry Self-control Requirements – O. PETER SNYDER, JR., Hospitality Institute of Technology and Management, St. Paul, MN, USA

WEDNESDAY AFTERNOON — AUGUST 4, 1999

S14 USDA HACCP Implementation – Where Have We Been; Where Are We Going?

Dearborn Ballroom

Co-Convenors: Robert Gravani and Margaret Hardin

1:30 • Overview and Reflections of HACCP for Meat and Poultry Plants – DANE T. BERNARD, National Food Processors Association, Washington, D.C., USA

2:00 • HACCP Implementation Experiences in a Large Plant – PETER BODNARUK, ConAgra Refrigerated Prepared Foods, Downers Grove, IL, USA

2:30 • HACCP Implementation Experiences in a Small Plant – HERB TETENS, Marathon Enterprises, Jersey City, NJ, USA

3:00 • *Break – Coffee and Dairy Products available in the Hubbard Foyer*

3:30 • USDA/FSIS Overview of HACCP – Past, Present and Future Challenges – BARBARA MASTERS, USDA/FSIS Technical Service Center, Omaha, NE, USA

4:00 • HACCP Model Demonstration Project Experiences – The Future? – ALAN OSER, Hatfield Quality Meats, Inc., Hatfield, PA, USA

4:30 • Regulatory Challenges and Perspectives for the Future – MICHAEL ROBACH, International Continental Grain Company, Gainesville, GA, USA

S15 *Campylobacter* and Food Safety: The State of the Science

Springwells Ballroom

Co-Convenors: J. Eric Line and Scott Fritschel

1:30 • Prevalence of *Campylobacter* in Human Disease – FRED ANGULO, CDC, Atlanta, GA, USA

2:00 • Guillain-Barre Syndrome and Other Chronic Sequellae of Campylobacteriosis – DINA MISHU, Vanderbilt University Children's Hospital, Nashville, TN, USA

2:30 • Modern Cultural Methodology for the Isolation of *Campylobacter* spp. – J. ERIC LINE, USDA, ARS, Athens, GA, USA

3:00 • *Break – Coffee and Dairy Products available in the Hubbard Foyer*

3:30 • Subtyping of *Campylobacter* spp. – SCOTT FRITSCHEL, Qualicon®, Inc., Wilmington, DE, USA

4:00 • Risk Assessment and Risk Management Implications of *Campylobacter jejuni* in Poultry, AAMIR FAZIL, Decisionalysis Risk Consultants, Guelph, Ontario, Canada

4:30 • Poultry Industry Response to the Challenges of *Campylobacter* – LENORE BENNETT, Perdue Farms, Horsham, PA, USA

S16 Methods for the Detection of Infectious Viruses in Foods

(Sponsored by the IAMFES Foundation Fund)

Regency B-C

Convenor: Gary P. Richards

1:30 • An Overview of Conventional Methods for Detecting Enteric Viruses in Foods – DEAN O. CLIVER, University of California-Davis, Davis, CA, USA

2:00 • Limitations in Cell Culture and Molecular Biological Methods for Detecting Infectious Viruses in Foods – GARY P. RICHARDS, USDA, ARS, Dover, DE, USA

2:30 • Integrated Cell Culture-PCR Techniques – CHARLES P. GERBA, University of Arizona, Tucson, AZ, USA

3:00 • *Break – Coffee and Dairy Products available in the Hubbard Foyer*

3:30 • Detection and Control of Viruses in Produce – MARK D. SOBSEY, University of North Carolina, Chapel Hill, NC, USA

4:00 • Role of Molecular Epidemiology in Virus Outbreak Investigations – LEE-ANN JAYKUS, North Carolina State University, Raleigh, NC, USA

4:30 • Panel Discussion

S17 The Seafood Safety Initiative

Regency E-K

Co-Convenors: Carlos Abeyta and Custy Fernandes

1:30 • Overview of Seafood Safety Initiative – ROBERT BUCHANAN, FDA, Washington, D.C., USA

2:00 • Considerations for Testing of *Listeria* in Seafood – CATHERINE DONNELLY, University of Vermont, Burlington, VT, USA

2:30 • Control of Viral and Bacterial Human Pathogens in Shellfish – WILLIAM BURKHARDT III, FDA, Dauphin Island, AL, USA

3:00 • *Break – Coffee and Dairy Products available in the Hubbard Foyer*

3:30 • Food Service Chain Experience – KEITH JACKSON, Darden Restaurants, Orlando, FL, USA

4:00 • Levels of *V. vulnificus* and *V. parahaemolyticus* in Retail Seafood – ANGELO DEPAOLA, FDA, Dauphin Island, AL, USA

4:30 • West Coast Working Group on *V. parahaemolyticus* Outbreaks – CHARLES KAYSNER, FDA, Bothell, WA, USA

HISTORICAL ADVENTURES

Monday, August 2, 1999

6:00 p.m. – 9:30 p.m.

Ride a carriage back into history at the Greenfield Village Living Museum. Discover what inspired inventors Henry Ford, Thomas Edison, and Orville and Wilbur Wright. Gather around the antique carousel. Enjoy dinner and spend the evening with friends.

