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DAIRY, FOOD AND ENVIRONMENTAL

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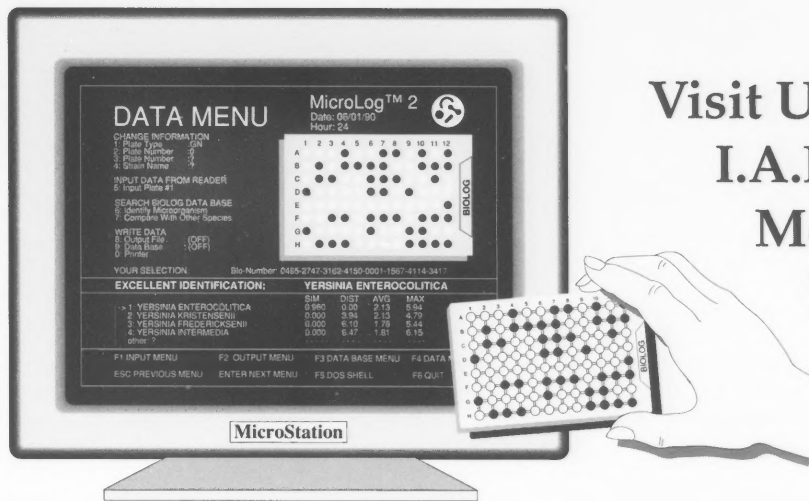
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Thoughts From the President . . .



By
Bob Sanders
IAMFES President

It's getting late in the month and I still haven't written my column for the coming month. I don't know where the time goes.

This month it was the NCIMS meeting in Louisville. Next week it will be the 3-A meeting in Milwaukee. It seems I hardly get done with one meeting before the next one starts.

There were many topics discussed at NCIMS. Many were related to animal drug residue issues. After much discussion, it would appear that the States and FDA will concur on some changes in the Pasteurized Milk Ordinance that will strengthen the program.

The 3-A Sanitary Standards Committees will hopefully complete the revision of the 3-A Accepted Practice for HTST and HHST Pasteurizer Systems. This project has been a long one, but will provide the dairy sanitarians and the dairy industry with an updated tool to use in inspection and installation of these pasteurizer systems.

While in Louisville I took the opportunity to contact the Galt House people to work out some last minute details for the IAMFES Annual Meeting. They assured me that they will be ready for us in July and will do everything possible to assure that we have a successful annual meeting again this year. If you haven't sent in your registration form, I would encourage you to do so.

In the mail today I received a copy of the announcement for the Procedures to Investigate Foodborne Illness workshop. The workshop will be held July 19-20 at the Galt House prior to the IAMFES Annual Meeting. The agenda is very impressive. Enrollment is limited so if you are interested in learning more about investigating foodborne illness, send in your reservations early.

This past week I had the fortunate opportunity to participate as a member of the jury to select the winner of the prestigious Samuel J. Crumbine Consumer Protection Award. This is an annual award given to a local public health agency that has demonstrated unsurpassed achievement in providing outstanding food protection services to its community. There were several outstanding candidates and it was a really tough job in reaching a decision. I wish I could tell you who the winner is, but it would not be proper to tell you before the formal announcement. Special presentations will be made to the supervisors of the winning department at the IAMFES Awards Banquet.

That's about all the news I can think of for now. See you next month.

On My Mind . . .



By
Steven K. Halstead
IAMFES
Executive Manager

. . . is continuing education.

We want to be able to offer continuing education credit (to those who can use it) for the upcoming Annual Meeting, July 21-24 in Louisville. We considered it last year, but decided we just didn't have time to get everything together in time.

This year, we started in plenty of time and should be able to offer a significant amount of credit.

We started off by contacting the National Environmental Health Association. As you may know, NEHA operates a national certification program for professionals in the environmental health area.

NEHA provides for con-ed credit via two avenues - agency sponsorship and individual requests. The latter is the easier (for us), in that anyone certified by NEHA can attend an educational program and then submit a request for credit. An agenda and a brief description of the program must accompany the request.

There are a few more requirements for agency approval. First of all, we have to get the program approved which means submitting an agenda and abstract for each session. NEHA will then decide whether or not to allow credit for it and how much credit to allow. For us, the work then begins.

As an agency sponsor, we have to agree to keep track of each person seeking credit. We must distribute and collect attendance sheets and submit these to NEHA.

While this seems like a lot of effort for us (and it is), we feel that it is worthwhile because, as our constitution states, our number one objective is to "Provide a forum for professionals in the areas of milk, food and environmental safety and quality." One only needs to look at the program for the meeting to appreciate our dedication to this objective.

Not everybody who needs con-ed needs it because of being certified by NEHA. Six states - Arizona, Maryland, North Carolina, North Dakota, Ohio and Oregon - have laws licensing sanitarians and which mandate continuing education. Others may license sanitarians and still others prescribe continuing education on a voluntary basis, but only these six (according to a NEHA study) require both.

We have contacted each of these states and inquired about what we must do to get our meeting pre-approved. Some were more stringent than others, but they all had essentially the same approach. Thus we will seek prior approval from all these states.

We have absolutely no idea how many attendees will want to take advantage of this opportunity. We are estimating around 100. Our decision as to whether to do this in the future will depend somewhat on the level of participation. If you want to participate, be sure to let us know. The sooner, the better.

Six states mandate licensing and continuing education for sanitarians.

. . . the annual meeting.

Our schedule for publishing and distributing *Dairy, Food and Environmental Sanitation* calls for it to be mailed during the second week of the month. Over the

past six months we have been able to meet this schedule and you can be assured we will strive to continue.

However, that means that for many of you, this is your last *Dairy, Food and Environmental Sanitation* before the Annual Meeting. With that in mind, I want to encourage you to attend this year's meeting.

Last month's *Dairy, Food and Environmental Sanitation* and the flyer you received outlined the program. Take a look at it. I think you will agree that it is outstanding, and certainly well-worth the cost.

Make a commitment. Turn out for this remarkable educational opportunity. You won't be sorry.

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Management of Food-Transmitted Infections and Intoxications¹

Prepared for the Professor Christiaan Eijkman Foundation at Utrecht University

Ernesto A. Brovelli² and Robert Howell²

Introduction

Food-transmitted infections and intoxications are nothing new. The discovery of "food poisoning" can be traced back to 1820 when the German poet Justinus Kerner described "sausage poisoning" (most probably botulism) and its high fatality rate. Later, in 1870, Francesco Selmi proposed his theory of ptomaine poisoning to explain diseases contracted by eating certain foods. Major breakthroughs in food preservation, such as the development of pasteurization and other approaches of equitable merit, appeared to start a fight that yet is far from over (9).

Today, alarming numbers of food transmitted infections and intoxications are reported every year, even in nations where an array of advanced technologies for the production, distribution and storage of food are available. Moreover, it is known that the majority of food-borne diseases are grossly under-reported in most countries, due, in part, to a lack of knowledge in the epidemiology of food borne illnesses and to largely deficient reporting systems (1,13).

If current approaches to the management of food-transmitted infections and intoxications are examined, the available data suggests that we are not doing well. Statistics spanning the years 1955 through 1990 indicate that in the United Kingdom the incidence of infections from *Salmonella* and *Shigella* roughly follows a straight projected line of increase since 1955. Infections from *Campylobacter* also follow a similar trend, suggesting a parallel between the increases in consumption of chicken and chicken products and incidences of campylobacteriosis (6).

Is there a reason why, in countries that rely on advanced methods of food processing and preservation, on cold-chains for the distribution of the products, on refrigerated stands for the exhibit of the food for sale, and other such conveniences, that food-borne disease outbreaks are a cause of major official and public concern? Is it negligence on the part of the people responsible for the processing and handling of these food products? Or is it on the part of the government

authorities and agencies that disregard this fact and procrastinate on corrective legislation? It is not easy to find an answer to these questions, when all parties may share some degree of responsibility. It would be more productive to examine what the food production and distribution sectors actually do to avoid these outbreaks.

One of the major principles that has supported the procurement of "high sanitary quality food" is based on food inspection. The importance of microbiological surveys and testing of products used to achieve that goal of high sanitary quality cannot be denied. But, is that enough? If we break down the global process of food inspection, there are four basic components:

- i. sampling of the finished product.
- ii. monitoring for pathogens, indicator or total number of colony forming units of microorganisms.
- iii. comparison to standards, guidelines, defect action levels, etc.
- iv. regulation or advice for remedial action according to results.

We are now able to analyze each step separately to detect failures in this scheme. Most sampling procedures are based on a Poisson distribution of target organisms (7). This statistical approach, which is successfully applied for the detection of toxic elements in food, relies on an homogenous distribution of the microorganisms in the food batch. Can we accurately state that microorganisms are homogeneously distributed in food products? Not likely. In solid foods, fats and insoluble food particles prevent a homogeneous distribution of organisms. Only in some liquid food systems we can overcome this fact by agitation and approach a more uniform distribution. Obviously, this is impossible with solids.

It is known, that according to the Poisson distribution, the sample size (number of units to be sampled) would have to be extremely large, if the probability of finding "failed" units is to approach zero (7). And in this situation "failed" units are food products that could bring about death. Evidently, safety assurance by careful screening of all the units is by no means feasible.

Some of the monitoring procedures are not based on the detection of pathogens themselves. Rather, they screen for the presence of what it is known as "indicator organisms," organisms readily detectable and the presence of which has a high degree of correlation to the presence of some

¹This paper is based on a lecture given by Prof. David A. A. Mossel at the University of Nebraska-Lincoln on September 29, 1989. The paper received the First Eijkman Award, from the Professor Christiaan Eijkman Foundation of Utrecht University, The Netherlands.

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pathogen. Although this is an extremely useful and practical approach, it has its limitations (10). Also, many times, precise analysis to detect the presence of undesirable organisms implies a lapse of time that food products can not linger without going to spoilage.

Also in principle, it is evident that all the "retrospective" techniques to assure the quality of food are of only relative value; the product has already left the production line and it is ready to be consumed. More importantly, and almost of incomparable value, would be to assume a preventive approach.

Food Sanitary Quality Standards

Obviously, one cannot expect all food products to be completely sterile. The risk of a particular food becoming a vector for some kind of pathogen can occur at any point during the production and marketing chain. However, there are now a number of approaches that tend to minimize that risk (9). Some of these new preventive tendencies are:

1. Safety Quality Acceptability (SQA).

Any food product should meet these three requirements: be safe for ingestion, have good eating qualities (flavor, taste, texture, etc.), and be acceptable by the consumer. The implications of this last point is made readily apparent by considering the recent controversies with irradiated food. This technology, which has been scientifically proven to be totally exempt from risk when properly carried out, is still not acceptable by the majority of the consumer sector (9).

Another problem in the SQA approach is that for some harmful agents, the cost or the possibility of removing them completely is beyond reasonable feasibility. This results in complete lots of food having to be discarded. A typical example is the case of mycotoxins, where removal is impracticable.

2. Hazard Analysis Critical Control Points (HACCP).

This kind of analysis, first introduced in 1973 as a preventive method to ensure the quality of food involved in space programs, then extended even to the preparation and handling of food in food service applications (12), involves:

- i. the identification of foods or ingredients that are known to have a pronounced effect on food safety (for example, because they are widely consumed by special sectors of the population, such as infants) and in view of the pathogens they can be vectors of. This is a very dynamic field where pathogens that once were only listed in taxonomy manuals can become a menace to public health (2).
- ii. the identification of various critical control points, where it is known that food can lose its sanitary quality. Once these points have been identified, we are able to follow the fate of the food and its invading pathogens. It is worth noting that these critical points have been established for canned as well as for frozen foods.
- iii. the prevention of food infection, once the sources of pathogens have been identified. One valid alternative at this point would be to make the food

unfavorable for the development of the problem-organism by changing some of its attributes.

3. Good Manufacturing (and Distribution) Practices (GMP).

This approach, promulgated by the United States Department of Health, Education and Welfare, the Public Health Service, and the Food and Drug Administration is aimed at specifying safe procedures. These regulations are found in the Code of Federal Regulations, Title 21. The code covers aspects on the processing plant, as well as grounds, utensils and equipment, sanitary facilities and operations, processes and controls, and personnel. There are also specific GMPs for fish and seafood products, cacao products and confectionery, bottled water, bakery foods, tree nuts and peanuts, pickled, fermented and acidified foods. However, these regulations do not specifically deal with a step which is crucial in the sanitary safety of food: distribution. It is known that it is during distribution and preparing of food, rather than in the processing phase, where the greatest damages are inflicted (9).

4. Longitudinally Integrated Safety Assurance (LISA).

This methodology, which links HACCP to safety assurance until the moment of consumption, urges for a control of the food from the early stages of raw material until the final step of eating it (8). This "auditing" of food at all stages followed by immediate rectification when required, is a real need in the present world where production centers are located far from processing centers and are sometimes distant from consumption centers. This time elapsed between production and consumption as well as all the handling steps food goes through contributes to the low sanitary quality of many products.

A Typical Case of Food Contamination

Let's analyze a common channel where food becomes contaminated. The animals we eat have been exposed during the course of their lives to many sources of contamination: feed, insects, contaminated waters, rodents, etc. Even though these animals are clinically healthy, their intestinal tracts act as reservoirs of human pathogens. It would be extremely difficult to find an animal devoid of potential pathogens in its intestinal tract. Once these animals are slaughtered, the microorganisms may be spread all over the carcass - this is especially true in pork and poultry - and it would be very unlikely to find a cut of meat that is not a vector of some intestinal microorganisms.

When meat is properly cooked, most of these microorganisms become heat-inactivated, but yet not all of the cells or their products are equally heat-sensitive. Some can survive in meat that has not been exposed to adequate cooking. Moreover, at any site and at any time the hazard of recontamination of initially safe food exists. The feces of the infected animal contributes to the dissemination, and also the utensils in contact with the raw meat, if they are not properly sanitized. The problem becomes more difficult to solve in societies where the consumption of raw meat is a habit.

Decontamination Measures

Within this context, it is easy to realize how important asepsis is in processes of food handling. However, it must also be realized that food contamination often becomes an unavoidable fact. It is in these instances when food decontamination measures become a necessity. Some of the procedures commonly used for food decontamination are:

1. Pasteurization, which is a moderate heat treatment that eliminates non-sporing pathogens commonly present in foods such as raw milk. As indicated in the "Wilson's Triad," pasteurization should go along with use of hermetically sealed containers and refrigeration, so as to avoid recontamination and proliferation of residual organisms, respectively.
2. Detergent Sanitation, which consists of a rinse with special detergents. This is mandatory in some western European countries to guarantee specific pathogen-free (SPF) vegetables. A water rinse is used effectively to reduce the microbial load present on shellfish.
3. Filtering or centrifugation of liquid foods, where the residue on the filters or the pellets that result from centrifugation are eliminated. They are used in the milk and fruit juices industry.
4. Irradiation, which is an ideal method for already packed food. This mode of processing is totally safe if applied at the recommended dosage, and the results are extraordinarily good.
5. Organic acid treatments, where acids such as lactic, citric, etc. have a remarkable germicidal effect on *Escherichia coli*, *Salmonella* spp., *Yersinia enterocolitica* and *Campylobacter* spp. It is also completely safe and applicable to fresh meat and poultry (11).
6. Antagonists to pathogens, where non-pathogenic microorganisms are used for their competitive ability. An example is the antagonism between *Lactobacillus*, *Lactococcus* and *Pediococcus* species and pathogens such as *Clostridium botulinum*, *Clostridium perfringens*, *Salmonella* spp., *Staphylococcus aureus*, and others (3,4,5).
7. Dome Approach, where two or more decontamination procedures are used simultaneously to increase the effectiveness provided there is no interference.

Risk Analysis and Monitoring

As has been mentioned before, zero risk of contracting a foodborne disease is not achievable. For this reason, probabilities of contracting such diseases are stated within the context known as "As Low As Reasonably Achievable" or ALARA. These probabilities are expressed in the number of years a human being can live before contracting one of these illnesses. Of course, acceptable probabilities differ for very severe diseases such as botulism as compared to those much less serious such as *Salmonella* infections (8).

Now, once it has been determined by advanced methods of risk analysis that an entire process is safe, can we neglect monitoring? The answer is an emphatic "no." However, if the process is known to be safe, and we have strictly adhered to the GM(D)P, we have achieved two goals at the same time:

1. one can be more certain about the sanitary quality of the product;
2. indirectly, we have made the food sanitary quality less variable, thus, making sampling and monitoring more reliable (7).

In spite of the introduction and adherence to LISA, incidental process failures may yet occur. These may be due to a minor break of the "protective net," or to human inaccuracies. Such deficiencies are manifested by microbiological monitoring charts and can then be instantaneously rectified. Consequently to protect consumers against incidental process failure within a LISA-steered process, monitoring of final products is indispensable (10).

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The Level of Contamination of Lebanese Poultry Meat with *Escherichia coli* and Other Coliform Bacteria*

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Introduction

Bacterial food poisoning presents a potential public health hazard in all countries regardless of their level of development. Many bacteria other than *Salmonella* have been incriminated as etiologic agents of food poisoning. *Escherichia coli* has been reported to cause food poisoning as have other bacteria of the coliform group (1,6,8). Ordinarily *E. coli* is a harmless commensal that resides in the lower part of the intestinal tract of warm-blooded animals. However, some strains are pathogenic to the gut and are referred to as enteropathogenic *E. coli* (EPEC). Some of the EPEC strains are capable of producing enterotoxins and are referred to as enterotoxigenic *E. coli* (ETEC), others possess an invasive capacity and are called enteroinvasive *E. coli* (EIEC) (5,10).

The testing of poultry meat, beef meat and other foodstuffs for coliform bacteria indicates whether or not the food had been subjected to contamination of nonspecific nature which results from poor standards of hygiene in the food industries, cafeterias, restaurants and the house kitchen. The microbiological examination of foods and food products provides information concerning the quality of the raw food and the adequacy of the sanitary conditions under which such foods were processed as well as the effectiveness of the methods used in preserving these foods (12). The present study was undertaken to determine the level of contamination of poultry meat with *E. coli* and other coliform bacteria. The presence of these bacteria in foods is considered to be indicative of contamination and hence of the possible presence of enteric pathogens, particularly salmonella organisms.

