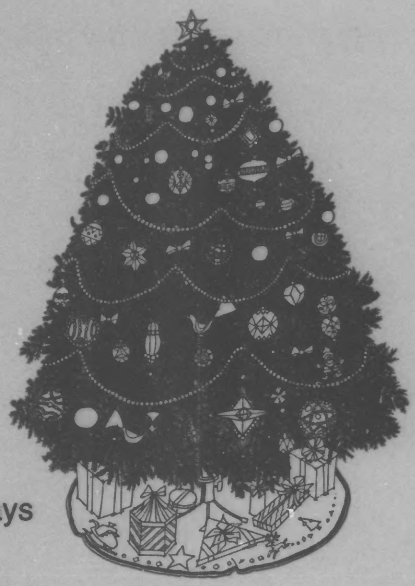
ISSN:0273-2866
Box 701
Ames, Iowa 50010

December, 1987
Vol. 7, No. 12
Pages 625-684
$6.00

Dairy and Food Sanitation®

A Publication of the International Association of Milk, Food and Environmental Sanitarians, Inc.



Call for Research Papers for the 1988 Annual Meeting, see the October issue. Developing Scientist Award Papers also being accepted, see page 625.

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Announcement
Developing Scientist Awards

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Awards

Five (5) awards will be presented: 1st place, $500 and a plaque; 2nd place, $200 and a certificate; 3rd place, $100 and a certificate; 4th place, $50 and a certificate; 5th place, $50 and a certificate.

Purpose

1. To encourage graduate students to present their original research at the IAMFES annual meeting.
2. To foster professionalism in graduate students through contact with peers and professional members of IAMFES.
3. To encourage participation by graduate students in IAMFES and the annual meeting.

Who Is Eligible

Graduate students enrolled in M.S. or Ph.D. programs at accredited universities or colleges whose research deals with problems related to environmental, food and/or dairy sanitation, protection and safety. Candidates cannot have graduated more than one (1) year prior to the deadline for submitting abstracts.

Criteria

1. A short abstract of the paper must be submitted to the IAMFES office by January 1 of each year. (Use the blue abstract forms from the October issue, if possible.)
2. The author must indicate on the abstract form the desire to be considered for the competition.
3. The paper and the student must be recommended and approved for the competition by the major professor or department head.
4. The paper must represent original research done by the student and must be presented by the student.
5. An extended abstract form will be sent to all who enter the competition, and must be completed and returned by the deadline date on that form.
6. Each student may enter only one (1) paper in the competition.
7. Papers are to be presented as oral papers and should be approximately fifteen (15) minutes in length with an additional five (5) minutes allowed for questions, for a total of twenty (20) minutes.
8. The use of slides or other visual aids is encouraged.
9. The papers will be judged by an independent panel of judges.
10. Awards will be presented at the annual IAMFES Awards Banquet.

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Dairy and Food Sanitation (ISSN:0273-2866) is published monthly by the International Association of Milk, Food and Environmental Sanitarians, Inc., executive offices at PO Box 701, 502 E. Lincoln Way, Ames, IA 50010. Printed by Heuss Printing, Inc., 911 Second St., Ames, IA 50010. **Second-class postage paid st Ames, IA. Postmaster: Send address changes to IAMFES, 502 E. Lincoln Way, Ames, IA 50010-0701.**

Manuscripts: Correspondence regarding manuscripts and other reading material should be addressed to Kathy Hathaway, PO Box 701, Ames, IA 50010-0701. 515-232-6699.

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Dairy and Food Sanitation

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Dairy and Food Sanitation, Vol. 7, No. 12, Pages 628-631 (December 1987)

Miniaturized Kits, Immunoassays and DNA Hybridization for Recognition and Identification of Foodborne Bacteria

N.A. Cox[1], D.Y.C. Fung[2], J.S. Bailey[1], P.A. Hartman[3] and P.C. Vasavada[4]

[1] *U.S. Dept. of Agriculture, Agricultural Research Service, Richard B. Russell Research Center, PO Box 5677, Athena, GA 30613*
[2] *Dept. of Animal Science & Industry, Kansas State University, Manhattan, KS 66506*
[3] *Dept. of Microbiology, Iowa State University, Ames, IA 50011*
[4] *Dept. of Animal Science, University of Wisconsin-River Falls, River Falls, WI 54022*

Contribution No. *87-118-J*, Kansas Agricultural Experiment Station, Manhattan, KS 66506.

The Applied Laboratory Methods Committee of the International Association of Milk, Food and Environmental Sanitarians requested the authors to prepare this paper as part of the committee's activities.

For all practical purposes the age of rapid, miniaturized techniques began when Weaver and his students (Weaver, 1954), in the late 1940's, added concentrated inocula to small tubes of different kinds of bacteriological media. The concept has gained steadily in popularity so that today a wide variety of commericallly available kits and minisystems covering many different procedures is available. These range in purpose from the enumeration of bacteria in urine and determination of antibiotic susceptibility to the more complex task of identification to species based on biochemical, immunological, and other intrinsic parameters, such as DNA. The development of disposable multi-chambered trays, plates and dishes of assorted shapes and sizes was made possible by the increased use of plastic and these were utilized by the manufacturers of the commercially available identification minikits. Many of these commercial kits have been specifically designed to identify microorganisms belonging to the *Enterobacteriaceae* family. This is not surprising because many of the organisms isolated from blood, urine, and fecal specimens in the clinical laboratory belong to this family. Also, *Salmonella, Shingella, Yersinia* and *Escherichia* are genera of this family and are very important to the food microbiologist.

Standard conventional tube and plate tests present many problems. The times required to obtain results are usually much too long and, in many instances, foods will be consumed before laboratory analyses are completed. In addition, the number and nature of biochemical and other tests necessary to speciate *Enterobacteriaceae* have frequently discouraged food microbiologists from obtaining these data. Although initially designed for the clinical laboratory, the commercially available systems to identify *Enterobacteriaceae* provide the food microbiologist with suitable alternatives to conventional tests (Cox and Mercuri, 1978).

A potential user's choice of a particular minikit may depend on many factors, some of which are not directly related to microbiology. A list compiled by Fung and Cox (1981) included: (1) precision and accuracy of a kit compared with an in-house procedure or to the conventional system, (2) readiness and personal preferences of a potential user to try a kit, (3) ability of sales representatives to demonstrate the product clearly and to train potential users, (4) clarity of manufacturer's instructions, (5) scientific soundness of the kit, (6) ease of inoculating, reading reactions and interpreting data, (7) access to computer data banks of the manufacturer, (8) reputation of the company for services, (9) speed of find identification, (10) storage life of the kit, (11) availability of the product and (12) cost per isolate identified. Safety factors are also important because the unknown isolate to be identified could be a pathogen. The greatest emphasis in choosing a particular kit has been the accuracy in identifying an unknown compared to the accuracy of the conventional system (Fung and Cox, 1981).

The most commonly used identification kits, number of tests, incubation time required, mailing address and published accuracy with food isolates are listed in Table 1. It is generally agreed that differences in the accuracy of identification among the various commercial systems are miniscule and that these test kits have an acceptable

accuracy.

For the last 15 years or so, these systems have been our answer, at least in practice, to rapid identification. Whereas it is true that they do speed up the overall identification process, it is less than accurate to classify them as a rapid procedure. Most of the various systems require the use of one or more colonies obtained from solid plating media or a pure culture; in the routine microbiological analysis of foods, several days are needed to reach this point. Additionally, these miniaturized kits do not include appropriate tests to identify several pathogens that are of concern to the food microbiologist, such as *Campylobacter jejuni, Bacillus cereus* and *Listeria monocytogenes*. Another point that should be made is that the food microbiologist is usually concerned with determining the presence or absence of one or more specific pathogens (especially *Salmonella*) and may not need to identify non-pathogenic isolates. Therefore, these packaged minikits are not the ultimate solution to the rapid recognition of pathogenic bacteria in foods.

For a procedure to be truly rapid, it must detect or recognize the pathogen in a liquid medium or, better still, be able to detect the organism itself, its toxin or its virulence factor directly from tissues or food material. In doing so, this eliminates the need to obtain a pure culture and saves 2-3 days of time.

