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Dairy and Food Sanitation®

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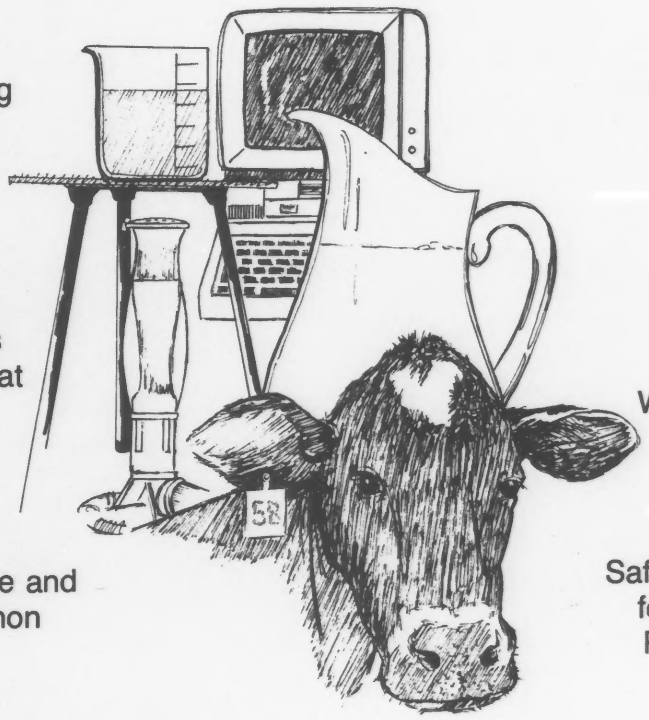
Storing and Handling "Boxed" Drinks

Evaluation of an Automatic Milk Sampling Device



Food Grade Acid Application Reduces Bacteria on Red Meat

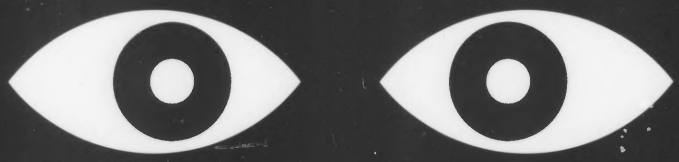
Preventive Pest Control "The Warehouse Beetle"

The Salmonellae: Isolation, Occurrence and Distribution in Lebanon

Safety Considerations for New Generation Refrigerated Foods

Call for Research Papers for the 1988 Annual Meeting, see the October Issue.

IT'S TIME TO GET OUT OF THE DARK.



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President's Message

January 1, 1988, like any new year, brings with it hope and many aspirations for the future.

For IAMFES members, this is especially true. The August, 1988 Annual Meeting in Tampa, Florida will be our 75th. Our *DIAMOND JUBILEE*.

What an opportunity, in today's modern world, to build on the insight and dreams of our founding fathers.

Your Executive Board has recently reviewed the minutes of IAMFES over the past 10 years. Even during this short span of time, many improvements can be seen.

We look forward in the year ahead to the work being done by our Long Range Planning Committee. Not only are they reviewing our past but will, I am sure, be making many recommendations for the future. Recommendations for change not for the sake of change, but to allow us to continue to grow and serve our membership in a positive way.

Your 1988 Program Committee met in October in Ames, Iowa. Under the leadership of President-elect Robert Gravani (Chairman, Program Committee), an excellent program was planned.

Those of you attending the '88 annual meeting will not only have the opportunity to choose from an expanded program, but will also see some new innovative formating.

The Opening Session will begin at 7:00 p.m. Sunday evening, July 31, 1988. This session will include a short Welcome and the Ivan Parkin Lecture. Following will be the Early Bird Reception.

The Florida Local Arrangements Committee, under the leadership of Dick Jolley, Ron Schmidt and Sonya Gambrel are bubbling over with enthusiasm and promise us nothing short of a sensational meeting.

* * * PLAN NOW TO ATTEND * * *

Respectfully submitted,
Leon Townsend
President

Monday, August 1			
8.25 am	Dairy Product Sanitation Session	Symposium: The Micro. Sasfety of Processed Poultry	Food Prot. Session
10:00 am	Refreshment Break----------		
10:25 am	Dairy Prod. Sanitation Session Cont'd.	The Micro. Safety of Processed Poultry	Food Prot. Session Cont'd.
12:00	Lunch----------		
1:25 pm	Milk Sanit. Session	Food Service Sanitation Session	Symposium: The Future of Ground Water Qual. & It's Effect on the Dairy & Food Industry.
3:00 pm-3:10 pm	Refreshment Break----------		
3:25 pm	Milk Sanit. Session Cont'd.	Food Service Sanitation Session Cont'd.	Ground Water Quality Symposium Cont'd.

Tuesday, August 2			
8:25 am Ingredients	Symposium: The Handling & Safety of Shelf Life Used in Dairy Prod.	Symposium: The Safety of Extended REsopnses to Refrigerated Foods	Symposium: Environmental health Disasters
10:10	Refreshment Break----------		
10:25	The Handling & Safety of Ingredients Symposium Cont'd.	Safety of Refirgerated Foods Symposium Cont'd.	Environmental health Responses to Disasters Symposium Cont'd.
12:00 Noon	Lunch----------		
1:25 pm	IAMFES Business Meeting		
3:00-3:10 pm	Refreshment Break----------		
3:25 pm	Dairy Prod. Safety Session	Food Prot. Session	HACCP Session

Wednesday, August 3		
Milk Sanit. Session on Seafood	Symposium: Current Perspect. Control Safety	Symposium: An Update on Pest Technology For the Dairy & Food Industry
Milk Sanit. Session Cont'd.	Seafood Safety Symposium Cont'd.	Pest Control Tech. Symposium Cont'd.
Symposium: Dairy Prod. Pathogen Update	Food Protection Session	Environ. Protection Session
Dairy Prod. Pathogen Update Cont'd.	Food Protection Session Cont'd.	

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Dairy and Food Sanitation

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Dairy and Food Sanitation, Vol. 8, No. 1, Pages 5-7 (January 1988)

Safety Considerations for New Generation Refrigerated Foods

Refrigerated Foods
and Microbiological Criteria Committee of the
National Food Processors Association, Attn: V. N. Scott,
1401 New York Ave., Suite 400,
Washington, D.C. 20005

Introduction

The number of U.S companies becoming active in refrigerated foods is rapidly expanding as a result of the opportunity to market products having convenience and "closer to fresh" product characteristics. A major thrust is the generation of new types of foods with enhanced shelf-life under refrigeration. Termed "partially processed foods," these products receive a heat process, or other preservation treatment, that reduces the microbiological load in the food, but does not produce "commercial sterility." Because partially processed foods are not commercially sterile, they share the characteristics common to all refrigerated foods:

- Sensitivity to temperature and consumer abuse.
- Limited shelf-life.
- Potential for consumers to mishandle them, especially if they appear to be shelf stable.
- Optimum storage at 33-40°F; upper limit generally near 45°F.

Examples of partially processed foods that are refrigerated include meat, seafood, egg, pasta and vegetable salads, fresh pasta, soups and sauces, entrees, meals and uncured meat and poultry items.

This recent interest in refrigerated products follows the trend which has been underway in other countries, especially in Europe, for some years. Recent experience indicates that a significant portion of the retail foods sold in Europe are refrigerated items, while the current U.S. market for refrigerated foods is much smaller. While there appears to be a great market potential in the U.S., there are significant differences between what is expected of food products in Europe versus the U.S. One major influence is the comparative geography. Simply put, the problems imposed by distribution may increase significantly with the larger distribution area in the U.S. Secondly, Europeans shop more often than U.S. consumers. Consequently, refrigerated foods in European markets may not be subject to as much abuse or require the longer shelf-life needed to be commercially viable in the U.S. Just because "it works in Europe," doesn't mean that "it" will work in the U.S.

Even within the U.S., production practices, product performance, safety expectations and product formulations will vary from company to company. Thus, because company "X" has a certain product on the market does not necessarily mean that company "Y" can produce the same product successfully, or that company "X" put its products through the same type of testing that company "Y" would use. Each company, therefore, should perform its own testing and evaluation on its specific product formulations.

Although the basic provisions of the Food, Drug and Cosmetic Act; the newly revised Umbrella Good Manufacturing Practice regulations (21 CFR 110); the Meat Inspection Regulations (9 CFR 318) and the Poultry Products Inspection Regulations (9 CFR 381) contain provisions relative to refrigerated foods, current regulations do not specifically address this class of products in the same depth as acidified and low-acid canned foods. This can facilitate the relatively rapid introduction of refrigerated foods into the marketplace. However, even in the absence of specific regulations, responsible companies feel a strong obligation to design, test, manufacture and distribute products which will minimize the risks imposed by the presence or growth of potentially harmful microorganisms. Most companies realize that a "keep under refrigeration" label does not by itself assure that a product will be safe.

The purpose of this paper is to promote awareness of the potential risks which can be associated with refrigerated foods and to provide recommendations on the proper development and evaluation of new refrigerated food products.

Types of Products Addressed by This Document

Refrigerated foods receiving less than a full "commercial sterility" process which may or may not be packaged in hermetically sealed containers are the subject of this document. Containers being employed for these products include packages long associated with shelf-stable products - glass jars, retortable pouches, metal cans - as well as new plastic containers, plastic pouches, or paperboard composite containers and boxes. These products will typically be retailed in the dairy, deli or refrigerated meats section of food stores.

Products not specifically addressed here include dairy products, packaged fresh produce, fresh meats and traditional cured meats. However, many of the potential haz-

ards and recommendations discussed below may apply to these products as well.

Basic Considerations Regarding Refrigerated Foods

Before presenting specific recommendations for the manufacture of products to be sold refrigerated, some important considerations surrounding the preparation, handling and distribution of refrigerated products will be reviewed.

First, food processors should always assume that unless a product is treated to destroy potential pathogens and then handled and packaged to prevent microorganisms from recontaminating the product, the potential exists to have pathogenic organisms in food products. Techniques to reduce this risk are discussed under "Product and Process Design" in the "Recommendations" section of this document.

The processor must be aware that while refrigeration temperatures slow or prevent the replication of most pathogenic microorganisms, some pathogens will continue to multiply. Given enough time at low temperatures, the number of organisms may increase to a level sufficient to cause illness.[11] A few psychrotrophic pathogens can thrive at refrigeration temperatures and the processor must be aware of the sources and growth potentials of these organisms. The psychrotrophic pathogens include *Yersinia enterocolitica, Listeria monocytogenes,* non-proteolyic strains of *Clostridium botulinum,* some strains of enterotoxigenic *Escherichia coli* and *Aeromonas hydrophila.* Several foodborne disease organisms are capable of growth at slightly above 5°C: *Vibrio parahemolyticus, Bacillus cereus, Staphylococcus aureus* and some strains of *Salmonella.*[11]

Manufacturers should expect that at some point during the storage, distribution, display or consumer handling of refrigerated foods, proper refrigeration of the product will not be maintained. Temperature abuse can occur for many reasons, including shipping and receiving delays resulting in improper storage, mechanical problems in refrigeration equipment, and improper loading or stacking of display cases.[2] Some products to be sold refrigerated may be frozen first with the intent of thawing at refrigeration temperatures. However, prescribed thawing procedures may not be followed, resulting in significant temperature abuse.

Format and location of the "Keep Under Refrigeration" label statements also deserve mention. This statement must be prominent on the product label as well as the outer carton to alert distributors, retailers and consumers to handle the product properly. This is especially important when marketing products in containers which resemble those used for shelf-stable products.

In discussing labeling, we must also address the importance of "Sell By" or "Use By" dates. Open dating of products is an important tool as an extension of the processors' control over their product. But it must be recognized that coding is not fail-safe. Modern supermarkets handle thousands of products and it is virtually impossible to track all dated material consistently. It is also a fact that not all deli workers or food handlers receive training which could help assure the safety of foods, such as the removal of outdated products, or even to recognize spoiled foods. Thus, not all supermarket personnel are ready to administer the special handling warranted by a temperature sensitive item.[2] Some producers have evaluated use of their own sales or distribution personnel to maintain a close rotation of stock and a strict compliance with "pull" dates. While this approach seems more effective than sole reliance on store personnel, it is still not unusual to find refrigerated products with expired dates in display cases. After purchase, product may not be consumed promptly or stored properly. Therefore, the product may be significantly beyond its "Sell By" date before being consumed, and may be temperature-stressed as well. The processor should therefore have a good understanding of the real shelf-life of the product under moderately abusive conditions and select "Sell By" or "Use By" dates accordingly.

Manufacturers of refrigerated foods should also be cognizant of handling practices at the consumer level. Due to time constraints, personal preference or a variety of other reasons, consumers do not always follow manufacturers' directions for storage or preparation. Because of the wide variations in heat treatments administered by consumers (especially in microwave ovens) and the inherent variation in the resistance of microorganisms to heat inactivation [15]. preparation at the consumer level cannot be depended on to eliminate pathogenic organisms if they are present. Additionally, consumers cannot be expected to recognize a spoiled food product which should not be consumed. This is especially true for unfamiliar products or those in which the signs of spoilage are subtle and not easily detected.[9]

Recommendations

Product and Process Design

Refrigerated foods may be subjected to periodic or even prolonged stress in the handling and distribution system.[5] Therefore, it is recommended that all possible care be exercised in manufacturing to minimize or eliminate the presence of any microbiological pathogens. Incorporation of a Hazard Analysis Critical Control Point (HACCP) System[1,4,10] in the control of manufacturing is highly recommended as a key to optimizing the microbiological safety and quality of foods. Ingredients or final products should also be exposed to a heat treatment (e.g., pasteurized) whenever possible in order to further reduce the numbers of microorganisms in product.[8,13]

It is also highly recommended that the food processor incorporate multiple barriers or hurdles (in addition to refrigeration) into the product formulation to inhibit or minimize microbial reproduction.[5,6,7,13] Examples of such barriers or hurdles[3] include:

Adjustments in formulation:

- Acidification
- Reduced water activity
- Preservatives

Changes in packaging and environment:
- Modified atmospheres*

One example of a product which successfully employs the principle of multiple barriers is a pasteurized cheese spread. This product uses a combination of limited water activity, salt, phosphates, and a mild heat treatment to eliminate non-sporeforming pathogens and inhibit the growth of sporeforming pathogenic microorganisms.[16,17]

One example of a product which successfully employs the principle of multiple barriers is a pasteurized cheese spread. This product uses a combination of limited water activity, salt, phosphates, and a mild heat treatment to eliminate non-sporeforming pathogens and inhibit the growth of sporeforming pathogenic microorganisms.[6,17]

Risk Assessment

Combinations of process and product design factors can be effective in controlling the growth of foodborne pathogens. However, the manufacturer should verify the effectiveness of these barriers using appropriate scientific studies to evaluate potential risk from their food products.[9] Such studies should be conducted by or in conjunction with persons knowledgeable in the area of food microbiology. Testing should concentrate on the effectiveness of the barrier system to be used in the products being developed against potential food pathogens of concern. Abuse testing of products is essential.

Processors should also conduct shelf life tests to determine when spoilage occurs. Spoiled products, even if no health hazard is present, is considered adulterated and is subject to regulatory action.

Summary

The NFPA feels that the market potential for refrigerated foods and the opportunities which refrigerated foods present may indeed be virtually unlimited. The possible abuses in the distribution chain, along with potential differences in product formulation and safety assessment by manufacturers, make it clear that a potential risk of public health related problems from extended shelf-life refrigerated foods does exist. To reduce this risk, the NFPA urges that proper manufacturing procedures, sanitation, product formulation and safety assessment via HACCP programs be applied during the formulation and manufacture of this class of product. The Association is convinced that these steps are essential to protect the health of consumers and to allow this market segment to grow without constraint.

As a further step in its efforts, the NFPA is in the final stages of preparing "Factors Involved in Establishing Good Manufacturing Practices for the Production of Refrigerated Foods." As soon as this document is completed, it will be made available by the Association to interested contacts.

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**Even though modified atmosphere is included as a potential microbial barrier, it must be noted that use of modified atmospheres may actually favor anaerobic pathogens.[12,14] For many products, therefore, applications for modified atmospheres may be restricted to enhancement of product quality rather than safety.*

Dairy and Food Sanitation, Vol. 8, No. 1, Pages 8-10 (January 1988)

The Salmonellae: Isolation, Occurrence and Distribution in Lebanon

by Nassim H. Nabbut

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The present communication presents a summary of the available data on the isolation, occurrence and distribution of *Salmonella* in various sources in Lebanon. Among 36 *Salmonella* serotypes isolated from various domestic animals, *S. dublin* was the most prevalent (37.6%) in cattle followed by *S. typhimurium* (21%). Sixteen serotypes were recovered from sewage effluents, 8 from sausages, 24 from animal feed additives, 3 from house flies and 2 from fish meal and shrimp. The epidemiological significance of these serotypes, the potential health hazards they present and the prevention and control of salmonellosis are discussed briefly.