Materials and Methods

Poultry Meat Samples

This study was carried out on a total of 50 raw samples of poultry meat consisting of 27 "Shish Tawouk" and 23 deboned meat slices. "Shish Tawouk" are small cubes of raw poultry meat soaked for about 30 minutes in a mixture of

lemon juice, tomato juice, olive oil, pepper and table salt to make the meat more tender and tasteful. Deboned poultry meat slices consist of small pieces of poultry meat from which the bones are removed. They are not treated with the mixture as in the case of the "Shish Tawouk" except for the addition of table salt. Both meat samples are served after being barbecued, together with a preparation made up of garlic paste and olive oil.

Fifty to 100 gram samples were randomly collected from different retail outlets including supermarkets, big and small restaurants and grocery stores in East Beirut. The samples were transported within 30 minutes to the Bacteriology Research Laboratory and were kept in the refrigerator at 4°C and examined within two hours after their receipt.

Bacteriological Examination of the Samples

A representative one-gram portion of each sample was minced into 9 ml of sterile saline in a sterile mortar and pestle. Ten-fold dilutions of each of the samples were prepared in universal bottles using sterile physiological saline as the diluent. The surface plate method (13) was used for determining the number of viable coliforms in each of the dilutions using violet Red Bile Agar (BBL) as the plating medium. Each dilution (0.1 ml) was plated in duplicate. The plates were kept at ambient temperature, for about 30 minutes, to dry. They were then incubated at 37°C for 18-24 hours. The number of pink colonies was counted on each plate and the average number of colony-forming-units (CFU) per gram of original sample was calculated. The species of the coliform bacteria were identified by means of conventional biochemical tests (4).

Results and Discussion

The contamination of meat with coliform bacteria is a continuous process from the time of slaughtering the animal until the meat reaches the consumer. In the slaughter house, there are a number of potential sources of contamination, such as the animal body, intestinal contents, air contamination, water supply, equipment used during slaughter and the personnel in the abattoir (1,8). Only few methods

*Supported by a grant from the Lebanese Council for Scientific Research, Beirut, Lebanon.

have found practical applications in the bacteriological examination of foods and food products. The foremost of these methods have been the surface spread and pour plate methods (7,12). Greenwood (9) and Thomas *et al* (13) have recommended a convenient surface plate method for bacteriological examination of poultry. Using this method of examination, we have encountered seven coliform species in poultry meat (Table 1). *Enterobacter agglomerans* was the most common species followed by *Escherichia coli*, *Enterobacter hafnia*, *Serratia rubidaea*, *Citrobacter freundii*, *Klebsiella pneumoniae* and *Serratia liquefaciens* listed according to their decreasing frequency of isolation. *E. coli*, *Enterobacter* spp. and *Citrobacter freundii* were found more frequently in deboned poultry than in "Shish Tawouk" samples suggesting that the absence of the additives in the deboned poultry meat slices provided a better environment for their survival and growth. However, some of the coliforms namely, *Klebsiella pneumoniae* and *Serratia liquefaciens* were encountered in "Shish Tawouk" but not in the deboned meat slices. This finding suggests that these two coliform species are poor competitors with the other species present in deboned meat, however, they have a better chance to grow in the "Shish Tawouk" which have lower bacterial counts compared with the deboned poultry slices. *E. coli* was recovered from both types of samples occurring more frequently in deboned poultry meat slices. The presence of this organism in meat and other foods implies that other bacteria of fecal origin may be present including enteric pathogens.

Table 1. The level of contamination of "Shish Tawouk" and deboned poultry meat samples with coliform bacteria.

Coliform species	Positive Samples				Total	
	"Shish Tawouk"		Deboned Poultry		No.	%
	No	%	No.	%	No.	%
<i>Escherichia coli</i>	7	18.4	8	57.1	15	26.8
<i>Enterobacter hafnia</i>	7	18.4	3	21.4	10	17.9
<i>Enterobacter agglomerans</i>	18	47.4	11	78.6	29	51.8
<i>Serratia rubidaea</i>	7	18.4	2	14.3	9	16.1
<i>Klebsiella pneumoniae</i>	2	5.3	0	0	2	3.6
<i>Citrobacter freundii</i>	2	5.3	1	7.1	3	5.4
<i>Serratia liquefaciens</i>	2	5.3	0	0	2	3.6

Guidelines have been proposed by six states, in the USA for acceptable limits of coliform densities in food products. The proposed limits range from 50 to 1000 CFU of coliforms per gram of meat. Table 2 shows that only 34% of all the meat samples examined had coliform densities within the acceptable range. The remaining 66% of the samples had counts exceeding 10^3 CFU/g. All (100%) of the deboned poultry meat slices had coliform counts greater than 10^3 /g and some (13%) had counts greater than 10^6 /g. Most of the "Shish Tawouk" (62.9%), on the other hand, had coliform counts less than 10^3 /g and none of the samples showed counts greater than 10^6 /g. This difference in the coliform densities between the two types of poultry meat samples suggests that the mixture in which the "Shish Tawouk" was soaked is partially bacteriostatic to the coliform bacteria. The findings that some (37%) of the "Shish Tawouk" samples had high levels of contamination (10^3 - 10^6 /g) suggests that these

samples were originally highly contaminated or were inadequately refrigerated. The presence of coliform bacteria in the poultry meat is indicative of contamination with other enteric pathogens and poor hygiene. The survival and further growth of these bacteria in meat results in its spoilage and presents a potential risk to the consumer if such meat is eaten undercooked or inadequately barbecued.

Table 2. Coliform counts for "Shish Tawouk" and deboned poultry meat samples.

Coliform counts CFU/g	Type of Samples				Total Samples	
	"Shish Tawouk"		Deboned Poultry		No.	%
	No	%	No.	%	No.	%
0	4	14.8	0	0	4	8
>10 - <10 ²	3	11.1	0	0	3	6
>10 ² - <10 ³	10	37.0	0	0	10	20
>10 ³ - <10 ⁴	5	18.5	7	30.4	12	24
>10 ⁴ - <10 ⁵	4	14.8	8	34.8	12	24
>10 ⁵ - <10 ⁶	1	3.7	5	21.7	6	12
>10 ⁶	0	0	3	13	3	6
Total	27	100	23	100	50	100

Among the coliform spp. perhaps *E. coli* is the most significant and medically important organism. Certain EPEC serotypes have been implicated in human diseases and food poisoning outbreaks. The human disease syndromes resulting from the ingestion of EPEC have been divided into two main groups. The first group include the cholera-like or enterotoxigenic illness in man caused by the ETEC *E. coli* serotypes. The second group include the dysentery-like or invasive illness caused by the EIEC serotypes that are invasive in nature. To our knowledge, sporadic cases and limited food poisoning outbreaks due to EPEC strains have been observed in Lebanon. However, none of these have been investigated or documented.

The systems of monitoring food handling and food processing, although in existence in Lebanon, are deficient and are not always implemented and followed-up particularly during the 15 years of continuous war. It is, therefore, strongly recommended to establish a central agency or body to set-up regulations guidelines, procedures and standards for foods and food products. The Lebanese Standards Institution started its work in 1964 setting up required standards for all locally industrial products. However, its work is far from being complete and any existing food standards are not adhered to. There is, at present serious considerations for the establishment of a Research Institute for Food and Drug Analysis in the Faculty of Medical Sciences at the Lebanese University. One of the main responsibilities of this Institute will be to formulate standard methods for the microbiological examination of all types of foods and to set-up microbiological standards for these foods (2).

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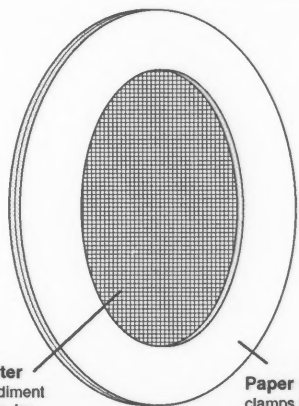
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Ivermectin in an Arkansas Dairy Herd

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On November 9, 1989, officials of the Arkansas Department of Health Milk Division notified Milk Specialists of the Southwest Regional Office of FDA of the misuse of an over-the-counter, anti-parasitic medication, Ivermec (Merck brand of Ivermectin). This product is a non-prescription wormer for use in beef and non-lactating dairy animals, but with a label restriction prohibiting its use in female dairy cattle of breeding age.

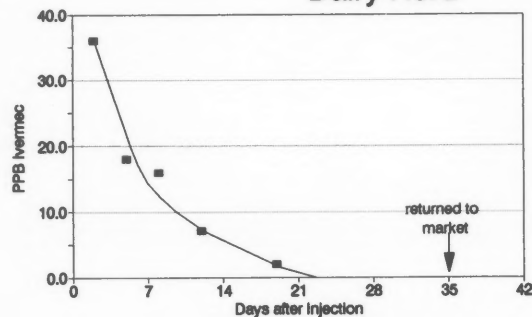
An Arkansas dairy farmer treated his 120-animal herd with this product, and then read the label restriction. His herd included 60 milking cows. He immediately notified the milk plant that purchased his milk. The plant notified state regulatory authorities. The state immediately embargoed the raw milk on the farm, took samples for analysis, and informed the FDA Regional Specialist. This Specialist contacted Milk Safety Branch (MSB) and the Center for Veterinary Medicine (CVM) in Washington D.C. for assistance and risk assessment, and Merck for technical and analytical information.

A staff veterinarian of Merck Veterinary Technical Services stated that the firm had done no milk withholding studies but that the drug had a 35-day slaughter withdrawal time. France and the United Kingdom have established a withdrawal time of 28 days prior to the next lactation for use on dry cows (1). One study of milk residues/withholding times conducted in Europe found traces of Ivermectin 29 days post use (2).

During phone conferences with MSB and CVM, it was determined that the tolerance levels for Ivermec in milk were 0 and that High Pressure Liquid Chromatography is the method of choice for residue detection. After discussions on risk assessment, detection limits, and analytical procedures and capabilities, it was determined that the affected herd milk should remain off the market for at least 35 days with testing to assure drug clearance and that no detectable residues remained in the milk.

Samples were analyzed on a weekly basis by Merck from 11-10 to 11-27, and on 11-16 by the FDA lab in Denver. Results of these analyses are shown in Fig. 1.

IVERMEC in an Arkansas Dairy Herd



Even though analytical results indicated that levels of Ivermec in the milk had dropped below levels of concern by the 24th day after injection, the milk was kept from the market for the full 35 days to ensure absolute safety of the product available to the consuming public.

This is an excellent example of State and Federal Regulators, the Milk Industry, and a Drug Manufacturer cooperating to solve a problem and maintain a safe wholesome milk supply for the consumer.

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The Yogurt Story - Past, Present and Future Part III

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Symbiosis Between Rod and Coccus

Earlier, it was mentioned that the uniqueness of yogurt is attributable to the symbiotic fermentation involved in its manufacture. Further, symbiosis was defined as a beneficial growth relationship between two different biological entities. When *Streptococcus thermophilus* and *Lactobacillus bulgaricus* are grown together one stimulates the growth and metabolic activity of the other. Reinbold (3) states that single strains or species often are incapable of accomplishing what mixtures of compatible symbiotic strains or species can do. The results of such associative growth are manifested in more rapid acid development, improved flavor, greater cell numbers, more extensive carbohydrate depletion and a more desirable body and texture in the finished product.

In discussing the characteristics of *S. thermophilus* it was noted that in pure cultures, *coccus* strains coagulated milk but the final titratable acidity attained was relatively low compared to other lactic acid bacteria. In short, *S. thermophilus* produces a relatively sweet curd in milk. Although *rod* cultures reach relatively high titratable acidities in milk, the rate of growth and acid production *initially* is slower because of its microaerophilic nature and the requirement for certain stimulatory compounds. The slow growth of the rod and the relatively low acid production by the coccus are characteristics that are unacceptable to the yogurt industry. Yogurt is a tart, high acid product (titratable acidity of 1.2-1.4 is desirable), and the dairy industry requires a rapid turnover of fermentation vats - generally 3.5 - 4.0 h at 43 C. - 45 C (110° - 113° F). This makes it mandatory for the dairy industry to exploit the symbiotic relationship between *coccus* and *rods* to obtain the accelerated acid production. Additionally, such symbiotic fermentation also results in a product with excellent flavor balance.

What Happens in Symbiotic Yogurt Fermentations?

When *rod* and *coccus* are grown together in milk, *S. thermophilus* initiates active growth because of its greater oxygen tolerance. The *rod* component lags behind. As lactic acid fermentation by *S. thermophilus* proceeds, the oxidation-reduction potential is lowered and the reduced environment allows *L. bulgaricus* to grow. Rod growth is further stimulated by the CO₂ liberated by the *coccus* from urea in

milk and by certain by-products of carbohydrate fermentation, namely, formic and pyruvic acids. The lactobacilli being relatively more proteolytic, breakdown milk proteins to yield peptides and amino acids. The availability of peptides and amino acids greatly spur the growth of the *coccus* component. The beginning and mid-stages of yogurt fermentation is dominated by *S. thermophilus*. As the pH declines to below 5.2, *L. bulgaricus* starts to grow actively and the contribution of the *coccus* is muted. This relationship continues till pH 4.4, when *coccus* growth fades away and the fermentation is dominated by the *rod*. Moon and Reinbold (1) likened this pattern of response to the proverbial fable of the hare and the tortoise: "*Streptococcus thermophilus* jumps off to an early start producing acetaldehyde and some lactic acid. The rod comes along more slowly, but powerfully lowers the pH by production of most of the lactic acid." The simile, however, ends at the comparison of the relative rates of growth and acid production of the *rod* and the *coccus*. Unlike the hare and the tortoise the relationship is *co-operative* and *not competitive*. The symbiotic relationship could probably be portrayed as a relay race where the fore-runner is the *coccus* which hands the baton to the *rod*, which finishes at an accelerated pace as the breaking pH of the yogurt coagulum (finish line) approaches. Yogurt fermentation is usually arrested by cooling when the pH reaches between 3.9-4.4 depending upon the tartness desired.

Factors in Symbiosis

Reinbold (3) points out that high caseinolytic activity of *L. bulgaricus* does not automatically assure enhanced stimulation of *S. thermophilus*. He adds that it is the specific nature of proteolysis that contributes to stimulation. Radke-Mitchell and Sandine (2) also state that the extent of stimulation of the *coccus* by the *rod* is determined by the specific temperature of incubation, which governs the concentration and type of stimulatory factors liberated by the *rods* in the mixture.

In their excellent review on the associative growth relationship of *S. thermophilus* and *L. bulgaricus*, Radke-Mitchell and Sandine (2) discuss certain critical characteristics that promote the symbiosis. They point out that cell-bound proteinase activity in *L. bulgaricus* is about 20 times greater than that found in *S. thermophilus*. On the other hand,

cell-bound aminopeptidase activity in the *coccus* was much greater than that found in the *rod*. Additionally, cell-bound and cell-free dipeptidase activity found in *S. thermophilus* was lacking in *L. bulgaricus*. These characteristics bode well for associative growth because the weak proteinase and high peptidase and amino peptidase activity of the *coccus* are complemented by the strong proteinase and near lack of the peptidase activity among the *rods*. They also mention that the other critical metabolic complementation is the stimulatory role of carbon dioxide on lactobacilli. Experimental evidence has shown that *L. bulgaricus* growing as pure cultures in milk needs greater than 3.1 mg of carbon dioxide per 100 grams of milk in addition to formate (the other stimulatory component produced by the *coccus*) to obtain stimulation equal to that found in associative growth with *S. thermophilus*. The key metabolic pathway that could yield the requisite amount of carbon dioxide is the degradation of urea in milk by *S. thermophilus*. Breakdown of urea also yields ammonia, which explains why coagulated milk cultures of pure *coccus* strains have a higher pH and lower

titratable acidity. Ammonia liberated from urea provides a sort of internal buffer, which the *rod* overcomes as mutual stimulation occurs.

At this juncture, a note of caution is necessary. In the selection of *rod* and *coccus* strains for pairing, evaluation for both rapidity of acid production and good acetaldehyde flavor is necessary. Evaluation on the basis of acid production alone would not ensure a good flavor balance and *vice versa*. Compromises have to be made in these characteristics to arrive at a desirable composite yogurt culture to be used at a specific incubation temperature range.

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Biotech Toolbox Will Soup Up Cheese Cultures

Biotechnology will soon allow cheesemakers to produce cheese at lower cost with less waste, thanks to engineered resistance to a nasty virus that infects cheese cultures. Cultures that produce full aged-Cheddar flavor in three months rather than 12 will be developed. New cultures will produce better "pizza characteristics" in Italian-type cheeses — improved melting, stretching and browning qualities. Customized culture genetics should also deliver low-fat and low-sodium cheeses with much better flavor and texture than currently available, according to a University of Wisconsin-Madison researcher.

New, souped-up cheese cultures should help cheesemakers produce and market a greater variety of better-tasting cheeses at lower cost than current cultures allow, according to UW-Madison food scientist Jim Steele. That's good news for consumers and dairy farmers as well as cheesemakers.

The bacteriophage (literally, "eater of bacteria"), a virus that infects bacteria, has given cheesemakers headaches for decades. The phage can kill the culture bacteria that generate lactic acid, producing a "dead vat." With no acid production, the pH of the milk can't drop, the vat can't produce cheese curd, and the cheesemaker has to dump the contents, Steele explained.

The virus can also create a "slow vat," yielding low-quality cheese that will be downgraded at market. A slow vat can back up all the batches behind it, throwing the entire factory off schedule.

Phage-resistant cheese cultures save time, milk and money for cheesemakers. But bacterial viruses, like common-cold viruses, come in a smorgasbord of strains. The cheese industry has been battling phages for decades, and the fight will continue because the viruses mutate to overcome whatever resistance the culture bacteria can develop. "We're trying to stay one step ahead of the phages. We're unlikely to eliminate them — just as we're unlikely to eliminate all cold viruses," Steele said.