With the introduction of "tagged" antibodies by Coons *et al* (1942), numerous immunoassays employing labeled

Table 1. The more commonly used commercial identification kits and their accuracy with food isolates.

System	Manufacturers	No. of tests	Incubation time (h)	Correlation with Conventional methods (%)	Reference
API-20E	Analytab Products, Inc. Division of Sherwood Medical 200 Express Street Plainview, NY 11802	20	18-24	99 94 82 76 91 97	Poelma *et al* (1978) Guthertz an Okoluk (1978) Cox and Mercuri (1978) Griffiths and Phillips (1982) Cox *et al* (1983) Fung *et al* (1984)
API Rapid E	Same address as above	20	4	94	Cox and Bailey (1986)
Enteric-Tek	Flow Laboratories 25 Lumber Road Roslyn, NY 11576	14	18-24	86 93 89	Griffiths and Phillips (1982) Cox *et al* (1983) Fung *et al* (1984)
Enterotube	Roche Diagnostic Division of Hoffman- LaRoche Inc. 340 Kingland Street Nutley, NJ 07110	15	18-24	99 84 79 97	Poelma *et al* (1978) Griffiths and Phillips (1982) Cox *et al* (1983) Fung *et al* (1984)
Micro-ID	General Diagnostics	15	4	98 97 99 97 97 97	Cox and Mercuri (1979) Cox *et al* (1979) ox *et al* (1981) Bailey *et al* (1983) Cox *et al* (1983) Fung *et al* (1984)
Minitek	BBL Microbiology Systems Becton Dickinson and Co. P.O. Box 243 Cockeysville, MD 21030	35 (20 suggested for identification of *Enterobacteriaceae*	18-24	99 97 94 97 94 99	Poelma *et al* (1977) Guthertz and Okoluk (1978) Cox *et al* (1979) Cox and Mercuri (1979) Cox *et al* (1983) Fung *et al* (1984)
R/B	Flow Laboratories 25 Lumber Road Roslyn, NY 11576	18	24	96 72	Poelma *et al* (1977) Cox and Mercuri (1978)
Spectrum 10	Austin Biological Laboratories 6620 Manor Road Austin, TX 78723	20	18-24	91 93 (genus) 82 (species)	Fung *et al* (1984) Cox *et al* (1985) Cox *et al* (1985)

antibodies have evolved. These include the use of various fluorescent dyes (FA), radioisotopes (RIA) and enzymes (EIA). These "tagged" antibody procedures have a wide spectrum of application and recently have become one of the best established procedures in microbiology. There are, however, both advantages and limitations to these various techniques.

The FA technique involves labeling antibodies by chemical combination with fluorescent dyes, such as fluorescein isothiocyanate. When applied to smears containing *Salmonella*, for example, these labeled antibodies attach to the flagella or cell walls of the organism and the bacterial cells become visible when illuminated by light of an appropriate wavelength. *Salmonella* stained by FA using fluorescein isothiocyanate appears under a fluorescence microscope as a yellow-green rods against a dark background. FA does not require pure cultures and can often detect the test organism in smears containing high levels of extraneous bacteria. Considerable training and skill are required to read the test and it shares the shortcomings of all microscopic tests in being tedious and cumbersome to laboratory technicians. Also, being a serological test, it is limited to the specificity of the antibodies used; a major problem is encountered in that false-positives are common in foods because food isolates produce cross reactive antigens. Using high-titered antibodies, or possibly monoclonal antibodies, should minimize or eliminate cross-reactions with some of the extraneous organisms.

Yalow and Berson (1959) developed immunoassays using radiolabeled reagents, which gave rise to radioimmunoassays (RIA). Radioactivity can be detected rapidly, directly and with a relatively high degree of sensitivity. The ionizing radiation which arises from nuclear decay should be of minor concern to the safety of laboratory personnel performing assays because of the low quantities of radiolabels used. Nevertheless, there has been a reluctance to use a radiometric technique. The small number of radioisotopes that can be used in practice, the need for complex and expensive equipment for measuring radioactivity, the chemical instability of certain radioactive levels, aversion of workers to anything connected with radioactivity and regulations concerning the disposal of radioactive materials are other disadvantages.

Many of the disadvantages listed above ultimately led to the introduction of alternative procedures with other labels such as enzymes, co-enzymes, chemiluminescence precursors, bacteriophage and metal ions. Ibrahim and Fleet (1985) recently published a comprehensive review on these subjects. Of these alternatives, immunoassays using enzyme-labeled tracers (EIA) have been the most widely accepted. The use of enzymes as tracers in immunoassays was first introduced by van Weeman and Schuurs (1971) and Engvall and Perlman (1971). Advantages of EIA include not having to use radioisotopes and monoclonal antibodies can be made against most purified antigens; therefore, this technology should be applicable to the identification of a wide variety of bacteria. A commercial system has recently become available for *Salmonella* detection (Flowers *et al.* 1986). The primary disadvantage is that this technique presently requires 10^6 organisms per ml of liquid medium for detection and as such requires 24-48 hours of incubation to reach this level. For more details, refer to review of Ibrahim (1986).

Recently genetic engineering has made it possible to select specific pieces of deoxyribonucleic acid (DNA), clone them and produce large quantities of desired DNA sequences. These DNA pieces can be employed through hybridization as specific tests for selected organisms or for DNA sequences are used to construct the probe, the test should be highly selective with very few false negatives and false positives. Some disadvantages are that, at present, the only commercially available system (Fitts, 1985) uses a radiolabeled probe which many laboratories object to and the sensitivity of the system (5×10^6 *Salmonella* cells/ml) is such that the test requires at least 48 hours to complete from the time the assay begins.

These newer technologies that have evolved in the last decade or two have been a vast improvement over what existed before. We must not be satisfied or complacent, however, because each of these techniques presently has one or more shortcomings. Therefore, work must be done to further improve them which in turn will surely widen their base of acceptance. Efforts should be made to develop homogeneous assays to replace the present heterogeneous, multi-step assays. Many existing procedures such as EIA and DNA-DNA hybridization tests are too complex and involve too many processing steps. Cost is a substantial consideration in any analytical laboratory. Therefore, it is important that methods and kits be as inexpensive as possible. The usefulness of the existing technologies will be increased when more of the microorganisms of concern to the food microbiologist are included and not just *Salmonella*. The manufacturers of the commercial systems are presently working toward this end, so this is simply a matter of time. Simple rapid (one hour or less), sensitive and quantitative assays for all important microbial toxins should be developed. Ideally, a kit would simultaneously analyze for a variety of pathogens and/or their toxins using a food homogenate or extract. Much room still exists for further advances and improvement in both sensitivity and specificity. Also unique, new more sensitive and specific assays are needed. Should this occur in the coming decade, we may finally realize the dream of a one work day analysis from food sample to confirmed result.

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Dairy and Food Sanitation, Vol. 7, No. 12, Pages 632-635 (December 1987)

Evaluation of the 3M Dry Medium Culture Plate (Petrifilm™ SM) Method for Enumerating Bacteria in Processed Fluid Milk Samples

by

J.S. McAllister*, M.S. Ramos*, and T.L. Fox**

**Medical/Surgical Division*
***Riker Laboratories, 270-3N-04, 3M Center*
St. Paul, MN 55144

Introduction:

Petrifilm Plates provide a time saving method for enumerating bacteria by eliminating the need to prepare media. This sample ready system consists of nutrients and/or selective and differential agents coated onto films along with a cold soluble gelling agent and triphenyl tetrazolium chloride (TTC). One ml of an appropriate dilution is applied directly to the Petrifilm plate; inoculated plates are incubated under the same conditions used for traditional plating methods. Colonies appear as red dots on a white background.

Petrifilm SM (PSM) plates have been shown to be comparable to Standard Methods agar (SMA) pour plates for aerobic colony counts in raw milk (1) and fresh ground beef (4).

The method has been collaboratively studied and is an approved official First Action AOAC method for use with raw and pasteurized milk (2). The method has also been approved by APHA for inclusion in Standard Methods for the Examination of Dairy Products (SMEDP) as an alternative microbiological method.