In recent years, salmonellosis has emerged as a public and veterinary problem of major importance. Its occurrence is world wide and appears to be increasing in most countries (1,2,8,21,23). The increased incidence of this disease has aroused great interest among bacteriologists in various countries for identifying the non-human reservoirs of salmonellae. Salmonellosis is a true zoonotic disease which is commonly transmitted from animals to man. Many of the so-called zoonotic diseases, such as brucellosis, anthrax, bovine-type tuberculosis, rabies and others, have a single or a limited number of hosts in the animal kingdom. Salmonellosis, on the other hand, has many warm-blooded and cold-blooded animal hosts.

The most dramatic and highly publicized aspects of salmonellosis are the foodborne infections which occur in large groups of persons that have consumed a contaminated common food. The food is usually prepared and held at an ambient temperature at which the *Salmonella* organisms grow and multiply until they reach up to 10^8-10^{11} organisms per gram of the food. Such occurrences result in extensive and often severe outbreaks of infection among the consumers of such foods (23).

The salmonellae may be grouped into three categories on the basis of their host predilections. (i) The salmonellae primarily adapted to man, consisting of *S. typhi* and *S. paratyphi A, B* and *C*, the causative agents of typhoid and paratyphoid fevers; (ii) the salmonellae primarily adapted to specific animal hosts, including *S. choloraesuis* (pigs), *S. dublin* (cattle), *S. pullorumigallinarum* (poultry), *S. abortus-equi* (horses) and *S. abortus-ovis* (sheep). In addition to their pathogenicity to domestic animals, members of this category are capable of causing infections in man. (iii) Unadapted salmonellae with no apparent host preference. They are potentially pathogenic to man and/or animals.

The real problem of human salmonellosis is caused by a limited number of serotypes the nature of which vary from country to country. In general the most prevalent serotypes belonging to this group are: *S. enteritidis, S. typhimurium, S. heidelberg, S. derby, S. infantis, S. montevideo, S. newport, S. agona* and *S. muenster*.

The present report presents a summary of the available data on the first isolations of *Salmonella*, other than *S. typhi* and *S. paratyphi A, B*, and *C*, in Lebanon. There are many potential sources of salmonella infection in animals and man in Lebanon, but no single source can be implicated as the most important. The distribution and epidemiological significance of *Salmonella* serotpyes of domestic animals have been surveyed extensively by Nabbut and Jamal (14). A total of 260 samonellae representing 36 serotypes were isolated, for the first time in Lebanon, from various animal species. *S. typhimurium* occurred in 35.5% of the chickens that were examined and was the predominant serotype, followed in descending order by *S. bareilly, S. pullorum, S. infantis, S. oranienburg, S. agama* and 31 other serotypes. *S. dublin* was the most frequent serotype (37.6%) in cattle followed by *S. typhimurium* (21%). Both serotypes as well as other serotypes are of great public health importance and are frequently associated with acute gastroenteritis in man in Lebanon and elsewhere (3,7,9,13,17,20,22). *S. dublin*

has been isolated from avian, bovine, ovine and caprine sources in Lebanon. *S. typhimurium* has established itself as the leading serotype not only in frequency, but also in zoological distribution and has been isolated from 10 animal species in Lebanon, namely from: chicken, duck, pigeon, canary, parrot, partridge, cattle, pig, rabbit and horse. In isolates from cattle slaughtered in "Beirut Abbatoir", *S. montevideo, S. dublin, S. kentucky, S. anatum, S. velge, S. typhimurium, S. bovismorbificans* and 18 other serotypes were encountered in a descending order of frequency (14).

Salmonella isolations from sewage effluents in the city of Beirut, included mostly *S. montevideo, S. goetborg, S. paratyphi B, S. bovis-morbificans, S. muenster, S. livingstone* and 10 other serotypes (15).

Of 250 samples of Lebanese sausages examined for the presence of salmonellae, 11.2% were found to contain salmonellae representing 8 *Salmonella* serotypes, namely; *S. reading, S. chester, S. lomita, S. sunnycove, S. bledgam, S. meleagridis, S. binningham* and *S. georgia* (18). There is a need to establish not only the incidence but also the levels of contamination of Lebanese sausages with salmonellas because it is well established by Bryan (6) that these organisms need to occur at number of 10^5 or more before they are likely to cause illness in healthly humans. In a survey of 300 animal feed additive samples, 57 (19%) yielded 24 *Samonella* serotypes, the 4 most predominant were *S. meleagridis* (35.1%), *S. tenessee* (7%), *S. chester* (5.2%) *S. seftenberg* (5.2%). (Most of the serotypes encountered in the feed additives (16) were different from those isolated from domestic animals. This indicates that animal feeds play an important role in the introduction of new *Salmonella* serotypes into Lebanon.) Animal feeds constitute one of the major inanimate sources of various serotypes which have a path of transmission from feeds to poultry and livestock and eventually to man through the consumption of contaminated foods of animal origin. Therefore, all imported and home produced feed ingredients, must be free of *Salmonella*. The introduction of compulsory feed supplement sterilization is mandatory to help control the occurrence of salmonellae in animal feed additives in Lebanon.

A study of flies for the presence of salmonellae was carried out by Bidawid *et al* (4). Isolates from batches of flies included *S. enteritidis, S. typhi,* and *S. paratyphi B*. More recently *S. agona* and an unidentified strain of *Salmonella* were isolated from fish meal and shrimp, respectively (19).

The recent review of zoonoses in Lebanon by Matossian and Hatem (12) dealt with the parasitic, bacterial and viral zoonotic diseases as related to their manifestations in human populations. According to the authors, salmonellosis is perhaps the most wide-spread infection that simultaneously affects the human and animal hosts of Lebanon. It causes large scale economic losses to livestock and constitutes a potential health hazard to the general population.

The extent of human salmonellosis and the frequency by which it produces gastroenteritis in single individuals have not been establishd. However, group outbreaks associated with *S. typhimurium, S. dublin, S. infantis, S. enteritidis* and *S. bovismorbificans* have been observed in Lebanon at varying intervals (3,10,13). The foods implicated in these outbreaks were identified as roasted chicken, white cheese, raw meat and ice cream.

Acute gastroenteritis is not a specific infection as it may be caused by a wide variety of *Salmonella* serotypes and other bacteria. It is regarded as one of the most important public health problems and is thought to be the principal cause of infant mortality in Lebanon (11).

This communication shows a widespread occurrence and distribution of various *Salmonella* serotypes in various sources in Lebanon and indicates the need for the development and enforcement of control measures in order to reduce the spread of animal and human salmonellosis. The prevention and control of foodborne diseases in general and salmonellosis in particular require the attention, cooperation and coordination of the activities of the entire food production, food processing and food service industries, public health workers, physicians, veterinarians, laboratory personnel, housewives and consumers. Furthermore, effective control is highly dependent on the institution of continuous nation-wide education programs that emphasize the importance of proper food handling practices, personal hygiene food sanitation and the control of the factors that contribute to the occurrence of foodborne salmonellosis. The various implicated factors in the United States, and presumably in other countries, include inadequate cooking, cooling, reheating, preparing the food a day or more before serving and consuming left over foods (5,6). The systems of monitoring of food handling and food processing, although in existence in Lebanon, are deficient and are not always followed up, particularly during the 12 years of war. It is therefore strongly recommended to establish a central public health agency or authority, analogous to the Center for Disease Control in the United States, to which all foodborne illnesses should be reported. The epidemiology of all such illnesses should then be thoroughly investigated by the public health agency emphasizing appropriate prevention and control measures.

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Evaluation of an Automatic Milk Sampling Device

by
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In recent years, much effort and considerable improvement has been made in reducing to a minimum the imprecision (hence, variation) in analyses done on raw milk samples for purchase purposes. In particular, analytical variability in milkfat and other component measurements has been significantly lowered through use of infra-red test methods. Although microbiological methods are much less precise, adoption of and consistency in following detailed steps of analysis also minimize to the extent possible variations in test results. However, throughout the years in which advances were being made in analytical methodology, sample quality--hence, major potential sources of inequity--rested in the hands of the milk hauler and his ability to procure and maintain a representative sample of milk from the bulk tank. Indeed, this source of variability yet remains and must be considered to carry within it a potential for error far exceeding those associated with analytical methodology. Even under ideal conditions, where milk haulers use the best of techniques, where five or more minutes of agitation are provided for and meticulous sampling and handling procedures employed, the bulk tank itself remains a kind of "unknown" factor in sample variability. Does the design ensure adequate blending of milk, and under all levels of fill? Does the sample taken from the specific location of the port represent precisely the composition of all of the milk in the tank? Do producers who happen to be scheduled for pick-up early in the route, when the agitator is running continuously and the milk is warmer, have somewhat greater assurance of a more completely blended milk supply and more representative sampling? Who loses, who gains when the sample is in fact unrepresentative of the supply? These are significant issues, particularly today with the economic pressures under which producer and processor must operate. Ultimately, that system serves best that best ensures fairness and equity in the marketplace, and it was with that throught in mind that the Foss "Auto-Sampler" (AS) automatic milk sampling device was evaluated. The central question was whether or not samples taken automatically could serve the analytical process, both microbiologically and compositionally, as well as those taken by hand.

MATERIALS AND METHODS

Samples and Sampling:

One milk route serving a Land O'Lakes, Inc. processing plant was selected for this study. The route and the producers served by it were considered reasonably representative of others in the area. Depending upon scheduling, one of two milk haulers was involved in actual milk pick-up. Both were instructed in operation of the automatic sampling device and both were advised of the necessity to employ precise techniques in procuring samples, both those taken automatically and those taken by hand.

The haulers were asked to allow five minutes of agitation prior to manual sampling from the bulk tank. They were then instructed to take three manual samples, one directly under the port where samples are commonly taken and two others at widely differing locations in the tank.

The one AS sample, taken at the tank truck as milk was pumped into the truck, was then compared in milkfat content and bacterial count to the average of the three manual samples. This procedure was used in order to ensure to the extent possible that the manual test results were truly representative of the total milk supply.

Serious doubt existed that confidence could be placed in one sample as being truly representative. The automatic sampler is in fact a proportionate sampling device that composites small aliquots of all the milk withdrawn from the tank, and a fair comparison could only be made against manually taken samples that could, indeed, be considered "representative".

In addition to the above samples, the hauler was also instructed to take a "manual" sample from the truck. Experience had shown that the most representative sample of this kind was one taken immediately after the last producer supply had been loaded, and this was the method used in this study. Another AS sample was then obtained from a unit installed at the plant intake. These two samples were then compared to each other and to the average of the several milk supplies making up the load.

Both farm weights of milk and truck milk weight (obtained on weigh scales) were recorded. In this way the data could also be used to assess fat accountability. Samples and data were collected on all the milk reflected by the given route on ten separate days of pick-up. On occasion, one or more weeks' interval elapsed between sampling for this study. Samples were taken in snap-cap vials. They were immediately refrigerated in ice water and were transported directly to Dairy Quality Control Institute, Inc. for analysis. All analyses were made within 24 hours of delivery.

Analytical Methods:

Fat content was determined on an infra-red instrument (Multispec, Inc., 23560 Lyons Avenue, Newhall, CA 91321) and bacteria counts were made by the Plate Loop method.[2]

Foss Auto Sampler:

The automatic milk sampling device used in this study was manufactured by A/S N. Foss Electric (69 Slangerupgade, DK 3400, Hillerod, Denmark). The unit is designed to take samples both for compositional and bacterial analysis. It is mounted on intake lines of tank trucks or milk plants, and aside from the necessity to dial manually the overall volume of product to be sampled, it is entirely automatic in function and can be cleaned in place.

The sampler consists of a small peristaltic pump, the rate of speed of which is governed by manual adjustment to volume of liquid to be sampled. Flow-rate is thus stabilized for various amounts of product and for a given volume of sample taken over the period of product flow through the unit.

During sampling, all milk passes through a short length of silicone tubing. To minimize carry-over of one sample to the next, a time delay is invoked, during which the fresh sample flushes out remaining product from the previous sample. Such delay may run from zero to five seconds. For this study, the time period was set at two seconds. In addition, a post-sampling emptying-out process reduces the amount of residual in the tubing to approximately 10 microliters. Hence, carry-over of residual milk is considered to be negligible. The manufacturer has in fact evaluated this aspect under controlled experimental conditions.[1]

The plastic sampling tubes can be obtained in sterile condition and can be replaced after each sampling routine, if desired. However, it is not essential to do so and was not done for this study. It is recommended that tubes be replaced either daily or after 20-30 samplings. For this work, new tubes were used each day milk was picked up, with samplings running from eight to, in one instance, fifteen producer supplies in total.

Manufacturer's recommendations call for mounting the sampler on the suction side of milk pumps. Special sensors operate to prevent sampling until liquid is actually present. In the same way, operation is stopped whenever air appears in the line. The sampler is wired to the tank truck battery for operation on milk trucks. Milk flow in this case should be downward through the sampler.

Sampler volume can be pre-set at 25, 50 or 100 mls., or adjusted to intermediate amounts. The units can be modified to accept samples in open containers, snap-cap vials or plastic bags. In this study, snap-cap vials were used and volume of sample was approximately 60 mls. The procedure used for automatic sampling was as follows. First, an estimate was made of the volume of milk to be sampled, either at the farm or from the truck at the plant. The sampler was then switched on and the appropriate volume dialed into the unit by hand. An empty sample container was locked into position, the milk pump turned on and a sample collected. After milk flow was stopped, the sampler was switched off, the container with sample removed and placed in ice water for storage and shipment.

RESULTS AND DISCUSSION

Data in Table 1 summarize findings of milkfat analyses of samples obtained manually and by AS from both bulk tanks and pooled truck supplies. It should be noted that the grand average test for samples taken manually from bulk tanks represents analyses of three samples extracted from three different locations in each bulk tank. This procedure was used to provide reasonable assurance that samples taken manually were indeed representative of the milk supply and could serve as truly appropriate reference samples against which the AS could be fairy compared. Only one AS sample could be obtained from any one bulk tank or tank truck load. Hence, that one sample alone had to be used to reflect the representativeness of samples taken by AS.

As a matter of interest, manual samples extracted at different locations were found to show significant differences in milkfat test in some instances. In the worst of these cases, one tank produced samples with a range of difference of 1.0% fat. The actual tests were 3.73%, 4.64% and 4.77%. This same tank yielded samples that varied from each other by 0.1 to 0.2% in fat test on three

occasions, but which on as many other occasions showed essentially no measurable difference. Other tanks also produced samples varying by 0.1 to 0.2% in some instances, but the majority were found on most occasions to provide samples varying less than 0.1% and, fairly often, samples of negligible difference in test.

At the very outset, therefore, it must be emphasized that some bulk tanks under some conditions likely will not, under full five minutes of agitation, yield representative milk samples. In this study, this factor was minimized by averaging tests of three samples. The fact remains, however, and must be considered a source of significant variability in test results in some tank samples taken manually.

As Table 1 shows, the grand average fat test results were 3.754% and 3.743% for samples taken manually and by AS, respectively. The difference is -0.011%. In a paired-t analysis, the difference was not found to be statistically significant (P>.05).

Grand average fat test results on truck milk supplies were 3.767% for manually taken samples and 3.754% for AS samples. The difference is -0.013%. This difference was in fact found to be statistically significant (P>.05). However, such fact should not be taken to indicate inferiority in AS sampling. Only one manual sample was taken as reference and this sample may well have reflected a bias. In addition, only 22 samples, 11 each of manual and AS samples were analyzed--a relatively small number overall and possibly less than adequate.

Assuming, however, that the results reflected actual differences in samples obtained by the two methods, and without making any assumption regarding which method produced the most representative samples, the differences in milkfat tests are nonetheless of interest. These data are shown in Table 2.

More often than not, the AS samples were found to test somewhat lower than samples taken by hand. The differences, though, show up only in the second and third decimal point and may be considered small, indeed. The fact that the bias is generally one-sided, however, no doubt adds basis to the fact that the differences were found to be statistically significant. Again, it seem inappropriate to suggest that one or the other of the sample methods produced more representative samples, or that the AS samples should necessarily be considered less representative than samples taken by hand.

One other point should perhaps be made, namely, that analytical procedures are themselves sources of variability in test results. A coefficient of variation (CV) is a good measure of this effect. In this study, the infra-red test for milkfat had a CV of 0.736% at 95% confidence. The sampling methods proved to have a CV of 8.0% at the same level of confidence. Hence, the analytical procedure does not appear to be a major factor in differences found in fat test results of samples obtained by the two methods.

Table 3 summarizes findings of Plate Loop counts of bacteria done on samples obtained by manual and AS

Table 1. Summary of statistics comparing milkfat test results on raw milk sampled by hand vs automatic samplers.

Sources of Samples	Manual (N)	Manual Grand Avg. (%)	Automatic (N)	Automatic Grand Avg. (%)	Difference Auto-Manual
Farm bulk tank	273	3.754	91	3.743	-0.011[1]
Tank truck (at plant)	11	3.767	11	3.754	-0.013[2]

[1]Not statistically significant (P>.05)
[2]Statistically significant (P<.05)

Table 2. Milkfat test results and differences observed between two methods of sampling milk from tank trucks.