To fend off the phages, researchers seek out resistant culture bacteria. Genetic engineering generates results much faster than traditional methods — in months rather than years, Steele said. For example, researchers using traditional methods to improve a Cheddar culture must screen thousands of bacteria from nature, or look for a one-in-a-million random mutation. Using biotechnology, researchers can transfer an unlimited number of genes, and derive new approaches for constructing phage-resistant genes.

Researchers also use natural gene transfer to move genes among various strains of culture bacteria, but only

a limited number of phage-resistance genes can be transferred via this method, according to Steele. The technique shuffles plasmids, which are packets of genetic instructions found in bacterial cells. Plasmids carry various genes, and bacteria often exchange plasmids on their own. Scientists have developed ways to encourage such exchanges.

Genetic engineering also offers opportunities to modify cultures for Italian-type cheeses. Natural gene-transfer systems either don't exist (because they don't involve plasmids) or are not well understood for these culture bacteria.

Phage-resistance is not the only culture quality under scrutiny. Researchers also want to speed up flavor development and cut aging time, and produce good flavor and texture in low-fat and low-sodium cheeses. "By enhancing the texture and flavor of low-fat and low-sodium cheese varieties, we hope to offer the consumer quality products that reflect current dietary concerns," Steele said. "Defects such as bitterness and other off-flavors are an even bigger problem in low-fat cheeses than in regular cheeses. We don't understand how flavor develops, so it's hard to fix flavor problems." Steele's lab and others are looking at how various enzymes influence flavor and texture.

Some technical and legal hurdles remain, Steele said. The industry needs a safe, food-grade vehicle for shuttling genes around. So far, scientists have not paid much attention to food-grade vectors. "We need more sophisticated vehicles — Cadillacs, not '66 VW bugs," he said.

Natural gene transfer is permitted, but the U.S. Food and Drug Administration has yet to review recombinant DNA techniques for cheese cultures. The International Biotechnology Council recently declared that gene transfers from harmless sources (bacteria that do not cause disease or generate toxins) to similar hosts, especially those that are already in the food chain, are safe for enzyme or ingredient production or for direct use in food products. Steele hopes that the FDA will take a similar stance.

In 1974, just two labs in the world studied the genetics of lactic acid bacteria. By 1978 there were eight; in 1986, 200. Today, there are more than 400 labs, mostly in the European Economic Community, New Zealand, Australia, the United States, and Scandinavia.

Steele discussed future cheese cultures at the fourth annual Cheese Research and Technology conference March 7 in Madison. The conference was sponsored by the Center for Dairy Research at UW-Madison.

For more information contact Jim Steele at (608)262-5960.

Taylor Technologies Inc. announces New Marketing Manager

Taylor Technologies Inc., manufacturer of quality water testing products, is pleased to announce the arrival of their new marketing manager, Dave Termotto.

Termotto, a marketing communications specialist, will work with Tom Metzbower, Director of Sales and Marketing, to demonstrate the quality associated with every Taylor product. "I plan to provide both existing and new customers the opportunity to see how well Taylor's test kits and reagents continue to out-perform our competition's products," Termotto said.

During his 15 years in the marketing field Termotto has worked for many corporations, including the Ogilvy Group and Citicorp.

For more information contact Marisa Feltham at (301)472-4340.

IDF/ISO/AOAC Submit Methods for Adoption

AOAC's liaison officer to IDF/ISO/AOAC, Ronald Case of Kraft General Foods, and AOAC's European Representative, Margreet Lauwaars, represented AOAC at the 22nd session of the FAO/WHO Committee of Government Experts on the Code of Principles Concerning Milk and Milk Products held in Rome, Italy, on November 5-9, 1990.

Lauwaars, who also chaired the IDF/ISO/AOAC Tripartite meeting prior to this session, presented the Tripartite Report. Since 1970, AOAC has actively participated in joint groups of experts within the International Dairy Federation and the International Organization for Standardization, Technical Committee 34, Subcommittee 5 — Milk Analysis. This cooperation, initiated by the Codex Milk Committee, has resulted in many methods being adopted by the FAO/WHO Code of Principles Concerning Milk and Milk Products, known as Codex Milk.

A total of 22 new methods were submitted at this session, and 11 other methods were revised and resubmitted. To date, 38 methods have been adopted by Codex Milk.

All methods submitted to the Codex Milk Committee by IDF/ISO/AOAC are listed in the *Inventory of Methods of Analysis for Dairy Products*. Reference numbers identify IDF Standards, ISO International Standards, AOAC's *Official Methods of Analysis* method numbers (14th and 15th editions), and FAO/WHO Codex Standards. The inventory was originally published in 1984, updated in 1985, and again in 1990 as IDF Bulletin 248/1990. It lists methods on the basis of products and analytes to be determined.

For a copy of the Codex inventory by dairy products, write to the International Dairy Federation, 41, Square Vergote, 1040 Brussels, Belgium, or the AOAC

European Representative Margreet Lauwaars, PO Box 153, 6720 AD Bennekom, The Netherlands.

London's Farm Dairy Introduces No-Fat Ice Cream

London's Farm Dairy has made the pursuit of good health easier by introducing a fat-free, cholesterol free ice cream.

London's line of non-fat ice cream features five mouth-watering flavors - vanilla, peach parfait, chocolate parfait, blueberry parfait, and strawberry parfait. The ice cream contains less than .5% butterfat, compared to the Standard 12% for regular ice cream, for consumers who want a delicious but healthy dessert.

The product is available to consumers in square half gallon packages at a price comparable to standard half gallon ice cream products.

London's Farm Dairy is one of Michigan's largest dairies. Introducing many innovative technological advances, London's was the state's first dairy to computerize its business operation to maximize production and distribution. London's Farm Dairy distributes its complete line of dairy products to over 1,700 retail outlets throughout Michigan.

For more information contact Marilyn G. Palliaer or Stacey L. Chidester, DDB Needham Detroit at (313)643-4300.

IBM Named Corporate Sponsor of '91 National Quality Month Campaign

John F. Akers, chairman of the board of International Business Machines (IBM) Corporation, will serve as chairman of the 1991 National Quality Month campaign. The annual campaign, sponsored by the American Society for Quality Control (ASQC), emphasizes the importance of quality improvement processes in business, industry, government, and academia.

The annual ASQC National Quality Month (NQM) campaign was launched in 1984 with a Joint Resolution of Congress and a Presidential proclamation designating October as National Quality Month. The original legislation was reaffirmed in 1989 by the U.S. Congress and President Bush. The 1991 theme, "World-Class Quality" will emphasize the importance of quality standards worldwide.

Market-driven quality, according to Akers, is the overriding goal of IBM in the 90s. "Our aim," says Akers, "is to make every IBM offering perfect in the eyes of the customer, and to rid IBM of every last vestige of waste and inefficiency." IBM hopes to achieve this goal internationally by 1994.

Akers has been with IBM since 1960, following active duty as a Navy carrier pilot. He joined IBM as a sales trainee in San Francisco and subsequently was

appointed to executive positions with various IBM business groups. He was elected senior vice president in 1982. The following year Akers was elected president and director of IBM. Akers was named chief executive officer in 1985 and retains that position since becoming chairman of the board in 1986.

As chairman of the NQM campaign, Akers will also give the keynote address at Quality Forum VII which will be held October 1 in New York City. The Forum is an annual meeting of some of the best strategic minds in business and industry. It is broadcast via satellite to more than 1700 locations. AT&T will sponsor the live broadcast of the Forum to satellite sites at various foreign locations.

ASQC, a professional, nonprofit association, is the worldwide leader in the development, promotion, and application of quality-related information and technology for the quality profession, private sector, government, and academia. The Society, headquartered in Milwaukee, serves more than 72,000 individual and 700 corporate members in the United States and 62 other nations.

New Transportation Products Division Formed at AFCO

Alex C. Fergusson, Inc. (AFCO products) president Robert F. Sistowicz has announced the formation of a new Transportation Products Division to provide cleaners, degreasers, sanitizers and related application equipment to the transportation market.

To head the new division, Sistowicz also announced the appointment of Donald H. Lambert as Division Manager. Lambert, previously Corporate Manager of Tank Cleaning Methods and Systems at Chemical Leaman Tank Line, Inc., has over 30 years management and sales experience in the field of tank and commercial vehicle cleaning and sanitizing and cleaning technique know-how for over 4,000 products, including hazardous materials, that are carried over the road. Notable in his background is the development of a modular tank cleaning system installed at more than 30 locations nationwide.

Fergusson, a 135 year old company, is a leading supplier of cleaners in the food processing, pharmaceutical and beverage industries.

For more information, contact Alex C. Fergusson, Inc., Spring Mill Drive, Frazer, PA 19355, (215)647-3300.

Princo Appoints Gilbert G. Pfaff General Manager of Process Control Instruments

Princo Instruments, Inc., manufacturer of level and density control instrumentation, has promoted Gilbert G.

Pfaff to general manager of its Process Control Instrument business segment. As general manager, Pfaff will be directing Princo's new product research and development, sales and marketing, customer service, and technical service and support teams.

According to Princo president Ray Weinmann, "We are fortunate to have, in Gil, a well-qualified, energetic professional who is thoroughly experienced in the instrumentation business. Gil has over 30 years experience with instrumentation development and sales, and has worked extensively with customers, our sales and marketing staff, and on new product planning and development. We are confident that Gil will help lead Princo to higher levels of customer and sales representative support while directing the development of new, innovative products."

Pfaff has been with Princo for the past 12 years, most recently as marketing manager for process instrumentation. Previously, he had been a sales representative with Miller Fluid Power and the S.C. Johnson Company. Before those positions, he had been with Princo for seven years in engineering and sales, helping to develop density, barometric pressure, and temperature measurement products. He has also worked in the research laboratories of American Meter Co. & Rohm & Haas Company. Pfaff is a member of the Instrument Society of America (I.S.A.), has attended LaSalle and Drexel Universities, and holds a design patent on patient heart monitoring equipment.

For more information contact Byron L. Goldstein at (215)884-9502.

New Lab Test Detects Yeast

A highly accurate lab test developed by Kansas State University researchers could make detection of a major human pathogen nearly foolproof.

Daniel Y.C. Fung, professor of food science, and Chao Liang, graduate student in food science, are researchers in the field of rapid-methods testing. They seek faster, more accurate ways of detecting microorganisms in clinical, food and industrial settings.

Fung and Liang have discovered a rapid-methods test for *Candida albicans*.

Candida is a common cause of human infection. Many women are familiar with the discomfort of vaginal yeast infections caused by *Candida*. The yeast can have more devastating effects, however, on persons with weakened immune systems.

Capable of invading any cavity or tissue in the human body, *Candida* can seriously threaten health in infants, elderly and those infected with the AIDS virus. It is the most common manifestation of HIV infection.

Patients with AIDS or other immune system disorders can be infected with a number of pathogens.

Pathogens are agents that cause diseases. *Candida* is one such micro-organism.

"Rapid identification of *Candida* is important," Fung said, so medical professionals can begin correct treatment as soon as possible.

This rapid-methods test uses a dye-containing growth medium that marks *Candida* as it grows. After exposing the medium to ultraviolet radiation, the pathogen is visible under fluorescent light.

Organic dyes have long been used in diagnostic microbiology to separate different species by color. What distinguishes this test is its high rate of accuracy.

"If a lab test is 90 percent accurate, it is considered a good test," explained Fung. The new test for *Candida* surpasses this mark at a rare 99.5 percent accuracy.

The yeast test is also notable for other qualities. "This medium is simple to make," Fung said.

Test results are available quickly, he said, often in 12 to 24 hours. The combination of simplicity, accuracy and rapid results make the test an attractive one for medical microbiologists who must detect millions of yeast infections each year.

If you have any questions or need more information contact Dr. Fung, Department of Animal Science & Industry, 207 Call Hall, Manhattan, KS 66506; (913)532-5654.

Thomas W. Glasgow Elected to NSF Board of Trustees

The election of Thomas W. Glasgow, Senior Vice President for McDonald's Corporation, to the National Sanitation Foundations's (NSF) Board of Trustees was announced by Dr. Nina McClelland, President, CEO, and Chairman of the Board after the Foundation's 1990 semiannual meeting.

"We are pleased to welcome Tom Glasgow as a Trustee," said Dr. McClelland from NSF's international headquarters in Ann Arbor, Michigan. "His 21 years of leadership experience in restaurant management is a valued addition to our Board."

Glasgow began his McDonald's career as a restaurant manager in 1969 and advanced through several field positions before becoming Atlanta's Regional Vice President in 1980. He was promoted to Vice President of Operations and Product Development in 1983, and to his present position as Senior Vice President for Operations, Product Development and Nutrition, Training, and Equipment Engineering in 1985. He graduated in 1968 from Michigan State University's School of Hotel, Restaurant and Institutional Management.

NSF, an independent, third-party, not-for-profit corporation, is a pioneer in setting consensus standards and certifying products and materials in the environmental and public health fields. The NSF Mark is seen on food service equipment in restaurants and institutional kitchens, hotel ice makers, bottled water, drinking water treatment units, swimming pool and spa equipment, plastics pipe and other water system components, water

and wastewater treatment systems and materials, and on many other products worldwide.

For further information contact Hoz Vischer, Director of Communications, NSF, P.O. Box 1468, Ann Arbor, MI 48106, or by telephone at (313)769-5521, FAX (313)769-0109.

New Comprehensive Guide to Packaging Foods With Plastics Now Published

Over the past 40 years, food packagers have come to realize that plastic is the material of choice for many products. In fact, this burgeoning packaging industry is spending over \$37 billion on plastics material in the United States alone.

While this figure may seem high, in reality, it is a sound investment in the \$500 billion Americans spend each year just to eat. Plastic offers versatility, light weight, environmentally-safe options, and the ability to both display and protect products.

A new book, *Packaging Foods with Plastics*, uniquely relates specific food packaging needs to plastics packaging solutions.

This new comprehensive guide and reference to packaging foods and beverages in plastics features:

- Organization by food type - how and why foods are packaged as they are, plus material and equipment needs
- Detailed information on the relationship of food properties to packaging requirements
- How properties combine with process and design capabilities to increase packaging cost-effectiveness
- Factors affecting food safety and the environment

The authors of this book, Wilmer A. Jenkins, Ph.D., consultant, and James P. Harrington, Editor, *Journal of Plastic Film & Sheeting*, have over 30 years combined experience in this field.

The book describes the design capabilities obtained with the use of plastics (fabricability, non-breakable, clarity, lightness, ease of handling by consumer, etc.) and the property range available through the development of coextrusion, polymer blends, and copolymerization.

Over 80 figures and tables illustrate the text and help communicate the concepts of packaging foods with plastics.

Animal Drug Residues in Milk - Recent Industry Activity

As you know, this topic has been getting a lot of attention lately. In order to represent Cheese Maker interests, WCMA has been a part of Wisconsin's Committee on Milk Quality and Milk Residues, which is

exploring ways and means to eliminate the animal drug residues in from the milk supply. Members of this committee include producers, processors, veterinarians, WDATCP, UW-Madison, and the Department of Health. Several meetings were held in order to refine the issue and determine a course of action. The Committee recommended the following:

1. Endorsed conducting a survey to identify what caused the residue problem at the farm - this project is underway.
2. Endorsed the combination educational/enforcement program directed toward producers and veterinarians that was included in the FDA policy/procedure memorandum.
3. Recommended that processor representatives explore:
 - a. Outlets for and proper disposition of milk from a farm pick-up load that is detected as having actionable residue.
 - b. Explore, on a voluntary basis, a program whereby dairy producers would agree to hold an identified producer responsible/liable for a positive farm pick-up load of milk.
 - c. If action in (b) above cannot be accomplished on a voluntary basis, explore establishing mandatory requirements via statute or rule.
4. Develop a summary test of most applicable and practical tests available now and explore what can be done to encourage development of better tests and test methods.
5. Recommend WDATCP investigate transfer of patrons from one dairy plant to another to determine if this transfer was prompted by activities related to a residue problem.
6. Agreed to explore establishing civil penalties for violations when residues are detected (particularly at the farm) with the action based on results obtained by the dairy plant.
7. Endorsed a survey to be conducted by the UW-School of Veterinary Medicine of dairy producers and veterinarians to identify management factors in-farm that affect antibiotic residues.

Work on this problem is continuing. The Department of Agriculture will be working to prepare amendments to the sections of Ag 60, which deals with milk quality standards, that incorporates the suggestions and recommendations of the Committee. All indications are that WDATCP and FDA will be involved in this issue in a big way. WCMA will keep you alerted to any proposed changes that may affect you.

Reprinted from the Wisconsin Cheese Makers Association Update, February, 1991.

Anderson Promotes "New Paradigm of Frozen Foods"

Frozen food companies are taking positive action in the 1990s to ensure the success of the industry well into the future — they are working through trade associations

to build a "new paradigm of frozen foods," according to Steven C. Anderson, president of the American Frozen Food Institute (AFFI).

At a National Prepared Frozen Food Association (NPFPA) dinner on March 21 in Teaneck, New Jersey, Anderson challenged those in attendance to use trade associations as a means to address today's important issues, and to build for the future.

"While your company may be concerned about the next quarter or the next year, you can plan for the future by working on industry-wide issues through your association," said Anderson. "If we are not building for the future, we are robbing from the future. Your association membership is a company investment."

Anderson stressed that there are many issues confronting the industry today, including packaging concerns, food labeling, handling and transportation and food safety. "However, the industry needs to look toward the future and I know of no better way to do that than through your trade association," he said.

Anderson gave two examples of AFFI programs that are building toward the future: AFFI's Foundation for Frozen Food Research and AFFI's Public and Trade Relations Program.

"One of the most important activities we have undertaken to ensure a bright future for the industry is to enhance the quality of frozen food. With the goal of enhancing quality, AFFI has established the Foundation for Frozen Food Research." Anderson said the Foundation is developing and coordinating scientific research into industry-wide, non-competitive areas to increase knowledge of the freezing, storage and thawing processes.