This study was done to evaluate the performance of PSM with processed fluid milk products. Various milk fat compositions were tested to show the effect of fat content on performance of PSM. PSM was compared to SMA pour plates.

Materials and Methods:

Dairy Samples: Milk products were purchased locally and plated before the expiration date stamped on the carton. Some products were stored at 45°. These stored products were tested because this simulates a Mosely psychtrotroph count. Different brands, different lots of the same branch, or different treatments of the same lot were treated as separate samples.

Samples were distributed as in Table 1.

Sample Analysis:

Samples were diluted in Standard Methods phosphate dilution water (3) and appropriate dilutions were plated in duplicate on PSM and SMA. SMA pour plates were prepared as described in SMEDP (3).

The PSM plate, developed by 3M Company (Medical/Surgical Products Division, St. Paul, MN 55144), consists of a ready-to-use bacterial culture medium coated onto a film base and overlaid with a polypropylene film. The base contains Standard Method nutrients and a cold-water-soluble gelling agent. The overlay film is also coated with the gelling agent and, in addition, 2,3,5 triphenyltetrazolium chloride indicator dye to facilitate counting. A gride (each square 1 cm X 1 cm) outlined on the bottom film aids in the counting process. The overall dimension of the growth area of a single Petrifilm plate is 20 cm^2. Petrifilm plates were inoculated and counted following the manufacturer's instructions.

Table 1: Type of Dairy Products Tests.

Product	Number Tested
Whole milk (3.25% milkfat)	36
Skim milk	27
Lowfat (1% milkfat)	10
Lowfat (2% milkfat)	11
Cream	14
Chocolate	27
Total	125

Table 2. Summary of statistical comparison of fluid milk bacteria enumeration.

	Whole Milk	Skim Milk	Chocolate Milk	Cream	Total
Correlation Coefficient	0.99	0.99	0.91	0.99	0.98
Slope	1.03	0.98	1.00	0.97	1.01
Intercept	-0.13	0.05	0.25	0.21	0.02
Mean Log_{10} count/ml PSM ± S.D.	3.11 ± 1.93	2.60 ± 1.02	2.99 ± 0.95	3.98 ± 1.72	2.98 ± 1.26
Mean log_{10} count/ml SMA ± S.D.	3.14 ± 1.34	2.61 ± 1.03	2.76 ± 0.86	3.88 ± 1.75	2.94 ± 1.22
Mean log_{10} difference	-0.04 ± 0.19	-0.01 ± 0.14	0.24* ± .40	0.10 ± 0.25	0.04 ± 0.26
Sample size	36	27	27	14	125

*Mean log difference is significantly different from O ($P<0.05$).

All plates (SMA and PSM) were incubated 48 hr at 32°C.

The study was designed as a paired comparison so that all tests were performed on the same sample. A total of 125 samples were tested. Some samples had such low microbial loads that the sample had to be plated undiluted to achieve the desired 25-250 countable range.

Data analysis:

Mean counts/ml were calculated according to the rules given in SMEDP (3). Bacterial counts were converted to log_{10} counts to more nearly match the major underlying statistical assumption of log normality and equality of variance of samples (5). Regression analysis is a system frequently used to describe relationships between two methods. The data are plotted, and the best fitting straight line is fitted to the data. If the two methods are exactly the same, then this straight line has a slope of 1.0, an intercept of 0, and a correlation coefficient of 1.0. Actual data varies from this ideal; therefore, with a data set, we test whether the calculated values of the slope, intercept and correlation coefficient are statistically different from the ideal values of 1.0, 0.0, and 1.0, respectively. 95% of the time, the line will be between the 95% confidence limits, as shown on the figures.

Results:

Whole milk and skim milk were analyzed separately because they represent the high and low ends of milkfat content. For high or low milkfat products (whole & skim) there was no significant difference in mean log recovery of bacteria between PSM and SMA. (Table 2). Statistical analysis showed a correlation coefficient in each case of 0.99. The resulting lines had slopes that were not significantly different from 1.0 and intercepts that were not significantly different from 0. (See Figures 1 and 2).

Since milk fat had no effect on the ability of either method to recover bacteria from the milk products, 1% and 2% lowfat milks were not tested independently, although these samples were included in the total samples tested (refer to Table 1).

Cream and chocolate flavored milk were analyzed separately because they seemed different enough to warrant special consideration. The chocolate found in chocolate flavored milk can affect nutrient characteristics of media.

Creams can have a milk fat content of 36% (heavy cream). This could be enough to affect the media. Thus 14 creams sample ranging from heavy cream to half and

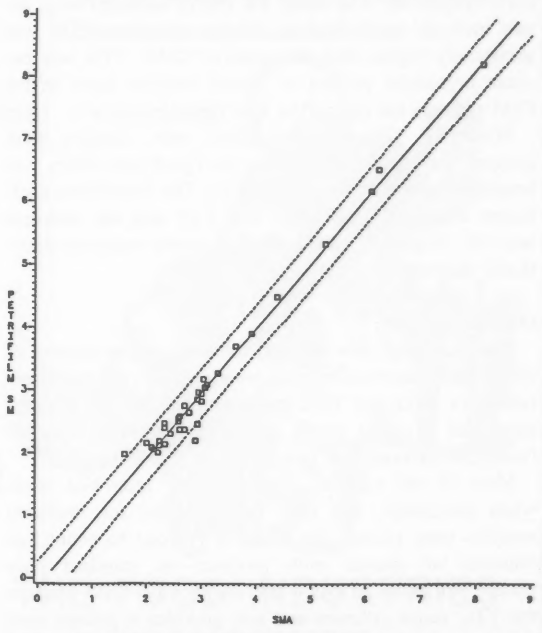

FIGURE 1. Whole Milk Samples: Regression line and 95% confidence limits of PSM plotted against SMA (in log_{10} counts/ml).

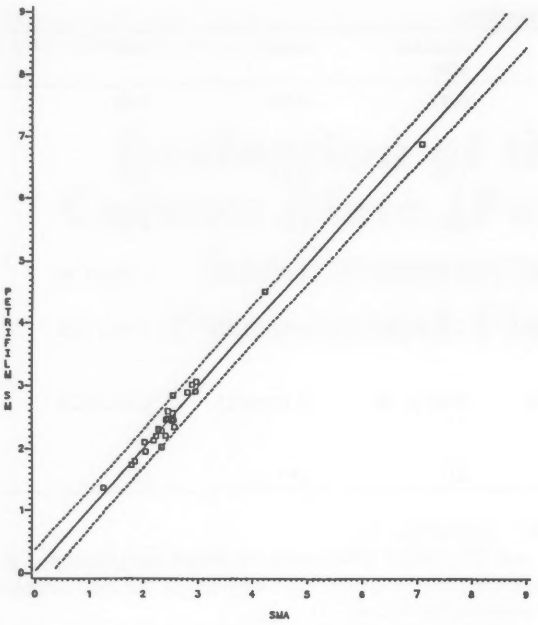

FIGURE 2. Skim Milk Samples: Regression line and 95% confidence limits of PSM plotted against SMA (in $\log_{10}$ counts/ml).

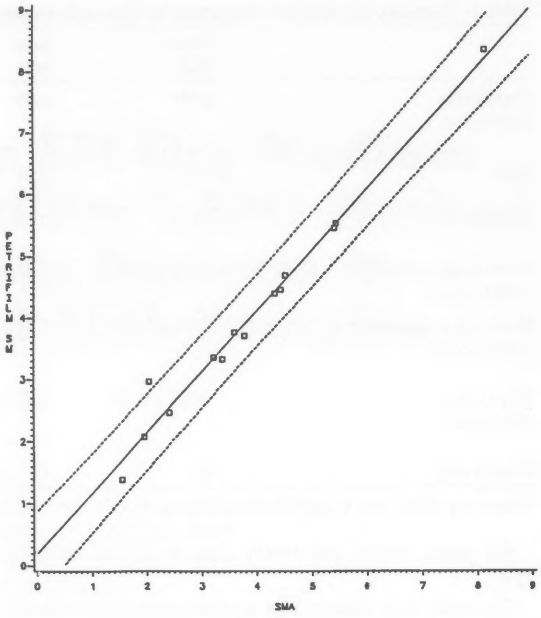

FIGURE 3. Cream Samples: Regression line and 95% confidence limits of PSM plotted against SMA (in $\log_{10}$ counts/ml).

half were analyzed separately. There was no significant difference between the two methods. (Table 2 and Figure 3).