See the registration form on page 519, or call the IAMFES office at 800.369.6337; 515.276.3344; Fax: 515.276.8655; or visit our Web site at **www.iamfes.org.**

The Workshops

Friday & Saturday
July 30-31, 1999

Hyatt Regency Dearborn – Dearborn, Michigan

WORKSHOP I – Procedures to Investigate Foodborne Illness

WORKSHOP PRESENTER:

Frank L. Bryan, Ph.D., M.P.H., Food Safety Consultant

Dr. Frank L. Bryan currently works as a Consultant developing HACCP systems for private companies and governmental agencies in the United States as well as for many countries through the Pan American Health Organization (PAHO) and the World Health Organization (WHO). Dr. Bryan was Consultant for the food safety office of the WHO and he was formerly with the Center for Disease Control where he specialized in epidemiology and foodborne disease.

Dr. Bryan conducts training on HACCP and foodborne disease investigation techniques, and provides expert consultation to companies in food safety and related litigation. He is a member and secretary of the International Commission on Microbiological Specifications for Foods.

Dr. Bryan has chaired the IAMFES Committee on Communicable Diseases Affecting Man since 1970. During this tenure, the committee published and updated three editions of the manual, *Procedures to Investigate Foodborne Illness*. The committee also published three editions of *Procedures to Investigate Waterborne Illness*, an edition of *Procedures to Investigate Arthropod-borne and Rodent-borne Illness* and *Procedures to Implement the Hazard Analysis Critical Control Point System*.

WHAT YOU WILL LEARN:

Participants will conduct a simulated outbreak investigation using the forms, tables and keys in the 1999 5th edition, *Procedures to Investigate Foodborne Illness*. This workshop will teach interviewing techniques, procedures for determining responsible foods, calculation of epidemic curves and attack rates, field investigation methods to determine source and mode of contamination and other factors that contribute to the cause of the outbreak.

WHO SHOULD ATTEND:

Food protection professionals from city, county, state, and federal health agencies that investigate outbreaks; sanitarians; veterinarians; epidemiologists; administrators; disease surveillance personnel; educators; and food industry and regulatory personnel.

WORKSHOP II – An Insider's Look at Microbial Risk Assessment

MODERATOR AND FACILITATOR:

Don Schaffner, Ph.D., Rutgers University

Dr. Schaffner is the Lead Scientist with the Food Risk Analysis Initiative at Rutgers. His research interests include modeling microbial behavior in foods and microbial quantitative risk assessment.

WORKSHOP PRESENTERS:

Robert McDowell, United States Department of Agriculture

Robert McDowell is Senior Staff Economist for Risk Analysis Systems at the Animal and Plant Health Inspection Service of the USDA where he is active in methods development, training, and application of risk analysis in agriculture and public health.

Greg Paoli, Decisionalysis Risk Consultants, Inc.

Greg Paoli is a Principal in Decisionalysis Risk Consultants, Inc. He specializes in the development of risk assessment models to support decisions primarily in the fields of food safety and environmental health.

William H. Ross, Ph.D., Bureau of Biostatistics and Computing Applications

Dr. Ross worked the last eight years for the Food Program of Health Canada in the area of statistical applications to predictive microbiology, microbial risk assessment, and micro-nutrient risk assessment. He presently leads the project for the renewal of the Risk Management Framework for Health Canada's Health Protection Branch.

Ewen C.D. Todd, Ph.D., Health Protection Branch, Health Canada

Dr. Todd has been a Research Microbiologist in the Bureau of Microbial Hazards for 30 years working in methods development for pathogens, foodborne disease surveillance, costs of foodborne disease and risk assessments for pathogens on foods. He is currently responsible for the Health Canada quantitative risk assessment for *Salmonella* Enteritidis in shell eggs.

Richard C. Whiting, Ph.D., Food and Drug Administration

Dr. Whiting has an active research program in modeling the growth and survival of foodborne microbial pathogens. This research ranges from formulating new mathematical models to composing a personal computer software program to make the models easily and widely available.

WHAT YOU WILL LEARN:

This workshop will compare and contrast two risk assessments conducted to address the risk of *Salmonella* Enteritidis in shell eggs to illustrate how different data and assumptions can impact the resulting risk estimate. The workshop will also demonstrate how distributions are derived for data, how they are input into commercial risk assessment software, and how the software can be used to look at "What if?" scenarios.

WHO SHOULD ATTEND:

Food industry microbiologists, HACCP coordinators, government food microbiologists, food microbiology researchers, microbial modelers and anyone else interested in an in-depth look at microbial risk assessment.

HOURS FOR BOTH WORKSHOPS:

Friday, July 30, 1999
Registration 1:00 p.m.
1:30 p.m. - 5:00 p.m.

Saturday, July 31, 1999
Continental Breakfast at 8:00 a.m.
8:30 a.m. - 5:00 p.m.
Lunch Provided Noon - 1:30 p.m.

1999 IAMFES Workshops
• Registration Form •

❑ **WORKSHOP I: Procedures to Investigate Foodborne Illness**

❑ **WORKSHOP II: An Insider's Look at Microbial Risk Assessment**

Hyatt Regency Dearborn, Dearborn, Michigan — Friday & Saturday, July 30-31, 1999

First Name (will appear on badge) PLEASE PRINT Last Name

Title Employer

Address City Country State/Province Postal Code/Zip + 4

Area Code & Telephone Fax E-mail

❑ Check Enclosed ❑ VISA ❑ ❑ MasterCard

Name on Card: _____

Expiration Date: _____

Signature: _____

For further information, please contact IAMFES at 800.369.6337; 515.276.3344; Fax: 515.276.8655; E-mail: jcattanach@iamfes.org.