Anderson also addressed AFFI programs targeted at increasing the use of frozen foods at the foodservice level. He stressed that consumer demand for variety is overwhelming, and operators are feeling hyperpressure to balance more complex means with declining labor and customer expectations of faster service.

Anderson concluded, "Whether you are involved in AFFI, NPFPA or another association, you must invest in planning for the future. Together, members can effectively achieve goals through group action rather than individual action. Associations, when they work well, represent a united voice, not many voices singing various tunes."

AFFI is the national non-profit trade association that has represented the interests of the frozen food industry for 50 years.

For more information contact Traci D. Vasilik at (703)821-0770.

Mandatory BST Labeling Too Costly

Based on what is known about consumer concerns and rBST, the costs of mandatory labeling outweigh its conceivable benefits. That's the conclusion of the

Wisconsin Department of Agriculture, Trade and Consumer Protection study of labeling dairy products produced using rBST released on March 11. Alan Tracy, Secretary of the Department, said, "State mandated labeling requirements for rBST pose significant concerns. There are a lot of dangers for states to attempt regulation of rBST without evidence that consumers are at risk." As you know, the FDA has found that milk produced by cows treated with rBST is safe for human consumption. The six-month study stresses that attempts to regulate rBST are difficult because there are no practical methods to test dairy products to determine whether the cattle were given rBST. Without testing, the study concludes, labeling efforts cannot be effectively enforced.

"Monitoring and control of rBST use will be expensive without effective product testing. Either consumers, taxpayers or the dairy industry would have to pay the costs," Tracy said. Some form of voluntary labeling could be implemented to satisfy consumers who want to avoid rBST products. However, Wisconsin and many other states already have laws that protect consumers from misleading labeling and deceptive advertising. The study evaluated three alternative approaches to rBST labeling:

1. Labeling under current regulations which protect against misbranding and fraudulent representation.
2. Regulation of voluntary claims that rBST was not used and certification of producers and processors who make voluntary claims.
3. Mandatory labeling of rBST and non-rBST products, and licensing requirements to facilitate audits and inspections.

These alternatives were analyzed comparing the reliability of consumer information, potential impacts of labeling on the dairy industry and labeling enforceability. The study states that the principal advantage of applying current food labeling laws to rBST labeling is that no new regulatory structures of costs would be needed; yet, rBST labeling could still be reviewed. The principal disadvantage is that, compared to more intensive regulations, consumers may have less assurance that rBST products would be identified and that non-rBST label claims were accurate. The main advantage of regulated voluntary labeling is that it would allow greater oversight of non-rBST claims. Also, the increased cost of labeling would be paid by those choosing to label their products. The main disadvantages are that it does not require labeling of rBST products and it may increase consumer apprehensiveness. It would also mean that dairy plants would have to keep their rBST milk separated from non-rBST milk - an expensive proposition. Regulated voluntary labeling could require certification of producers and processors and add inspection and recordkeeping requirements, but the truth of label claims could not be fully guaranteed.

The primary advantage of mandatory labeling is that, in theory, it would provide the most information to consumers about rBST use, and it could ensure the greatest degree of labeling accuracy as to whether rBST

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Environmental/Community Health Planner. Starting salary: \$31,000, **Springfield/Greene County, Missouri Health Department.** Duties will involve comprehensive planning and analysis of environmental, morbidity and mortality data. Request application from Personnel Office, City Hall, 830 Boonville Avenue, Springfield, MO 65802. Closing date for application acceptance: July 15, 1991.

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was used in milk production. The biggest disadvantage is that mandatory labeling would affect the whole dairy industry and would again require that milk supplies be kept separated. Mandatory labeling also assumes that all consumers are concerned about rBST, which is not true. Furthermore, it probably would conflict with federal laws governing food labeling and interstate milk shipments.

The FDA has jurisdiction over the regulation of rBST in its applications to cattle and over food labeling generally. This study notes that state level labeling of rBST should only be based on a clear state interest, such as consumer health and safety. Since FDA has found no human health concerns about rBST, state mandatory labeling is not justified.

Reprinted from the United States Cheese Makers Association, March, 1991.

Basic Food Microbiology Short Course

A basic food microbiology short course will be held September 9-13, 1991 at the University of California, Davis. The objective of the course is to give food processors a basic understanding of food microbiology principles and laboratory techniques. The course is appropriate for people with limited training in microbiology, and includes lectures, demonstrations and laboratory sessions. There are no prerequisites for this course.

Lectures include an introduction to microbiology, good laboratory practice, basic laboratory procedures, and microorganisms important in food processing. Presentations will also include environmental factors affecting microbial survival, foodborne pathogens, and solving in-plant microbiology problems.

Laboratory topics include standard plate count, most probable number, and membrane filter techniques for enumerating bacteria. New methods for detecting specific bacteria will be demonstrated.

Enrollment is limited to 32 students. Pre-registration is highly recommended. The \$700 registration fee includes reference and laboratory materials plus two dinners. A certificate of completion will be issued. For registration information and further details, contact: Robert J. Price, Food Science & Technology Dept., University of California, Davis, CA 95616-8598; phone (916)752-2194.

Federal Register

Animal and Plant Health Inspection Service

Production Requirements for Biological Products; Outline Guide for Diagnostic Test Kits

Agency: Animal and Plant Health Inspection Service, USDA

Action: Final rule.

Summary: We are amending the regulations by adding an outline guide which contains the requirements for the preparation Outlines of Production for diagnostic test kits. The current Standard Requirements contain such guides for other biological products but not for diagnostic test kits. The purpose of this action is to codify uniform requirements for the preparation of Outlines of Production for diagnostic test kits which could be used by all producers of veterinary biologics.

Effective Date: June 3, 1991

For further information contact: Dr. Albert P. Morgan, Senior Staff Veterinarian, Veterinary Biologics, BBEP, APHIS, USDA, Room 838, Federal Building, 6505 Belcrest Road, Hyattsville, MD 20782, (301)436-8245.

Supplementary Information:

Background

Veterinary biological products subject to the provisions of the Virus-Serum-Toxin Act as amended by the Food Security Act of 1985 (21 U.S.C. 151-159), including diagnostic test kits, are required to be prepared in accordance with the production requirements for biological products contained in 9 CFR, part 114. An Outline of Production must be filed with the Animal and Plant Health Inspection Service (APHIS) for each product. The Outline of Production contains a detailed protocol of methods to be followed in the preparation of a biological product.

Currently, the regulations contain outline guides for the preparation of Outlines of Production for antisera, antitoxins, and normal sera; vaccines, bacterins, antigens, and toxoids; and for allergenic extracts. However, there is no such guide in the regulations for diagnostic test kits.

This amendment adds a regulation developed through the cooperative efforts of licensees and applicants, research organizations, academic institutes, and the National Veterinary Services Laboratories, for the preparation of Outlines of Production for diagnostic test kits. The requirements in the regulation are like those for the other categories of veterinary biological products listed in part 114, including guides for vaccines, bacterins, and antisera. Codifying the outline guide for diagnostic test kits in the regulations creates a uniform standard and helps to assure the purity, safety, potency and efficacy of these products.

On August 13, 1990, we published a proposed rule in the Federal Register (55 FR 32920-32922, Docket No. 90-003) discussing this amendment. The proposed rule provided that comments would be accepted for 60 days, until October 12, 1990.

Executive Order 12291 and Regulatory Flexibility Act

This final rule is issued in conformance with Executive Order 12291 and Department Regulation 1512-1 and has been determined not to be a "major rule." Based on information compiled by the Department, it has been determined that this final rule has an effect on the economy of less than \$100 million; does not cause a major

increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions and does not cause a significant adverse effect on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

Its purpose is to publish in the regulations a guideline for preparing Outlines of Production for diagnostic test kits which are required to be submitted to APHIS for filing. Prior to the implementation of these regulations licensees were required to prepare Outlines of Production in support of product license applications. However, no specific requirements were available to assist firms in the preparation of an outline for a diagnostic product. This often resulted in several revisions of an outline having to be made before an outline could be approved. This regulation will assist licensees in outline preparation and should make the licensing process more efficient. This regulation imposes no additional costs beyond what firms are already required to submit.

Under these circumstances, the Administrator of the Animal and Plant Health Inspection Service has determined that this action does not have a significant economic impact on a substantial number of small entities.

Paperwork Reduction Act

Information collection requirements contained in this document have been approved by the Office of Management and Budget (OMB) under the provisions of the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*) and have been assigned OMB control number 0579-0013.

Executive Order 12372

This program/activity is listed in the Catalog of Federal Domestic Assistance under No. 10.025 and is subject to Executive Order 12372, which requires intergovernmental consultation with State and local officials. (See 7 CFR part 3015, subpart V.)

Lists of Subjects in 9 CFR Part 114

Animal biologics.

Accordingly, title 9 of the Code of Federal Regulations is amended as follows:

Part 114 - Production Requirements for Biological Products.

1. The authority citation for 9 CFR part 114 continues to read as follows:

Authority: 21 U.S.C. 151-159; 7 CFR 2.17, 2.51, and 371.2(d).

2. Section 114.9 is amended by adding paragraph (f) to read as follows:

114.9 Outline of Production Guidelines

(f) Outlines of Production for diagnostic test kits based on antigen-antibody reactions, and other diagnostics whose production methods are amenable to description as described herein shall be written according to the following requirements:

Outline Guide for Diagnostic Test Kits

License No.	Name of Product	Date
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Introduction

Provide a brief description of the kit as follows:

1. Principle of the test (ELISA, latex agglutination, etc.)
2. Antigen or antibody detection test.

3. Sample(s) used for testing (serum, whole blood, tears, etc.)
4. List reagents, references, and equipment included.
5. Identify materials obtained under split manufacturing agreements.
6. General description of test interpretations and their limitations, including followup tests.

I. Antibody Components

A. Production of polyclonal antibody components.

1. If purchased, list suppliers, criteria for acceptability, and describe all tests performed after receipt to determine that specifications have been met.

2. If produced in-house, describe the species, age, weight, conditions, and general health of all animals used in antisera production.

a. Preinjection considerations:

Describe the examination, preparation, care, quarantine procedures, and treatments administered before immunization(s). Describe all tests used to determine suitability for use. Describe all tests used to determine suitability for use. Describe the preparation of any standard negative serum(s) collected prior to immunization.

b. Immunization of animals.

i. Describe the character and dose of the antigen; if adjuvant is used provide details on its preparation. If commercial product is used include its true name as shown on the label, the manufacturer, serial number, and expiration data.

iii. Describe the method for harvesting and evaluating the immunization product, including tests for acceptability.

iv. Provide number and intervals between harvests, volume obtained, and any other pertinent information.

B. Production of Monoclonal Antibody Components.

1. Hybridoma components.

a. If hybridoma components are purchased, list suppliers and criteria for acceptability; if tests are performed after receipt, describe fully.

b. If hybridomas are prepared inhouse, identify the antigen(s) used, describe the immunization scheme, and the species of animal used.

c. Identify the tissue of origin, and the procedures for harvesting, isolating, and identifying the immune cells.

d. Describe the source, identity, and the product secreted (light or heavy chain) by the parent Myeloma Cell Line.

e. Summarize cloning and recloning procedures, including clone characterization and propagation, if appropriate.

f. If appropriate, describe procedures for establishing and maintaining seed lots.

g. Describe any other pertinent tests or procedures performed on the hybridoma cell line.

2. Antibody production:

a. Describe the production method. If produced in cell culture, animal serum additives must conform to 9 CFR 113.53. If produced in animals, describe fully including husbandry practices and passage procedures.

b. Provide the criteria for acceptable monoclonal antibody, including tests for purity.

c. Describe all tests or other methods used to ensure uniformity between production lots of monoclonal antibody. Include all reaction conditions, equipment used, and reactivity of the component.

d. Describe all characterization procedures and include the expected reactivity of all reference monoclonal antibodies.

II. Antigen Preparation

A. Identify the microorganism(s) or antigen being used. If previously approved Master Seed virus, bacteria, or antigen derived therefrom is used, provide pertinent information on the testing performed, and details of dates of United States Department of

Agriculture confirmatory tests and approval, as appropriate.

B. Describe all propagation steps, including identification of cell cultures, media ingredients, cell culture conditions, and harvest methods. For antigen produced in eggs, give the egg source, age, and route of inoculation. If cell lines are being used, give dates of testing and approval as specified in 9 CFR 113.52.

C. Describe procedures used for extracting and characterizing the antigen.

D. Describe the method used to standardize the antigen.

E. If the antigen is purchased, identify the supplier and describe the criteria for acceptable material, including all tests performed by the producer and/or the recipient to determine acceptability.

III. Preparation of Standard Reagents

A. Describe the positive and negative controls included in the kit. If purchased, list suppliers and criteria for acceptance.

B. Describe the preparation and standardization of the conjugate(s). If purchased, list suppliers and criteria for acceptance.

C. Describe the preparation and standardization of the substrate(s). If purchased, list suppliers and criteria for acceptance.

D. Identify buffers, diluents, and other reagents included in the kit. The preparation of these components may be described in this section or in filed Special Outlines.

IV. Preparation of the Product

Fully describe methods used to standardize antigens, reference standards, positive control serum, negative control serum, and standard reagents from production/purchase to completion of finished product in final containers, including the following:

1. Composition and quantity of preservative in each.

2. Method of filling, plating, or attaching the antigen or antibody component to a solid phase.

3. Minimum and maximum acceptable fill volumes for each final container of reagent included in the kit.

4. The disposition of unsatisfactory material.

V. Testing

Refer to all applicable standard requirements.

A. Purity.

Describe all tests of the kit for purity or specify the exemption as provided in 9 CFR 113.4.

B. Safety.

In vitro products are exempt from safety tests.

C. Potency.

Provide details of tests used to determine the relative reactivity of the kit including minimum requirements for a satisfactory test. Reference standards and control serum used for this purpose should be identified by unique codes or lot numbers.

VI. Postpreparatory Steps

A. Describe the form and size of final containers of each reagent/component included in the kit.

B. Describe the collection, storage, and submission of representative samples. Refer to 9 CFR 113.3(b)(7).

C. Specify the expiration date. Refer to 9 CFR 114.13.

D. Provide details of recommendations for use, including all limitations, qualifications, and interpretation of results.

E. Submit confidentiality statement identifying specific parts of the outline containing information, the release of which would cause harm to the submitter.

Done in Washington, DC, this 26th day of April 1991.

James W. Glosser,

Administrator, Animal and Plant Health Inspection Service.

(FR Doc. 91-10416 Filed 5-1-91; 8:45 am)

Federal Register/Vol. 56, No. 85/Thursday, May 2, 1991/
Rules and Regulations

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- Prepare for the Investigation
 - Take Steps to Verify Diagnosis
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Food and Environmental Hazards to Health

Mosquito-Transmitted Malaria - California and Florida, 1990

In 1990, two persons—one each in California and Florida—were diagnosed with malaria classified as cryptic*; their infections may have been acquired in the United States through bites of mosquitoes that became infected after biting parasitemic migrant workers.

California

On July 30, a teenaged male resident of Oceanside in north San Diego County presented to a physician's office with an 11-day history of fever, malaise and myalgia. *Plasmodium vivax* parasites were identified during a blood smear examination. On hospital admission, the patient had splenomegaly and a hemoglobin level of 5.9 gm%. He was treated with chloroquine and primaquine and recovered.

The San Diego Department of Health Services conducted an epidemiologic investigation to determine the source of his infection. The patient had no history of foreign travel, intravenous (IV)-drug use, or blood transfusions. He lives in a suburban housing development within 1/2 mile of the San Luis Rey River. The open area between his house and the river is flat, with heavy vegetation near the river. In the evenings, he frequently visited a nearby park within 150 yards of the river. Several encampments of migrant workers employed at local farms were identified along the river. No history of malaria-like illness was elicited from migrant workers in these encampments; no malaria cases were reported among these migrant workers or among other residents of Oceanside.

Entomologic investigations along the river during August 1-6 identified larvae and adult mosquitoes of *Anopheles hermsi*, a competent mosquito vector for malaria. No anopheline mosquitoes were identified near the patient's residence. Control measures consisted of larviciding mosquito breeding sites with oil and fogging with pyrethrins along the riverbed.

Florida

On June 8, a female resident of Bay County in the Florida Panhandle consulted a physician because of a 5-day history of remittent fever, chills, myalgia and headaches. *P. vivax* parasites were identified on a peripheral blood smear. She was treated with chloroquine and primaquine and recovered.

The Florida Department of Health and Rehabilitative Services conducted an epidemiologic investigation to determine the source of her infection. The woman had no history of foreign travel, blood transfusion or IV-drug use. A survey of medical-care providers in Bay County and neighboring Gulf County did not identify other cases of malaria or unexplained febrile episodes within the previous three months.

The patient and her family had spent the nights of May 19 and 27 sleeping outdoors in a campground in Gulf County, 30 miles from her home. Mosquito activity and biting at night was reportedly intense.

A door-to-door survey of residents of this campground and follow-up visits with the owner of the campground did not identify any suspected cases of malaria. In May, a large fish farm contiguous to the campsite had employed approximately 40 migrant workers, many of whom came from Mexico and Central America. None of the migrant workers were known to have had symptoms compatible with malaria. Health-care providers in the area had not treated any patients with malaria-like symptoms. Efforts to trace and survey the migrant workers were unsuccessful.

On June 14, approximately 50 *A. quadrimaculatus*, a competent mosquito vector of malaria, were caught in light traps near the campsite. Control measures included ultralow-volume spraying with malathion.

Editorial Note: Both of the malaria cases described here were classified as cryptic. However, both persons may have acquired their infections in the United States through bites of mosquitoes that became infected after biting parasitemic migrant workers.