Statistical analysis of chocolate flavored milk samples again showed a correlation between the two methods of 0.91. (Figure 4). The mean log counts obtained from the two methods were similar, but the count on PSM was statistically higher than the count of SMA. This was because organisms present in certain samples grew in the PSM systems but not on the agar plates.

When all 125 processed fluid milk samples were grouped for analysis there were no significant differences between the two methods (Table 2). The correlation coefficient was 0.98, the slope was 1.01 and the intercept was .02. (Figure 5). The mean log counts were not statistically different.

Discussion:

The preceding data demonstrates the appropriateness of the Petrifilm method for enumerating total aerobic populations in processed fluid milk samples. In 125 samples purchased in local stores no significant difference between the methods was detected.

Most of the samples had very low microbial loads when purchased, and thus low dilutions (or undilute) samples were plated. We found it difficult to count low dilutions of opaque milk products on standard pour plates, but easier to count the colonies on PSM because the TTC stains colonies red and provides a greater contrast between the red colony and white background. Some milk samples were stored a week at 45°F, then replated. Some of these counts were quite high. Regression analysis shows a similar relationship between the two methods over the entire range of contamination.

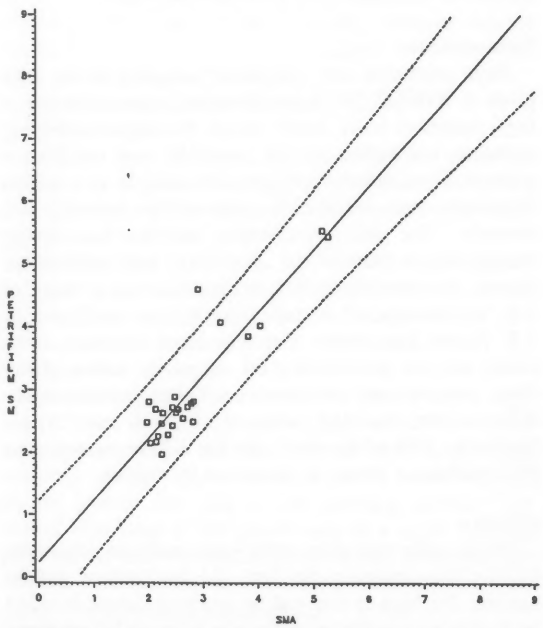

FIGURE 4. Chocolate Milk Samples: Regression line and 95% confidence limits of PSM plotted against SMA (in $\log_{10}$ counts/ml).

Milk fat content of fluid milk products, including creams, had no effect on the recovery of bacteria on the

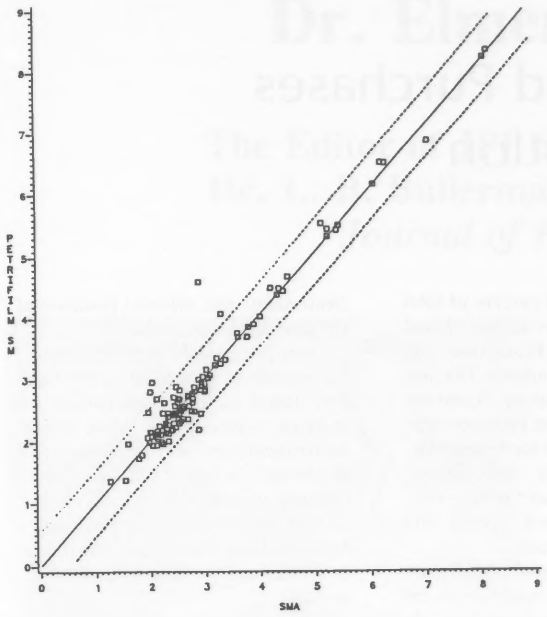

FIGURE 5. All Fluid Milk Samples: Regression line with 95% confidence limits of PSM plotted against SMA (in $\log_{10}$ counts/ml).

Petrifilm method as compared to the Standard method.

The Petrifilm system offers a practical, convenient and accurate alternative to the conventional pour plates for enumeration of bacteria in finished fluid milk products.

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The Scientists Tell Me . . .

Study Examines Seafood Purchases For At-Home Consumption

By Marilyn Brown
TAES Science Writer

Per capita consumption of fresh and frozen seafood has risen nearly 50 percent since 1960 and is expected to grow at a faster rate than beef, pork, vegetables, cereal, and milk over the next two decades, according to government surveys.

Americans spend $15 billion annually, or about 4 percent of their food budgets, on seafood, and the National Marine Fisheries Service projects the share of the food dollar to be almost 10 percent by the end of the century.

With those buying patterns in mind, Hsiang-tai Cheng, agricultural economist for the University of Georgia, and Oral Capps Jr., Texas Agricultural Experiment Station agricultural economist, studied consumer characteristics to better understand who buys seafood and what types of seafood are bought.

In analyzing household expenditures, the researchers considered the effects of income, prices, socio-demographic differences, household size, geographic region, race, education, occupation, and seasonality.

Socio-demographic characteristics, the researchers say, are likely to reflect expenditure shifts due to differences in lifecycle and product accessibility, and by differences in climate, tastes, preferences, culture, and infrastructure of households.

Also, to capture shopping behavior of consumers, the study considered types of seafood outlets and the use of coupons to help explain expenditures on seafood products.

In addition, the researchers note that although away-from-home outlets account for roughly 60 percent of total seafood consumption in the United States, data on away-from-home consumption were not available. The Seafood Consumption Survey, conducted for the National Marine Fisheries Service, is the source of data for the research.

Shellfish, including crabs, oysters, and shrimp, as well as finfish—cod, flounder/sole, haddock, perch and snapper—were analyzed.

In general, they found that Southerners spend significantly more on fresh and frozen seafood than do households in any other region and that white families spend significantly less on seafood for at-home consumption than do non-white familites. Additionally, those households with children spend significantly less on seafood than do childless households.

In addition to increased consumption in the South and in non-white households, Cheng and Capps found that households with lower education levels generally spent more on shrimp and haddock but less on cod and total finfish than did the more educated.

The research found that households with religious affiliation spent significantly less on oysters, cod and total finfish than did households with no such affiliation.

The researchers also found significant differences in expenditures for the various seafood products according to the occupation of the household head and the urbanization of the houshold itself. Employment status and age of the household manager was generally found to be unimportant.

The study also found that particular store outlets and coupon values or other special offers affected purchases, with an exception for oysters. Seasonality, too, affected purchase of the products being analyzed.

Own-price effects were key factors on household expenditures for fresh and frozen seafood commodities for at-home consumption. Also, household expenditures were more sensitive to changes in household size than to changes in household income. Finally, cross-price effects of meat and poultry had relatively little effect on household consumption of fresh and frozen seafood.

Own-price effects refer to the direct price of the commodities in question —for example, the price of shrimp when considering the purchase of shrimp. Cross-price effects refer to the prices of other commodities which may influence the purchase of a particular commodity—for example, the price of lobster when considering the purchase of shrimp.

Cheng and Capps say that their research will be valuable to the seafood industry. Various producer, processor, and consumer groups may ascertain key demand factors from the study. It will also assist retailers and the newly created National Fish and Seafood Promotional Council in the identification of target groups for fresh and frozen seafood products. Even though improvements and refinements in data collection and model formulation merit attention, the scientists say their work is a fruitful, first step.

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

Dr. Elmer H. Marth

The Editor of JFP Says "Aufwiedersehen" Dr. L. B. Bullerman is New Editor of the *Journal of Food Protection*

Dr. Elmer Marth - 1968

Dr. Elmer Marth - 1987

It was in July, 1967 that Dr. J.C. Olson, Jr., then a professor of food microbiology at the University of Minnesota and editor of the *Journal of Milk and Food Technology (JMFT),* visited with me in my office at the University of Wisconsin, Madison. Dr. Olson indicated he was leaving the University of Minnesota to become director of the Microbiology Division of the Food and Drug Administration and thus felt it was necessary to relinquish his position as editor of the *JMFT*. He indicated further that he has been empowered by the Executive Board of the IAMFES to offer me the position. After some thought I agreed to accept the position, and a month or so later my wife, Phyllis, and I traveled to Miami Beach to attend the annual meeting of the IAMFES where my appointment as editor was made official.