Refund/Cancellation Policy

Registration fees, less a $50 administrative charge, will be refunded for written cancellations received by July 16, 1999. No refunds will be made after that date; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after August 6, 1999. The workshop may be cancelled if sufficient enrollment is not received by July 2, 1999.

• Registration •

WORKSHOP I: Procedures to Investigate Foodborne Illness

	Before 7/1/99	After 7/1/99
IAMFES Member	$220	$270
NonMember	$315	$365

GROUP DISCOUNT: Register 3 or more people from your company and receive a 15% discount. Registrations must be received as a group.

WORKSHOP II: An Insider's Look at Microbial Risk Assessment

	Before 7/1/99	After 7/1/99
IAMFES Member	$310	$360
NonMember	$405	$455

TOTAL AMOUNT ENCLOSED: $ _____
(US Funds on US Bank)

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www.remelinc.com

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IAMFES ANNUAL MEETING

86th Dearborn • Michigan

EVENT INFORMATION

EVENING EVENTS

Cheese and Wine Reception
Sunday, August 1, 1999, *(8:00 p.m. – 10:00 p.m.)*

An IAMFES tradition continues for attendees and guests. The reception begins immediately following the Ivan Parkin Lecture on Sunday evening in the exhibit hall.

Exhibit Hall Reception
Monday, August 2, 1999, *(5:00 p.m. – 6:30 p.m.)*

Relax with colleagues and friends in the exhibit hall at the end of the day. Exhibitors showcase the latest developments in the industry at an informal reception.

Historical Adventures
Monday, August 2, 1999, *(6:00 p.m. – 9:30 p.m.)*

Ride a carriage back into history at the Greenfield Village Living Museum. Discover what inspired inventors Henry Ford, Thomas Edison, and Orville and Wilbur Wright. Gather around the antique carousel. Enjoy dinner and spend the evening with friends.

An Evening in Wine Country
Tuesday, August 3, 1999, *(5:30 p.m. – 10:30 p.m.)*

A quiet country evening begins in surroundings reminiscent of an "Old World" wine cellar at Pelee Island Winery, located near Kingsville, Ontario. Then tempt your taste buds in the tropical gardens of Colasanti while exotic birds call to you from the wild.

(When traveling to Canada, proof of citizenship such as voter's registration, passport, or birth certificate is required.)

Take Me Out to the Ballgame
Tuesday, August 3, 1999, *(6:00 p.m. – 10:30 p.m.)*

Cheer yourself silly as the Detroit Tigers take on the Chicago White Sox in one of the oldest baseball stadiums in the US. When the game is over, you can claim to be one of the last fans to visit the original Tiger Stadium before it closes. Tickets and round trip bus transportation included.

IAMFES Awards Banquet
Wednesday, August 4, 1999, *(7:00 p.m. – 9:30 p.m.)*

A special occasion to formally recognize the accomplishments of deserving food safety professionals. An elegant reception and dinner are followed by the awards ceremony. Business attire requested.

TOURS

Great Lakes and "Motor City" Culture
Sunday, August 1, 1999, *(9:30 a.m. – 3:00 p.m.)*

Belle Isle, a 1000 acre island park, beckons you to visit the Dossin Great Lakes Museum and other cultural attractions. Tour the Coast Guard Station on the Detroit River. Then it's smooth sailing to lunch on the waterfront at Sinbad's restaurant. Start your engines at the interactive "Motor City Exhibition" in the Detroit Historical Museum. Race to explore your favorite destinations including the Detroit Institute of Art, the Museum of African American History and the Detroit Science Center.

At Home with the Auto Barons
Monday, August 2, 1999, *(9:30 a.m. – 3:30 p.m.)*

Just for a day, imagine you are a guest in Fair Lane, the 15th and final home of Henry Ford. Stroll through the same rooms as some of the world's most influential people.

Don't forget your invitation for lunch at the Eleanor and Edsel Ford Estate, located on the shores of Lake St. Claire. Architect Albert Kahn created a sense of the English countryside in the home at Grosse Point. Inside, original masterpieces line the walls. Your tour includes the home, the scenic gardens, the pool-house, the garage with Mrs. Ford's custom-built 1952 Lincoln Town Car, and the children's playhouse.

All Things Canadian
Tuesday, August 3, 1999, *(9:30 a.m. – 3:30 p.m.)*

Watch as world famous Canadian Club Whiskey is produced at the Hiram Walker & Sons Distillery. Then stroll through the classical Jackson Park gardens featuring over 12,000 rose bushes in bloom. Soak up the local flavor during lunch at a restaurant in downtown Windsor, Canada. Step inside the log cabin used as terminal of the Underground Railway built by fugitive slave John Freeman Walls.

(When traveling to Canada, proof of citizenship such as voter's registration, passport, or birth certificate is required.)