Transmission of mosquito-borne *P. vivax* malaria in San Diego County has occurred intermittently since 1986. These episodes have shared several common features: 1) identification of the initial case(s) usually in residents; 2) limited access to medical care for migrant workers from countries with endemic malaria, resulting in delays both in identification and treatment of parasitemic persons and in institution of control measures; 3) presence of standing water and lack of adequate sanitary facilities and shelter in migrant workers' encampments; and 4) proximity of competent *Anopheles* vectors and a susceptible population. In contrast, although *A. quadrimaculatus* is widespread in Florida, no cases of suspected or confirmed mosquito-borne malaria infections have been identified since 1948.

In other states, conditions may be similar to those in Florida and California (i.e., large populations of migrant workers and conducive environmental conditions), especially in the Southwest and along the Gulf of Mexico. Health-care providers should be aware of the potential for introduced malaria in both migrant workers and local residents. In these areas, malaria should be included in the differential diagnosis of any patient with a fever of unknown origin. When malaria infection is diagnosed, physicians should inquire about recent travel, previous malaria infections, IV-drug use, and blood transfusions. Prompt reporting of confirmed malaria infections will aid health departments in immediately investigating potential local transmission.

MMWR 2/15/91

*An isolated case of malaria ascertained by appropriate epidemiologic investigation not to be associated with secondary cases.

***Trichinella spiralis* Infection - United States, 1990**

Since 1947, when the Public Health Service began to record statistics on trichinosis, the number of cases reported by state health departments each year has declined: in the late 1940s, health departments reported an average of 400 cases and 10-15 deaths each year; from 1982 through 1986, the number declined to an average of 57 per year and a total of three deaths. Although this trend reflects a decline in the number of cases related to commercially purchased pork, recent outbreaks of trichinosis in Iowa and Virginia emphasize the continuing need for education about the dangers of eating inadequately cooked pork.

Des Moines, Iowa. From July 21 through September 3, 1990, 90 (36%) of 250 persons who attended or ate food taken from a wedding in Des Moines on July 14 developed trichinosis; most (approximately 95%) of the 250 persons had immigrated to the United States since 1975 from Southeast Asian countries. Of those who became ill, 52 (58%) were treated by physicians; one of the 52 was hospitalized.

Detailed case histories were obtained from 39 ill and 13 well persons who attended the wedding. Of the 39 ill persons, 34 (87%) ate uncooked pork sausage, compared with four (31%) of the 13 well persons ($p < 0.01$, Mantel-Haenszel test); no other foods were associated with illness. The sausage had been prepared from 120 lbs of commercially purchased pork and was served uncooked, as is customary for that food item in Southeast Asian culture. No pork was available for analysis at the time of investigation.

The meat could not be traced back to the source farm because the meat-packing company that supplied the pork slaughters 14,000-15,000 hogs a day from hundreds of farms, and the exact date the hogs were slaughtered was unknown.

Only four (4%) of 107 persons who attended the wedding and were interviewed knew about trichinosis or about the potential hazards of eating undercooked pork. The Iowa Refugee Health Program, Iowa Department of Health, prepared a brief information sheet describing trichinosis and ways to avoid infection and translated this information into the three major languages (Laotian, Cambodian, and Vietnamese) of the Southeast Asian community in Iowa; the information sheet is being distributed by the Bureau of Refugee Programs.

Staunton, Virginia. In November and December 1990, 15 cases of trichinosis were reported by eight local physicians in Augusta, Page, Rockingham, and Shenandoah counties to the Central Shenandoah Health District, Virginia Department of Health. Six cases were confirmed by muscle biopsy, five had positive serology by bentonite flocculation, and four were epidemiologically linked. Nine of these persons required hospitalization. All patients had fever, myalgia, and periorbital edema; all nine patients for whom eosinophil counts were available had elevated levels.

Detailed case histories were available for all ill persons. Fourteen (93%) persons reported eating pork sausage 4-21 days before onset of symptoms; 10 (67%) ate the sausage

uncooked. One person who denied eating undercooked sausage was employed as a meat handler in the plant that processed the implicated sausage.

The investigation was limited to those who were ill; no controls were interviewed. The 14 persons who had consumed sausage had purchased bulk pork sausage from several local retail grocery stores; the stores had purchased this sausage from a local processing plant. No pork was available for analysis at the time of investigation. During the 6 weeks before the outbreak, the plant purchased hogs from two brokers who had obtained hogs from multiple producers in Virginia and surrounding states. The plant produces 1500 lbs of sausage per week, which is distributed throughout eight counties in the Shenandoah Valley.

The health department issued an areawide alert to physicians and hospitals and a news release to all area newspapers that included information on proper cooking and handling of raw pork.

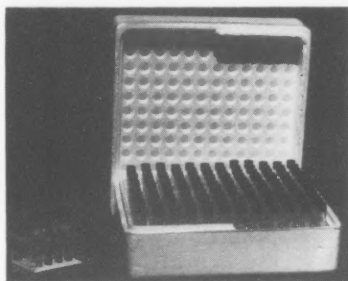
Editorial Note: Since 1975, the proportion of trichinosis cases associated with consumption of contaminated commercial pork has declined in the United States. This decline probably reflects a combination of factors, including laws prohibiting the feeding of offal to hogs, the increased use of home freezers, and the practice of thoroughly cooking pork. In recent years the relative importance of consumption of wild game (including bear, wild boar and walrus) as a cause of trichinosis has increased. Consumption of meat from any carnivorous animal that has fed on trichina-infested flesh poses a risk. In addition to the two multiple-case outbreaks in this report, 15 other cases were reported in 1990. At least three cases were sporadic; information on the remaining twelve is unavailable.

The outbreak in Iowa is the fourth since 1975 that occurred among the 900,000 Southeast Asian refugees who have immigrated to the United States. The three previous outbreaks were related to consumption of undercooked pork that was not obtained from a commercial producer. This outbreak is consistent with previous reports indicating that recent immigrants from Southeast Asia are at particular risk for developing trichinosis because of their dietary habits.

Based on serologic examination of hogs at abattoirs, the prevalence of *Trichinella* infection in commercial pork ranges from 0 to 0.7%. Approximately 80 million hogs are slaughtered commercially each year in the United States. About 40% of the pork produced is sold as "ready to eat" pork products; such products must be made with trichina-free pork or pork adequately cooked or treated to kill trichina larvae. *Trichinella* larvae in pork are killed by freezing at 5 F (-15C) for 21 days (or longer if meat is >15 cm thick); however, *Trichinella* larvae present in wild game are often relatively resistant to freezing. Cooking is one of the most common methods of assuring that *Trichinella* are destroyed; a temperature of 170F (77C) substantially exceeds the thermal death point and is usually achieved if the meat is cooked until it is no longer pink.

MMWR 2/1/91

Industry Products



Bioscience, Inc. Introduces Micro-Cod Tests Systems

Bioscience, Inc. has introduced an EPA accepted method for rapid, low-cost determination of chemical oxygen demand (COD) in wastewater to complement its line of biochemical oxygen demand (BOD) test systems. The Bioscience micro-COD test replaces the expensive and time-consuming reflux titration method and can be performed by any laboratory technician with a minimum of training and equipment.

Bioscience offers premixed COD reagents in either easy-to-use twist off Twist Tubes® or heat sealed glass ampules in a variety of test ranges. Both Twist Tubes and ampules are manufactured using optical quality glass specified to provide accurate and consistent results when determining COD using a spectrophotometer. Test equipment includes a sample digestion block and automated ampule resealing devices.

Bioscience, Inc. - Bethlehem, PA

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Spraying Systems Co. has Released a Bulletin Featuring its Newly Designed PW4000 GunJet®.

Spraying Systems Co. has just released Bulletin No. 309, featuring the newly designed PW4000 GunJet. The one page bulletin is available in both U.S. and metric versions. The bulletin describes the gun's advantages and features, and includes performance data and ordering information.

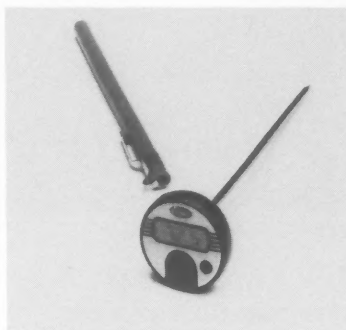
The bulletin will be of special interest to those in the food industry as the gun may be used to clean floors, sanitize and rinse equipment, or wash waste from food barrels.

The high pressure spray gun's primary new design feature is the position of the shut-off valve, located beneath the hand grip area, at the base of the gun. The unique design provides for easier maintenance, and safer, more controllable gun handling.

In addition to Bulletin No. 309, Spraying Systems Co. offers three other new bulletins: Bulletin No. 306, for the meat & poultry industry; Bulletin No. 307, for the dairy & beverage industry; and Bulletin No. 308, for the food processing industry.

Spraying Systems Co. - Wheaton, IL

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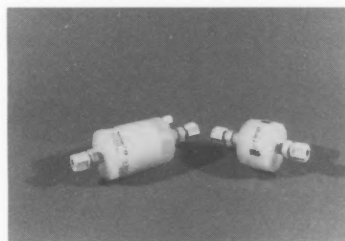


This proprietary pocket thermometer features many more FIRSTS. Battery life is significantly improved over competitive models because of its unique ON/OFF switch and an integrated auto shut off feature. To extend battery life, the thermometer is programmed to automatically shut off after fifty minutes of service. COOPER INSTRUMENT estimates that the battery life of the DP 450 is ten times longer than any currently available digital pocket thermometer.

Further improvements have been made with the addition of a flat segment on the round high impact case to prevent the test thermometer from rolling when placed on a surface.

Cooper Instrument Corp. -
Middlefield, CT

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Point of Use Capsule for Air Filtration Systems

The Point of Use capsules distributed by Funke Dairy Supplies, Inc., a national distributor of filtration products for the dairy and food industry, provides bacteria retention down to .20 micron which includes Salmonella, Listeria, Campylobacter and Yersinia.

Enclosed in this rugged polypropylene capsule is a hydrophobic PTFE membrane which is integrity testable by the bubble point method. Membrane is biosafe USP Class VI.

A special feature of these compact Point of Use capsules is the users ability to provide sterile air closely to the point of use.

Applications for use include ice cream over-run, leak detectors in blow mold machines, air agitation, air transport of product and others. Installs easily on back of freezers.

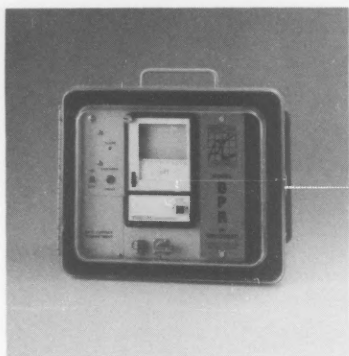
Funke Dairy Supplies, Inc. -
Cincinnati, OH

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New DP 450 Pocket Test Thermometer

COOPER INSTRUMENT CORPORATION is pleased to announce the introduction of a revolutionary new pocket test thermometer.

The DP 450 digital thermometer boasts a range of -40°F to 450°F—the widest range of any HVAC digital thermometer on the market today. To wholesalers and contractors alike, the three thermometers that needed to be inventoried to cover the same range, can now be replaced by this single thermometer.



Battery Powered Strip Chart Recorder

The BPR-212 is a lightweight (6.5 lbs) battery powered strip chart recorder for field or remote pH recording requirements. The 30 day strip chart recorder uses a 6 volt 10 amp rechargeable battery that may be left unattended for approximately two weeks. Temperature compensation is automatic or manual. A Nema 4X enclosure and battery charger are standard.

Presto-Tek Corporation -
Los Angeles, CA

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Portable Carbon Dioxide Analyzer Offers High Accuracy and Stability

The Servomex Model PA404SVS Portable Carbon Dioxide Analyzer utilizes a highly reliable single beam, dual wavelength infrared technique which offers high accuracy and stability.

Unaffected by oxygen and other gases used in food packaging, the Servomex PA404SVS offers easy-to-use, fast, accurate, reliable 3 digit LCD readout with the convenience of portability operating off an internal rechargeable battery or an AC power supply.

The Servomex Model PA404SVS Carbon Dioxide Analyzer can be used on package volumes down to 6ml. Several choices of sampling methods are available.

Servomex Company - Norwood, MA

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GENE-TRAK Systems Markets Hygicult® Agar Slides to Monitor Plant Hygiene

GENE-TRAK Systems recently began marketing Hygicult® Agar Slides throughout the United States through an exclusive distribution agreement with Orion Diagnostica, Espoo, Finland.

Hygicult® Agar Slides are specifically designed for the reliable, economical, and time-saving monitoring of microbiological hygiene. They are widely used in the food industry where monitoring of hygiene during the manufacturing process is of critical importance. Raw materials, production facilities, as well as finished products can be easily checked with Hygicult® Agar Slides.

Hygicult® Agar Slides are available in three versions, including Total Plate Count, Yeasts and Fungi, and Enterobacteriaceae, and are packaged in convenient tests kits containing 10 Agar Slides and easy-to-follow instructions.

GENE-TRAK Systems - Framingham, MA

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The New CentriVap™ Benchtop Concentrator Assures Complete Solute Recovery From Microliter Samples

Labconco Corporation introduces the New CentriVap Benchtop Concentrator to rapidly separate solutes from biological or analytical samples by using centrifugal force combined with vacuum.

The Benchtop Concentrator's compact size and low profile lets the user easily situate the concentrator on countertops with low overhanging cabinets, and the easy-to-clean, epoxy coated, molded aluminum chamber accommodates either single or double deck rotor.

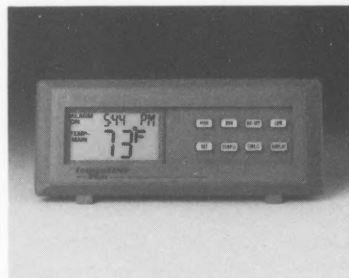
The Concentrator features a unique rotor locking system that facilitates quick rotor release and replacement, a safety switch that prevents start-up when lid is open, and a 300-watt heater that speeds evaporation rates by warming samples to 40°C during centrifugation, when heat is desired.

The Concentrator also comes equipped with a built-in vacuum delay, a removable acrylic lid, a stainless steel hose connector, and two rocker switches, one to activate the centrifugation and one to activate the heater.

The CentriVap line also includes a benchtop cold trap, a combination concentrator/cold trap mobile console and vacuum pumps.

Labconco Corporation - Kansas City, MO

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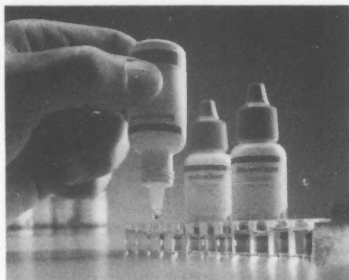


Brooklyn Introduces A New Digital Thermometer

A new digital thermometer featuring temperature and time alarms and a memory for maximum and minimum temperature display is available from Brooklyn Thermometer Co., Inc. Suitable for wall mounting or table-top use the Computemp Plus has a very wide temperature range of -65 to 215°F (-54 to 101°C). With its main and auxiliary temperature sensors the Computemp Plus can simultaneously monitor two separate environments up to 300 feet apart! Temperature alarm can be set to alert the user if the temperature rises up to or above the alarm temperature, or falls to or below the alarm temperature. Thus the Computemp Plus may be used in applications ranging from blood bank refrigerators, chemical storage rooms, computer rooms, manufacturing plants, animal confinements, saunas & hot tubs, nursery rooms, attics, food storage, or anywhere personal health, comfort and property are critical. Powered by a single 9 volt battery it can be used "on-the-road" in motorhomes (RV's), automobiles, boats or airplanes.

Brooklyn Thermometer Co., Inc. -
Farmingdale, NY

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Millipore Introduces Pesticide Detection Kits

Millipore recently introduced EnviroGard™ Test Kits for the laboratory and on-site analysis of pesticide residues in water. Through innovative immunoassay protocols, pesticide detection and measurement can be completed in as little as 7 minutes.

The EnviroGard tube test kit is completely portable. All necessary reagents are pre-packaged in dropper bottles, and the test tubes come pre-coated with special antibodies. No preparation is required and test results can be visually interpreted with the naked eye.

The EnviroGard plate test kit is designed for strictly laboratory analysis. The kit provides precise residue analysis down to parts-per-billion (ppb) levels.

Results can be used as a stand-alone analysis or as a screening test prior to more extensive GC analysis.

Millipore Corp. - Bedford, MA

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Sparta "Hi-Lo Plus" Floor Scrubber Two Tools in One

The new 39X "Hi-Lo Plus" Floor Scrubber combines Sparta Brush Company's unique split block floor brush design with the newest multiblade squeegee to provide two tools in one for more efficient surface cleaning.

The "Hi-Lo Plus" Floor Scrubber is ideal for cleaning in hard-to-reach spots in food service, food processing, dairy or industrial applications. The squeegee picks up liquid spills and dirt from any angle.

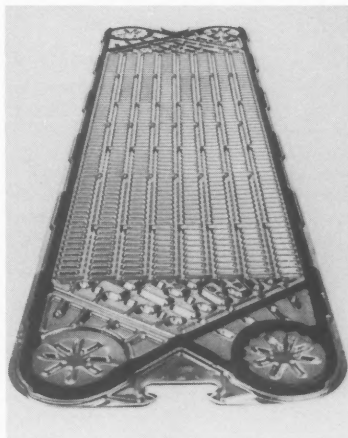
The heavy-duty Spartex golden polypropylene bristles clean easily and flare open to cover wide areas in a few fast strokes. The bristles are crimped to hold more water and are directly set into a structural foam block that will not absorb water, warp, split, crack or splinter.

The split block shape allows full brush or squeegee surface contact even when working under very low counters or equipment. The foam block design maximizes brush life and eliminates areas for bacteria buildup.

Sparta Brush Company manufactures and markets a quality line of specialized brushes for the food service, processing, dairy, janitorial and gourmet industries.