In March of 1987, I indicated to the Executive Board of the IAMFES my desire to "retire" as editor at the end of 1987, when I will have completed slightly more than 20 years in that position. Dr. Lloyd B. Bullerman of the University of Nebraska will begin to serve as editor of the *Journal of Food Protection (JFP)* on January, 1988 (see following story).

When a change such as this is made, it is appropriate to briefly reflect on what has happened in the past. To begin with, during the last 20 years we published about 3,020 papers in the *JFP* and the *JMFT*. As editor, I dealt with authors and did the copy editing on all but about 475 of these papers. Dr. M.P. Doyle handled those papers during his 5 years (1981-1986) of service as associate editor. In addition to the papers that were published, another 400 to 500 papers were handled that were never published either because they were unacceptable or were withdrawn by the author after the review process was completed.

A few comparisons will be made between the current situation and that of 1967. Since *JMFT* in 1967 served the purposes now being served by *JFP* and *Dairy and Food Sanitation (DFS),* I have combined the data for those publications. First in 1967 there were 512 pages in *JMFT,* but in 1986 we published 1700 pages (*JFP* plus *DFS*). There were 30 research papers published in 1967, and this grew to 150 (all in *JFP*) in 1986. Review papers numbered 11 in 1967 and 18 (all in JFP) in 1986. There were 23 non-technical papers published in 1967 and 29 (all in *DFS*) in 1986. Total papers published

numbered 64 in 1967 and 197 (*JFP* plus *DFS*) in 1986.

Now a few comments about costs of journals to members of IAMFES. In 1967, membership dues were $10.00 per year and in 1986 the dues were $50.00 (included both *JFP* and *DFS*). Hence, in 1967 the cost was $1.95 per 100 pages, whereas it was $2.94 in 1986, an increase of about 51%. Calculated on the cost per paper made available to the reader, it was 16 cents in 1967 and 25 cents in 1986; this is an increase of about 56%. While the salaries of readers of *JFP/DFS* increased by 400 to 500% during the last 20 years, the cost to readers of information in the journals increased by a mere 51 to 56%. Hence, the cost of journals to members of IAMFES continues to be a real bargain.

During the past 20 years, and in particular the last 10 years, *JFP* has emerged as a world-class journal and is a leading publication in food microbiology and food safety. In reflecting on this, it seems to me this development is related, at least in part, to the following factors. (1) The outbreak of salmonellosis in 1966 that was associated with nonfat dry milk focused attention on foodborne illness which, in turn, generated research interest and ultimately manuscripts for publication. Research interest in food safety continued (and still does) throughout the 20-year period since 1967. (2) Departments of Food Science were established in nearly all land-grant universities in the U.S. Often Dairy Science/Industry departments were converted to Food Science departments. Generally, there has been a greater emphasis on research in these "new" departments than there was in the "old" departments. (3) A page charge to help cover the cost of publishing the journal was instituted in 1969. This made it financially possible for more pages (e.g. more papers) to be published. (4) The editorial board was expanded to include many U.S. and Canadian scientists actively engaged in research in areas of concern to the journal. (5) In 1977, the title of the journal was changed to *Journal of Food Protection*. This served to more clearly define the primary emphasis of the journal than was true of the old title, *Journal of Milk and Food Technology*. Furthermore, the new title served to make the journal more attractive to research scientists than was true of the old title. (6) In 1981, *Dairy and Food Sanitation* was established. This provided a medium for publication of non-technical articles, news and events, new product information, and news of the IAMFES. Publication of this important material in a separate journal allowed for its removal from *JFP*, which further enhanced it as a scientific journal. (7) An increasing number of scientists from outside of the U.S. are submitting manuscripts for publication, thus making *JFP* truly international in character.

For several reasons, I consider serving as editor as one of the most worthwhile and satisfying professional activities of my career. However, to carry out this responsibility, I had the help of many people, and I want to thank them for their contributions and support. My thanks go to: (1) my wife, Phyllis, for her support and for spending many lonely hours while I worked on the journal, (2) the Journal Management Committee, and Dr. R.B. Read, Jr., its chairman for many years; the committee was always supportive, but also originated the idea to change the title of the journal to *JFP* from *JMFT*, and to create *DFS* - both of these changes had a salutary effect on *JFP*, (3) twenty executive boards of IAMFES who always recognized the importance of the publishing function of the association and generally were supportive of efforts to improve the journal, (4) Dr. M.P. Doyle who served with distinction as associate editor during 1981-1986, (5) three executive managers of IAMFES [H.L. Thomasson (deceased), E.O. Wright, and K.R. Hathaway] and others in the IAMFES office who always were helpful in the publication process, (6) two printing firms, Franklin Press of Shelbyville, Indiana and Heuss Printing Company of Ames, Iowa for their efforts in publishing a high-quality journal, (7) the hundreds, and possibly thousands of authors who submitted papers for publication during the past 20 years, (8) scientists, perhaps 400 to 500, who reviewed papers that were submitted for publication and thus helped to improve the quality of science and of the journal, (9) readers who found the journal useful in their work, and (10) the Department of Food Science at the University of Wisconsin-Madison for support and occasional secretarial help.

The future of *JFP* is in good hands, with Dr. L.B. Bullerman as editor, Dr. R.T. Marshall as chairman of the Journal Management Committee, and a capable staff in the IAMFES office in Ames. I'm sure they will have the same support and help that I enjoyed for these many years.

When persons speaking German take leave of each other they don't say "good-bye", but rather they say *"Aufwiedersehen."* This word implies it is only "good-bye" until they again see each other. An in that spirit, to all my journal friends, I now say *"Aufwiedersehen."*

Dr. L. B. Bullerman

Dr. Lloyd B. Bullerman, Professor in the Department of Food Science and Technology, University of Nebraska will become the Scientific Editor of the *Journal of Food Protection* on January 1, 1988.

Dr. Bullerman, a native of southwestern Minnesota, was born at Adrian, Minnesota and grew up on family farms located near Adrian, Lismore and Welmont, Minnesota. Dr. Bullerman received the B.S.

degree in Agriculture in 1961, and the M.S. degree in Bacteriology and Biochemistry in 1965 from South Dakota State University. He received the Ph.D. degree in Microbiology and Food Technology in 1968 from Iowa State University. From 1968 to 1970 Dr. Bullerman was employed by Green Giant Company as a Food Scientist in Product Development at the Le Sueur, Minnesota Headquarters location. In 1970, Dr. Bullerman joined the Department of Food Science at the University of Nebraska in Lincoln. At Nebraska, Dr. Bullerman served as Interim Head of the Department of Food Science and Technology from January of 1980 to September of 1981, as well as in all academic ranks. He became Professor in 1979.

Dr. Bullerman's research interests include food microbiology, mycology, aspects of toxicology including mycotoxins, food poisoning bacteria, processing to control potentially hazardous microorganisms, storage and determination of molds in cereal grains, effects of antifungal substances on mold growth, physiology of mycotoxin production, fermentations by edible fungi and biotechnology. He has taught courses in food microbiology, food mycology, foodborne infections and intoxications, food toxicology and advanced food microbiology.

Bullerman has been active in the IAMFES, chairing the Scientific Paper Committee, and in developing mechanisms and guidelines for evaluating and awarding the Developing Scientist Award. He has also been active in the Food Microbiology and the Toxicology and Safety Evaluation Divisions of the Institute of Food Technologists (IFT), having served as Secretary of both divisions. He has also served as chairman of the Joint ASM/IFT Committee on Food Microbiology Education as a member of the Food Protection Committee of the National Academy of Sciences; and the Expert Panel on Food Safety and Nutrition of IFT. Bullerman has served on the Editorial Boards of the *Journal of Food Protection, Applied and Environmental Microbiology, International Journal of Food Microbiology* and *Lebensmittel-Wissenschaft und Technologie,* and has been involved in international activities, having served as a member of a USDA/OICD team of scientists to study grain storage and post-harvest losses in the Peoples Republic of China. He has taught intensive short courses on mycotoxins and food toxicology at the University of Sonora, Hermosillo, Sonora, Mexico and at Fundacion CIEPE, San Felipe, Venezuela.