GOLF TOURNAMENT

FORE! Best-Ball Golf Tournament
Sunday, August 1, 1999, *(6:00 a.m. – 2:00 p.m.)*

A swinging good time at the newest golf course in the area — the Inkster Golf Course. You don't even need to know how to play to win a prize. Golf, transportation, breakfast, lunch and prizes all included in your registration fee.

GENERAL INFORMATION

IAMFES 86th ANNUAL MEETING
AUGUST 1-4, 1999
DEARBORN, MICHIGAN

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

■ Meeting Information

Register to attend the world's leading food safety conference.

Registration includes:

- Technical Sessions
- Symposia
- Poster Presentations
- Ivan Parkin Lecture
- Exhibit Hall Admittance
- Cheese and Wine Reception
- Exhibit Hall Reception
- Awards Banquet
- Program and Abstract Book

■ Registration Information

Please mail the registration form with payment today. Registrations post-marked after July 1, 1999 must pay the late registration fee. Checks should be made payable to: IAMFES, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2863, USA. 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

Registration fees, minus a $50 processing charge and any applicable bank charges, will be refunded for written cancellations received by July 15, 1999. **No refunds will be made after July 15;** however, the registration may be transferred to a colleague with written notification. Refunds will be processed after August 6, 1999.

■ Hotel Information

For reservations, contact the hotel directly and identify yourself as an IAMFES Annual Meeting attendee to receive a special rate of $102 per night, single or double. Make your reservations as soon as possible, this special rate is available only until July 2, 1999.

Hyatt Regency Dearborn
Fairlane Town Center
Dearborn, Michigan 48126
Phone: 313.593.1234; Fax: 313.593.3366

■ EVENTS

(See the preceeding page for detailed descriptions)

■ Evening Events

Sunday, August 1, 1999
Cheese and Wine Reception *(8:00 p.m. – 10:00 p.m.)*

Monday, August 2, 1999
Exhibit Hall Reception *(5:00 p.m. – 6:30 p.m.)*
Historical Adventures *(6:00 p.m. – 9:30 p.m.)*

Tuesday, August 3, 1999
An Evening in Wine Country *(5:30 p.m. – 10:30 p.m.)*
Take Me Out to the Ballgame *(6:00 p.m. – 10:30 p.m.)*

Wednesday, August 4, 1999
IAMFES Awards Banquet *(7:00 p.m. – 9:30 p.m.)*

■ Tours

Sunday, August 1, 1999
Great Lakes and "Motor City" Culture
(9:30 a.m. – 3:00 p.m.) (Lunch included)

Monday, August 2, 1999
At Home with the Auto Barons
(9:30 a.m. – 3:30 p.m.) (Lunch included)

Tuesday, August 3, 1999
All Things Canadian
(9:30 a.m. – 3:30 p.m.) (Lunch included)

■ Golf Tournament

Sunday, August 1, 1999
FORE! Best-Ball Golf Tournament *(6:00 a.m. – 2:00 p.m.)*

MEMBERSHIP RATES

	UNITED STATES	CANADA/ MEXICO	INTERNATIONAL
Membership with *Journal of Food Protection* and *Dairy, Food and Environmental Sanitation* (Student Membership)*	**$140.00** ($70.00)	**165.00** ($95.00)	**$210.00** ($140.00)
Membership with *Dairy, Food and Environmental Sanitation* (Student Membership)*	**$85.00** ($42.50)	**$95.00** ($52.50)	**$110.00** ($67.50)
(Student Membership* with *Journal of Food Protection*)	($42.50)	($57.50)	($87.50)

**Full-time student verification required*

All prices include Shipping & Handling

Prices effective through August 31, 1999

FOR OFFICE USE
First initial Last name DFES
Registration #

REGISTRATION FORM

IAMFES 86th Annual Meeting August 1-4, 1999 Dearborn, Michigan

Name (Print or type your name as you wish it to appear on name badge)

Title Employer

Mailing Address (Please specify: ❒ Home ❒ Work)

City State/Province Country Postal/Zip Code

Telephone Fax E-mail

IAMFES Member since: 19____

Regarding the *Americans with Disabilities Act*, please indicate special requirements you may have. _____

REGISTER BY JULY 1, 1999 TO AVOID LATE REGISTRATION FEES

REGISTRATION FEES:	MEMBERS	NONMEMBERS	AMOUNT
Registration (Awards Banquet included)	$ 245 ($295 late)	$365 ($415 late)	
IAMFES Student Member*	$ 40 ($ 50 late)	Not Available	
Retired IAMFES Member*	$ 40 ($ 50 late)	Not Available	
One Day Registration: ❒ Mon. ❒ Tues. ❒ Wed.	$ 125 ($150 late)	$180 ($205 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	

*Awards Banquet not included

EVENTS:		# OF TICKETS	
FORE! Best-Ball Golf Tournament (Sunday, 8/1)	$ 80 ($ 95 late)		
Historical Adventures (Monday, 8/2)	$ 39 ($ 44 late)		
Children 14 and under	$ 29 ($ 34 late)		
An Evening in Wine Country (Tuesday, 8/3)	$ 49 ($ 54 late)		
Take Me Out to the Ballgame (Tuesday, 8/3)	$ 22 ($ 27 late)		
IAMFES Awards Banquet (Wednesday, 8/4)	$ 40 ($ 45 late)		