Sparta Brush Company - Sparta, WI

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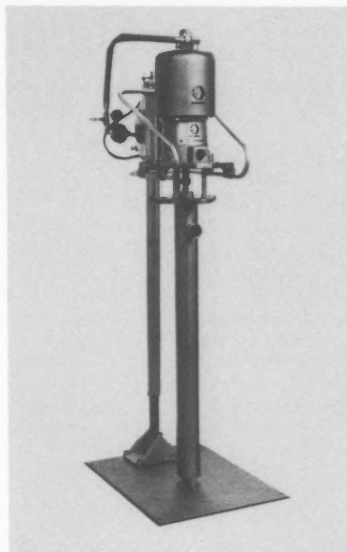
New Minimum Contact Flow Plate from APV

The new ER5 Paraflow heat exchange plate, specially developed by APV Crepaco to process liquids containing pulp, peel, seeds, and other solids, is ideal for applications in the food, dairy beverage, pharmaceutical, and pulp and paper industries. The ER5 Minimum Contact flow plate has 90% fewer contact areas than standard plates and provides clearer passage with less risk of pulp or fiber hang-up.

Other benefits and exclusive features include the unique in-phase plate corrugation pattern; only 81 line contacts per plate; longer runs between cleanings; operating pressures to 120 psig; lower pressure drops on viscous products; diagonal flow for better product distribution; heavy gauge 0.9 mm T-316 stainless steel plates; and choice of cemented or clip-in gaskets. The ER5 Minimum Contact flow plate will also fit existing APV Series R5 heat exchange frames and uses the proven R5 interlocking gasket.

APV Crepaco, Inc. - Lake Mills, WI

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Sanitary Pump for Viscous Transfer

Graco's FT-14 sanitary pump will transfer light to moderately viscous material such as tomato paste, fruit juice concentrate, fruit puree, creams and lotions from open or closed head drums at rates to 23 gpm. The FT-14 pump is designed for direct insertion into a 4-1/2" closed head drum bung, or a new 300-gallon bag-in-the-bin. It will empty a standard 55-gallon drum in less than three minutes, or a 300-gallon bin in less than 20 minutes, with minimal residue.

The drum length pump is ideal for fluids which are self-leveling or transfer easily with slight pressure. Once pressurized, these products flow easily with minimal pressure drops.

The FT-14 is a demand-type pump; by closing the outlet or dispense valve, the pump will stall until flow is again required. The pump features a quick knock-down design and complies with USDA standards.

Accessories include an air-powered elevator which provides a quick, easy method of lifting the pump for fast drum changeover, or a sanitary ram and plate mounting for the pumping of very viscous products.

Graco, Inc. - Minneapolis, MN

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Dairy, Food and Environmental Sanitation Instructions for Authors

Nature of the Magazine

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

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

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

Submitting Articles

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

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

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

Articles, when accepted, become the copyright property of *Dairy, Food and Environmental Sanitation* and its sponsoring association. Reprinting of any material from *Dairy, Food and Environmental Sanitation* or republishing of any papers or portions of them is prohibited unless permission to do so is granted by the editor.

Reprints

Reprints of an article may be ordered by the author. An order form for reprints will be sent to you. Reprints may be ordered with or without covers, in multiples of 100. Reprint costs vary according to the number of printed pages in the article. Reprints cannot be provided free of charge.

Types of Articles

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

General Interest

Dairy, Food and Environmental Sanitation regularly publishes non-technical articles as a service to those readers who are not involved in the technical aspects of milk, food and environmental protection. These articles deal with such topics as the organization and application of a milk or food control program or quality control program, ways of solving a

particular problem in the field, organization and application of an educational program, management skills, use of visual aids, and similar subjects. Often talks and presentations given at meetings of affiliate groups and other gatherings can be modified sufficiently to make them appropriate for publication. Authors planning to prepare general interest nontechnical articles are invited to correspond with the editor if they have questions about the suitability of their material.

Book Reviews

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

Preparation of Articles

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

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

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

Illustrations, Photographs, Figures

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

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

Examples of Proper Bibliographic Citations

Paper in a journal

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

Paper in a book

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

Book

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

Patent

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

Letter to the Editor

Dear Editor:

On page 76 of the February 1991 issue of *Dairy, Food and Environmental Sanitation* there is an error, I believe, of omission in that Dr. Snyder intended to say, "Heat will NOT inactivate the spores or toxin."

Such an error of information can be quite misleading to the novice.

Respectfully,
Bernard Rosenberg, Ph.D.
Town of Darien
Department of Health
Town Hall, 2 Renshaw Road
Darien, CT 06820-5397

Dear Editor:

This letter is in response to Dr. Rosenberg's. Clearly, he is correct. We accidentally left out the word "not" from the sentence in question (p. 76 of the February 1991 issue). Please also note one other correction (p. 79, 1st column, line 17). It should read 10⁹ viruses, not 10 viruses.

Both of these corrections refer to very important points that I am making in terms of identifying hazards and critical control points. I hope the article will have an impact on bringing HACCP to the food industry.

Thank you very much for the letter Dr. Rosenberg. If there are any more questions or comments, contact me at the Hospitality Institute of Technology & Management, 830 Transfer Road, Suite 35, St. Paul, MN 55114.

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

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Affiliate News

Missouri Milk, Food & Environmental Health Association 1991 Annual Educational Conference Report

The 1991 Annual Educational Conference for the Missouri affiliate of IAMFES took place in Columbia, Missouri on April 3-5, 1991. The conference was attended by 192 members to hear approximately 45 speakers. A pre-conference seminar on earthquake preparedness brought Diane Evans, Director of Environmental Health for Santa Cruz County, California, to tell of her experiences involving the 1989 California earthquake. The meeting provided topics of interest in the area of milk sanitation, food sanitation, environmental health, and institutional health and sanitation. The group also sponsored a "casino night," all proceeds going to support MMFEHA's scholarship award fund. At the annual awards banquet, Robert Fields, Environmental Sanitarian III, Missouri Department of Health, was awarded the Monarch Sanitation Citation Award sponsored by the Monarch Division of H.B. Fuller Company. The group was also excited to learn that Wilbur S. Feagan, President of F and H Food Equipment Company, Springfield, Missouri announced that he will be sponsoring a new award to be given to a practicing regulatory field sanitarian beginning in 1992. Early in his career, Mr. Feagan was involved in the milk sanitation program. Feagan commented about the proposed award, "I trust this award will inspire and express appreciation to all of you with regulatory responsibilities to professionally carry out your obligations." It is Feagan's hope that the award will show recognition to the regulatory sanitarians who consistently demonstrate integrity, perseverance, and honesty, and to promote education and cooperation with industry and the public as well as fellow professionals to safeguard the health and welfare of the citizens of the State of Missouri.



Leland Scroggins (l), consultant/salesman of Monarch Division of H.B. Fuller Co. presents the Monarch Sanitarian Citation Award to Robert C. Fields (r), Environmental Sanitarian III, Missouri Department of Health, Raytown Area Office.

Upcoming IAMFES Affiliate Meetings

1991

JULY

•21-24, International Association of Milk, Food and Environmental Sanitarians 78th Annual Meeting to be held at the Galt House, Louisville, KY. For more information contact Julie at (800)369-6337 or (800)284-6336 (Canada).

SEPTEMBER

•16-20, Wyoming Public Health Sanitarians Association will hold their Annual Meeting at the Holiday Inn, Cheyenne, WY. For further information contact Terry Carlile, Box 1182, Laramie, WY 82070; (307)742-3611.

•24-26, New York State Association of Milk and Food Sanitarians Annual Conference will be held at the Sheraton Inn, Liverpool, NY. For more information contact Paul Dersam at (716)937-3432.

•25-26, Wisconsin Association of Milk and Food Sanitarians, Wisconsin Environmental Health Association and Wisconsin Dairy Plant Fieldmen's Association Joint Education Conference will be held at the Maritime Inn, Manitowoc, WI. For further information contact Neil M. Vassau, Publicity Chairman, P.O. Box 7883, Madison, WI 53707; (608)267-3504.

OCTOBER

•16-17, Iowa Association of Milk, Food and Environmental Sanitarians, Inc. 50th Anniversary Annual Meeting will be held at the Ramada Inn, Waterloo, IA. For more information contact Dale Cooper (312)927-3212.

NOVEMBER

•13-14, Alabama Association of Dairy & Milk Sanitarians Annual Meeting will be held in Birmingham, AL. For more information call or write Tom McCaskey, Department of Dairy Science, Auburn University, Auburn, AL 36849; (205)844-1518.

Officers elected at the conference include: President, Charles Sanders; President-Elect, Jerry Brown; Vice President, Cal Badding; Treasurer, Richard Janulewicz; Secretary, Janet Murray; and Auditors, Gerry Worley and Ron Leuthen.



Wilbur S. Feagan, (l), president, F and H Food Equipment Company, Springfield, Missouri, receives thanks from Bruce Myers (r) immediate past president MMFEHA, for his generous contributions.



Karalyn R. Littlefield (l), UMC graduate student receives MMFEHA J. E. Edmundson Scholarship Award from Dr. J.E. Edmundson, professor emeritus, University of Missouri, Columbia, Missouri.

Nebraska Association of Milk and Food Sanitarians Meet

The Nebraska Association of Milk and Food Sanitarians held their 4th annual meeting April 11-12, 1991 at the Douglas County Extension office in Omaha. The two day program featured 10 speakers of national, regional and local prominence. They represented federal, state and local agencies, industry, and university.

Topics presented to the 50 conference attendees were presentations on *Salmonella* and *Listeria* testing; Heat Shock of Microorganisms; Natural Antimicrobials; Role of Viruses in Foodborne Disease Outbreaks; and Regulatory Issues. Key speakers at the conference included Damien Gabis, CEO of Silliker Labs and President-Elect of IAMFES; Richard Pappé, Technical Director of MG Waldbaum, Co., Erdal Tuencan, ConAgra Frozen Foods; and Jana Crane, Bio Control Systems. Representing IAMFES at the affiliate meeting was Dee Buske, IAMFES Affiliate Liaison.

At the NAMFS annual business meeting, the following slate of officers were elected for 1991: President, Lois Clauson, Douglas County Health Laboratory; President-elect, Susan Sumner, University of Nebraska-Lincoln; and Secretary/Treasurer Fred Cook, ConAgra Frozen Foods.

Everyone in attendance agreed that the topics presented were informative and educational. The Nebraska affiliate continues to grow in numbers and scope. Each year the program becomes more diversified to include topics of interest to regulatory sanitarians as well as industry and university members.

Iowa Affiliate to Hold 50th Annual Meeting

The Iowa Association of Milk, Food and Environmental Sanitarians, Inc., led by President, Gary Schall, have put together committees for their 50th Annual Meeting.

Mark your calendar for October 16-17, 1991, at the Ramada Hotel in Waterloo.

The Executive Board of Iowa AMFES will meet on August 2 to update plans. If you have any suggestions, please contact Gary at (319)398-3551, Scott Core (515)276-8634 or Dale Cooper (319)927-3869.

The Alberta Association of Milk, Food and Environmental Sanitarians Hold Annual Meeting

The Alberta Association of Milk, Food and Environmental Sanitarians held their Annual Meeting on February 27, 1991 at the Faculty Club, University of Alberta. Dr. John Walters, Director of Communicable Disease Control and Epidemiology, Alberta Health Department was the featured speaker and his topic was "Hamburger Disease Symptoms (*E. coli* 0157:H7: Is it a Bum Steer?) He explored the fast food industry with technical knowledge and humorous stories that made it a very informative morning. A buffet luncheon was served with a vast assortment of foods and with the exception of one or two desserts, I believe it was prepared with the awareness of the occupation of the attendees, compliments to the chef.



The group picture of the Executive Board is as follows: (right to left) Dr. Ken Yu, Director, Professor and Bio Safety Officer for the Office of Health and Safety at the University of Alberta. James Steele, Past President and IAMFES Delegate. Dr. Harry Jackson, President - Elect, Professor, Food Science, University of Alberta, and Tom Lampman, President, Quality Control Supervisor, N.A.D.P.; Karen Emde, Immediate Past President and Mike Mavromaras, Treasurer, Regional Dairy Specialist, Alberta Agriculture. My apologies to Debra Mooney, Secretary. My camera just didn't do its' job to include her in this shot. Because it is so difficult to get everyone together we are using the photo and will somehow make it up to Debra, she is a vital part of the team.

Thank you to everyone for making me feel at home, the blizzard was going a step too far, however!

Submitted by Dee Buske, affiliate liaison

Synopsis of Papers for the 78th Annual Meeting

Abstracts of papers to be presented at the 78th Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc. to be held in Louisville, Kentucky, July 21-24, 1991.

A Rapid Concentration Procedure for Microorganisms in Raw Milk, E. Pahuski, L. Martin*, K. Stebnitz, J. Priest and R. Dimond, Promega Corporation, 2800 Woods Hollow Road, Madison, WI 53711

We have developed a simple, rapid concentration procedure for removing microorganisms from raw milk samples. In this procedure a novel concentrating reagent is mixed with a raw milk sample, and the mixture is centrifuged at 12,000 x g for 5 minutes.

After this treatment microorganisms are concentrated 100-fold into a small pellet while milk components separate into an easily removable upper phase. Following this procedure the microorganisms obtained are amenable to a number of standard evaluation techniques including total viable organism assay, direct microscopic evaluation, and immunochemical testing. Data collected using this procedure with a luciferase-based ATP viable cell assay demonstrated a linear correlation to 22°C Standard Plate Count over a 3 log range of cell concentrations with an assay sensitivity of approximately 2×10^4 Colony Forming Units (CFU). The correlation coefficient (r) for a linear regression analysis comparing the two methods was 0.9 for 80 raw milk samples tested. The test exhibits precision for duplicate samples comparable to standard plating methods. Data also shows that direct microscopic examination of bacteria concentrated by this procedure is far superior to standard staining procedures with respect to background, sensitivity and scoring due to the concentration of cells in the assay and removal of milk contaminants.

Thermal Resistance of *Listeria monocytogenes* in Raw Liquid Egg Yolk, R.T. McKenna*, S.V. Patel, M.C. Cirigliano, Thomas J. Lipton Company, 20 Noel Dr., N. Arlington, NJ 07032

The potential for *Listeria monocytogenes* contamination of raw egg yolk exists, the presence of Lm in poultry, on egg shells and in the environment of egg breaking facilities has been documented. Previous work indicates that Lm can be more thermally resistant than *Salmonella*. Further, growth of Lm in egg yolk stored within traditionally acceptable and safe temperature and time parameters (5-7°C and 7-12 days) has been demonstrated. This study was undertaken to assess the comparative thermal resistance of Lm and *Salmonella* spp. in raw egg yolk. Raw yolks from retail-purchases shell eggs were aseptically collected, pooled and homogenized. Yolks inoculated with a 48-hour culture of Lm Scott A or CA (Food Research Institute) were transferred in 1 ml aliquots to sterile 2 ml thin-walled glass ampules. The ampules were heated in a water bath to 57.2, 60.0 or 62.8°C and sampled at appropriate intervals. The samples were pour-plated on modified Oxford agar (Oxoid) and incubated. The ranges of D values observed were as follows: 144.2-151.5 seconds at 57.2°C; 55.1-101.3 seconds at 60.0°C; and 35.7-57.1 seconds at 62.8°C. These values are approximately 4 x greater than those reported recently for *S. enteritidis* and *S. typhimurium* in raw egg yolk. It is conceivable that the current processing parameters for raw egg yolk present an Lm risk concern.

***Cryptosporidium Parvum* - A Newly Recognized Waterborne Pathogen**, Robert McMahon, Massachusetts Testing Laboratory, Div. of Microbac Labs, 202 Bussey St., Dedham, MA 02026

Cryptosporidium parvum is an enteric protozoan that causes waterborne illness in humans. Symptoms in a healthy person include diarrhea, vomiting, abdominal cramps and a low grade fever for 2-14 days. In immunocompromised individuals, especially those with AIDS, the symptoms are severe and persist up to six months with a high degree of mortality. *Cryptosporidium* has recently been implicated in swimming associated illness, as well as an outbreak in a filtered public water supply. With the possible exception of ozone, the use of disinfectants alone cannot be expected to inactivate *Cryptosporidium* oocysts in water. Immunofluorescent antibody staining techniques are used to identify *Cryptosporidium* in water. A review of recent literature is given.

Who Participates in Voluntary Recycling Programs and Why? David Z. McSwane* and Troy Abel, School of Public and Environmental Affairs, Indiana University, 801 W. Michigan St., Indianapolis, IN 46202

A study of 783 Marion county (Indianapolis), Indiana residents was conducted to determine if there are measurable demographic and behavioral differences between people who participate in a voluntary materials recycling program and those who do not.

Intrinsic reasons, such as concern for the environment (81%) and to fight litter (45%) were the overwhelming motivators for participating in a voluntary recycling program. Inadequate space to store recyclables (31%) and inaccessibility of recycling centers (25%) were the reasons most frequently given for not recycling. Chi-square tests showed no significant relationship, at the .05 level, between recycling behavior and income and education levels, awareness of the solid waste crisis, and willingness to perform source separation if curbside pickups were available.

Use of Agar Dipslides For Hygiene Monitoring in a Bakery, T. Kujala, S. Levo and M.A. Mozola*, GENE-TRAK Systems, 31 New York Avenue, Framingham, MA 01701

Agar dipslides are designed for the rapid and convenient determination of the microbiological status of finished food products, raw materials and the food processing environment. A study was performed in a bakery to evaluate the suitability of Hygicult dipslides for in-house determination of the microbiological quality of various raw materials and finished products. Samples were tested in parallel by standard microbiological methods for total aerobic count and Enterobacteriaceae and by Hygicult-TPC and Hygicult-E dipslides. Criteria were established for comparing results from conventional testing with those from dipslides, and using these parameters test samples were grouped into "good/acceptable" and "poor/unacceptable" categories. A total of 125 samples were analyzed. Results showed 89% overall agreement between Hygicult dipslides and conventional methods. These results indicate that Hygicult dipslides are useful for the in-house analysis of raw materials and finished bakery products.

1991 Annual Meeting Exhibitors

The 78th IAMFES Annual Meeting will be held July 21-24, 1991 at the Galt House Hotel in Louisville, Kentucky. In conjunction to the Annual Meeting sessions, symposia and poster presentations, the IAMFES Annual Meeting Exhibition will be held on July 21-23. This Exhibition will feature over 60 companies displaying the latest technologies in equipment, products and services available to the food and dairy industries. The following is a list of companies, with their booth assignments, who will participate in the exhibition. The July 1991 issue of Dairy, Food and Environmental Sanitation will contain a brief description of each of these companies' displays, and a floor plan of the exhibition area.