Dr. Bullerman has advised and taught graduate students from Taiwan, Korea, Libya, Tunisia, Morocco, the Philippines and Sri Lanka. He has worked with AID programs in Tunisia and Morocco and worked with peer scientists in Germany, Netherlands and England. He is a member of IAMFES, IFT, ASM, AACC, Sigma Xi, Gamma Sigma Delta and Phi Tau Sigma, and was honored with a Pre-Doctoral Fellowship from 1965-1968 and received the Educator Award of IAMFES in 1985.

Dr. L. B. Bullerman

NOTICE TO AUTHORS

Dr. Elmer H. Marth, who has served as Editor of the ***Journal of Food Protection*** for 20 years, will "retire" from that position at the end of 1987. The new Editor will be Dr. Lloyd B. Bullerman. Consequently, after January 1, 1988 manuscripts to be considered for publication in the ***Journal of Food Protection*** should be sent to:

Dr. Lloyd B. Bullerman
Editor, ***Journal of Food Protection***
Department of Food Science and Technology
Lincoln, Nebraska 68583, U.S.A.

Samuel Palumbo Wins Sherman Award for Food Protection Article

Samuel A. Palumbo, microbiologist with the U.S. Department of Agriculture, Eastern Regional Research Center, Wyndmoor, Pennsylvania, won the 1987 Sherman Award from the Educational Foundation of the National Restaurant Association for an outstanding magazine article on food protection. The Sherman Award is offered annually to provide recognition to magazine articles that best reflect the principles of Norbert F. Sherman, late treasurer of the Foundation.

Palumbo received the award for his article, "Is Refrigeration Enough to Restrain Foodborne Pathogens?", published in the December, 1986 issue of *Journal of Food Protection*.

In his article, Palumbo wrote, "With the advent of mechanical refrigeration, food processors and consumers were able to increase the microbiological shelf life of foods. The widespread use of mechanical refrigeration permitted fresh foods to become available to wider geographical areas and to be available for longer periods."

He noted, "By the mid-1950's, it became evident that mechanical refrigeration was not adequate to prevent completely the growth of food spoilage organisms. At that time, the growth of various spoilage bacteria, yeasts, and mold was observed to occur in a wide range of meat, fish, poultry and dairy products held at 5°C (41°F)."

Palumbo concluded, "The overall philosophy that proper refrigeration (5°C holding) will insure a safe food must be reassessed. As with spoilage organisms, 5°C holding of a food will only delay and not prevent the growth of many of the pathogens discussed in this review, and which are present in a food. These concepts should be kept in mind when formulating refrigerated products."

Lower Cholesterol Intake May Not Result in Lower Cholesterol Levels for Most People, New Study Shows

Rosemont, IL., Sept. 23, 1987 -- Two out of three individuals are "cholesterol compensators," says a recent *Journal of Clinical Investigation* study. That is, most people adapt to the amount of cholesterol in their diets through their bodies' ability to absorb and/or produce cholesterol.

Therefore, reducing dietary cholesterol intake will not result in lower cholesterol readings for everyone, said principal researcher Donald J. McNamara, Ph.D., regarding the studies conducted at Rockefeller University in New York.

McNamara's group studied 50 people in 12-week studies. In 69 percent of the studies, participants receiving 800 mg of cholesterol per day (a high-cholesterol diet) were cholesterol compensators. Their bodies regulated blood cholesterol levels by reducing the amount the body absorbed and/or produced.

Those participants receiving 250 mg of cholesterol per day (a low cholesterol diet) did not necessarily lower their blood cholesterol levels, according to the study. In addition, these individuals did not decrease the body's own production of cholesterol.

"Lowering cholesterol in the diet may not necessarily be the answer for those persons concerned with blood cholesterol levels and heart disease," said McNamara. "Our studies clearly show that most people consuming high-cholesterol diets actually compensate for high levels of cholesterol in the diet."

Among other results, blood cholesterol levels fluctuated more with the type of fat in the diet than the amount of cholesterol, said McNamara. About 20 percent of the individuals had lower blood cholesterol levels after consuming a diet high in polyunsaturated fat as opposed to saturated fat, regardless of cholesterol intake. McNamara noted, however, that the extent of cholesterol reduction varied greatly among individuals.

The study represented a cooperatively funded effort by the U.S. Public Health Service including National Heart, Lung and Blood Institute; American Egg Board; National Dairy Council; Herman Goldman Foundation and Jean and Louis Dreyfus Foundation.

National Dairy Council conducts nutrition research and nutrition education programs as part of United Dairy Industry Association. UDIA and its member organization and affiliated Dairy Council units invest $110 million annually in a unified promotion program for the dairy industry.

Robert (Pinky) Holtgrieve

Assistant Secretary/Treasurer of the 3-A Symbol Council, Robert Holtgrieve Dies

It is with deep regret that we inform you that Robert (Pinky) Holtgrieve passed away on October 4 after a lengthy illness.

Pinky retired in November 1982 after 41 years at the Waukesha Foundry, Division of Abex Corporation in Waukesha, WI.

During his time at the Waukesha Foundry he served on the 3-A Sanitary Standards Committees and as a member of DFISA Technical Committee for more than 25 years.

In May of 1982 during the 3-A Sanitary Standards Committee Meeting, Pinky was awarded the DFISA Special Honor Certificate for his extraordinary service to the 3-A Committees and the standards program. He was instrumental in advancing the development of new E-3-A Standards for the poultry industry.

Pinky took over the position of Assistant Secretary/Treasurer of the 3-A Symbol Council in May 1983 with the office in Waukesha, WI.

Condolences may be sent to Pinky's wife, Jane Holtgrieve, 1114 Evergreen Dr., Waukesha, WI 53188. He will be sorely missed by all who knew him.

Scientific Glass, Thermometers and Instrument Buyer's Guide

A NEW 28 page POCKET BUYERS GUIDE containing product information on hundreds of different scientific and industrial thermometers and laboratory instruments available from the SGA/HOUDE was announced.

SGA/HOUDE maintains the world's largest inventory of scientific glass tubing and rod in 7052 Kovar, 7720 NONEX, 3320 Uranium, 7740 Pyrex, 0120 and 0010 Soda Lead and clear fuzed quartz.

The SGA/HOUDE GUIDE will be an invaluable tool for specifiers of industrial and laboratory processing systems of fluid and gaseous materials. It contains technical specifications of a complete range of thermometers that meet or exceed ASTM standards. It also contains special thermometers designed for the chemical, medical, coal, petroleum, cement and power industries all manufactured to the exacting specifications of their professional associations.

The Technical Information Section describes several techniques for reuniting mercury columns split due to thermal or mechanical shock. There are Centigrade to Fahrenheit conversion tables ranging from -95.5C to 560C and -220F to 1904F. The GUIDE, designed for easy references, should become a staple in every process control operator's briefcase.

The GUIDE also contains descriptions of laboratory equipment available from SGA/HOUDE including crimping equipment, tissue grinders, rotary evaporators, water stills, environmental systems, temperature controls, suspension culture system, magnetic stirrers and many others.

For your FREE copy of the SCIENTIFIC GLASS, THERMOMETERS & INSTRUMENT BUYER'S GUIDE write to SGA/HOUDE, Inc., 1177 McCarter Highway, Newark, NJ 07104 or call 800-526-1275.

Candidates Sought for 1988 Harold Macy Award

The Minnesota Section of IFT is seeking nominations for suitable candidates from all IFT sections for the 1988 Harold Macy Food Science and Technology Award.

The award, which was established in 1981, is to be given annually for an outstanding example of food technology transfer or cooperation between scientists or technologists in any two of the following settings: academic, government, and private industry. The purpose of the award is to advance the profession and practice of food technology and to honor former Harold Macy, Dean Emeritus of the University of Minnesota and a founding member of IFT. The award consists of a $1,000 honorarium and travel expenses.