Trial No.	Automatic Sampling % Fat[1]	Manual Sampling % Fat[1]	Difference (Auto.-Man.)
1	3.725	3.72	-0.005
2	3.755	3.745	-0.01
3	3.78	3.76	-0.02
4	3.755	3.725	-0.03
5	3.755	3.745	-0.01
6	3.755	3.745	-0.01
7	3.74	3.75	0.01
8	3.765	3.77	0.005
9	3.71	3.71	0.0
10	3.785	3.755	-0.03
11	3.84	3.795	-0.045

[1]Average of duplicate analyses

Table 3. Summary of statistics comparing Plate Loop bacteria counts of raw milk sampled by manual vs automatic methods.

Sources of Samples	Automatic (N)	Automatic Grand Avg. (x 1000)	Manual (N)	Manual Grand Avg. (x 1000)	Diff. Auto-Man. (x 1000)
Farm bulk tank	91	34	273	27	7[1]
Tank truck	10	36	11	36	0[1]

[1]Not statistically significant (P>.05).

N.M.C.

NATIONAL MASTITIS COUNCIL

Eliminate Mastitis in Heifers

The new heifer crop is the foundation of a dairy herd. With a sound breeding program, heifers bring with them the best genetics in the herd.

Ideally, heifers should enter the herd infection free and remain that way as long as possible to insure maximum production and herd life. But as more data is accumulated, we find that mastitis can be and is a real problem in heifers. It is not unusual to find 20 percent of first lactation animals requiring treatment for clinical mastitis during their first lactation with more than half of the cases occurring within 30 days of calving. Thus, we fall short of our goal very early in their productive life.

What is the source of infection? To date, only preliminary data is available but the following are potential sources:

1. Calves suckling each other, especially during the milk feeding stages.
2. Infections spread following teat end damage by biting flies, especially in young heifers kept on pasture.
3. New infections that occur near the time of calving associated with leaking milk and inadequate hygiene of calving pens.
4. Infections which may occur soon after calving due to milking machine factors associated with liner slip which can be enhanced by udder edema and heifer movement during the first milkings.

In the absence of good research data, we suggest the following prevention procedures:

- Prevent heifers from suckling infantile udders.
- Control biting flies in pastured animals
- Keep calving area clean and be especially conscientious with teat dipping.
- Be aware of milking machine adjustments when milking new heifers.

This article is one of a continuing series made available by the National Mastitis Council. For additional information contact the NMC, 1840 Wilson Blvd., Arlington, VA 22201.

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703-243-8268

techniques. Again, the grand average results of samples taken manually from the bulk tank reflect averages of three samples from three different locations. Indeed, in all testing, the same samples used for fat analysis were also used for bacteria count determinations.

Manual and AS samples from the bulk tank averaged 27,000 and 34,000 cfu/ml, respectively. The difference, and this point is emphasized, was not statistically significant ($P>.05$). In other words, no measurable difference could be detected in count of milk samples obtained by the two methods at least 95% of the time. Indeed, the difference in the grand average counts appears small in relation to the variability of the test procedure which, in these analyses, had a CV of 57.7%. The latter value simply expresses the well-known fact that bacteria count determinations are not very precise. An observed difference of 7,000 cfu/ml in bacteria counts, as noted in Table 3, might well fall below measurable detectability.

The grand average bacteria counts of samples taken from tank trucks showed no difference, but an explanation is necessary. You will note, in Table 3, that 11 manual samplings have been compared to 10 AS samplings. This comes about as a result of one AS sample being intentionally omitted because of excessively high counts. In this instance, the sample taken by hand yielded a count of 35,000, the AS sample an estimated count of 330,000 cfu/ml. Upon checking out the reason for this difference, it was discovered that the plastic tube in the AS device had not been replaced nor had the unit been cleaned and sanitized after its most recent use. This fact and the results obtained serve as an object lesson: No method, manual or automatic, is beyond the influence of human error. And, although automatic sampling can and should minimize such errors, it does not eliminate them.

Results of the testing done on truck samples suggest that additional pumping/handling of the milk was of little or no consequence. That is, counts were apparently not increased as a result of the break-up of clumps of bacteria. Both bulk tank samples and the manually taken truck samples show counts in good agreement with AS samples taken at the dairy plant.

One other consideration should be mentioned, and the bacteria counts serve this purpose to an extent at least. It is an obvious concern that any automatic sampling device not allow significant carryover of one sample to another. This is particularly important when samples are used to evaluate milk supplies for purchase purposes. No one producer's milk supply should be favorably or unfavorably altered by another.

As mentioned previously, no attempt was made to evaluate carryover effect. The manufacturer of the AS unit has undertaken such work and cites data indicating minimal or no problems in this regard (1). One observation from the study provides insight into the issue. It comes about as a result of one supply of milk found to be excessively high in bacteria count. Both manual and AS samples yielded results in the range of 600,000 to 900,000 cfu/ml. However, counts on milk picked up at

the farm immediately following averaged 13,000 cfu/ml. Although such evidence does not discount possible carryover, it does illustrate the potential of the AS unit.

In Summary

This study suggests that the Foss Auto-Sampler is capable of providing samples from bulk tanks and tank trucks suitable for both milkfat and microbiological analyses of raw milk supplies. This statement seems appropriate even under operating conditions in which the plastic tube through which samples are obtained serves without replacement during any one day of milk pick-up at several different farms. It was in this mode of usage that the present study was carried out.

The advantage of automatic sampling appears to lie primarily in the "representativeness" of milk samples obtained from bulk tanks under a variety of--and sometimes less than appropriate--conditions of sampling. Not all bulk tanks provide representative milk samples after five minutes of agitation. Not all haulers wait five minutes for the agitation process to properly blend milk in the bulk tank. Many haulers assume that milk is already properly blended on the first few farms where milk is picked up shortly after the morning milking. Presumably, the agitator has been running during cooling of the milk and a representative sample can be procured without further agitation. This may in fact be true. It is not guaranteed, however, nor is it possible to know precisely what time of day--which farm supply--is the break-point where agitation then becomes essential. An AS device tends to minimize all of the preceding problems. As noted, however, such devices are not foolproof, and this is especially true in sampling for determination of bacteria counts. A soiled, uncleaned and unsanitized AS unit can be a source of high counts, at least on the first supply sampled with it.

The study was initiated in the winter season in order to make the evaluation during cold weather and under generally unfavorable conditions. Technical specifications indicate that the AS can be operated at temperatures ranging from -30° to 40°C (-22° to 104°F). In particular, the authors were concerned with the influence of cold weather. In all candor, however, it must be pointed out that very cold temperatures and generally bad winter conditions failed to materialize; the major problems encountered actually turned out to be those associated with leaking sample containers caused by failure of the hauler to press the caps in place properly. In general, therefore, this work suggests that the Foss "Auto-Sampler" serves the sampling process in a reasonably simple and foolproof fashion, both for milk to be tested for milkfat content and bacteria count.

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News and Events

Marriott Manager Receives 150,000th Certificate for Food Protection Education

Greater knowledge of foodservice sanitation is leading to a vast improvement in the quality and safety of food in foodservice establishments across the United States.

William C. Derby, (second from left) Operations Director of Marriott's Saga Education Services at Western Illinois University, Macomb, Illinois, is shown receiving the 150,000th Certification of Completion for *Applied Foodservice Sanitation*. Looking on as the presentation is made by Paul F. Martin, Director of Educational Programs of the Foundation (right), is Norbert D. Weller, Vice President, Human Resources, Food Service Management division of Marriott Corporation.

The popular management course is being used by state restaurant associations, health departments, the U.S. armed forces, private industry and about 250 college and university programs. Purdue University offers continuing education units to persons taking home study courses.

Widely accepted because it fills an urgent industry need, *Applied Foodservice Sanitation* uses nontechnical language and focuses on essential principles and practices of safe food handling.

For more information about *Applied Foodservice Sanitation,* contact the Educational Foundation of the National Restaurant Association, 20 N. Wacker Dr., Suite 2620, Chicago, IL 60606. Telephone: 312-782-1703.

The Scientists Tell Me . . . Food Grade Acid Application Reduces Bacteria on Red Meat

Increasing the shelf life of Texas beef products would make the products more competitive on national and international markets, which in turn would be a boon to the state's beef industry, a Texas Agricultural Experiment Station animal scientist says.

With that goal in mind, G.R. Acuff and fellow researchers C. Vanderzant, J.W. Savell, and H.R. Cross have found that spraying beef with food grade acids significantly reduces the microflora, but there has been some question as to which stage of production is optimal for acid application.

Controlling the microbial contamination and growth on the carcass and suppressing further contamination and growth during the fabrication (or cutting) of carcasses into primal, subprimal, and retail cuts are accomplished by maintaining standards as sanitary as possible.

But even with the strictest standards, some contamination inevitably occurs and is a limiting factor to centralized packaging and distribution of retail cuts of beef, pork, and lamb, Acuff says.

For a centralized distribution system to be successful, meat must be produced under uncompromising sanitary conditions and packaged and stored in vacuum or "modified atmosphere" packaging, Acuff says.

Acuff's first study involved decontaminating beef carcasses early in processing. Immediately after slaughter, 20 carcasses were sprayed with water, 1 percent acetic acid, or 1 percent lactic acid. The carcasses were then fabricated into subprimal cuts (such as those that are shipped to retailers) and tested both immediately and after 28 days of refrigeration in vacuum packages.

The acid-sprayed samples had significantly reduced bacterial counts, even after storage, says Acuff.

In two other similar studies, beef subprimal cut - strip loins and steaks from strip loins - were treated with sprays consisting of either lactic acid; acetic acid; or a mixture of lactic, acetic, citric, and ascorbic acids.

These studies showed that acid decontamination of subprimal beef cuts before packaging or acid decontamination of beef strip loin steaks had a little or no effect on the shelf life of steaks.

Once the carcasses are chilled, bacteria have attached and are more difficult to remove, Acuff says.

"The results indicate that decontamination of beef with food grade acids is probably more effective when employed as soon after slaughter as possible,

before bacterial attachment has had an opportunity to occur," says Acuff.

Editor's Note: Any question regarding this column should be addressed to Science Writer, Dept. of Agricultural Communications, Texas A & M University, College Station, TX 77843.

Imitation Cheeses Common in Frozen Meat Pizza

The picture on the front of the frozen pizza package may not tell you what you're getting, says a Texas A&M University Agricultural Extension Service nutritionist.

According to Dr. Alice Hunt, almost three-fourths of frozen pizzas with meat contain imitation cheese.

"Under current U.S. Department of Agriculture guidelines, frozen meat pizzas may contain up to 90 percent imitation cheese without having to be labeled as such," she says.

"As long as the pizza with imitation cheese tastes good, many consumers may not mind the substitution," Hunt notes.

"However, for people who are trying to reduce their sodium intake, pizza with imitation cheese may not be the best choice," she adds.

The nutritionist explains that imitation cheeses are usually made from milk protein with vegetable fat or soybean oil, and generally contain twice as much sodium as real cheeses.

When it comes to frozen cheese pizza without meat, consumers can easily tell whether they are getting real or imitation cheese because it must be stated on the front label, says Hunt.

The difference in labeling rules results from the fact that different federal agencies regulate pizza content. The Food and Drug Administration regulates non-meat pizzas, and requires front labeling for imitation cheese.

The USDA regulates pizzas and does not require the front labeling.

"The only way for consumers to determine whether artificial cheese is used in a frozen meat pizza is to find and read the ingredient listing on the package," remarks the nutritionist.

Hunt notes that the National Milk Producers Federation is now lobbying Congress to pass legislation requiring front-of-package labeling for imitation cheese.

For more information, contact: Alice Hunt, Texas A&M University, College Station, TX. Telephone: 409-845-1735.

Evaporator Handbook

Revised and expanded, the APV Evaporator Handbook (second edition) provides 48 pages of basic information covering evaporators for the food, dairy, chemical and pharmaceutical industries.

Contents include evaporator types and design, evaporator selection, engineering conversions, residence time in film evaporation, plate type evaporators, process controls involving microprocessor automation/colorgraphics, tubular evaporators to 3A sanitary standards, advances in MVR evaporator technology, evaporators for chemical applications, economics of evaporation, packaged evaporators, and properties of saturated steam (temperature tables).

The mini-textbook is available from APV Crepaco, Inc., 100 South CP Ave., Lake Mills, WI 53551. Telephone: 414-648-8311.

Storing and Handling "Boxed" Drinks

The aseptic packaging of drinks has some consumers wondering about safely storing and using these products, says a Texas A&M University Agricultural Extension Service specialist.

According to nutritionist Marilyn Haggard, aseptic packaging involves sterilizing the product and container separately. Then the product and package are brought together in a sterile environment where the container is filled and sealed.

Aceptic packaging is now used for a variety of products, including boxes for juice or milk and foil pouches for juice and fruit drinks.

"The aseptically packaged milk does not have to be stored in the refrigerator, and can sit on your shelf for up to 6 months," she says.

"While it's safe and wholesome, aseptically packaged milk does have a slightly different taste, which is often described as 'richer' than regular milk, even after it's been chilled," adds the specialist.

Haggard notes that aseptic juice boxes or pouches can be a special convenience for sack lunches.

"The cartons can be stored overnight in the freezer without the multilayered packaging tearing as the freezing juice expands. Then if you pack the frozen carton in a lunch, it should thaw, but still be cool by lunch time," she explains.

The aseptic juices have a shelf life of 6-8 months, and like canned food, should be rotated so those bought first are used first, says the specialist.

For more information, contact: Marilyn Haggard, Texas A&M University, College Station, TX. Telephone: 409-845-1735.

Kraft Purchases Tamp-R-Alert® Systems From Culbro in Largest Single Tamper-Evident Packaging Order Ever

Kraft, Inc., Glenview, IL, has placed the largest single order ever for tamper-evident packaging equipment with Culbro Machine Systems (CMS), the leading manufacturer of tamper-evident shrink-banding machinery.

Kraft has ordered Culbro Tamp-R-Alert® shrink-banders as part of its commitment to offer tamper-resistant packaging on its entire product line by January, 1988. The purchase is the largest single capital equipment investment in Kraft's history, and will provide shrink-banding protection for all of its dairy and viscous products.

"Kraft management has decided to implement tamper-evident packaging across the board," says Dr. Lewis Erwin, Kraft's Director of Packaging Technology.

"We are extremely proud to be associated with Kraft in providing packaging that will decrease the threat of tampering and increase consumer confidence in the integrity of the product," says Michael Swanson, Director of Marketing for Culbro.

Culbro will provide additional quality assurance for the Kraft products with its Fail-Safe™ customized quality assurance systems. These turn-key quality assurance operations range from electronic fault detection/ejection units to fully computerized systems for the entire packaging line.

Shink-banding has proven to be an effective, graphically appealing response to the tampering threat in both the pharmaceutical food industries. Culbro already has more than 200 of its Tamp-R-Alert units in customer plants, and the market for this type of equipment is expected to grow 55 - 60% annually during the next few years.

By giving consumers visible evidence of product protection, tamper-evident, shrink-banded packaging also can be a boon to sales. The following statistics from two recent studies support the contention that tamper-evident packaging can positively effect point-of-purchase buying decisions:

**Approximately one-third of consumers put products back on the shelf because of apparent signs of tampering.*

**Nearly two-thirds of shoppers rate tamper-resistant production an important consideration in influencing their purchasing decisions.*

To further educate the industry concerning this critical issue, Culbro has produced a videotape that addresses tampering from a variety of perspectives. Experts participating on the tape include a forensic psychiatrist, a civil and corporate attorney, a renowned packaging consultant and a director of manufacturing for a major food processor. For information concerning how to obtain a free copy of the tape, contact Michael Swanson at Culbro Machine Systems, Division and Brook Streets, Kingston, PA 18704. Telephone: 717-283-0583.

"3-A® - Mark of Compliance"

The 3-A Sanitary Standards Symbol Administrative Council has published a new brochure entitled *"3-A® - Mark of Compliance"*. This new publication describes the origin of the 3-A Symbol and outlines the purposes of the 3-A Sanitary Standards Symbol Administrative Council. The *"3-A® - Mark of Compliance"* also illustrates the steps in procuring the use of the 3-A Symbol and what its use means to processors, equipment manufacturers, and sanitarians.

The 3-A Symbol Council is administered by an 8-member Board of Trustees representing the Dairy Industry Committee (DIC), Dairy & Food Industries Supply Association (DFISA) and International Asssociation of Milk, Food and Environmental Sanitarians (IAMFES). Current Symbol Council Trustees are: Dr. Warren S. Clark, Jr., American Dairy Product Institute, Chairman; Mr. Carl F. Nielsen, DCI, Inc., Vice-Chairman; Mr. Earl O. Wright, Secretary-Treasurer; and Mr. William L. Arledge, Dairymen, Inc.; Dr. Henry V. Atherton, University of Vermont; Dr. A. Richard Brazis, Laboratory Quality Systems; and Mr. Robert L. Nissen, Trustees.

To obtain a copy of *"3-A® - Mark of Compliance"*, or for more information on the 3-A Symbol and the 3-A Sanitary Standards Symbol Administative Council, contact: 3-A Sanitary Standards Symbol Administrative Council, W255 N477 Grandview Blvd, Suite 100, Waukesha, WI 53188. Telephone: 414-542-0200.

Scholarship Fund to Honor Fred Uetz

A special student loan fund, to assist students in financing dairy and food-related studies in colleges and universities, has been established by the Dairy Remembrance Fund in memory of Fred Uetz who died this past January.