TOURS:			
Great Lakes and "Motor City" Culture (Sunday, 8/1)	$ 45 ($ 51 late)		
At Home with the Auto Barons (Monday, 8/2)	$ 42 ($ 47 late)		
All Things Canadian (Tuesday, 8/3)	$ 43 ($ 48 late)		

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

TOTAL AMOUNT ENCLOSED _____

(CHECK PAYABLE TO IAMFES — US FUNDS ON US BANK)

International Association of Milk, Food and Environmental Sanitarians
6200 Aurora Avenue, Suite 200W
Des Moines, Iowa 50322-2863, USA
Phone: 800.369.6337; 515.276.3344
Fax: 515.276.8655; E-mail: iamfes@iamfes.org

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EXHIBITORS DO NOT USE THIS FORM

FOOD MICRO '99

Ecology and physiology of food related microorganisms
Veldhoven, The Netherlands, 13 – 17 September, 1999

SCIENTIFIC PROGRAMME

General ecology and physiology
general physiology
stress responses and virulence
cleaning and disinfection
microbiology of food ecosystems
probiotics

Preservation
physiology of spoilage organisms
new preservation technology
and agents
fermentation

Risk based safety approaches
risk analysis
safety of novel foods
resistance, virulence and pathogenicity
emerging pathogens
methods for detecting pathogens
mycology and mycotoxins

FOOD MICRO '99 is designed to be a meeting place for those working in food microbiological research and those who are studying food microbiology as well as for professionals responsible for the production of safe food and authorities involved in safe food regulations. Each session will be preceeded by a keynote lecture.

For information, registration, etc. please contact Congress Service Brabant either by fax 31 40 2546566 or E-mail: KSB@koningshof.nl. Information about Food Micro '99 is also available on internet: www.cbs.knaw.nl/foodmicro

Food Micro '99 is co-sponsored by the International Association of Milk, Food and Environmental Sanitarians.

Don't Forget

TO SUBMIT YOUR MANUSCRIPT

The Editors are seeking articles of general interest and applied research with an emphasis on food safety for publication in *Dairy, Food and Environmental Sanitation.*

Please submit three copies of manuscripts along with a fourth copy on 3 1/2" computer disk.

Submit your articles to:
Donna Bahun
Dairy, Food and Environmental Sanitation
c/o IAMFES, Inc.
6200 Aurora Ave., Suite 200W
Des Moines, Iowa 50322-2863, USA

EXHIBITORS

of the IAMFES 86th Annual Meeting

(Companies scheduled to exhibit as of June 5, 1999)

3-A Sanitary Standards Symbol Administrative Council
1500 Second Avenue SE, Suite 209
Cedar Rapids, IA 52403
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Web site: www.mmm.com

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Ames, IA 50010
Phone: 515.296.6187 Fax: 515.296.9910
Web site: www.advanced-analytical.com

ABC Research Corporation
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Gainesville, FL 32607
Phone: 352.372.0436 Fax: 352.378.6483
Web site: www.abcr.com

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Atlanta, GA 30324
Phone: 404.888.2749 Fax: 404.877.4999

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Two Technology Way
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Phone: 800.255.4034 Fax: 781.320.8181
Web site: www.aitests.com

American Egg Board
1460 Renaissance Drive
Park Ridge, IL 60068
Phone: 847.296.7043 Fax: 847.296.7007
Web site: www.aeb.org

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1159 Business Park Drive
Traverse City, MI 49686
Phone: 800.333.0958 Fax: 616.941.7287
Web site: www.api-pt.com

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Cogent Technologies, Ltd.
11140 Luschek Drive
Cincinnati, OH 45241
Phone: 513.469.6800 Fax: 513.469.6811

Decagon Devices, Inc.
P.O. Box 835, 950 NE Nelson Court
Pullman, WA 99163
Phone: 509.332.2756 Fax: 509.332.5158
Web site: www.decagon.com

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Sweden
Phone: 46 31.58.32.70 Fax: 46 31.58.33.70
Web site: www.diffchamb.com

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Web site: www.elsevier.com/locate/foodsci

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Gibbstown, NJ 08027
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Web site: www.emscience.com

FDA Center for Food Safety & Applied Nutrition
200 C Street SW
Washington, D.C. 20204
Phone: 202.205.4220 Fax: 202.401.3532
Web site: www.fda.gov

FoodHandler
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Phone: 800.338.4433 Fax: 516.338.5486
Web site: www.foodhandler.com

FoodLabs, Inc.
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For additional information on these videos, contact Tami Schafroth at 800.369.6337; 515.276.3344; Fax: 515.276.8655; E-mail: tschafroth@iamfes.org.

ADVERTISING INDEX

83rd IDF Annual Sessions

14-18 September 1999

The National Dairy Committee of Greece in cooperation with the International Dairy Federation (IDF), is organizing the *83rd IDF Annual Sessions* (14-18 Sept. '99) and the *International Seminar on Organic Dairy Products* (14 Sept. '99). The venue of the event is the "Divani-Caravel" Hotel in Athens, Greece.