- Acculab, Inc.**, Newark, DE, **Booth #2**
Advanced Instruments, Inc., Needham Heights, MA, **Booth #10**
Ampco Pumps, Milwaukee, WI, **Booth #18**
Analytical Luminescence Laboratory, San Diego, CA, **Booth #36**
Anderson Instrument Co., Inc., Fultonville, NY, **Booth #30**
Aquionics, Erlanger, KY, **Booth #37**
Atkins Technical, Inc., Gainesville, FL, **Booth #26**
BS & B Safety Systems, Tulsa, OK, **Booth #39**
Becton Dickinson Microbiology Systems, Cockeysville, MD, **Booth #13**
Biolog, Inc., Hayward, CA, **Booth #56**
Capitol Vials, Inc., Fultonville, NY, **Booth #12**
Carmel Chemical, Westfield, IN, **Booth #4**
CEM Corporation, Matthews, NC, **Booth #62**
Charm Sciences, Inc., Malden, MA, **Booth #28**
Columbus Instruments, Columbus, OH, **Booth #9**
Custom Control Products, Inc., Racine, WI, **Booth #39**
DBK, Incorporated, Corona, CA, **Booth #53**
DQCI Services, Inc., St. Paul, MN, **Booth #16**
DTR, Modesto, CA, **Booth #57**
Difco Laboratories, Detroit, MI, **Booth #7**
Diversey Corp., Wyandotte, MI, **Booth #38**
Educational Testing Service, Princeton, NJ, **Booth #15**
Escort Instruments of America, San Francisco, CA, **Booth #44**
Charles Felix Associates, Leesburg, VA, **Booth #51**
Foss Food Technology Corporation, Eden Prairie, MN, **Booth #1**
H.B. Fuller Co., Minneapolis, MN, **Booth #19**
Funke Dairy Supplies Inc., Newtown, OH, **Booth #61**
GENE-TRAK Systems, Framingham, MA, **Booth #35**
General Polymers, Cincinnati, OH, **Booth #54**
Gist-brocades Food Ingredients, Inc., King of Prussia, PA, **Booth #22**
GRiD Systems Corp., Dallas, TX, **Booth #6**
IDEXX Corp., Portland, ME, **Booth #50**
Integrated BioSolutions, Inc., Princeton, NJ, **Booth #29**
Klenzade, A Service of Ecolab Inc., St. Paul, MN, **Booth #32**
Lincoln Suppliers, Owatonna, MN, **Booth #34**
Meritech, Inc., Tempe, AZ, **Booth #52**
Micro Diagnostics, Inc., Addison, IL, **Booth #46**
Microbac Laboratory, Inc., Louisville, KY, **Booth #25**
Minnesota Valley Testing Laboratories, New Ulm, MN, **Booth #20**
NASCO, Fort Atkinson, WI, **Booth #8**
Nelson-Jameson, Inc., Marshfield, WI, **Booth #58**
Organon Teknika Corp., Durham, NC, **Booth #5**
Polar Tech Industries, Inc., Elgin, IL, **Booth #43**
Promega Corporation, Madison, WI, **Booth #45**
Q Laboratories, Inc., Cincinnati, OH, **Booth #48**
R & D Labs, Inc., Columbus, OH, **Booth #3**
Radiometer America/Malthus Division, Westlake, OH, **Booth #40**
REMEL, Lenexa, KS, **Booth #27**
Shat-R-Shield, Salisbury, NC, **Booth #42**
Silliker Laboratories Group, Inc., Chicago Heights, IL, **Booth #31**
SMITHKLINE-BEECHAM Animal Health, Exton, PA, **Booth #14**
Tekmar Company, Cincinnati, OH, **Booth #55**
3-A Symbol Council, Cedar Rapids, IA, **Booth #23**
3M Microbiology Products, St. Paul, MN, **Booth #11**
Trojan, Inc., Mt. Sterling, KY, **Booth #47**
Troy Biologicals, Inc., Troy, MI, **Booth #41**
Unipath Co. - Oxoid Division, Ogdensburg, NY, **Booth #24**
Vicam - Aflatest, Somerville, MA, **Booth #17**
Walker Stainless Equipment Co., Inc., New Lisbon, WI, **Booth #33**
Weber Scientific, East Windsor, NJ, **Booth #21**

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DAIRY

- **The BST Debate: Biotechnology and the Dairy Case** - (13 minute videotape). Provides retail grocers with an overview of bovine somatotropin or BST...a biotechnology product now being used to enhance the efficiency of milk production in cows. This video report focuses on how BST fits into the overall biotechnology picture, what possibilities it is likely to present at the retail level, and offers some specific tactics retailers can use in addressing questions shoppers may have on BST. (Monsanto Agricultural Company)
- **Babcock Method for Determination of Butterfat in Raw Milk** - A videotape report that describes the purposes, procedures and refinements of The Babcock Method for determining fat content in raw milk. Revised test procedures are presented which will result in greater accuracy and reproducibility. Viewing is recommended by anyone in public health or the dairy industry who uses the Babcock test. (Ozark Film & Video Production, Inc.)
- **The Bulk Milk Hauler: Protocol & Procedures** - (8 minute videotape). Teaches bulk milk haulers how they contribute to quality milk production. Special emphasis is given to the hauler's role in proper milk sampling, sample care procedures, and understanding test results. (Iowa State University Extension)
- **Causes of Milkfat Test Variations and Depressions** - (140 slides-tape-script-30 minutes). This set illustrates the many factors involved in causing milkfat test variations or depressions in your herd, including feeding, management, stage of lactation, age of samples, handling of samples, and testing procedures. The script was reviewed by field staff, nutritionists, laboratory personnel and county extension staff. It is directed to farmers, youth and allied industry. (Penn State-1982)
- **Controlling Volumes and Fat Losses** - (110 slides-tape-script-30 minutes). Keeping milk volume and product loss from farm to supermarket of fluid dairy products is discussed. This set was done with the cooperation of the dairy industry who reviewed the script and provided opportunities to take pictures. It is designed to be used by milk plants for their processing personnel, regulatory representatives, field staff and milk haulers. (Penn State-1982)
- **Ether Extraction Method for Determination of Raw Milk** - (26 minute video). Describes the ether extraction procedure to measure milkfat in dairy products. Included is an explanation of the chemical reagents used in each step of the process. (CA-1990)
- **The Farm Bulk Milk Hauler** - (135 slides-tape-script-30 minutes). This set covers the complete procedure for sampling and collecting milk from farms. Each step is shown as it starts with the hauler entering the farm lane and ends when he leaves the milk house. Emphasis is on universal sampling and automated testing. Funds to develop this set were provided by The Federal Order #36 Milk Market Administrator. (Penn State-1982)
- **Frozen Dairy Products** - (27 minute videotape). Developed by the California Department of Food and Agriculture. Although it mentions the importance of frozen desserts, safety and checking ingredients; emphasis is on what to look for in a plant inspection. Everything from receiving, through processing and cleaning and sanitizing is outlined, concluded with a quality control program. Directed to plant workers and supervisors, it shows you what should be done. (CA-1987)
- **The Gerber Butterfat Test** - (7 minute video). Describes the Gerber milkfat test procedure for dairy products and compares it to the Babcock test procedure. (CA-1990)
- **High-Temperature, Short-Time Pasteurizer** - (59 minute videotape). Provided by the Dairy Division of Borden, Inc. It was developed to train pasteurizer operators and is well done. There are seven sections with the first covering the twelve components of a pasteurizer and the purpose and operation of each. The tape provides the opportunity for discussion after each section or continuous running of the videotape. Flow diagrams, processing and cleaning are covered. (Borden, Inc., 59-min.-1986)
- **The How and Why of Dairy Farm Inspections** - (110 slides-tape-script-15 minutes). This was developed at the request of seven northeast dairy cooperatives and with their financial support. Emphasis is on clean cows, facilities and equipment and following proper procedures. Regulatory agencies cooperated in reviewing the script and taking pictures. This was developed for farmers, youth and allied industry. (Penn State-1984)
- **Milk Plant Sanitation: Chemical Solution** - (13 minute video). This explains the proper procedure required of laboratory or plant personnel when performing chemical titration in a dairy plant. Five major titration are reviewed ... alkaline wash, presence of chlorine and iodophor, and caustic wash and an acid wash in a HTST system. Emphasis is also placed on record keeping and employee safety.
- **Milk Processing Plant Inspection Procedures** - (15 minute videotape). Developed by the California Department of Food and Agriculture. It covers pre and post inspection meeting with management, but emphasis is on inspection of all manual and cleaned in place equipment in the receiving, processing and filling rooms. CIP systems are checked along with recording charts and employee locker and restrooms. Recommended for showing to plant workers and supervisors. (CA-1986)
- **Processing Fluid Milk** - (140 slides-script-tape-30 minutes). It was developed to train processing plant personnel on preventing food poisoning and spoilage bacteria in fluid dairy products. Emphasis is on processing procedures to meet federal regulations and standards. Processing procedures, pasteurization times and temperatures, purposes of equipment, composition standards, and cleaning and sanitizing are covered. Primary emphasis is on facilities such as drains and floors, and filling equipment to prevent post-pasteurization contamination with spoilage or food poisoning bacteria. It was reviewed by many industry plant operators and regulatory agents and is directed to plant workers and management. (Penn State-1987)
- **Producing Milk of Good Quality and Flavor** - (114 slides-tape-script-25 minutes). The steps and corrective measures necessary to produce quality milk with good flavor are outlined. It is directed at dairy farmers, field staff, milk haulers and youth. (Penn State-1982)
- **Safe Milk Hauling - You're the Key** - (34 minute videotape). Recommended for anyone who samples, measures and collects milk from dairy farms. The purpose of this tape is to acquaint milk handlers with the proper procedures for sampling and picking up milk at the farm and delivering it safely to the handling plant. This tape provides an excellent review for experienced milk haulers and shows step-by-step procedures for novice milk haulers. (Cornell University)
- **Tests for Milk Quality and Composition** - (140 slides-tape-script-25 minutes). This set shows and describes in simple terms the various quality tests performed on milk samples. These include bacteria, antibiotics, freezing point, pesticides, somatic cells, flavor and others. The purpose, desirable results, and ways to improve poor results are outlined. It was developed for farmers, youth, field staff and allied industry. (Penn State, 1983)

FOOD

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

- Close Encounters of the Bird Kind** - (18 minute videotape). A humorous but in-depth look at Salmonella bacteria, their sources, and their role in foodborne disease. A modern poultry processing plant is visited, and the primary processing steps and equipment are examined. Potential sources of Salmonella contamination are identified at the different stages of production along with the control techniques that are employed to insure safe poultry products. (Topek Products, Inc.)
- The Danger Zone** - (30 minute videotape). Teaches deli department employees about food safety and sanitation and how they help build deli customer traffic. Recommended for retail employees who sell products in the deli department, as well as brokers, distributors and manufacturers who sell their products in the deli department. The tape is accompanied by printed material that serves as excellent training supplements. (The International Dairy-Deli Association)
- Food Irradiation** - (30 minutes). Introduces viewers to food irradiation as a new preservation technique. Illustrates how food irradiation can be used to prevent spoilage by microorganisms, destruction by insects, overripening, and to reduce the need for chemical food additives. The food irradiation process is explained and benefits of the process are highlighted. (Turnelle Productions, Inc.)
- Food Quality, Food Safety, and You!** - (80 slides, script, and cassette tape). This is an educational program designed for consumers. The presentation deals with the role of the consumer in maintaining the freshness, quality and safety of food in the home. It is intended for use by home economists, dieticians, cooperative extension agents and others interested in food quality and safety. (Cornell University)
- Food Safe - Series I** - (4-10 minute videos). (1) "Receiving & Storing Food Safely", details for food service workers the procedures for performing sight inspections for the general conditions of food, including a discussion of food labeling and government approval stamps. (2) "Foodservice Facilities and Equipment", outlines the requirements for the proper cleaning and sanitizing of equipment used in food preparation areas. Describes the type of materials, design, and proper maintenance of this equipment. (3) "Microbiology for Foodservice Workers", provides a basic understanding of the microorganisms which cause food spoilage and foodborne illness. This program describes bacteria, viruses, protozoa, and parasites and the conditions which support their growth. (4) "Foodservice Housekeeping and Pest Control", emphasizes cleanliness as the basis for all pest control. Viewers learn the habits and life cycles of flies, cockroaches, rats, and mice. (Perennial Education).
- Food Safe - Series II** - (4-10 minute videos). Presents case histories of foodborne disease involving (1) *Staphylococcus aureus*, (sauces) (2) *Salmonella*, (eggs) (3) *Campylobacter*, and (4) *Clostridium botulinum*. Each tape demonstrates errors in preparation, holding, or serving food; describes the consequences of those actions; reviews the procedures to reveal the cause of the illness; and illustrates the correct practices in a step-by-step demonstration. These are excellent tapes to use in conjunction with hazard analysis critical control point training programs. (Perennial Education).
- Food Safe - Series III** - (4-10 minute videos). More case histories of foodborne disease. This set includes (1) Hepatitis "A", (2) *Staphylococcus Aureus* (meats), (3) *Bacillus Cereus*, and (4) *Salmonella* (meat). Viewers will learn typical errors in the preparation, holding and serving of food. Also included are examples of correct procedures which will reduce the risk of food contamination. (Perennial Education).
- Food Safety Is No Mystery** - (34 minute videotape). This is an excellent training visual for food service workers. It shows the proper ways to prepare, handle, serve and store food in actual restaurant, school and hospital situations. A policeman sick from food poisoning, a health department sanitarian, and a food service worker with all the bad habits are featured. The latest recommendations on personal hygiene, temperatures, cross contamination, and storage of foods are included. (USDA-1987)
- Food Safety: For Goodness Sake, Keep Food Safe** - (15 minute videotape). Teaches food handlers the fundamentals of safe food handling. The tape features the key elements of cleanliness and sanitation, including: good personal hygiene, maintaining proper food product temperature, preventing time abuse, and potential sources of food contamination. (Iowa State University Extension)
- Is What You Order What You Get? Seafood Integrity** - (18 minute videotape). Teaches seafood department employees about seafood safety and how they can help insure the integrity of seafood sold by retail food markets. Key points of interest are cross-contamination control, methods and criteria for receiving seafood and determining product quality, and knowing how to identify fish and seafood when unapproved substitutions have been made. (The Food Marketing Institute)
- Northern Delight - From Canada to the World** - A promotional video that explores the wide variety of foods and beverages produced by the Canadian food industry. General in nature, this tape presents an overview of Canada's food industry and its contribution to the world's food supply. (Turnelle Production, Ltd.)
- On the Front Line** - (18 minute video). A training video pertaining to sanitation fundamentals for vending service personnel. Standard cleaning and serving procedures for cold food, hot beverage and cup/drink vending machines are presented. The video emphasizes specific cleaning and serving practices which are important to food and beverage vending operations. (National Automatic Merchandising Association)
- On the Line** - (30 minute VHS videocassette). This was developed by the Food Processors Institute for training food processing plant employees. It creates an awareness of quality control and regulations. Emphasis is on personal hygiene, equipment cleanliness and good housekeeping in a food plant. It is recommended for showing to both new and experienced workers.
- 100 Degrees of Doom ... The Time and Temperature Caper** - (14 minute videotape). Video portraying a private eye tracking down the cause of a salmonella poisoning. Temperature control is emphasized as a key factor in preventing foodborne illness. (Educational Communications, Inc.)
- Pest Control in Seafood Processing Plants** - (26 minute videotape). Videotape which covers procedures to control flies, roaches, mice, rats and other common pests associated with food processing operations. The tape will familiarize plant personnel with the basic characteristics of these pests and the potential hazards associated with their presence in food operations.
- Product Safety and Shelf Life** - (40 minute videotape). Developed by Borden Inc., this videotape was done in three sections with opportunity for review. Emphasis is on providing consumers with good products. One section covers off-flavors, another product problems caused by plant conditions, and a third the need to keep products cold and fresh. Procedures to assure this are outlined, as shown in a plant. Well done and directed to plant workers and supervisors. (Borden-1987)
- Safe Handwashing** - (15 minute videotape). Twenty-five percent of all foodborne illnesses are traced to improper handwashing. The problem is not just that handwashing is not done, the problem is that it's not done properly. This training video demonstrates the "double wash" technique developed by Dr. O. Peter Snyder of the Hospitality Institute for Technology and Management. Dr. Snyder demonstrates the procedure while reinforcing the microbiological reasons for keeping hands clean. (Hospitality Institute for Technology and Management).
- Sanitation for Seafood Processing Personnel** - A training video suited for professional food handlers working in any type of food manufacturing plant. The film highlights Good Manufacturing Practices and their role in assuring food safety. The professional food handler is introduced to a variety of sanitation topics including: 1) food handlers as a source of food contamination, 2) personal hygiene as a means of preventing food contamination, 3) approved food storage techniques including safe storage temperatures, 4) sources of cross contamination, 5) contamination of food by insects and rodents, 6) garbage handling and pest control, and 7) design and location of equipment and physical facilities to facilitate cleaning.
- Sanitizing for Safety** - (17 minute video). Provides an introduction to basic food safety for professional food handlers. A training pamphlet and quiz accompany the tape. Although produced by a chemical supplier, the tape contains minimal commercialism and may be a valuable tool for training new employees in the food industry. (Indiana -1990)

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

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

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

ENVIRONMENTAL

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

OTHER

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

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

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

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

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

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

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

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78th IAMFES Annual Meeting Registration Form

Galt House - Louisville, Kentucky - July 21-24, 1991
(Use photocopies for extra registrations)

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IAMFES Member (Banquet included) _____ Amount \$ 95 (\$125 on-site)
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IAMFES Member One Day (Circle: Mon/Tues/Wed) _____ \$ 45 (\$ 55 on-site)
Non-Member One Day (Circle: Mon/Tues/Wed) _____ \$ 65 (\$ 75 on-site)
Spouse/Companion (Name: _____) _____ \$ 15 (\$ 20 on-site)
Children (14 & Over), Name: _____ \$ 15 (\$ 20 on-site)
One-Day Exhibits Only (Circle One: Mon/Tues) _____ \$ 10

***New Membership Fees:**

Membership (Dairy, Food & Environmental Sanitation) _____ \$ 40
Membership Plus (Dairy, Food & Env. Sanitation & Journal of Food Protection) _____ \$ 70
Student Membership Dairy, Food & Env. San. or Journal of Food Protection _____ \$ 20
Student Membership Plus (Dairy, Food & Environmental Sanitation & Journal of Food Protection) _____ \$ 35

POSTAGE CHARGES: OUTSIDE THE U.S. - SUREFACE RATE _____ \$ 15 per journal
AIRMAIL _____ \$ 95 per journal

Other Fees: (Per Person)

Cheese & Wine Reception (Sun., 7/21) _____ FREE
Belle of Louisville Dinner Cruise (Mon., 7/22) _____ Adult \$30 (\$35 on-site)
Children Under 14 -- _____ \$ 15 (\$ 18 on-site)
IAMFES Awards Banquet (Wed., 7/24) _____ \$ 25 (\$ 30 on-site)

Spouse/Companion Events:

They're Off - Lunch at Derby Cafe (Mon., 7/22) _____ \$ 25 (\$ 30 on-site)
Bardstown & Jim Beam Distillery, Lunch at Talbot Tavern (Tues., 7/23) _____ \$ 25 (\$ 30 on-site)
Shelbyville, Lunch at Old Stone Inn (Wed., 7/24) _____ \$ 25 (\$ 30 on-site)

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Refund/Cancellation Policy

The IAMFES policy on meeting cancellation/refunds is as follows: "Registration fees, minus a \$15,000 processing fee, will be refunded for written cancellations post-marked at least two (2) weeks prior to the start of the meeting. No refunds will be made for cancellations made less than two (2) weeks prior to the start of the meeting, however, the registration may be transferred with written notification to a colleague.