Fred had been associated with the dairy industry for nearly 60 years. Following graduation from Cornell University in 1925 and a year of graduate work at the University of Kentucky, Fred started out with the New York City Health Department where he worked for 3 1/2 years. He then transferred to work at the Borden Company with which he was associated for many years.

Fred accumulated a multitude of honors and titles in his association with the dairy industry. He was past president of the International Association of Milk, Food and Environmental Sanitarians, and past president of the New York State Association of Milk and Food Sanitarians in 1954-1955. He was an honorary life member of both organizations.

For more information, contact: Jackie McKool, Dairy Remembrance Fund, 888 Sixteenth St., NW, Washington, DC 20006. Telephone: 202-296-4250.

National Mastitis Council Annual Meeting to be held February 8-10 in Reno

The 27th Annual Meeting of the National Mastitis Council is scheduled for February 8-10, 1988 at the Nugget Hotel in Reno, Nevada. The meeting will cover the latest information relating to mastitis control and quality milk production.

"Management Makes the Difference" is the theme for the first day of the General Session. Topics to be covered are housing management and mastitis, milking machine update, bulk tank analysis, and predipping. The keynote address will be delivered by James Booth, from the Milk Marketing Board in England.

The program on the second day will be highlighted by discussions focusing on the effect of incentive programs on milk quality. Other topics include people management and milking management, how to influence producers to use DHI SCC, and results of mastitis control programs. The meeting will conclude with a presentation on how to improve communication skills to increase implementation.

The meeting will also feature a Technology Transfer Session designed to disseminate additional information on mastitis control and milk quality. Exhibitors include industry, universities and non-profit organizations.

Committee meetings will be held on Monday, February 8, and are open to all attendees of the conference. The General Session will begin at 11:00 a.m. on Tuesday, February 9, and conclude at 12:30 p.m. on Wednesday, Feburary 10.

For additional information, contact: Anne Saeman, National Mastitis Council, 1840 Wilson Blvd, Arlington, VA 22201. Telephone: 703-243-8268.

In Memory of Bradley D. Ryan

Dairylea Special Membership Representative Bradley D. Ryan, 39, of Syracuse, NY died October 27, 1987. Ryan was employed by Dairylea in 1981 and was a former director of field quality control.

Ryan was previously employed by the Steuben County Cooperative Extension Association as an agent and by Utah State University as an instructor of the vocational dairy herdsman program. A graduate of the University, he received a bachelor's of science degree in wildlife management and a master's degree in dairy science.

Ryan served as secretary of the Penn-York Milk and Food Sanitarians Association and was member of PADSA, NYS AMFS, IAMFES, the National Mastitis Council and the Finger Lakes Sanitarians Association.

Surviving are his wife, Elizabeth; two daugthers, Jennifer and Jessica; and a son, Keenan.

Contributions can be made to Dairylea Cooperative Inc., c/o "The Ryan Children's Trust Fund."

Preventive Pest Control

George T. Okumura

Warehouse Beetle

Q. Which insect is the major pest in the dairy industry relative to powdered milk?

A. I believe the major pest is the Warehouse Beetle.

Q. Why?

A. This common insect prefers high protein food and when the larvae are ingested they cause illness.

Q. What are the symptoms?

A. Abdominal pain, diarrhea and vomiting.

Q. How common is this pest?

A. It is found throughout the U.S. and other foreign countries.

Q. What other foods does it attack besides powdered milk?

A. I have never encountered an insect that attacks more types of foods than this species. Cookies, bread, dried fruits, nuts, powdered eggs, grains, cereals, etc. It is almost endless.

Q. How can one recognize this insect?

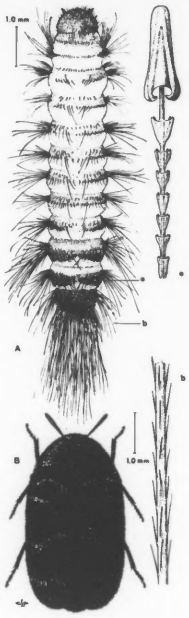
A. The adult is about 1/8 of an inch and with an orangish pattern on its back as the illustration shows. A larva may reach 1/4 of an inch in length.

Q. Can this insect be confused with other species?

A. Yes, it resembles seven other species which are also pests of stored foods. One is the Khapra Beetle. This is a quarantine insect. When this pest is found on a premise, the place is usually closed down for one to two months.

Q. Why closed so long?

A. The U.S. Government must investigate how the premise became infested and to determine what other companies were involved with the original infested property. Then the property is usually completely fumigated. When I was with the government, 800 places were shut down in the Western United States.



Q. Is the Khapra Beetle still being found?

A. Yes. About eight years ago several infestations occurred in the Northeastern States.

Q. Is there anything else that is interesting about the Warehouse Beetle.

A. There are many lawsuits that are involving the Warehouse Beetle -- consumers versus food corporations, vendors versus buyers, customer versus warehouses, etc.

Q. How common do you think it is in powdered milk processing plants?

A. If the plants do not have a good sanitation program and are not familiar with this beetle, likely the place has an infestation.

Q. If the Warehouse Beetle is so common and prefers high protein, why aren't there many complaints from the powdered milk industry?

A. I believe the infested properties have a low population level, hiding in cracks and crevices. The chance of observing the beetles is very slim.

Q. What is the possibility of the Warehouse Beetle contaminating foods during storage?

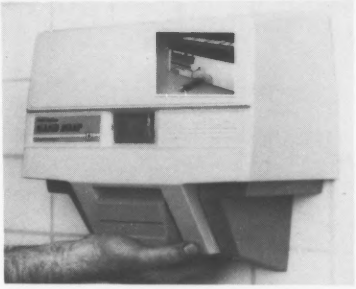
A. The majority of the contamination occurs during the storage at distribution centers and warehouses.

Q. How can one detect the presence of this insect?

A. The easiest method is to employ a sex pheromone trap which attracts the males if they are present. It is a detection trap.

New Product News

The products included herein are not necessarily endorsed by Dairy and Food Sanitation.



Go-Jo Industries Introduces New Dermatech® Industrial Hand Care System

• Go-Jo Industries has announced availability of the DermaTech Advanced Industrial Skin Care System. The DermaTech System has been engineered to provide a durable, reliable, heavy-duty dispenser and easy-to-load, sanitary sealed, 5000 ml Push-Pak bag-in-a-box soap refills. Each refill cartridge has a new dispensing valve. This innovation eliminates clogging, the number one cause of dispenser malfunctions.

According to Go-Jo Industries officials, the DermaTech system is designed to meet skin care needs in today's changing industrial environment. The heavy-duty, push-type dispenser won't pull away from walls like pull- or crank-type dispensers can. The durable ABS design fully protects the refill cartridge from moisture and vandalism. The DermaTech soap dispensing systems can be mounted at any sink installation, including Bradley and other types of circular wash fountains.

DermaTech provides the right soap formula match to specific cleaning requirements. They are effective, safer and less costly to use. The DermaTech soil-matched cleaning system prevents over-use of soap, reduces time at the sink and promotes efficient cleaning without skin irritation. Hands are thoroughly cleaned, reducing the risk of industrial dermatitis.

DermaTech hand cleaners are available in 11 non-toxic, biodegradable formulations in four categories: (1) High-Performance, Solvent-Free hand cleaners; (2) Advanced Formula Lotion skin cleansers; (3) Economical, Natural hand soaps, including a USDA E-1 rated antiseptic skin cleanser; and (4) a group of three special purpose soaps, including two shower formulations and a USDA E-2 rated sanitizing soap for use in federally inspected meat and poultry plants.

All DermaTech formulations are completely solvent-free, yet can handle the most difficult soils quickly and effectively.

To learn more about the DermaTech Industrial Skin Care System, please contact: Go-Jo Industries, PO Box 991, Akron, Ohio 44309. Telephone: 800-321-9647. In Ohio: 216-920-8100.

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Perfection in Chocolate Milk

• A solution has been found to problems which often arise in the production of chocolate milk.

These problems, which include sedimentation, layer formation, serum segregation and also curdling, may be for a large part overcome through the use of Cacao De Zaan's recently developed cocoa powder types.

These new powders have specific features which help the Dairy Industry prevent these problems.

The R & D Department of Cacao De Zaan, in cooperation with the Agricultural University of Wageningen, Holland, and the Dutch Institute for Dairy Research (NIZO), has carried out thorough research over the fundamental causes related to the above mentioned problems.

As a result of this effort, Cacao De Zaan undertook a specific development program to find some solutions to them.

The cocoa powders which resulted from these efforts, have been testmarketed with great success in the production of chocolate milk, packed in cartons and glass containers, sterilized according to various processes.

Good results were also achieved in the production of chocolate milk in plastic containers, which almost always has sedimentation problems. Sedimentation was reduced without resulting in curdling.

These new De Zaan powders are being produced as of September 1, 1987, and will be available shortly. These powders were launched in the U.S. market at the Food & Dairy Expo, Chicago, September 26-30, 1987. Introduction in the European market began in mid September.

For more information, contact: Cacao De Zaan B.V., Postbus 2, 1540 AA KOOG AAN DE ZAAN, Holland.

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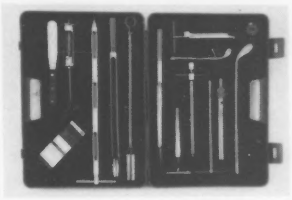
Motomco's Pivalyn
Water Soluble Concentrate



"NUTRIMENTA" Kit for Chemicals-Foods-Dairy-Water-Feeds-Soil Sampling

• Representative and correct sampling is an essential requirement to obtain valid results in laboratory testing. Tests to determine safety, quality, content and compliance with official requirements are of little or no value if the sampling is done without care. Sampling is done with care if you have available different and appropriate sampling devices for different products and if the personnel involved in sampling are well trained.

"P B I"'s years of experience in servicing applied microbiology, agriculture, education and industry have provided an excellent insight into the needs of laboratories and associations involved in extensive testing programs. Combined with the knowledge of several highly qualified health inspectors and chemists, who acted as consultants, simple, practical, economical and useful sampling devices have been produced. The "Nutrimenta Kit" is a complete set.

For more details write to: P B I International, Via Novara 89, Milan, Italy.

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on your Reader Service Card

Water Soluble Bait Available In New Display Bag

• Montomco's Pivalyn Water Soluble Concentrate is now available in a handy display bag containing four, four-gram packets.

Pivalyn Concentrate is a liquid bait that kills rats and mice. Each four-gram packet makes one quarter of finished bait. Pivalyn is ideal for use where other rodent baits have failed.

Liquid bait is best used in hot and dry climates, warm areas such as boiler or furnace rooms, high humidity areas where dry baits deteriorate rapidly, or in food storage areas where liquid baits don't have to compete against other food stuffs.

The colorful display bags are made of strong polyethylene material and are diecut at the top so the bag can hang on pegs in retail stores. Easy-to-follow use instruction and diagrams are printed right on the bag.

For more information, contact: Motomco, Ltd., 29 N. Fort Harrison Ave., Clearwater, FL 33515. Telephone: 813-447-3417.

Please circle No. 271
on your Reader Service Card

DataMyte Introduces Trend-Tracking Data Collector

• DataMyte Corporation today introduced a factory data collection system that tracks trends and gives advance notice of process problems. Using built-in Statistical Process Control software, the data collector allows machine operators to record part measurements and get SPC control charts in real time. The data collector also flashes warnings to the operator when control chart patterns indicate potential process problems, such as tool wear, cycles, and mixtures.

The DataMyte 862 Data Collector is intended for any factory that has groups of automated or semi-automated machinery maintained by a single setup and inspection person. The data collector has a multiple file structure, making it ideal for gaging stations that handle a number of parts or where there is frequent changeover of jobs.

The DataMyte 862 Data Collector connects to hundreds of electronic gages, including micrometers, calipers, height gages, and indicators made by Mitutoyo, Federal, Fowler, Brown and Sharpe, Mauser and Ono Sokki. The unit also accepts data for RS 232 devices as weigh scales.

DataMyte Corporation is a manufacturer of data collection systems for the improvement of quality and productivity. DataMyte products include handheld and fixed station data collection devices for attributes and variables data, gages, gaging interfaces, and computer software. There are currently over 12,000 DataMyte systems in use in the industry.

DataMyte Corporation is a wholly owned subsidiary of Allen-Bradley Company, Incorporated.

For more information, contact: Jerry Houston, DataMyte Corp., 14960 Industrial Rd., Minnetonka, MN 55345. Telephone: 612-935-7704.

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on your Reader Service Card

Artek Systems Corporation Announces a New Counter for Deft (Direct Epifloures-cence Filter Technique)

• Artek Systems Corporation, manufacturers of Automated Colony Counters and Image Analysis equipment, is pleased to announce the introduction of the new DFT 1000 Counters designed to facilitate the Direct Epifluorescence Filter Technique (DEFT).

The DFT 1000 is designed to offer the food microbiologists an economical and rapid method for microbiological analysis. This instrument is equipped with an external camera and Chalnicon tube which can be easily interfaced to a microscope.

As soon as the sample is within the field of view, the counter button is pressed and the DFT 1000 yields a count in less than a second. Software is available to automatically determine the actual count per milliliter or gram.

Special features of the DFT 1000 include size discrimination to eliminate objects smaller than a set size threshold; a unique patented flagging system which places an illuminated dot on the objects which are counted.

For further information, contact: Kenneth Anderson, National Sales Manager, Artek Systems, Corp., 170 Finn Court, Farmingdale, NY 11735. Telephone: 516-293-4420.

Please circle No. 273
on your Reader Service Card

Sanitary Construction Pumps and Mixers Receive USDA Approval

• Thompson-Chemtrex® sanitary construction transfer pumps and mixers have been approved by the United States Department of Agriculture for use in federally inspected meat and poultry plants. The SC Series meets design and material requirements for sanitation standards.

These pumps and mixers are constructed of FDA-approved materials including polished 316 stainless steel tube and shaft with Teflon* internals. In addition, quick nut-nipple disconnects allow for easy cleaning. Pumps handle viscosities to 15,000 cps and densities to 1.8 sp gr. Motor selections include standard electric, explosionproof electric and air drives.

The SC Series pumps and mixers are designed for handling pharmaceuticals and ultrapure fluids as well as foods.

For additional information SC Series sanitary pumps and mixers, contact: Thompson-Chemtrex, Inc.®, 921 Greengarden Rd., Erie, PA 16501-1591. Telephone: 814-452-3185.

*Du Pont Registered trademark.

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New Critical Process Air Handling Guide Available

• American companies invest tens of millions of dollars every year in quality control programs designed to assure clean, sanitary environments for food processing, electronic and pharmaceutical manufacturing, and health care. However, in many cases, the "ocean of air" which envelops the work space is overlooked.

King Company, the industry's leader in manufacturing air handling systems for critical process environments, has just begun shipping its new Series 2000 systems which addresses that concern.

Temperature and humidity control, pressurization, and alternative filtration systems designed for various bacteria, viruses and other airborne contaminants are all covered. Unforseen potentials for air handling units themselves to become biological contaminant breeding grounds is also discussed.

King Company is an industry leader in the design and manufacture of a complete line of refrigeration and HVAC equipment and components.

For a free copy of this brochure which also includes complete technical specifications on King Company's new Series 2000 equipment which is engineered to deliver extremely high quality air for critical process environments, write or call the Engineered Air Systems Group at King Company, 1001 21st Ave. NW, Owatonna, MN 55060. Telephone: 507-451-3770.

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Thompson Chemtrex, Inc.

Two, 6 Foot Air Doors Introduced By Mars Air Doors

• Mars Air Doors has announced the introduction of two, 6 foot air doors...Model 72C for front doors and Model 72CH for back doors. Both models are also available with electric heat.

The new 6 foot units eliminate the need to use two, 3 foot units in wider entry ways, reducing both the initial cost and the cost of installation.

As is the case with all Mars Air Doors, the 6 foot units use a powerful internal blower to direct a stream of high velocity air downward, thereby creating an invisible barrier to insects, dust, dirt and fumes. They also provide important energy savings as the curtain of air helps prevent conditioned air from escaping in warm weather and heated air from escaping during cold weather. Additionally, Mars Air Doors enable personnel and material to pass freely from one area to another without the encumbrances caused by plastic strips and swinging doors.

Mars Air Doors comply with USDA regulations and are approved by the National Sanitation Foundation as well as most local health departments.

For additional information, contact: Mel Liner, National Sales Mgr., Mars Air Doors, 14716 So. Broadway, Gardena, CA 90248. Telephone: 213-770-1555.

Please circle No. 276
on your Reader Service Card

Faster, Safer Nitrogen Determinations

• Antek Pyro-chemiluminescent™ Nitrogen Systems make the analysis of nitrogen containing compounds faster and safer than using a Kjeldahl method. The instruments can detect and quantitate the total nitrogen content of solid, liquid, or gas samples. The entire method is instrumental, and requires no hazardous chemicals, fume hoods, or protective clothing. Little or no sample preparation is needed for most testing. Liquids and gases can usually be analyzed in 30 seconds; most solids in under 10 minutes. The instruments can detect total chemically bound nitrogen in amounts from low ppb to 10%.

Applications include pharmaceutical/biological samples, environmental monitoring (air or water), petrochemical samples, coal, paper, and foods.