More than 500 world wide known scientists and their accompanying persons are expected to attend the event from all over the world to discuss important dairy issues such as:

- Production, Hygiene and Quality of Milk
- Technology and Engineering
- Economics, Marketing and Policies
- Legislation, Standards of Identity, Classification, Terminology
- Analytical Standards, Laboratory Techniques
- Science, Nutrition and Education

The *83rd IDF Annual Sessions* include scientific presentations, technical excursions and social events. In addition, a well organized commercial exhibition will take place, providing opportunities for presentations of ingredients, products, equipment and services relative to the dairy sector.

The organizing committee of the *83rd IDF Annual Sessions*, in order to meet the cost of the Symposium, invites companies from Greece and abroad related to the dairy sector to contribute in the form of a sponsorship or exhibition.

For more details as well as to receive the General Information and registration forms brochure, please feel free to contact Ms. Anastasia Kosmea at:

National Dairy Committee of Greece
75. Iera Odos / 118 55 Athens / Greece
Phone: 30 1 529-4651; Fax: 30 1 529-4616
E-mail: ndcg@auadec.aua.gr

Thoughts on Today's Food Safety, *continued* from page 532

analysis for fecal contamination by using *E. coli* as an indicator to identify potential hazards of the water supply.

In general, will one water source be safer than another? Common sense tells us that this will depend on several factors, including water quality, irrigation method, the farming operation, the location of the farm, and the intended water use. For example, a drip irrigation system consists of plastic or rubber tubing located near the plant's root system (often buried in the ground). Small holes in the tubing allow the irrigation water to be applied directly to the roots. In addition to increasing water use efficiency by concentrating water distribution, the other benefit is minimizing direct water contact with the plant. Having minimal contact with the plant product to be consumed is one method to minimize the risks, especially if the quality of the water is in question.

Availability of field sanitation facilities and proper worker hygiene practices are important GAPs. It is critical in any field operation, that clean and properly maintained sanitation facilities, and well-stocked handwashing stations are provided and accessible to all employees. It is equally important that workers be instructed in the use of the facilities and that proper handwashing training be provided. Illustrated materials such as posters and training videos in the appropriate languages are useful tools to promote the importance of proper hygiene when handling food products.

As the California Strawberry Commission learned, identifying GAPs for the state's strawberry industry was not difficult. Growers and shippers/handlers, as stakeholders, participated in the early development of a comprehensive, user-friendly food safety program for their operations while working within a regulatory framework that already had well-defined and stringent requirements for public health, including worker health and safety. University scientists, state and federal health officials provided additional support with their technical knowledge and microbiological expertise. When defining "good agricultural practices" be aware that the practice can be general or commodity specific, but must be flexible enough to adapt within a specific operation.

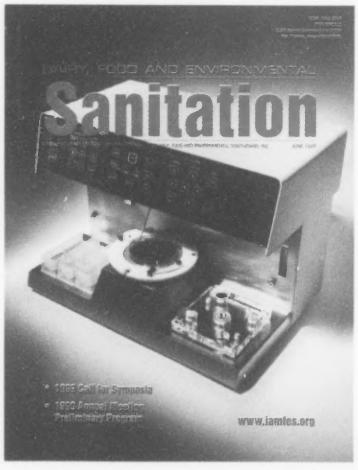
REFERENCES

1. US Environmental Protection Agency, Department of Health and Human Services, and US Department of Agriculture. "Food Safety from Farm to Table: A National Food Safety Initiative – A Report to the President," May 1997.
2. California Strawberry Commission "Quality Assurance Program Implementation Manual," Copyright May 1998.
3. US Department of Health and Human Services, Food and Drug Administration, Center for Food Safety and Applied Nutrition (CFSAN). "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables," October 1998.

OOPS!

EDITOR'S NOTE:

This is a copy of the June *DFES* cover with the correct description from Spiral Biotech, Inc.



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ComingEvents

AUGUST

·**1-4, IAMFES 86th Annual Meeting,** Dearborn, MI at the Hyatt Regency Dearborn. Two workshops precede the Meeting; Workshop I, "Procedures to Investigate Foodborne Illness," and Workshop II, "An Insider's Look at Microbial Risk Assessment." Registration information available in this issue of *DFES* on page 519 or contact Julie Cattanach at Phone: 800.369.6337; 515.276.3344; Fax: 515.276.8655; E-mail: jcattanach@iamfes.org.

·**9-13, Laboratory Methods in Food Microbiology,** Silliker Laboratories' Corporate Research Center, South Holland, IL. For additonal information, contact Silliker Laboratories, Education Services Dept., 900 Maple Road, Homewood, IL 60430; Phone: 800.829.7879; 708.957.7878; Fax: 708.957.8405.

·**10-11, Pennsylvania Food Processors Association (PFPA) 85th Annual Convention,** Baltimore, MD. For additional information, contact PFPA, 500 N. 3rd St., 9th Floor, Harrisburg, PA 17101-1111; Phone: 717.238.1252; Fax: 717.238.7554.

SEPTEMBER

·**1, Management of Dairy Food Safety, University of Wisconsin-Madison,** Madison, WI. This workshop will address why we keep plants clean, how we keep plants clean, and what to do if a sanitation problem occurs in your plant, including recall programs and legal ramifications. For additional information, contact Mary Thompson, Wisconsin Center for Dairy Research, 1605 Linden Dr., Babcock Hall, Room 241, Madison, WI 53706; Phone: 608.262.2217; Fax: 608.262.1578; Web site: www.cdr.wisc.edu.