Nominations for the award should be made on an appropriate form and are due by December 15, 1987. Nomination forms are available from Leanne Hearne, Chairperson, Macy Award Committee, General Mills, Inc., 9000 Plymouth Ave. N., Minneapolis, MN 55427.

Condoms Are Not 100% Effective In Preventing the Spread of AIDS

Although the use of a condom can provide protection against infection with the AIDS virus, this protection is by no means complete, according to the report *Answers About AIDS*, published by the American Council on Science and Health (ACSH), an independent scientific organization.

"If you choose to have sex with a person who may be infected with the AIDS virus or whose history is unknown to you, you should definitely use a latex condom, since this will reduce your risk of becoming infected with the AIDS virus. However, you should recognize that condoms do not completely eliminate the risk of contracting AIDS. The only way to assure absolute safety is never to have sexual contact with persons who may be infected with the AIDS virus," said ACSH Executive Director Dr. Elizabeth M. Whelan.

In one study of AIDS patients and their steady heterosexual partners, 3 of 10 partners became infected with the AIDS virus despite use of condoms, the ACSH report states.

Twelve of 14 partners in couples who continued to have intercourse without condoms became infected, according to the ACSH report.

"Neither vaginal nor anal intercourse with a condom should be regarded as 'safe sex,' said ACSH Associate Director Dr. Edward G. Remmers. "Anal intercourse with a condom may be even less safe than vaginal intercourse with a condom since condoms were designed for vaginal heterosexual intercourse. Their use effectiveness in other circumstances is unknown. There is good reason to believe that anal intercourse, either heterosexual or homosexual, is a particularly efficient way to transmit the AIDS virus. This practice should be avoided."

Only *latex* condoms should be used to help prevent AIDS virus transmission, ACSH advises. "Laboratory tests have shown that an intact latex condom can prevent the passage of the virus. Natural membrane condoms, however, have small pores which may allow the virus to pass through," the ACSH report states.

"Experts emphasize that proper and consistent use of a condom is essential in minimizing the risk of infection," said ACSH Research Associate Cathy Becker Popescu, author of the Council's report. "If the condom is not put on correctly, if it breaks, or if it is not used from start to finish during each sexual act with an infected person, transmission of the AIDS virus could occur."

Using a spermicidal agent in conjunction with a condom or using a condom containing a spermicide in the tip can provide further protection against AIDS virus transmission, ACSH advises. However, spermicides *alone* do not provide adequate protection, ACSH warns. Other forms of contraception, such as birth control pills, diaphragms, and intrauterine devices, do not provide protection against AIDS virus transmission, the ACSH report states.

The American Council on Science and Health is an independent, nonprofit consumer education organization promoting scientifically balanced evaluations of food, chemicals, the environment, and health.

To obtain a copy of the report *Answers About AIDS*, send a self-addressed, stamped (66 cents postage), business-size (#10) envelope to AIDS Report, ACSH, 47 Maple St., Summit, NJ 07901.

Food Processors' Sanitation Workshop

The Food Processors' Sanitation Workshop will be held at the Holiday Inn, Santa Nella, CA February 3 and 4, 1988. It is presented by the University of California Cooperative Extension, and Food Processors' Sanitation Association, along with representatives of various food trade associations. The workshop includes a wide variety of sanitation topics, including microbiology, pest management, sanitary design, handling toxic compounds, and employee motivation. For more information, contact: Kathryn Boor, Food Science and Technology, Univ. of California, Davis, CA 95616. Telephone: 916-752-1478 or Sharen Chaffin at 916-752-3835.

International Conference on Bioavailability

Bioavailability 88, an international conference on chemical and biological aspects of nutrient availability will be held on August 21-24, 1988 in Norwich, England. The aim of the conference is to bring together nutritionists, clinicians and chemists having a shared interest and concern in the various facets of bioavailability, its measurement, physiological significance and relevance to diet and the food industry. Plenary lectures, contributed papers and posters and workshop sessions are planned covering both micro- and macronutrients. The proceedings of the meeting will be published in book form, all contributions being included. A display of analytical and instrumental equipment, books and journals is also planned. Deadline for abstracts is December 31, 1987. Information on the program, registration, deadlines for contributions, etc., can be obtained from: Bioavailability 88, AFRC Institute of Food Research, Colney Lane, Norwich, NR4 7UA, UK.

New Report Examines Commercial and Homemade Baby Foods

Either commerical or homemade baby foods can be a safe, wholesome part of a nutritious diet for infants, according to the new report *Baby Foods,* published by the American Council on Science and Health (ACSH), an independent scientific organization.

"Advocates of homemade baby foods have claimed that additives or other ingredients in commercial baby foods are causes for concern. But the truth is that homemade foods may contain more salt, sugar, water, or additives than their commerical equivalents," said ACSH Executive Director Dr. Elizabeth M. Whelan. "If homemade baby foods are poorly chosen, carelessly prepared, or improperly stored, they may also be unsanitary or lacking in nutrients.

"We're not trying to discourage people from making homemade baby food. Parents who select and prepare foods carefully can certainly provide their infants with safe, nutritious meals," she continued. "On the other hand, parents who elect to use commerical products need not feel that they have sacrificed quality for the sake of convenience."

The technology currently used by baby food manufacturers maximizes nutrient retention and safety, and many desirable features of commercial baby food preparation simply cannot be duplicated at home, ACSH said.

All parents should consult a pediatrician or registered dietitian to help them plan balanced diets for their infants at each stage of devlopment, the ACSH report recommends.

"Parents should always follow the specific dietary instructions provided by their child's doctor, rather than relying on the suggestions of relatives or friends," said ACSH Associate Director Dr. Edward G. Remmers. "Professional recommendations concerning infant feeding have changed dramatically over the years; the advice you receive from laymen is likely to be outdated.

"Parents who follow current dietary recommendations can be assured that their infants are receiving an adequate diet. The current recommendations are also designed to minimize problems associated with food sensitivity, tooth decay, and obesity," he said.

Infants should receive most of their nutrition from breast milk or infant formula, not from baby foods, the ACSH report states. After four to six months, solid foods should be added to supplement, but not replace, breast milk or formula, the report advises. To help avoid food sensitivity problems, each new food should be introduced in small portions and increased slowly over several days, according to current recommendations. ACSH noted that babies should be fed to satisfy their appetities, and not urged to finish the portion or jar; this precaution may help to reduce the risk of obesity.

The American Council on Science and Health in an independent, nonprofit consumer education organization promoting scientifically balanced evaluations of food, chemicals, the environment, and human health.

To obtain a copy of the report *Baby Foods* send a self-addressed, stamped (66 cents postage), business-size (#10) envelope to Baby Food Report, ACSH, 47 Maple St., Summit, NJ 07901.

DataMyte Published Third Edition of Handbook

DataMyte Corporation today released the third edition *DataMyte Handbook*, "A practical guide to computerized data collection for Statistical Process Control". The Third Edition, at 22 chapters and 624 pages, is a major update of the popular SPC reference.

The original book sold out within a year of its July 1984 publication. Now, including the Third Edition, there are over 100,000 copies in print. It is currently being used as a text at several educational institutions, including California State University at Fresco, and is part of many corporate in-house SPC training programs, including Boeing.

The book is divided into three sections: Theory, Applications, and Products. The theory section, regarded as one of the best written introductions on SP, has new material on advanced SPC.

The applications section contains case studies on successful SPC applications in American industry. The 100 case studies are arranged in eight industry-specific chapters. The first chapter, Chapter 7, for example, contains 11 case studies about aerospace and defense.

The products section has two new chapters. Chapter 21 describes the Allen-Bradley Quality Management offering which, including the acquisition of DataMyte, is now the broadest, deepest line of products and systems for quality management. Chapter 22 details factory automation for quality and describes specific offerings from Digital Equipment Corporation, Apollo, AT&T, and Hewlett-Packard.

Complimentary copies of the *DataMyte Handbook* are free to professionals in management and quality control. For more details contact: DataMyte Corp., 14960 Industial Rd., Minnetonka, MN 55345. Telephone: 612-935-7704.