Two systems are available: the Model 703C, designed for analyzing liquids, gases, and some solids; and the Model 707C, with microprocessor controlled temperature programming for analysis of gases, liquids, and solid samples. Optional data systems and autosamplers may be added for additional time and labor savings.

For more information, contact: Mary Jo Martin, Antek Instruments, Inc., 6005 North Freeway, Houston, TX 77076. Telephone: 713-691-2265.

Please circle No. 277
on your Reader Service Card

Concert Corporation Introduces QE-LINK, The SQC Communications Hook-Up

• The QE-LINK is a new communications hook-up that permits direct electronic transfer of data from the operator's real-time SQC data collector, the QE-100, to the manager's post-analysis QE-1000 quality control data base. QE-LINK is the *first* direct data transfer communications hook-up that has been designed for the SQC manufacturing environment.

The QE-LINK replaces the manual "footnet" way of collecting data from the operator's QE-100 and transporting it to the quality manager's QE-1000 IBM PC AT computer for post-analysis. With QE-LINK, the quality manager can upload data, download setups and monitor any QE-100 operators' control charts without moving away from the desk. No longer does the quality manager need to walk to the shop floor and stop the operators to collect data or monitor the process.

Included among the unique features of the QE-LINK are the following: RS232 compatibility, immunity to electronic noise, dial up capability (telephone link), and one QE-LINK can monitor up to 100 QE-100 workstations.

Concert Corporations, with headquarters in Dayton, Ohio, is a leading manufacturer of low cost, high performance statistical process control systems.

For more information, contact: Gail Westerfield, Concert Corp., 3757 Inpark Circle, Dayton, OH 45414. Telephone: 800-382-0028.

Please circle No. 278
on your Reader Service Card

Protective Coatings for Metal

Non-Stick Chemical, and Wear-Resistant Metal Coating Meets FDA Regulations For Direct Food Contact

• A new high-tech copolymer coating, LECTROFLUOR® 615, that exhibits superior chemical and abrasion/wear resistance while adding exceptional mold release properties has been announced by General Magnaplate Corp., Linden, NJ.

The new coating was specifically developed for use in food contact applications where superior non-stick, mold release, chemical and wear resistance properties can improve the operation and lengthen service life of food/drug processing and packaging equipment. New LECTROFLUOR 615 conforms with FDA regulations for direct food contact.

Current areas of use include sealing dies, die rolls, stirrers, dryers, hoods, tanks and conveyor systems which are exposed to chemical attack or subject to clean room requirements. It is also recommended for use where both high and/or low temperatures are encountered.

Additional technical data on LECTROFLUOR 615 is available from: General Magnaplate Corp., 1331 Route 1, Linden, NJ 07036. Telephone: 201-862-6200.

Please circle No. 279
on your Reader Service Card

Workplace Smoking Survey - New York City

During the period May 16-23, 1986, employees of the New York City Department of Health (NYCDOH) participated in a survey regarding smoking practices an attitudes toward a workplace smoking policy. The survey was conducted to obtain baseline information for evaluating the impact of a smoking policy initiated by the mayor and scheduled to be implemented July 1, 1986. It was also intended to familiarize employees with the policy.

Questionnaires were completed by employees who volunteered to attend one of several NYCDOH meetings concerning the mayor's proposed legislation and pending executive order about smoking restrictions. Of the estimated 900 employees in the department's primary office building, 608 attended the meetings, and 496 completed the survey. Thus, 5.5% of the total employees and 82% of those attending the meetings completed the questionnaire. Of the respondents, 137 (28%) currently smoked cigarettes, eight (2%) smoked pipes or cigars, 333 (67%) were nonsmokers, and 18 (4%) did not answer this question. The female to male ratio of respondents was 2.5:1. Thirty-one percent of the males and 28% of the females were current smokers. Eighteen percent of the smokers smoked a pack or more of cigarettes per day. Sixteen percent of the cigarette smokers reported that they did not smoke at work. Fifty-nine percent of nonsmokers reported at least occasional exposure to tobacco smoke from others in the workplace; 56% of nonsmokers reported at least occasional exposure to tobacco smoke from the visiting public.

Regarding employee attitudes toward smoking in the workplace, 63% of all respondents (26% of smokers and 79% of nonsmokers) reported being annoyed when other employees smoked nearby. Of nonsmokers, 38% reported that, when exposed to tobacco smoke, they would like to ask smokers to stop but are hesitant to do so. Thirty-three percent of nonsmokers reported that they were able to work without noticing smoke. Twenty-nine percent reported that they try to move away when other employees smoke. Overall, 82% of the respondents (including 69% of smokers) indicated that smoking in the workplace should be either limited (65%) or banned (17%). Most respondents indicated that restricting smoking in the NYCDOH would have no adverse effect on relations among their co-workers (87%), on their job performance (94%), or on their office morale (90%). Of current smokers, 46% indicated they would quit or reduce their smoking if workplace smoking were restricted.

Editorial Note: The control of smoking and tobacco smoke exposure in the workplace has become an important public health issue in the United States in recent years. No studies have yet quantified the nonsmoking worker's risk of lung cancer from chronic exposure to tobacco smoke in the workplace. However, numerous studies have documented that nonsmoking wives of smoking men have a risk of lung cancer that is between 14% and 34% higher than that of wives of nonsmoking men. In addition, it has been shown that employees exposed to sidestream tobacco smoke in the work environment are at greater risk of developing small airways dysfunction than are nonexposed employees. Small airways disease, which is the first pathological change seen in beginning smokers, may increase the risk of developing disabling chronic airways obstruction.

As a consequence of data such as these concerning the effects of sidestream tobacco smoke exposure, an increasing number of employers have instituted policies to control smoking in the workplace. While some policies and control measures have been adopted voluntarily, others have been required by legislative actions. There are already laws in 17 states and ordinances in at least 100 localities regulating workplace smoking (Office on Smoking and Health, unpublished data). In one recent national survey 36% of 662 responding employers reported having established workplace smoking policies; an additional 2% planned to enact policies by the end of 1986, and 21% reported that policies were under consideration.

Despite the voluntary nature of the NYCDOH survey, the results are consistent with previously reported findings, concerning employee knowledge, attitudes, and smoking practices in the workplace. Since this represents 55% of total NYCDOH employees, however, these results should be interpreted with caution. Smoking prevalence among respondents in this survey (28%) is similar to the estimates of national smoking prevalence (30%). It is also similar to the prevalence reported for white collar (32% of females, 33% of males) and for those in a surveyed private workplace (33%).

In most surveys, the majority of respondents have approved of some limitation of smoking in the workplace. A nationwide survey commissioned by the American Lung Association, asked 1,540 randomly selected individuals whether companies should have a policy on smoking at work. Eighty-seven percent of all respondents - including 80% of smokers - indicated that smoking in the workplace should be limited. Surveys of employees at individual workplaces have provided similar support for smoking restrictions. For example, 74% of employees at a large health maintenance organization approved of a smoking prohibition policy 4 months after implementation of the policy. In another survey 71% of all employees indicated that smoking in the immediate work area should be restricted (80% of non-smokers and 51% of smokers).

Policies limiting smoking in the workplace not only protect nonsmokers from the health effects of passive smoking but also may encourage smokers to quit or reduce smoking. In one survey, 51% of the employees who smoked indicated that workplace smoking regulations might prompt them to reduce smoking or try to quit smoking completely. In the NYCDOH survey, the majority of participating employees were in favor of restricting smoking in the workplace.

MMWR 12/5/86

Staphylococcal Food Poisoning from Turkey at a Country Club Buffet - New Mexico

An outbreak of acute gastrointestinal illness followed a buffet served to approximately 855 people at a New Mexico country club on March 30, 1986. Of the 162 persons interviewed, 67 (35%) were ill with diarrhea, nausea, or vomiting. Twenty-four required emergency medical treatment or hospitalization. Of the 67 patients, 59 (88%) reported diarrhea; 52 (78%), nausea; 52 (78%), vomiting; 44 (66%), abdominal cramps; 30 (45%), headaches; 16 (34%), fever; and three (4%), bloody stool. Incubation periods ranged from 1.5 hours to 27.5 hours with a mean of 5.5 hours and a median of 4 hours. Duration of illness ranged from 1 to 88 hours with a mean of 26.3 hours and a median of 16 hours.

Three food items (turkey, poultry dressing, and gravy) were significantly associated with illness. For turkey, the odds ratio (OR) = 5.5 and the confidence limits (CL) = 2.3-13.1; for dressing, OR = 17.9 and CL = 6.1-56.4; and for gravey, OR = 2.9 and CL = 1.4-5.9. Bacteriologic cultures of the turkey and dressing yielded 4×10^7 and 3×10^6 *Staphylococcus aureus* organisms per gram respectively. Small concentrations of S. aureus were found in other foods that were not associated with illness, suggesting some degree of cross-contamination. Preformed staphylococcal enterotoxin type C was found in the turkey but not in the dressing.

S. aureus phage type 95 was isolated from the turkey and dressing, one food handler's nares (nasal passages) and stools, the nares of a second food handler, and the stools of a third. In addition, *S. aureus* that either could not be typed or was of another phage type was isolated from stools and nares of other food handlers and restaurant patrons. Two food handlers had open sores on their hands, but coagulase-positive staphylococci were not isolated from these sores. Although all of the food handlers had eaten at the buffet, none of them had gastrointestinal symptoms.

Review of food handling procedures indicated that the turkey had cooled for 3 hours at room temperature after cooking - a time and temperature sufficient for bacterial proliferation and toxin production. It was believed that the same utensils were used for both the turkey and other foods before and after cooking.

This same country club had experienced another foodborne outbreak in July 1984. The source of this outbreak was staphylococcal contamination of burritos and tacos. The ingredients had been cooked, assembled by hand, and then placed in a snack bar at room temperature. Phage typing was not performed. None of the food handlers with *S. aureus* isolated during investigation of the current outbreak were reported to have been working at the country club in July 1984.

After both outbreaks, food handlers were retrained by state environmental health personnel. Special emphasis was placed on increased hand washing, handling food only with gloves or implements, maintaining better equipment and utensil sanitation, and exercising better management and supervision.

Editorial Note: Epidemiologic and bacteriologic data in this large outbreak strongly implicate turkey and dressing as the vehicle. Turkey has accounted for 10% to 21% of all bacterial food-borne outbreaks for which a vehicle has been determined. Such outbreaks are particularly frequent around the Thanksgiving and Christmas holidays. The large number of people who may eat the meat of a single bird may amplify errors in preparation and make turkey-associated outbreaks more likely to be detected. Cooking turkey calls for particular care because of the large volume of meat to be heated and cooled, the practice of preparing it the day before it is served, and the amount of handling needed to remove the meat from the carcass. The pathogens most frequently causing turkey-related outbreaks are *Clostridium perfringens* (36% of such outbreaks reported in 1982), *Salmonella* (36%), and *Staphylococcus aureus* (27%).

This report illustrates several characteristics of staphylococcal foodborne outbreaks. Outbreaks most frequently involve foods high in protein. From 1977 to 1981, approximately 25 outbreaks of staphylococcal foodborne disease were reported to CDC annually. The most common vehicles were ham (27% of outbreaks with a known vehicle), potato or egg salad (15%), and poultry (11%). An outbreak occurs when a contaminated food is held at inappropriate temperatures long enough to allow the organisms to elaborate toxin. The toxin is heat stable, and reheating foods will not prevent the illness. Human carriers are presumed to be the source of the enterotoxigenic *S. aureus*, but carriers often do not have visible lesions. Thus the absence of nasal or hand lesions is no guarantee of safety. As in this outbreak the most frequently found problem is a critical error in food handling that facilitates bacteria contamination and growth. Proper education and supervision, along with thorough investigation of outbreaks, remain the cornerstones of prevention of foodborne illness.

MMWR 11/21/86

Cholera in Louisiana - Update

Since mid-August 1986, 12 cases of cholera have been identified among residents of Louisiana. The cases occurred in nine families living in New Orleans and in other towns in six parishes (Jefferson, LaFourche, Assumption, St. Mary, Iberia, and Jefferson Davis) within a 200-mile radius to the south and west of New Orleans. None of the patients had traveled abroad within the past year.

Onset of symptoms occurred between August 8 and October 1. Ten of the patients had severe diarrhea, seven required hospitalization, and four required treatment in an intensive care unit for hypotension. All patients recovered following intravenous fluid therapy. Seven patients had stool cultures yielding toxigenic Vibrio cholerae 01, biotype E1 Tor, serotype inaba. The remaining five patients did not have stool cultures performed but had vibriocidal antibody titers greater than or equal to 1280, suggesting recent infection with *V. cholerae 01*.

Sewer system surveillance using Moore swabs had detected toxigenic *V. cholerae 01* in sewage in eight separate sites in southern Louisiana (three in Jefferson Parish, one in Orleans Parish, one in St. Tammany Parish, one in Iberia Parish, and two in Jefferson Davis Parish). Five of these sites are in towns without a clinically identified case of cholera.

Although no common source has been identified, eleven of the patients reported eating crabs or shrimp within 5 days before the onset of symptoms. The seafoods were harvested from multiple sites in a wide area along the Louisiana coast of the Gulf of Mexico. Surveillance is continuing, and further epidemiologic studies are underway.

Editorial Note: Thirteen cases of domestically acquired cholera (one involving a Florida patient) have been detected near the U.S. Gulf coast so far during 1986. Past studies of *El Tor V. cholerae* infections in both endemic and non-endemic countries indicate that many mild or clinically inapparent infections occur for every hospitalized patient. The detection of toxigenic *V. cholerae 01* in the sewer systems of several towns with no identified cases suggests that undected cases have occurred in Louisiana.

The source of infection, as in 1978 in Louisiana, appears to be crustacea. Because seafood from the Gulf Coast is shipped to many states, even physicians located far from the Gulf should consider the possibility of cholera when a patient has severe, watery diarrhea. Diagnosis is confirmed by the isolation of *V. cholerae 01* from stool culture, preferably on thiosulfate-citrate-bile salts-sucrose (TCBS) agar. Isolates of *V. cholerae* should be serotyped and tested for toxin production through state public health laboratories, and all cases should be reported immediately to the state epidemiologist.

In this outbreak, inadequate cooking or improper handling of crustacea appeared to play a significant role in the development of *V. cholerae 01* infection. Thoroughly cooking potentially contaminated food and then carefully handling and storing cooked food will prevent foodborne cholera. (*V. cholerae 01* has been shown to survive in crabs boiled for 8 minutes, but not in crabs boiled for 10 minutes.)

Vigorous rehydration (preferably with Ringer's lactate) and careful correction of electrolyte and acid-base disturbances are the mainstays of therapy and result in very low mortality rates among hospitalized patients. Tetracycline shortens the duration of symptoms and the period of fecal shedding of the organism.

MMWR 11-7-86

Tularemia - New Jersey

On December 3, 1985, a 67-year-old woman died from tularemia in a New Jersey hospital. She had been admitted 7 days previously with a metabolic acidosis secondary to combined dehydration and sepsis. On admission, she had an "unhealing sore" on the first finger of her right hand. Initial treatment included gentamicin and cefazolin, as well as insulin for uncontrolled, late-onset diabetes. After 3 days, the treatment was changed to streptomycin. Despite these measures, disseminated intravascular coagulation, respiratory failure, and hypotension developed, and the woman died.

The case history showed that on November 9, 1985, an 18-year-old neighbor had shot two rabbits behind his home in Gloucester County, New Jersey. After eviscerating the animals, he gave them to the patient and her 64-year-old husband, who skinned and froze the rabbits. During the summer, the young man had noticed several dead rabbits around his house and had attributed their deaths to insecticide that had been sprayed on local fields. One of the two rabbits he shot was noted to be losing its fur.

Two days after dressing out the rabbits, the young man became ill with an ulcerated hand lesion, axillary lymphadenopathy, and a fever. He was examined at the local hospital; no diagnosis was made, but he was treated with antipyretics. On November 23, his two neighbors - the recipients of the rabbits - were admitted to the local hospital. They both had sepsis and hand lesions. On November 26, following instructions from the hospital, the young hunter was started on streptomycin, and he recovered rapidly.

The woman's original titer for tularemia, drawn November 23, was less than 20. Her titer rose to 160 after 10 days. First samples from both men were drawn late in the disease. The hunter's first blood specimen was drawn on November 29, when his titer was 1,280. It was reported as 2,560 after 7 days. Blood specimens from the husband were drawn December 3, when his titer was 320, and the level rose to 1,280 after 14 days.

The two rabbits were sent to CDC for analysis. Cultures from the bone marrow of both animals grew Francisella tularensis.

Editorial Note: Six cases of tularemia had been reported in New Jersey over the 5-year period prior to this outbreak. One case, in 1985, was also associated with rabbits. No tularemia deaths had been reported in the state in the previous 5 years.

The association between rabbits and human tularemia was first documented in 1913 and rabbit contact was implicated in 90% of the more than 14,000 cases reported through 1944. Although bloodsucking anthropod vectors have accounted for an increasing percentage of cases in more recent years, rabbits continue to be an important source of infection.