·**9-10, 36th Annual Marschall Cheese Seminar,** Santa Clara Convention Center. Co-sponsored by the California Dairy Research Foundation (CDRF) and Rhodia Inc. For more information, contact Jo Ann Sterenberg at 219.264.2557.

·**13-17, Food Micro 99,** Veldhoven – The Netherlands, **co-sponsored by IAMFES.** Food Micro 99 is primarily for individuals working in food microbiological research and those who are studying food microbiology as well as for professionals responsible for the production of (safe) food and authorities involved in safe food regulation. For additional information, contact Dr. Leon Gorris, Unilever Research Laboratorium Vlaardingen, Postbus 114, 3130 AC Vlaardingen, The Netherlands, Phone: 31 10 4605709; Fax: 31 10 4605188; E-mail: leon.gorris@unilever.com.

·**14, International Seminar on Organic Dairy Products,** in association with the 83rd IDF Annual Sessions, Athens, Greece. For additional information, contact National Dairy Committee of Greece, lera Odos 75 - 118 55 Athens, Greece; Phone: 30 1 5294651; Fax: 30 1 5294616.

·**14-18, 83rd IDF Annual Sessions,** Divani Caravel Hotel, Athens, Greece. For additional information, contact National Dairy Committee of Greece, lera Odos 75 - 118 55 Athens, Greece; Phone: 30 1 5294651; Fax: 30 1 5294616.

·**16-18, Lead Auditor Training Seminar,** Embassy Suites, St. Louis, MO. For further information, contact Christine VerPlank or Shelia Brewer, ASI Food Safety Consultants, 7625 Page Blvd., St. Louis, MO 63133; Phone: 800.477.0778; Fax: 314.727.2563.

·**19-24, The International Institute of Refrigeration (IIR) 20th International Congress of Refrigeration,** Sydney, Australia. For further information, contact ICR99 Secretariat, 52 Rosslyn St., West Melbourne Vic 3003 Australia; Phone: 61 3 9328 2399; Fax: 61 3 9328 4116; Web site: www.airah.org.au/icr99.

·**22, New York State Association of Milk and Food Sanitarians Affiliate Meeting,** at the Rochester Marriott Throughway Hotel in Rochester, NY. For further information, contact Janene Lucia at 607.255.2892.

·**22-24, Washington Milk and Food Sanitarians Association Affiliate Meeting,** West Coast Wenatchee Center Hotel in Wenatchee, WA. For further information, contact William Brewer at 206.363.5411; E-mail: billbrewer@juno.com.

·**23-24, Wisconsin Association of Milk and Food Sanitarians Affiliate Meeting.** For further information, contact Randy Daggs at 608.266.9376.

OCTOBER

·**4-8, Aseptic Better Process Control Certification School and Aseptic Symposium,** North Carolina State University, Raleigh, NC. For further information, contact Ms. Lisa Gordon at 919.515.2956; Fax: 919.515.7124; E-mail: lisa_gordon@ncsu.edu.

·**6-7, Associated Illinois Milk, Food & Environmental Sanitarians Annual Meeting** at Pere Marquette Hotel in Peoria, IL. For additional information, contact Lee Dressel at 618.654.3438.

·**6-7, Iowa Association of Milk, Food and Environmental Sanitarians, Inc., Affiliate Meet-**

ing. For further information, contact Monica Streicher at 319.933.4521.

·28-31, Worldwide Food Expo '99, McCormick Place, Chicago, IL. Register today and see new products, make new contacts, and get the information you need to operate faster. For additional information, contact Worldwide Food Expo '99, 2751 Prosperity Ave., Suite 100, Fairfax, VA 22031 or Phone 703.645.9302; Fax: 703.876.2637; Website: www.worldwidefood.com.

NOVEMBER

·1-3, Pasteurizer Operators Workshop, endorsed by International Dairy Foods Association at the Nittany Lion and Borland Laboratory, University Park, PA. The program will include hands-on activities, discussions and lectures on regulations, cleaning and sanitation, pasteurization, milk flavor, and other operational procedures in milk plants. For more information, call 814.865.8301; fax: 814.865.7050; Web site: www.cas.psu.edu.

·8-9, The International Fresh-cut Produce Association (IFPA) Hosts 7th Annual Technical Seminar, Holiday Inn Old Town Select in Alexandria, VA. This event will focus on "Global Food Safety Issues," and their impact on the fresh-cut produce sector. For more information, contact Justina Brewer at 703.299.6282.

·10-12, FAMFES Annual Retreat, held at the Florida Leadership Training Center, Haines City, FL. For further information, contact Bill Thornhill at 914.298.7748.

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Good Agricultural Practices: Methods to Minimize Microbial Risk

Frances F. Pabrua
Quality Assurance Director
California Strawberry Commission

In 1996, on the heels of increased food safety concerns from consumers regarding fresh produce and possible microbial contamination, the California Strawberry Commission's Quality Assurance Program (QAP) was born. The commission is recognized for developing the first comprehensive commodity-specific QAP addressing "good agricultural practices" in the production of fresh produce to reduce or minimize the risk of microbial contamination.