Exhibitor Information

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

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Send payment with registration to IAMFES, 502 E. Lincoln Way, Ames, IA 50010-6666. Make checks payable to IAMFES. Pre-registration must be post-marked by July 10, 1991. The pre-registration deadline will be strictly observed. For additional information contact Julie Heim at 1-800-369-6337, 1-800-284-6336 (Canada).

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July 21-24, 1991
The Galt House
Louisville, Kentucky

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After June 19, 1991 reservations will be accepted on a space availability basis only. Reservations will be held until 6:00 p.m. on the date of arrival, unless guaranteed by one night advance deposit, payable by money order, certified check or a Major Credit Card.

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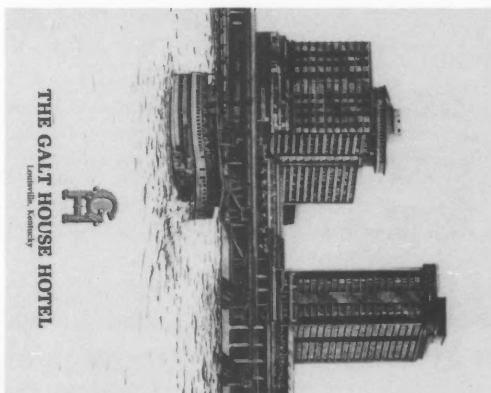
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IAMFES

78th Annual Meeting Spouse/Companion Tours

THEY'RE OFF - LUNCH AT DERBY CAFE

Monday, July 22, 1991

9:00 a.m. - 1:00 p.m.

Cost: \$25 (Includes Lunch)

You'll visit historic West Main Street, home of the nation's second-largest district of preserved cast iron facades; then on to the grandeur of St. James Court and one of the country's finest neighborhoods of Victorian mansions. Next, you'll pass by the University of Louisville, oldest municipal university west of the Alleghenies, and its splendid J. B. Speed Art Museum, Kentucky's largest fine arts collection. The famed twin spires of Churchill Downs will greet your arrival at the fabulous Kentucky Derby Museum where you will experience fascinating hands-on Kentucky Derby exhibits and the spectacular three hundred sixty degree multi-image show depicting the panorama of Derby Day! You'll finish your circuit at the world famous Louisville Stoneware for a tour and opportunity to make that prized bargain purchase in the Seconds Shop. **(Tour limited to 47 people).**

BARDSTOWN & JIM BEAM DISTILLERY - LUNCH AT TALBOTT TAVERN

Tuesday, July 23, 1991

9:00 a.m. - 3:00 p.m.

Cost: \$25 (Includes Lunch)

Just up the road from Bardstown, your group will wind its way to Clermont, Kentucky, home of the oldest continuing business in the state, Beam Distillery. Nestled among gently rolling hillsides, Jim Beam's American Outpost offers a film on bourbon making and splendid handmade crafts. Your trip into quaint Bardstown includes a must for travelers worldwide - a tour of Federal Hill, the stately Georgian Colonial mansion built circa 1818 and immortalized by composer Stephen Foster as "My Old Kentucky Home." You'll return to days of the antebellum South as your costumed guide points out the rare furnishings, formal gardens, and introduces you to other attractions in the Nelson County seat, such as Spalding Hall, dating from 1826 and now the home of the Oscar Getz Museum of Whisky History. This unsurpassed collection of the bourbon maker's art from pre-Colonial days to post-Prohibition years even contains an authentic - albeit illicit - whisky still! Lunch is at the historic Talbott Tavern. Time allowing, Bardstown's charming stores extend wonderful shopping opportunities. **(Tour limited to 47 people).**

SHELBYVILLE, LUNCH AT OLD STONE INN

Wednesday, July 24, 1991

9:00 a.m. - 3:00 p.m.

Cost: \$25 (Includes Lunch)

A visit to the Farm of the nationally known Saddlebred horse trainer, Don Harris, will allow you a fascinating glimpse into the world of gaited horses! At Don Harris Stables, you'll see a demonstration of the skills and finesse being taught these magnificent animals. Then, it's onto your comfortable coach for a short trip to picturesque Shelbyville, and the many fine shops at Science Hill, built in 1870 as a girls' finishing school. Today, the National Register structure houses the Wakefield-Scearce Galleries, noted for its internationally-recognized collections of antique English furniture, fine silver -- including a silver vault -- and period accessories. A stroll through Science Hill and down Shelbyville's quaint streets is like a trip back in time, perhaps putting you in the mood for a leisurely lunch at the Old Stone Inn. **(Tour limited to 47 people).**

*Special Events - Belle of Louisville Dinner Cruise, Monday evening, July 22
and the IAMFES Awards Banquet, Wednesday evening, July 24*

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JOURNAL OF APPLIED BACTERIOLOGY

Published for the Society for Applied Bacteriology

Editors:

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The Society for Applied Bacteriology launched the *Journal of Applied Bacteriology* in 1954 and since that time the journal has grown in size, in prestige and in the subject matter covered. It has established an international reputation with readers and authors; indeed each number of the journal contains papers from worldwide sources. The Society's interest in the systematics and ecology of groups of microorganisms is reflected in the journal, which publishes four types of article:

Review articles: a substantial survey with an adequate historical perspective;

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A note on....: research having narrow, readily defined limits, or contributions to the knowledge but not the development of concepts, or new methods, techniques or apparatus.

Subscription Information

Journal of Applied Bacteriology is published monthly together with *Letters in Applied Microbiology*. The subscription also includes the Annual S.A.B. Symposium volume and rates for 1991 are £210.00 (UK), £240.00 (overseas) and US\$437.50 (USA & Canada) post free.

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Coming Events

1991

July

- 11-18, International Workshop on Rapid Methods and Automation in Microbiology, XI, and Mini-symposium July 11-12th** at Kansas State University. Contact Daniel Y.C. Fung, Director, Tel (913)532-5654 or FAX (913)532-5681, 207 Call Hall, KSU, Manhattan, KS 66506.
- 16-18, Texas Association of Milk, Food and Environmental Sanitarians** will hold a seminar entitled "Basic Pasteurization Course" will be held at the Le Baron Hotel, 1055 Regal Row, Dallas, TX. For more information contact Janie Park of TAMFES at (512)458-7281.
- 21-24, International Association of Milk, Food and Environmental Sanitarians 78th Annual Meeting** to be held at the Galt House, Louisville, KY. For more information contact Julie at (800)369-6337 or (800)284-6336 (Canada).

August

- 4-6, The Pennsylvania Bakers Association 1991 Show and Convention** will be held at the Sheraton Resort, Lancaster, PA. For more information contact Tina Baum, Coordinator, PO Box 2467, Mechanicsburg, PA 17055, phone (800)346-7767 or (717)697-4199, FAX (717)790-9441.
- 5-9, Biotechnology: Principles and Processes**, will be held at the Massachusetts Institute of Technology, Cambridge, MA. For more information, please contact the Director of Summer Session, MIT, Room E19-356, Cambridge, MA 02139.
- 12-15, 105th Annual International Meeting and Exposition of the Association of Official Analytical Chemists** will be held at The Pointe at South Mountain, Phoenix, Arizona. For more information contact the AOAC, Suite 400, 2200 Wilson Boulevard, Arlington, VA 22201-3301; (703)522-3032; FAX (703)522-5468.
- 13-14, Food Plant Sanitation Workshop**, sponsored by the American Institute of Baking, will be held in Cherry Hill, NJ. For more information contact AIB at (913)537-4750 or (800)633-5137.
- 13-14, Food Plant Sanitation Workshop**, sponsored by the American Institute of Baking, will be held in San Jose, CA. For more information contact AIB at (913)537-4750 or (800)633-5137.
- 20-21, Food Plant Sanitation Workshop**, sponsored by the American Institute of Baking, will be held in Cherry Hill, NJ. For more information contact AIB at (913)537-4750 or (800)633-5137.

September

- 9-13, Basic Food Microbiology Short Course**, sponsored by the University of California, will be held at the Food Science and Technology Department, Cruess Hall, UC Davis

Campus. For further information contact Robert J. Price, Food Science and Technology, University of California, Davis, CA 95616-8598; (916)752-2194.

- 10-11, Marketing Development Seminar** will be held at The Registry, Denver, CO. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.
- 10-11, Food Plant Sanitation Workshop**, sponsored by the American Institute of Baking, will be held in Chicago, IL. For more information contact AIB at (913)537-4750 or (800)633-5137.
- 10-12, Texas Association of Milk, Food and Environmental Sanitarians** will hold a seminar entitled "Special Problems in Milk Plants" at the Howard Johnson, Plaza South, IH 35 at Woodward, Austin, TX. For more information contact Janie Park of TAMFES at (512)458-7281.
- 10-12, Western Packaging Exposition** to be held at the Anaheim Convention Center, Anaheim, CA 92802. For more information contact Debra Lee, Public Relations Manager, at (203)352-8297.
- 16-20, Wyoming Public Health Sanitarians Association** will hold their Annual Meeting at the Holiday Inn, Cheyenne, WY. For further information contact Terry Carlile, Box 1182, Laramie, WY 82070; (307)742-3611.
- 24-26, New York State Association of Milk and Food Sanitarians 68th Annual Conference** will be held at the Sheraton Inn, Liverpool, NY (Syracuse). For more information contact Paul Dersam at (716)937-3432.
- 25-26, Wisconsin Association of Milk and Food Sanitarians, Wisconsin Environmental Health Association and Wisconsin Dairy Plant Fieldmen's Association Joint Education Conference** will be held at the Maritime Inn, Manitowoc, WI. For further information contact Neil M. Vassau, Publicity Chairman, P.O. Box 7883, Madison, WI 53707; (608)267-3504.
- 25-27, BIOTECH USA '91** will be held at the Philadelphia Civic Center, Philadelphia, PA. For more information contact Gina Amatruda at (203)852-0500, ext. 266.
- 29-Oct. 4, 8th World Congress of Food Science and Technology**. The Westin Harbor Castle, Toronto, Canada. For further information, please write 8th World Congress, (IUFoST), 3340 Orlando Drive, Mississauga, Ontario, Canada L4V 1C7; or FAX (416)678-1229.

October

- 1-2, Food Plant Sanitation Workshop**, sponsored by the American Institute of Baking, will be held in Toronto, Ontario, Canada. For more information contact AIB at (913)537-4750 or (800)633-5137.
- 1-4, Canadian Institute of Public Health Inspectors Annual Conference**. For further information contact John Foruna, Public Health Inspector at Hamilton-Wentworth Regional Department of Public Health Services, P. O. Box 897,

Hamilton, Ontario, Canada, L8N 3P6; (416)546-3570 or FAX (416)521-8093.

•**2-4, South Dakota Environmental Health Association** will hold its Annual Meeting at the Howard Johnson Hotel, Rapid City, SD. For more information call Dave Micklos, SD State Department of Health, (605)773-3364.

•**2-5, National Society for Healthcare Foodservice Management's Third National Conference** will be held at the Washington Court Hotel on Capitol Hill, Washington, DC. For more information call or write the National Society for Healthcare Foodservice Management, 204 E. Street, NE, Washington, DC 20002; (202)546-7236.

•**2, National Automatic Merchandising Association's Pre-Convention Early Education Sessions**, Chicago, IL. For further information contact NAMA Convention Department at (312)346-0370.

•**3-5, National Automatic Merchandising Association's National Convention, Trade Show and Education Sessions for Vending/Foodservice Management**, will be held at the McCormick Place, Chicago, IL. For further information contact NAMA Convention Department at (312)346-0370.

•**6-9, Annual Meeting and Convention: Milk Industry Foundation and International Ice Cream Association** will be held at the Marriott River Center, San Antonio, TX. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

•**6-9, The 1991 National Frozen Food Convention and Exposition**, sponsored by The National Frozen Food Association and the American Frozen Food Institute, will be held in Orlando, FL. For more information contact the National Frozen Food Association, 4755 Linglestown Road, Suite 300, Harrisburg, PA 17112, (717)657-8601, or the American Frozen Food Institute, 1764 Old Meadow Lane, Suite 350, McLean, VA 22102, (703)821-0770.

•**16-17, Iowa Association of Milk, Food and Environmental Sanitarians, Inc. 50th Anniversary Annual Meeting** will be held at the Ramada Inn, Waterloo, IA. For more information contact Dale Cooper (312)927-3212.

•**16-17, Annual Conference of the North Central Cheese Industries Association** will be held at the Earle Brown Center, University of Minnesota, St. Paul. For further information contact E. A. Zottola, Executive Secretary, NCCIA, P. O. Box 8113, St. Paul, MN 55108.

•**20-Nov. 2, National Fisheries Institute 46th Annual Convention** will be held at the New Orleans Marriott, New Orleans, LA. Contact the NFI at (703)524-8881 for more information.

•**26-30, Food & Dairy Expo 91**, sponsored by Dairy & Food Industries Supply Association, to be held at the McCormick Place, Chicago. For more information contact DFISA, 6245 Executive Boulevard, Rockville, MD 20852-3938 (301)984-1444.

•**29-30, Dairy Food Processors' Symposium** will be held at the Palmer House, Chicago, IL. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

November

•**6, Food Industry Sanitation and Food Safety Workshop**, presented by the University of California Cooperative Extension, will be held at the Anaheim Plaza Resort Hotel, 1700 S. Harbor Blvd., Anaheim, CA. For more information contact Heidi Fisher, Food Science and Technology, University of California, Davis, CA 95616; (916)752-1478.

•**6-9, The Fundamentals of Selling & Merchandising** will be held at the Holiday Inn, Chicago, IL. For more information contact the International Dairy Foods Association, 888 Sixteenth Street, NW, Washington, DC 20006; (202)296-4250.

•**13-14, Alabama Association of Dairy & Milk Sanitarians Annual Meeting** will be held in Birmingham, AL. For more information call or write Tom McCaskey, Department of Dairy Science, Auburn University, Auburn, AL 36849; (205)844-1518.

•**15-17, National Automatic Merchandising Association Financial Management Seminar** will be held at the Las Vegas Hilton Hotel, Las Vegas, NV. For further information contact NAMA Convention Department at (312)346-0370.

•**18-20, International Association of Biological Standardization (IABS)** will hold its 22nd Congress and Exposition on "Characterization and Standardization of Purified Biologicals" in San Francisco, CA. For more information, contact Crest International, 940 Emmett Avenue, #14, Belmont, CA 94002. Telephone (415)5955-2704 or outside California (800)222-8882, and by fax, (415)595-3379.

To insure that your meeting time is published, send announcements at least 90 days in advance to: IAMFES, 502 E. Lincoln Way, Ames, IA 50010-6666.

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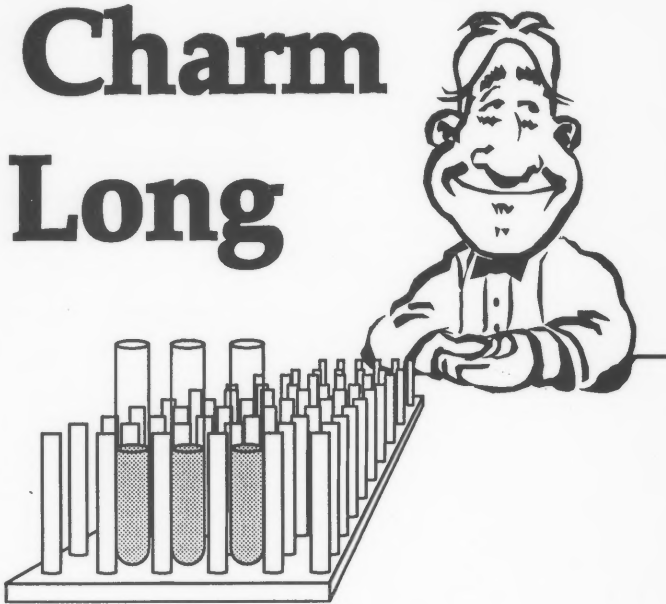
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