In the United States, wild rabbits of the genus Sylvilagus (cottontails, marsh rabbits, and swamp rabbits) present the greatest hazard. Jack rabbits and snowshoe hares are susceptible to tularemia but have rarely been implicated as direct sources of human infection. The domestic rabbit (Oryctolagus cuniculus) has not been documented as a source of human tularemia.

Exposure of the skin or conjunctiva to blood and other infectious tissue while skinning and dressing rabbits ac-

count for most cases. Ingestion of inadequately cooked meat has also been implicated. In some instances pulmonary tularemia has resulted from breathing aerosols generated while handling unopened rabbits or merely by poking at a dead rabbit with a stick. Indirect transmission from rabbits to humans may result from bites by pet animals or deerflies.

In 1939, the peak incidence year in the United States, 2,291 cases (17.5/1,000,000 population) were reported. Only 291 cases (1.2/1,000,000 population) were reported in 1984.

MMWR 12-5-86

Multiple Resistant Shigellosis in a Day-Care Center - Texas

Between October 10 and November 6, 1985, 15 children at a day-care center in Diboll, Texas, developed a diarrheal illness. *Shigella sonnei* was isolated from 10 ill children and from two of 19 asymptomatic children who were cultured on November 7. All isolates were colicin type 9, resistant to ampicillin, carbenicillin, streptomycin, cephalothin, and trimethoprim/sulfamethoxazole (TMP/SMX), and sensitive to tetracycline, nalidixic acid, chloramphenicol, and gentamicin. The attack rate was highest among the 12-to 22-month-old group. Family members of this group had the highest secondary attack rate. No cases occurred among the 22 staff members. None of the children were hospitalized, but four of five ill family members were.

The 89 children attending the center were cared for, by age group, in separate rooms. All groups except infants and toddlers had separate toilet and playground facilities. Infants and toddlers share these facilities.

Symptomatic children were excluded from the center until their diarrhea had resolved. Then they were permitted to return, without treatment or cultures, to their classrooms. Handwashing and hygiene were emphasized; contact between age groups was limited; and the routine policy excluding food preparers from child care, particularly diaper-changing, was reinforced. No further cases were reported at the center after November 7, when this strategy was implemented.

During the following month, statewide surveillance for TMP/SMX-resistant *S. sonnei* infections detected an outbreak among kindergarteners in a town 100 miles away. Although this outbreak strain had the same colicin type and antimicrobial resistance profile as the Diboll strain, its plasmid content differed, and no direct connection between the two outbreaks was discovered.

Editorial Note: Shigellosis in day-care centers can be difficult to control. Basic hygiene, exclusion of symptomatic persons, and routine antimicrobial therapy for all infected persons have been advocated as control measures. In the Texas outbreak reported here, antimicrobial therapy was not part of the control strategy because the strain was resistant to all drugs commonly used to treat shigellosis in children. Nonetheless, the straightforward control strategy in this well-designed day-care center was associated with the end of the outbreak, even through untreated convalescent children returned to the center and untreated asymptomatic carrier children remained there.

The elements contributing to this apparent success included vigorous emphasis on handwashing among staff and children; routine exclusion of ill children; separate areas and staff for diapering and food-preparation; and separate rooms, toilets, and play-facilities for different age groups. There is some evidence that each element is important. Handwashing has been shown to reduce the incidence of diarrheal illness in day-care centers. In day-care centers in Houston, Texas, the incidence of diarrheal illness was significantly associated with the proportion of staff who changed diapers and also served or prepared food. The usefulness of separating children by age was suggested by uniform shigellosis attack rates observed across ages 0 to 5 years at a day-care center where the children were grouped together. Additional study of the efficacy and utility of these specific control measures is needed.

Providing day-care in isolation for convalescent children may limit the spread of shigellosis in the community. In one outbreak, in which children with shigellosis were rigidly excluded from a day-care center until negative cultures were obtained, the outbreak strain spread to a day-care center in an adjacent county. In another outbreak, at a center where isolation of convalescent children was possible, treated, convalescent children without negative cultures were allowed to return to the day-care center, and there was no further spread of illness in either the center or the community. Further evaluation of convalescent day-care, with and without isolation, is needed before specific recommendations can be made.

To help day-care center directors, employees, and parents work with health departments to control disease in day-care centers, CDC has produced a training kit: "What To Do To Stop Disease in Child Day-Care Centers". This kit has been distributed to state health departments and licensing boards for distribution to licensed day-care centers. It also can be purchased for $4.00 from the Government Printing Office, Superintendent of Documents, Washington, D.C.. 20402. The GPO Stock Number is 017-023-00172-8.

MMWR 12/5/86

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June 1 Deadline for listing in Program.

A full refund will be made for all space cancelled on or before April 1, 1988. A fifty percent refund will be made for space on or before May 1, 1988. **No refund after June 1, 1988.**

For More Information Contact IAMFES, P.O. Box 701, Ames, IA 50010 or call Kathy Hathaway at 515-232-6699, outside Iowa 800-525-5223.

Affiliate Newsletter

Proposed Nebraska IAMFES Affiliate

The membership and program committee for the proposed Nebraska IAMFES affiliate met at the Nbraska State Laboratory Building on Friday, November 13 at 10 a.m. Those present were Dr. Richard Brazis, Dr. Mike Liewan, Tom Tieso, Beth Pierson, Dirk Shoemaker and Nancy Bremer.

The tentative title of the organization chosen by the committee was the Nebraska Association of Milk and Food Sanitarians. The date chosen for the yearly meeting and seminar was April 14 and 15 with March 29 and 30 as a back-up date. The Lincoln Hilton will be contacted as to cost feasibility pf holding the meetings there. Registration cost for the meeting will be deterined after the expense for the hotel is known. Yearly membership dues of $5 will be suggested at the meeting in April.

A mailing list will be compiled from national IAMFES members in Nebraska, mailing lists from Dr. Liewen and the list of those previously contacted concerning the organizational meeting. The first mailing will go out the third week of January. There will possibly be a follow-up mailing the first part of March.

The session will begin on Thursday at noon and run until 4:30 with a dinner held at 6:30. The next morning an optional breakfast will be followed by a business meeting from 7:30 - 8:30. The general session will run from 8:30 - 11:30. Fifteen minute breaks will be scheduled at 2:15 on Thursday and 10:00 on Friday.

Thirty minute blocks were scheduled for each topic and speaker. The following is a list of possible topice: yeast problems and solutions, Listeria, quality of milk, determination of sulfa drugs in milk, current and new methods for Salmonella, emerging pathogens, laboratory quality assurance, crisis communication, updates on Standard Methods, national IAMFES headquarters, update on Pasteurized Milk Ordinace, delicatessen quality problems, protein determination by infra red, FDA current work - Omaha, UNL Food Science current work and Hazard Analysis Critical Control Point Process.

For more information regarding the proposed Nebraska IAMFES affiliate and for meeting information, contact: Nancy Bremer, State Dept. of Agric. Labs, 3703 So. 14th St., Lincoln, NE 68502. Telephone: 402-471-2176.

W.A.M.F.E.S. Annual Meeting Highlights

Approximately one hundred and fifty people attended the Eighth Annual Joint Educational Conference held September 23 and 24, 1987 at the Midway Motor Lodge in Eau Claire, WI. The keynote address was given by Dr. Robert Nelson of U W, Eau Claire who discussed the Enviornmental Health Program at Eau Claire and where many of the graduates of tha program are now employed.

Many interesting topics were on the program. Groundwater problems were of major interest with sessions on groundwater protection, pollution and well codes. Dairy problems were also of keen interest. Subjects discussed were on somatic cell counts, stray voltage, shelf life of milk products and quality milk programs. Legal aspects of food regulations were discussed by Mike Kernats, attorney with the W.D.A.T.C.P. William Schmidt of W.D.H. discussed the future of public health in Wisconsin.

The Awards Luncheon was scheduled for Noon on Thursday. The Wisconsin Association of Milk and Food Sanitarians chose Ward Peterson of the Wisconsin Division of Health as their Sanitarian of the Year. The first Memorial Scholarship Award was presented to Kathryn Gerland, daughter of Mr. and Mrs. Gordon Gerland of Rice Lake. IAMFES Certificate of Merit Awards were presented to Ray Larsen of the Wisconsin Division of Health and Dr. P.C. Vasavada of the U W, River Falls.

Affiliate Calendar

1988

February 16-17, KAMFES 1988 ANNUAL CONFERENCE to be held at the Ramada Convention Center, 9700 Bluegrass Pkwy, Louisville, KY. For more information, contact: Dale Marcum, 108-A Sunset Ave, Richmond, KY 40475.

February 19, GEORGIA ASSOCIATION OF FOOD AND ENVIRONMENTAL SANITARIANS 2ND ANNUAL MEETING, for more information contact Dr. Robert E. Brackett, GAFES secretary, Department of Food Science/University of Georgia Experiment Station/ Experiment, Georgia 30212/404-228-7284.

February 24-26, MICHIGAN ENVIRONMENTAL HEATLH ASSOCIATION 44TH ANNUAL EDUCATIONAL CONFERENCE to be held at the Grand Traverse Report, Acme, MI. For more information, contact: Ike Volkers, R.S., Michigan Dept. o Public Health, Bureau of Environmental and Occupational Health, PO Box 30035, Lansing, MI 48909. Telephone: 517-335-8268.

March 1-2, VIRGINIA ASSOCIATION OF SANITARIANS AND DAIRY FIELDMAN'S ANNUAL MEETING AND DAIRY INDUSTRY WORKSHOP will be held at Virginia Polytechnic Institute and State University, Blacksburg, VA. For more information, contact: W. J. Farley, Rt. 1, box 247, Staunton, VA 24401.

April 6-8, MISSOURI MILK, FOOD AND ENVIRONMENTAL HEALTH CONFERENCE will be held at the Holiday Inn Executive Center, Columbia, Missouri. For more information, contact: Grace Steinke, 9713 Fall Ridge Trail, Sunset Hills, MO 63127-1508.

April 14-15, THE FIRST ORGANIZATIONAL ANNUAL MEETING OF THE PROPOSED NEBRASKA AFFILIATE will be held in Lincoln, Nebraska. Sessions will begin at noon on the 14th and end at noon on the 15th. For more information, contact: Nancy Bremer, State Dept. of Agric., 3703 So. 14th St., Lincoln, NE 68502. Telephone: 402-471-2176.

May 16-18, THE PA DAIRY SANTARIANS & LABORATORY DIRECTORS ANNUAL MEETING, to be held at Penn State University. For more information, contact: Sidney Barnard, Food Science Extension Specialist-Dairy, 8 Borland Laboratory, Penn State Univ., University Park, PA 16801. Telephone: 814-863-3915.

NEW YORK STATE ASSOCIATION OF MILK AND FOOD SANTARIANS annual meeting will be held in Binghamton, NY. For more information, contact: Paul Dersam, telephone: 716-937-3432.

September 29-30, SOUTH DAKOTA STATE DAIRY ASSOCIATION will hold it annual convention at the Holiday Inn, Brookings, SD. For additional information, contact: Shirley W. Seas, Dairy Science Dept., SD State University, Brookings, SD 57007. Telephone: 605-688-5480.

New Members

Arizona

Daniel A. Flores
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1988 IAMFES AWARDS

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

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You were recently sent a nomination form. Simply check those awards which you would like to nominate a person for and mail the form to the Ames office by March 1, 1987.

The Ames office will then send you a complete form for that particular award(s). Those forms need to be completed and back to the Ames office by April 1, 1987.

1. Previous award winners are not eligible for the same award. Check pages 38 and 39 in this issue for a complete listing of past award winners.

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

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

Presentation of these awards will be during the IAMFES Annual Meeting August 2-6, 1987 at the Disneyland Hotel in Anaheim, California during the Annual Awards Banquet.

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The following page lists the awards that you may nominate a person for, along with awards that are presented.

Nominate a deserving colleague for these prestigious IAMFES Awards

NOMINATIONS

- **SANITARIANS AWARD**

  $1000 award and plaque

  in recognition of outstanding service to the profession of the Sanitarian.

- **EDUCATOR AWARD**

  $1000 award and plaque

  presented to an educator in recognition of outstanding service in academic contributions to the profession of the Sanitarian.

- **CITATION AWARD**

  plaque

  for many years devotion to the ideals and objectives of the association.

- **HAROLD BARNUM INDUSTRY AWARD**

  $500 award and plaque

  in recognition of outstanding service to the public, IAMFES and the profession of the Sanitarian.

- **HONORARY LIFE MEMBERSHIP**
  plaque and lifetime membership with IAMFES

  for devotion ot the high ideals and principles of IAMFES.

- **SHOGREN AWARD**

  certificate and $100 award

  presented to the affiliate association for service to their members and IAMFES.

- **CERTIFICATE OF MERIT AWARD**

  certificate

  presented to those affiliate members who are active within their state/province affiliate group and IAMFES.

- **MEMBERSHIP ACHIEVEMENT AWARD**

  certificate

  presented yearly to the affiliate with the large increase of IAMFES members.

Past IAMFES Award Winners

EDUCATOR-INDUSTRY AWARD

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

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

EDUCATOR AWARD

1982-Floyd Bodyfelt
1983-Dr. John Bruhn
1984-Dr. R. Burt Maxcy
1985-Dr. Lloyd B. Bullerman
1986-Dr. Robert T. Marshall
1987-David K. Bandler

HAROLD BARNUM AWARD

1982-Howard Ferreira
1983-C. Dee Clingman
1984-Omer Majerus
1985-William L. Arledge
1986-Hugh C. Munns
1987-Dr. J. H. Silliker

CITATION AWARD

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

SANITARIANS AWARD

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

HONORARY LIFE MEMBERSHIP AWARD

1957-Dr. J. H. Shrader
1958-H. Clifford Goslee
1959-Dr. William H. Price
1960-None Given
1961-Sarah Vance Dugan
1962-None Given
1963-Dr. C. K. Johns and Dr. Harold Macy
1964-C. B. and A. L. Shogren
1965-Fred Basselt and Ivan Parkin
1966-Dr. M. R. Fisher
1967-C. A. Abele and Dr. L. A. Black
1968-Dr. M. P. Baker and Dr. W. C. Frazier
1969-John Faulkner
1970-Harold J. Barnum
1971-William V. Hickey
1972-C. W. Dromgold and E. Wallenfeldt
1973-Fred E. Uetz

and Presidents

1974-H. L. Thomasson and
Dr. K. G. Weckel
1975-A. E. Parker
1976-A. Bender Luce
1977-Harold Heiskell
1978-Karl K. Jones
1979-Dr. Joseph C. Olson, Jr.
1980-Alvin E. Tesdal
1981-Robert M. Parker
1982-None Given
1983-Orlowe Osten
1984-Dr. Paul Elliker
1985-Patrick J. Dolan
Dr. Franklin W. Barber
Clarence K. Luchterhand
1986-John G. Collier
1987-Dr. Elmer Marth
Dr. James Jezeski

SHOGREN AWARD

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

MEMBERSHIP ACHIEVEMENT AWARD

1986-Iowa Affiliate
1987-Florida Affiliate

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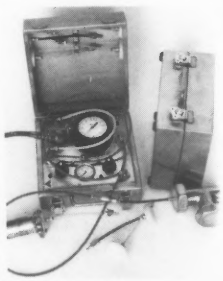

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JFP Abstracts

Abstracts of papers in the January Journal of Food Protection

To receive the* Journal of Food Protection *in its entirety each month call 1-800-525-5223, ext. A or 515-232-6699, ext. A in Iowa.

Effect of Potassium Sorbate and Other Treatments on the Microbial Content and Keeping Quality of a Restaurant-Type Mexican Hot Sauce, Lisa M. Flores, Lutgarda S. Palomar, Peggy A. Roh and Lloyd Bullerman, Department of Food Science and Technology, University of Nebraska, Lincoln 68583-0919

J. Food Prot. 51:4-7

Spoiled and unspoiled restaurant-made Mexican hot sauces were examined for presence of pathogenic and spoilage microorganisms. Studies to determine whether microorganisms isolated from the sauce could grow and cause spoilage were also carried out. The effects of potassium sorbate at various levels (0, 0.02, 0.03, 0.05, 0.1 and 0.2%) on the keeping quality of the sauce were also determined. Spoiled sauce had microbial counts 4 log-cycles higher than the unspoiled sauce. Bacteria were either very few or absent in all the samples and were unable to grow when reinoculated. The pH of the sauce was below 4.5. Yeasts increased after 10 d of incubation and were the main organisms that caused the spoilage. Potassium sorbate at .05% was inhibitory to yeasts in both original and inoculated sauces. Levels of 0.02 and 0.03% were only fungistatic. Benzoic acid at 0.05% was also inhibitory, while heating at 80°C for 10 min did not extend shelf life appreciably, and acidification to pH 3.5 increased shelf life only slightly.

Antibiotic/Antimicrobial Residues in Milk, M. S. Brady and S. E. Katz, Department of Biochemistry and Microbiology, Cook College, New Jersey Agricultural Experiment Station, Rutgers - The State University of New Hersey, New Brunswick, New Jersey 08903

J. Food Prot. 51:8-11

A qualitative receptor assay for antibiotic and antimicrobial residues in milk was used in a survey of commercial milk samples obtained in the eastern Pennsylvania, Central New Jersey, New York City area. Sixty-four milk samples were obtained over a 3-month period, representing different brands and bottling plants. Sixty-three percent of milk samples contained one or more residues; 27% contained 2 residues; 11% contained 3 or more residues. Tetracyclines and sulfonamides were the most predominant residues detected. A subsample of milk was used to confirm the qualitative presence of residues, using microbial assays. Of 9 presumptive tetracycline-positive samples, 9 were confirmed. Of 4 presumptive streptomycin-positive samples, 3 were confirmed.