During the 1997 California strawberry-growing season, the commission initiated outreach and educational meetings with growers and shippers/handlers to increase awareness and provide support in implementing good agricultural practices (GAPs). To facilitate program implementation and address the issues of food safety, the California Strawberry Commission (CSC) hired the first quality assurance director for a commodity group in the United States. The California strawberry industry was becoming the leader in the fresh produce industry in addressing microbial food safety concerns. It was also in 1997 that President Bill Clinton announced the "Food Safety from Farm to Table: A National Food Safety Initiative" *(1)*.

The CSC introduced a comprehensive, user-friendly quality assurance program implementation manual *(2)* in December 1997. This 90-page instructional manual, written in English and Spanish, describes GAPs that can be found or used in California's strawberry fields that will help minimize or reduce the risk of microbial contamination.

But what are good agricultural practices and how can they minimize or reduce the risk of microbial contamination on fresh fruits and vegetables? The Federal Food and Drug Administration in the "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables" *(3)* defines good agricultural practices as "general practices to reduce microbial food safety hazards in growing, harvesting, sorting, packing and storage operations of fresh fruits and vegetables."

Identifying GAPs may be as simple as being aware of potential microbial hazards that may exist in the farming operation; anticipating how and where in the farming and production cycle produce might be contaminated; avoiding or mitigating those risks; and documenting all the steps taken to ensure that the product is safe. In some cases, it is a matter of complying with state and/or federal laws and regulations covering areas such as field sanitation facilities or worker health and safety requirements. In other cases, it may be following traditional farm management practices and/or scientific field-tested procedures, such as using an organic soil amendment that has undergone pathogen reduction through a composting treatment.

The California Strawberry Commission places a high priority on being able to trace every tray of California strawberries from the retailer to the grower's field and to the date of harvest. The foundation of any food safety program should be the ability to trace produce back to its source. In a foodborne illness investigation, this good agricultural practice provides the ability to quickly identify the possible source of a foodborne outbreak and then be able to take mitigation steps. It is the responsibility of both the grower and shipper/handler to provide information regarding tracebacks. This will require the grower to coordinate traceback procedures with the shipper/handler that includes detailed documentation to track individual trays from farm through the cooler to the receiver. Minimum traceback information will include in most cases, the grower or ranch identification, date of harvest, and a documentation trail which would include shipping invoices, daily harvest records, etc.

Concerns about water uses in the farming and production of any commodity is another serious consideration in terms of being a potential source for pathogens and/or a vehicle for spreading microbial contaminants. Water has several uses in a farming or production operation, including irrigation, handwashing, cooling, produce washing, and pesticide/foliar applications. Knowing the source and the safety of the water used in a farming operation is another example of a GAP, especially when sources of water can range from a capped or enclosed well to open rivers and reservoirs. How do you determine the safety of the water? One method would be to conduct

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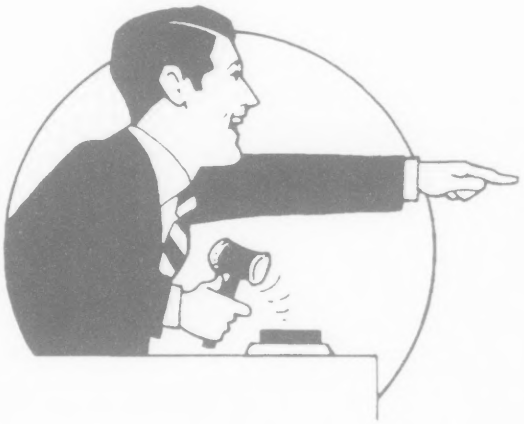
DONATE AN ITEM TO THE FOUNDATION FUND SILENT AUCTION



The Second Annual Foundation Fund Silent Auction will be held at the IAMFES 86th Annual Meeting in Dearborn, Michigan, August 1-4, 1999.

Why donate an item to the auction? Last year's auction raised over $2,000 for the Foundation Fund. Promote your state or organization by donating items now to help the Foundation exceed its goal of $100,000 in 2000. The Foundation benefits the Ivan Parkin Lecture, the Developing Scientist Competition, the Audiovisual Library and co-sponsorship of the Crumbine Award. It also provides surplus *JFP* and *DFES* journals to developing countries.

Be part of the excitement – Items donated last year included California wine, a Carolina sweet grass basket, food safety videos, Tennessee Smoked Country Ham, a gift certificate from Omaha Steaks International and imported cigars. Donations are accepted from individuals and groups.

Here's how it works – If you would like to donate an item, complete the accompanying form and return it to the IAMFES office. A listing of auction items and donors will be included in the Annual Meeting Program and Abstract Book.

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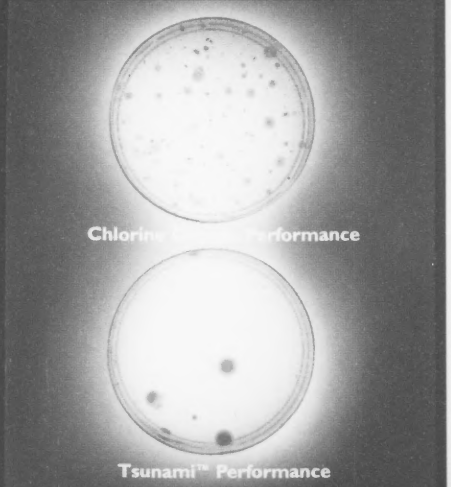

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