Behavior of *Listeria monocytogenes* During the Manufacture and Storage of Colby Cheese, Ahmed E. Yousef and Elmer H. Marth, Department of Food Science and the Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 51:12-15

Colby cheese was made from pasteurized whole milk to which *Listeria monocytogenes* (strain V7 or California) was added. Cheese was stored for 140 d at 4°C. Numbers of *L. monocytogenes* in newly-made cheese were 1.27 orders of magnitude (average) higher than in milk from which cheese was made. This indicates the bacterium did not grow to any appreciable extent during the manufacture of cheese. A minor portion (2.4%) of the population of *Listeria* in the cheese vat escaped in the whey and the rest was entrapped in the curd. Early during storage, numbers of *Listeria* in the cheese remained relatively constant for a time that depended on the strain used. Numbers of *Listeria* in cheese decreased steadily thereafter at a rate that depended mainly on composition of the cheese. After 140 d of storage, higher numbers of *Listeria* remained in cheese when *(a)* a higher rather than lower concentration of the microorganism was present in milk, *(b)* cheese with a higher rather than lower moisture content was produced, and *(c)* strain V7 rather than California was added to milk.

Loss of Viability by *Listeria monocytogenes* in Commercial Calf Rennet Extract, Fathy E. El-Gazzar and Elmer H. Marth, Department of Food Science and The Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 51:16-18

Loss of viability by *Listeria monocytogenes* (strain California) in three lots of commercial calf rennet extract was determined during storage for 56 d at 7°C. Four levels (3×10^3 to 10^7/ml) of *L. monocytogenes* were added to the rennet extract, and McBride Listeria Agar was used to determine numbers of survivors. Selected colonies thought to be *L. monocytogenes* were confirmed biochemically. Samples were also tested during and after completion of cold enrichment (up to 8 weeks at 4°C). Samples of rennet extract inoculated with 10^3 to 10^4 *L. monocytogenes*/ml were always free of viable cells of the bacterium after 28 d and sometimes after 14 d, as determined by direct plating and cold enrichment. When the inoculum was 10^5 to 10^7/ml, samples of rennet extract usually were free of viable *L. monocytogenes* (direct plating and cold enrichment) after 42 d and sometimes after 28 d at 7°C. In this work, results of cold enrichment correlated well with those of direct plating. All lots of rennet extract, before inoculation, were free of *L. monocytogenes* (direct plating and cold enrichment).

Effect of Fluorescent Light on Flavor and Riboflavin Content of Milk Held in Modified Half-Gallon Containers, J. C. Hoskin, Department of Dairy Science and Food Science, Clemson University, Clemson, South Carolina 29634-0363

J. Food Prot. 51:19-23

A study was conducted to evaluate the ability of aluminum and oriented polypropylene film to protect milk in half-gallon polyethylene containers from light radiation and thereby stabilize it from light-induced off-flavor (LIOF) and riboflavin loss. Both films, applied to the major portion of the outer surface of the containers, protected milk from light radiation better than when applied only to the container top.

Use of Lysostaphin and Bacitracin Susceptibility for Routine Presumptive Identification of Staphylococci of Bovine Origin, B. E. Langlois, R. J. Harmon and K. Akers, Department of Animal Sciences, University of Kentucky, Lexington, Kentucky 40546-0215

J. Food Prot. 51:24-28

A simple agar plate system based on susceptibility to lysostaphin and bacitracin to differentiate between staphylococci and micrococci is described. The system also uses susceptibility to novobiocin to aid in identification to species level of staphylococci. Growth from the agar plate can be used to prepare inocula for inoculation of rapid identification systems.

A Bacteriocin Produced by *Pediococcus* Species Associated with a 5.5-Megadalton Plasmid, Dallas G. Hoover, Patricia M. Walsh, Karen M. Kolaetis and Mary M. Daly, Department of Food Science, Biotechnology Group, University of Delaware, Newark, Delaware 19716

J. Food Prot. 51:29-31

Agarose gel electrophoresis of plasmid DNA and plasmid-curing experiments suggested that bacteriocin activity was harbored on a plasmid of approximately 5.5 megadaltons (Mdal) in *Pediococcus acidilactici* PO2, B5627 and PC, and *Pediococcus pentosaceus* MC-03. Bacteria that were sensitive to the bacteriocin included other pediococci, *Leuconostoc mesenteroides, Streptococcus faecalis* and *Listeria monocytogenes*. Three of the five serotypes of *L. monocytogenes* examined were inhibited by a variant lacking the 5.5 Mdal plasmid; however, when the plasmid was present, zones of inhibition doubled in size.

Evaluation of Citrinin Toxicity on the Immune Functions of Mice, R. V. Reddy, M. J. Taylor and R. P. Sharma, Toxicology Program, Department of Animal, Dairy and Veterinary Sciences, Utah State University, Logan, Utah 84322-5600

J. Food Prot. 51:32-36

Citrinin, a nephrotoxic fungal metabolite produced by several species of *Penicillium* and *Aspergillus*, has been found to contaminate foods used by humans and animals. The present study investigated potential effects of this compound on the immune system. Male CD-1 mice received 0, 0.12, 0.6 or 3.0 mg of citrinin/kg i.p. every other day for 2-4 weeks. Food consumption and body or organ weights were not affected but kidneys were enlarged. Splenic cells from mice exposed to citrinin for 2 or 4 weeks were cultured with or without the mitogens, phytohemagglutinin (PHA), pokeweed mitogen (PWM) or lipopolysaccharide (LPS). Exposure to citrinin stimulated splenic lymphocyte proliferation. Antibody production by splenic cells in animals sensitized to sheep red blood cells (SRBC) increased in the two highest dose groups. Delayed hypersensitivity reaction, measured as a foot-pad swelling, in response to SRBC sensitization and subsequent challenge were not affected by citrinin treatment. In vitro addition of citrinin ($>1 \times 10^{-5} M$) to splenic lymphocytes was cytotoxic. These findings suggest that citrinin mildly stimulates the immune system but does not have consistent immunotoxic effects at the doses tested.

Germination of Spores of *Clostridium botulinum* Type G, Koichi Takeshi, Yoshiaki Ando and Keiji Oguma, Department of Epidemiology, Hokkaido Institute of Public health, North 19, West 12, Kitaku Sapporo, Hokkaido 060 Japan and Department of Microbiology, Sapporo Medical College, South 1, West 17, Chuoku Sapporo, Hokkaido 060, Japan

J. Food Prot. 51:37-38

Germination of spores of *Clostridium botulinum* type G under various conditions of heat activation, incubation temperature and minimum nutrition was studied. The spores were optimally germinated in a mixture of L-cysteine + L-lactacte + bicarbonate. The rate and extent of germination were greatly increased when unheated spores were heat-activated at 75°C for 10 min before exposure to the germination medium. Maximum germination was obtained at incubation temperatures of 37 to 45°C within 1 h. However, germination occurred substantially even at 4°C if the incubation time was extended to 48 h.

Essential Elements in Dry and Canned Kidney Beans (*Phaseolus vulgaris* L.), Anthony Lopez and Harriet L. Williams, Department of Food Science and Technology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061

J. Food Prot. 51:39-42

Ten essential mineral elements were determined in dry and in canned kidney beans (*Phaseolus vulgaris* L.). Samples were taken at different stages during the canning process to determine where changes in element content occurred. Canned kidney beans contained significantly lower concentrations of iron, magnesium, manganese, potassium, and zinc than dry kidney beans, on a dry weight basis. These decreases were probably caused by the elements being extracted out during soaking and blanching of the kidney beans and/or during the actual thermal processing where elements were extracted into the can liquid. There was a significant increase in calcium in the canned product and no significant difference in copper and phosphorus contents between the dry and canned products. Chloride and sodium content in canned kidney beans increased due to the sodium chloride content of the filling medium, and their concentrations varied depending on the concentration of the medium used. Retention of all elements, except chloride and sodium, ranged from 61 to 117% on a dry weight basis and from 19 to 36% on wet weight basis, retention being defined as the ratio of content in the canned to that in the dry product as received at the plant.

Evaluation on the Swab Test on Premises, the Calf Antibiotic and Sulfa Test, and a Microbial Inhibitor Test with Standard Solutions of 22 Antibiotics, Gary O. Korsrud and James D. Macneil, Agriculture Canada, Animal Pathology Laboratory, 116 Veterinary Road, Saskatoon, Saskatchewan S7N 2R3, Canada

J. Food Prot. 51:43-46

The sensitivities of the Swab Test on Premises (STOP), the Calf Antibiotic and Sulfa Test (CAST) and a laboratory Microbial Inhibitor Test (MIT) previously used for confirmation of STOP results were compared. Different media were compared for the STOP and MIT. The CAST was more sensitive than the STOP for the 22 antibiotics tested. The sensitivity of the STOP procedure increased for 15 of the 22 antibiotics tested when the standard STOP medium, Antibiotic Medium No. 5 (AM-5), was replaced with Saskatoon Antibiotic Medium-3 (SAM-3), the medium used for thin-layer bioautography. When Antibiotic Medium No. 2 (AM-2) was used in the STOP procedure, the overall sensitivity was intermediate between that obtained using AM-5 and SAM-3. For the MIT, *Micrococcus luteus* ATCC 9341 provided greater sensitivity as a test organism than *Bacillus cereus* ATCC 11778 for 16 antibiotics and was less sensitive for 4 antibiotics, particularly chlortetracycline, oxytetracycline and tetracycline. *M. luteus* ATCC 9341 was notably more sensitive as a test organism for bacitracin and lincomycin than was *B. cereus* ATCC 11778.

Prevalence of *Salmonella* and Thermophillic *Campylobacter* in Fresh Pork, Beef, Veal and Poultry in Canada, A. M. Lammerding, M. M. Garcia, E. D. Mann, Y. Robinson, W. J. Dorward, R. B. Truscott and F. Tittiger, Agriculture Canada, Food Production and Inspection Branch, Animal Pathology Laboratory, 110 Stone Road West, Guelph, Ontario, Canada N1G 3W4

J. Food Prot. 51:47-52

A national surveillance program was undertaken in Canada to establish the prevalence and distribution of *Salmonella* and thermophilic *Campylobacter* biotypes in slaughter animals and poultry. During the years 1983 to 1986, samples were collected from federally inspected abbatoirs across Canada and tested at regional laboratories. The laboratory isolation procedure for thermophilic *Campylobacter* included selective enrichment and isolates were characterized according to Lior's biotyping scheme. *Salmonella* were isolated from 17.5% pork, 2.6% beef and 4.1% veal carcasses. Thermophilic *Campylobacter* were isolated from 16.9% pork, 22.6% beef and 43.1% veal carcasses. *Salmonella* were isolated from 69.1% turkey and 60.9% chicken carcasses, and thermophilic *Campylobacter* were isolated from 73.7% and 38.2% turkey and chicken carcasses, respectively. *Salmonella typhimurium* was the most frequently isolated serotype, and predominant in broiler chickens from 1983 to 1985. *Salmonella brandenburg* was predominant in pork, and *Salmonella schwarzengrund* was the primary serotype from turkey carcasses. *Campylobacter jejuni* biotypes I and II were the most frequently isolated biotypes from beef, veal and poultry. Although *Campylobacter coli* biotype I was the predominant thermophilic *Campylobacter* in pork, 41.1% of the biotyped isolates from pork were *C. jejuni* biotypes I and II.

A Survey of Coliforms and *Staphylococcus aureus* in Cheese Using Impedimetric and Plate Count Methods, F. A. Khayat, J. C. Bruhn and G. H. Richardson, Department of Nutrition and Food Sciences, Utah State University, Logan, Utah 84322-8700

J. Food Prot. 51:53-55

A total of 256 cheese samples were analyzed for coliform plate count using violet red bile agar and for an impedance count using Bactometer^{R} Coliform Medium with a correlation coefficient between methods of R=-.91. Fifty-four percent of the samples contained 10^2 to 10^7 colony forming units/gram (CFU/g). The highest counts were in cream and fresh cheese products. When 27 Cheddar cheese samples were inoculated with from 10^2 to 10^7 CFU of *Escherichia coli*/g a correlation of R=-.97 was found between methods. Two hundred of the cheese samples were analyzed for *Staphylococcus aureus* using Baird-Parker medium and impedance

count using Bactometer[R] *S. aureus* Medium. Five samples (2%) contained over 10^3 CFU/g. The strains isolated were coagulase-positive. When 34 samples of cheese were inoculated with 10^2 to 10^7 CFU of staphylococci/g, the correlation between the plate and impedance method was R=0.98.

Foodborne and Waterborne Disease in Canada - 1982 Annual Summary, E. C. D. Todd, Bureau of Microbial Hazards, Food Directorate, Health Protection Branch, Health and Welfare Canada, Ottawa, Ontario K1A 0L2, Canada

J. Food Prot. 51:56-65

Data on foodborne disease in Canada in 1982 are compared with those for 1981. A total of 988 incidents comprising 791 outbreaks and 197 single cases, caused illnesses in 7,384 persons in 1982. These figures are greater than for 1981, and, in fact, the numbers of incidents and cases are the highest on record. *Salmonella, Staphylococcus aureus, Clostridium perfringens* and *Bacillus cereus* caused most of the illnesses. The main *Salmonella* serovars were *S. typhimurium, S. muenster* and *S. infantis*. *Escherichia coli* 0157:H7 hemorrhagic colitis was reported for the first time. Parasitic diseases were caused by *Trichinella spiralis* and *Giardia lamblia*. The same number of animal related incidents occurred in 1982 and 1981 involving paralytic shellfish poison, scombroid poison and insect infestation of food. There were also 72 incidents and 113 cases of chemical origin; extraneous matter, rancid compounds and cleaning substances were the most frequently implicated. Unusual chemical problems included ammonia from decomposition in tuna, strychnine in vitamin pills (murder), tartaric acid in gum, excess licorice in candy, calcium chloride in a popsicle, sodium acetate in potato chips and sodium hydroxide in pretzels. Some of these are discussed in more details under the narrative reports. There were 15 deaths from salmonellosis, hemorrhagic colitis (*E. coli* 0157:H7 infection), *Clostridium perfringens* gastroenteritis and strychnine poisoning. About 30.7% of incidents and 40.1% of cases were associated with meat and poultry. Bakery products, marine foods and dairy foods were also important vehicles of foodborne disease. Mishandling of food took place mainly in foodservice establishments (38.1% of incidents, 75.7% of cases), homes (13.9% of incidents, 7.1% of cases) and food processing establishments (11.5% of incidents, 4.0% of cases). Chemicals, such as extraneous matter, sodium hydroxide and tin, were the agents associated with 51.8% of incidents caused by processors' mishandling. The three largest of these types of outbreaks, however, were associated with contamination by *Salmonella* or *S. aureus* (total of 102 cases). On a population basis incidents were greatest in Ontario, followed by those in British Columbia, Nova Scotia, Manitoba and Alberta. Reports of nine foodborne disease incidents are presented. In addition, four incidents of waterborne disease were documented in 1982, three fewer than in 1981. All were caused by ingestion of infectious agents but the nature of two of them was unknown. The largest outbreak (121 cases) was a result of contamination of a town water supply by *Giardia* originating from beavers.

Foods and Food Ingredients for Prevention of Diarrheal Disease in Children in Developing Countries, N. R. Reddy, S. M. Roth, W. N. Eigel and M. D. Pierson, Department of Food Science and Technology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061

J. Food Prot. 51:66-75

Increased awareness of the morbidity and mortality attributed to diarrheal disease among children under 5 years of age in developing countries has led to a variety of approaches aimed toward prevention. In this review, foods and food ingredients which appear to be most effective in prevention of diarrheal disease in infants are considered. The effect of each of the following potential food or food ingredient categories on the control or prevention of diarrheal disease is discussed: human milk components, antibodies, probiotics, and fermented foods.

Calendar

1988

January 20-23, FOURTH INDUSTRYWIDE U.S. DAIRY FORUM, sponsored by the Milk Industry Foundation and International Ice Cream Association. To be held at the Innisbrook in Tarpon Spring, FL. For more information, contact: Joe Dugan, 888 Sixteenth Street, N.W., Washington, DC 20006. 202-296-4250, TELEX 150185.

January 25-26, SOUTHERN CALIFORNIA IFT SECTION AND CHAPMAN COLLEGE plan Food Industry Conference I at Chapman College, Orange, CA. Cooperating sponsors are California Dairy Industries Association, California Dietetics Association, California Nutrition Council and U.C. Davis. This year's conference theme is "Food Technology and Nutrition Highlights 1988." For further information, contact: Adrienne Alexander or Dr. Walt Clark, Food Science and Nutrition Department, Chapman College, Orange, CA 92666. Telephone: 714-997-6831 or 714-997-6869.

February 3-4, FOOD PROCESSORS' SANITATION WORKSHOP, will be held at the Holiday Inn, Santa Nella, CA. Presented by the University of California Cooperative Extension, and Food Processors' Sanitation Association, along with representatives of various food trade associations. For more information, contact: Kathryn Boor, Food Science and Technology, University of California, Davis, CA 95616. Telephone: 916-752-3835.

February 8-10, NATIONAL MASTITIS COUNCIL ANNUAL MEETING to be held at the Nugget Hotel, Reno, Nevada. For more information, contact: Anne Saeman, National Mastitis Council, 1840 Wilson, Blvd, Arlington, VA 22201. Telephone: 703-243-8268.

February 9, SYMPOSIUM ON FOODBORNE PATHOGENS, to be held at the Red Lion Inn in Omaha, NE. For more information, contact: Dr. Michael Liewen, Food Processing Center, University of Nebraska, Lincoln, NE 68583-0919. Telephone: 402-472-2814.

February 10-11, DEPARTMENT OF FOOD SCIENCE & NUTRITION DAIRY & FOOD INDUSTRY CONFERENCE, to be held at the Fawcett Center for Tomorrow, Ohio State University, Columbus, OH. For more information, contact: John Lindamood, 2121 Fyffe Road, Columbus, OH 43210-1097.

February 12-14, DAIRY PRODUCTS INSTITUTE OF TEXAS ANNUAL CONVENTION, to be held at the Hershey Hotel, Corpus Christi, TX. For more information, contact: Glenn R. Brown, 201 Vaughn Building, Austin, TX 78701.

February 15-17, ABC RESEARCH CORPORATION'S 14TH ANNUAL TECHNICAL SEMINAR will be held at the University Centre Hotel, Gainesville, Florida. For more information, please contact Sara Jo Atwell, ABC Research Corporation, 3437 SW 24th Avenue, Gainesville, FL 32607. Telephone: 904-372-0436.

February 16-17, KAMFES 1988 ANNUAL CONFERENCE will be held at the Ramada Convention Center, 9700 Bluegrass Pkwy, Louisville, KY. For more information contact Dale Marcum, 108-A Sunset Ave, Richmond, KY 40475.

February 19, GEORGIA ASSOCIATION OF FOOD AND ENVIRONMENTAL SANITARIANS 2ND ANNUAL MEETING, for more information contact Dr. Robert E. Brackett, GAFES secretary, Department of Food Science/University of Georgia Experiment Station/Experiment, Georgia 30212/404-228-7284.

February 21-24, SWEETNER USERS GROUP, INTERNATIONAL SWEETENER COLLOQUIUM, to be held at Innisbrook Resort, Tarpon Spring, FL. For more information, contact: Constance E. Tipton, 888 16th Street, NW, Washington, DC 20006.

February 24-26, MICHIGAN ENVIRONMENTAL HEALTH ASSOCIATION 44th ANNUAL EDUCATIONAL CONFERENCE, will be held at the Grand Traverse Resort, Acme, MI. For more information, contact: Ike Volkers, R.S., Michigan Dept. of Public Health, Bureau of Environmental and Occupational Health, PO Box 30035, Lansing, MI 48909. Telephone: 517-335-8268.

February 29 - March 1, NEW YORK STATE CHEESE MANUFACTURER'S ASSOCIATION IN COOPERATION WITH CORNELL UNIVERSITY, Dept of Food Science, will be held at the Syracuse Marriott, East Syracuse, NY 13057. The annual convention of cheese processors from NY and other cheese producing regions of the U.S., focusing on technology, safety and merchandising of cheese. Contact the following for more information: Prof. David K. Bandler, 11 Stocking Hall, Cornell University, Ithaca, NY 14853. Telephone: 607-255-3027.

February 29-March 4, MANAGEMENT FOR WATER & WASTEWATER TREATMENT SYSTEMS will be held at the University of Florida, Gainesvilles. For more information, contact: Dr. Barbara Mitchell. Telephone: 904-392-9570.

March 1-4, PUMP APPLICATION FOR WASTEWATER TREATMENT SYSTEMS will be held at the University of Florida, Gainesville. For more information, contact: Dr. Barbara Mitchell. Telephone: 904-392-9570.

March 1-2, VIRGINIA ASSOCIATION OF SANITARIANS AND DAIRY FIELDMAN'S ANNUAL MEETING AND DAIRY INDUSTRY WORKSHOP will be held at Virginia Polytechnic Institute and State University, Blacksburg, VA. For more information, contact: W.J. Farley, Rt. 1, Box 247, Staunton, VA 24401.

March 6-8, OHIO DAIRY PRODUCTS ASSN., INC. ANNUAL CONVENTION, to be held at Dayton Marriott Hotel, Dayton, OH. For more information, contact: Don Buckley, 1429 King Ave., #210, Columbus, OH 43212.

March 6-9, TEXAS PUBLIC HEALTH ASSOCIATION, 63rd Annual Meeting to be held at the Hilton Palacio del Rio in downtown San Antonio. For more information, contact: James O. Allen, Jr., Texas Public Health Association, PO Box 4246, Austin, Texas 78765.

AMERICAN BUTTER INSTITUTE - NATIONAL CHEESE INSTITUTE ANNUAL MEETING, to be held at the Hyatt Regency Washington on Capitol Hill, Washington, DC. For more information, contact: the ABI-NCI, 699 Prince Street, Suite 102, Alexandria, VA 22314. 703-549-2230.

March 13-16, INTERNATIONAL CONFERENCE ON THE BIOTECHNOLOGY OF MICROBIAL PRODUCTS: NOVEL PHARMACOLOGICAL AND AGROBIOLOGICAL ACTIVITIES, to be held in San Diego, CA. For more information, contact: Mrs. Ann Kulback, SIM, PO Box 12534, Arlington, VA 22209-8534.

March 13-16, AMERICAN CULTURED DAIRY PRODUCTS INSTITUTE ANNUAL MEETING and annual meeting and conference/Cultures and Curds Clinic/International Cultured Dairy Products Evaluation Sessions, Marriott Hotel, Newport Beach, CA. For more information, contact: Dr. C. Bronson, ACDPI, PO Box 547813, Orlando, FL 32854-7813. Telephone: 305-628-1266.

March 16, INDIANA DAIRY INDUSTRY CONFERENCE sponsored by the Food Science Department at Purdue University. For more information, contact: James V. Chambers, Food Science Dept., Smith Hall, Purdue University, West Lafayette, IN 47907. Telephone: 317-494-8279.

March 21-24, INDUSTRIAL REFRIGERATION SHORT COURSE is designed for engineers and supervisors employed by food processors or for contractors, design firms and equipment manufacturers. The 4 day course will be held on the U.C. Davis campus. The fee is $630. For more information on refrigeration, contact: James Lapsley, University Extension, U.C. Davis 95616. Telephone: 916-752-4395.

March 21-25, DEPARTMENT OF FOOD SCIENCE & NUTRITION, MID-WEST WORKSHOP IN MILK & FOOD SANITATION, to be held at Fawcett Center for Tomorrow, Ohio State University, Columbus, OH. For more information, contact: David Dzurez, 2121 Fyffe Road, Columbus, OH 43210-1097.

DAIRY AND FOOD INDUSTRIES SUPPLY ASSOCIATION 1988 ANNUAL CONFERENCE to be held at Marriott's Rancho Las Palmas in Rancho Mirage, CA. For more information call DFICA offices at: 301-984-1444.

APRIL 6-8, MISSOURI MILK, FOOD AND ENVIRONMENTAL HEALTH CONFERENCE, to be held at the Holiday Inn Executive Center, Columbia, Missouri. For more information, contact: Grace Steinke, 9713 Fall Ridge Trail, Sunset Hills, MO 63127-1508.

April 6-8, MECHANICAL MAINTENANCE FOR WATER & WASTEWATER PERSONNEL will be held at the University of Florida, Gainesville. For more information, contact: Dr. Barbara Mitchell. Telephone: 904-392-9570.

April 10-13, MILK INDUSTRY FOUNDATION, INTERNATIONAL ICE CREAM ASSOCIATION, MARKETING & TRAINING INSTITUTE SPRING BOARD MEETING, to be held at The Ritz Carlton, Laguna Niguel, CA. For more information, contact: John F. Speer, Jr., 888 16th Street, NW, Washington, DC 20006.

April 11-13, MECHANICAL MAINENANCE FOR WATER & WASTEWATER PERSONNEL will be held in West Palm Beach, FL. For more information, contact: Dr. Barbara Mitchell. Telephone: 904-932-9570.

38th ANNUAL UNIVERSITY OF MARYLAND ICE CREAM CONFERENCE, for more information, contact: Dr. James T. Marshall, Department of Animal Sciences, University of Maryland, College Park, MD 20742. 301-454-7843.

April 13-14, CHEESE RESEARCH CONFERENCE, to be held at the Sheraton Inn, Dane Co. Expo Ctr., Madison, WI. For more information, contact: Agricultural Conference Office, Jorns Hall, 650 Babcock Drive, Madison, WI 53706. Telephone: 608-263-1672.

April 13-15, BASIC ELECTRICAL MAINTENANCE FOR WATER & WASTEWATER PERSONNEL will be held at the University of Florida, Gainesville. For more information, contact: Dr. Barbara Mitchell. Telephone: 904-392-9570.

April 18-20, BASIC ELECTRICAL MAINTENANCE FOR WATER & WASTEWATER PERSONNEL will be held in West Palm Beach, FL. For more information, contact: Dr. Barbara Mitchell. Telephone: 904-392-9570.

April 18-21, AMERICAN DAIRY PRODUCTS INSTITUTE ANNUAL MEETING & TECHNICAL CONFERENCE, to be held at Chicago O'Hare Marriott Hotel, Chicago, IL. For more information, contact: Warren S. Clark, Jr. 130 N. Franklin Street, Chicago, IL 60606.

April 20-21, 1988 CENTER FOR DAIRY RESEARCH CONFERENCE (MILKFAT: TRENDS AND UTILIZATION), alternates with Cheese Research and Technology Conference, to be held at the Holiday Inn Southeast, Madison, WI. For more information, contact: Nina Albanese-Kotar, Center for Dairy Research, University of Wisconsin-Madison, 1605 Linden Drive, Madison, WI 53706. 608-262-5970.

May 9-12, PURDUE ASEPTIC PROCESSING AND PACKAGING WORKSHOP, sponsored by the Food Science Department at Purdue University. For more information, contact: James V. Chambers, Food Science Dept., Smith Hall, Purdue University, West Lafayette, IN 47907. Telephone: 317-494-8279.

May 16-18, THE PA DAIRY SANITARIANS & LABORATORY DIRECTORS ANNUAL MEETING, to be held at Penn State University. For more information, contact: Sidney Barnard, Food Science Extension Specialist-Dairy, 8 Borland Laboratory, Penn State Univ., University Park, PA 16802. Telephone: 814-863-3915.

May 22-24, GEORGIA DAIRY PRODUCTS ASSOCIATION ANNUAL CONVENTION, to be held at Callaway Gardens, Pine Mountain, GA. For more information, contact: Pat Hamlin, P.O. Box 801, Macon, GA 31208.

May 29-June 2. INTERNATIONAL CONFERENCE ON MASTITIS will be held in St. Georgen/Langsee, Carinthia, Austria. For information, contact: Prof. Dr. E. Glawischnig, International Conference on Mastitis, II. Medizinische Universitatsklinik for Klauentiere, der Veterinarmedizinischen Universitat in Wien, Linke Bahngasse 11, A-1030 Vienne, Austria. Telephone: 0222 / 73 55 81 ext. 500, 501.

RAPID METHODS AND AUTOMATION IN MICROBIOLOGY will be held at Kansas State University. The workshop is certified by American Society for Microbiology for Continuing Education Credits. Contact Dr. Daniel Y.C. Fung, Call Hall, Kansas State University, Manhattan, KS 66506. Telephone: 913-532-5654.

July 31-August 4, IAMFES 75th ANNUAL MEETING, to be held at the Hyatt Regency Westshore, Tampa, FL. For more information, contact Kathy R. Hathaway, IAMFES, Inc., PO Box 701, Ames, IA 50010. 800-525-5223, in Iowa 515-232-6699.

August 7-12, 1988 ANNUAL MEETING OF THE SOCIETY FOR INDUSTRIAL MICROBIOLOGY, to be held at the Hyatt Regency, Chicago, IL. For more information, contact: Mrs. Ann Kulback, SIM, PO Box 12534, Arlington, VA 22209-8534.

September 11-13, NATIONAL DAIRY COUNCIL OF CANADA ANNUAL CONVENTION, to be held at the Winnipeg Convention Centre, Winnipeg, Manitoba. For more information, contact: Pat MacKenzie, 141 Laurier Avenue West, Ottawa, Ontario, Canada K1P-5J3.

September 11-14, SOUTHERN ASSOCIATION OF DAIRY FOOD MANUFACTURERS, INC. 74TH ANNUAL CONVENTION, to be held at the Boca Raton Hotel & Club, Boca Raton, FL. For more information, contact: John E. Johnson, P.O. Box 1050, Raleigh, NC 27605.

September 21-22, UNITED DAIRY INDUSTRY ASSOCIATION ANNUAL MEETING, to be held at the Hyatt Regency Minneapolis, Minneapolis, MN. For more information, contact: Edward A. Peterson, 6300 N. River Road, Rosemont, IL 60018.

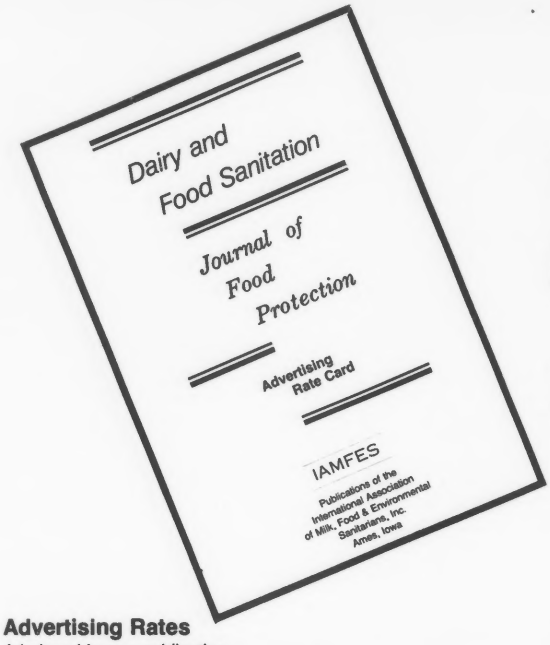
September 27-29, NEW YORK STATE ASSOCIATION OF MILK AND FOOD SANTARIANS, to hold annual meeting in Binghamton, NY. For more information, contact: Paul Dersam, telephone: 716-937-3432.

September 29-30, SOUTH DAKOTA STATE DAIRY ASSOCIATION, will hold it's annual convention at the Holiday Inn, Brookings, SD. For more information, contact: Shirley W. Seas, Dairy Science Dept., SD State Univ., Brookings, SD 57007. Telephone: 605-688-5480.

October 9-13, AACC ANNUAL MEETING, to be held at the Hotel InterContinental San Diego, in San Diego, California. For more information, contact: Raymond J. Tarleton, American Assoc. of Cereal Chemists, 3340 Pilot Knob Road, St. Paul, MN 55121. 612-454-7250.

October 15-19, MILK INDUSTRY FOUNDATION & INTERNATIONAL ICE CREAM ASSOCIATION ANNUAL CONVENTION & SHOW, to be held at Marriott's Orlando World Center, Orlando, FL. For more information, contact: John F. Speer, Jr., 888 16th Street, NW, Washington, DC 20006.

November 28-December 1, NATIONAL MILK PRODUCERS FEDERATION ANNUAL MEETING, to be held at the Hilton, Anaheim, CA. For more information, contact: James C. Barr, 1840 Wilson Blvd., Arlington, VA 22201.



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101	114	127	140	153	166	179	192	205	218	231	244	257	270	283	296	309	322	335	348
102	115	128	141	154	167	180	193	206	219	232	245	258	271	284	297	310	323	336	349
103	116	129	142	155	168	181	194	207	220	233	246	259	272	285	298	311	324	337	350
104	117	130	143	156	169	182	195	208	221	234	247	260	273	286	299	312	325	338	351
105	118	131	144	157	170	183	196	209	222	235	248	261	274	287	300	313	326	339	352
106	119	132	145	158	171	184	197	210	223	236	249	262	275	288	301	314	327	340	353
107	120	133	146	159	172	185	198	211	224	237	250	263	276	289	302	315	328	341	354
108	121	134	147	160	173	186	199	212	225	238	251	264	277	290	303	316	329	342	355
109	122	135	148	161	174	187	200	213	226	239	252	265	278	291	304	317	330	343	356
110	123	136	149	162	175	188	201	214	227	240	253	266	279	292	305	318	331	344	357
111	124	137	150	163	176	189	202	215	228	241	254	267	280	293	306	319	332	345	358
112	125	138	151	164	177	190	203	216	229	242	255	268	281	294	307	320	333	346	359
113	126	139	152	165	178	191	204	217	230	243	256	269	282	295	308	321	334	347	360

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and sulfamethazine etc.)
that spoiled the milk,
that contaminated the silo,
that shut down the plant,
that lost $100,000.
Because somebody didn't
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