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 systems 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 is a wholly owned subsidiary of Allen-Bradley Company, Inc.

George T. Okumura

"Preventive Pest Control"

Starting in January *Dairy and Food Sanitation* will be publishing a monthly column on "Preventive Pest Control". It will be a question and answer column written by George T. Okumura.

He was formerly Chief of Laboratory Services, California Dept. of Food and Agriculture and completed 28 years of service. For 20 years he was a consultant. Recently, he has enrolled over 100 major corporations and their employees in the Okumura Biological Institute Seminars. He has given over 500 presentations to Federal and State Food and Drug Administration personnel, food industry sanitarians and inspectors for County Agricultural Commissions. His audiences also include representatives of the chemical industry, universities and colleges as well as pest control operators, agricultural advisors, landscape architects and nurserymen.

George Okurmura has published 23 scientific articles. He has co-authored several books:

1. Handbook of Pest Control (Stored Product Pests, pp. 507-591); 1982.
2. Insect Management for Food Storage and Processing; 1984.
3. Certification Training Manual (Written for Environmental Protection Agency=EPA) Kellog West, Center for Continuing Education. California State Polytechnic University, Pamona, CA, 1975.
4. Community Pest Related Vector Control (Written for California State, County and City sanitarians) Pest Control Operators of California, Inc., Los Angeles, CA; 2nd Edition, 1975.
5. Stored Product Insects is in progress of being published (Written for U.S. Food and Drug Administration).

We would like any questions concerning this column to be sent to: Associate Editor, Dairy and Food Sanitation, PO Box 701, Ames, IA 50010.

In Memory of -

The Ames office has been notified of the following members who passed away in 1987. They will be greatly missed both in the industry and the Association:

Robert E. (Pinky) Holtgrieve
Waukesha, WI

Ed L. Ruppert
Tarboro, NC

George H. Steele
St. Paul, MN

Fred E. Uetz
West Englewood, NJ

Raymond Wilken
Plainfield, VA

Lawrence Dodge
Brodhead, WI

Bradley Ryan
Dairylea
Syracuse, NY

Al Negus
Negus Container Co.
Madison, WI

Orville Hintz
Dane Col. Health Dept.
Madison, WI

Keith Stolldorf
Annandale, VA

Letters to the Editor

The Editor
Dairy and Food Sanitation
International Association of Milk,
Food and Environmental Sanitarians, Inc.
Box 701
Ames, IA 50010

Dear Ms. Hathaway:

RE: MEAT INSPECTION TECHNOLOGY RESEARCH

Arthur Andersen and Company and Hassall and Associates Pty. Ltd. have been given the responsibility of conducting a major study, commissioned by the Australian Meat and Livestock Research and Development Corporation, into the basis for, the purpose and conduct of, meat inspection in Australia.

We have to undertake a thorough re-examination of current procedures to determine those which are necessary to maintain public and animal health, those necessary to meet the various national and international market requirements, and their relevance to the 1980's and beyond.

Additionally, we have to examine recent and current research which may be applicable to meat inspection, to meat identification,to package security, to quality assurance, to public health, and to national animal health. Such research will involve the output of many different disciplines, and may include advances in processing technology, microbiology, rapid diagnostic procedures, meat science, batch coding, temperature sensitive indicator labelling, risk assessment and so on.

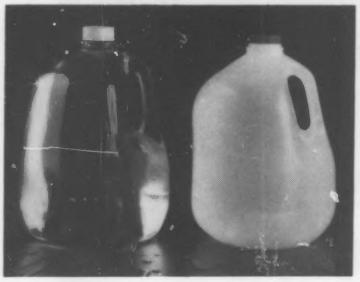
I am writing to you to ask for your assistance. We are anxious to identify and correspond with authorities and researchers in the various related fields. I would be very grateful if you would consider publishing this letter in the next issue of your journal stating that once again we would be very grateful if researchers would contact me, and tell me of their research, supplying reprints, if possible.

I hope you are to assist.

Thanks and regards,
Dr. John Kingston, B.V.Sc. B. Pharm. M.A.A.A.C.
Hassall and Associates Pty. Ltd.
PO Box 405, Spring Hill
Queensland 4000 Australia

New Product News

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



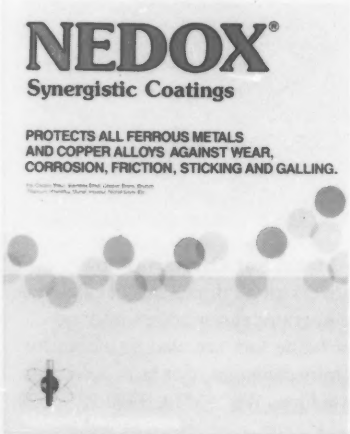
General Electric Plastics Offers New Water Bottles

• Las Vegas, NV -- New water bottles molded of LEXAN® polycarbonate resin from General Electric Plastics offer many advantages over current bottles molded of high-density polyethylene (HDPE). Polycarbonate will not affect the taste or purity of bottled water, and the resin's crystal-clear transparency actually enhances the image of quality and cleanliness the water industry promotes. In addition polycarbonate offers nearly triple the strength and ductility of HDPE as well as almost twice the heat deflection temperature.

The bottles are positioned to replaced containers currently used for water, fruit juices and milk, and they can be recycled. Polycarbonate has no extractables, which would add taste or an odor to the product.

For more information, contact: Blair Anthony, General Electric Company, Plastics Group, Inquiry Handling Service, One Plastics Ave., Pittsfield, MA 01201. Telephone: 800-845-0600.

Please circle No. 256 on your Reader Service Card



Sanitary Seals Are Now Available for L&N 2600 Series Transmitters

• North Wales, PA, February 11, 1987 -- Leeds & Northrup Instruments is now offering sanitary seals for its line of 2600 Electronic Pressure Transmitters. The seals are designed to meet the needs of the food, beverage and pharmaceutical industries -- and other applications requiring sanitary and/or easily cleaned systems.

L&N can supply seals in standard or custom designs for all sanitary piping systems. They mount directly without the need for adapters and are available in both O-ring and gasket designs.

Constructed of 316 Stainless Steel, the L&N sanitary seals also come with bleed screws standard. A Teflon-coated diaphragm can be supplied as an option when an anti-stick characteristic is desirable.

L&N introduced its line of 2600 Electronic Pressure Transmitters in late-1984, and they are finding wide application in the chemical, petroleum, utility, and pulp/paper industries, for example. Food, beverage, pharmaceutical and similar industries can now use the extremely accurate (±0.1%) L&N transmitters.

Leeds & Northrup Instruments, a Unit of General Signal, is a leading manufacturer of precision instruments for measurement, display and control.

For more information, contact: Leeds & Northrup, North Wales, PA 19454. Telephone: 215-643-2000.

Please circle No. 257 on your Reader Service Card

Synergistic Protective Coatings For Ferrous Metals and Copper Alloys

• NEDOX® synergistic coatings that protect all ferrous metals and copper alloys against wear, corrosion, friction, sticking and galling are available from General Magnaplate Corp., Linden, NJ.

The NEDOX process actually impregnates the pores of the metal surface to give the metal parts improved surface hardness, protection against chemical attack, better abrasion resistance and permanent lubricity as well as providing a USDA/FDA-approved surface.

Additional information and technical data are provided in 6-page, profusely illustrated NEDOX Brochure #2 from: General Magnaplate Corp., 1331 Rt 1, Linden, NJ 07036. Telephone: 201-862-6200.

Please circle No. 258 on your Reader Service Card

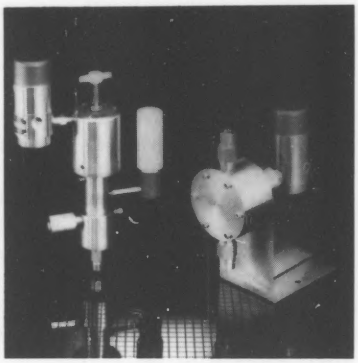
Enka Adds New Product to Line

• Enka AG of West Germany has produced Nylon 6 and Accurel PP flat microporous membranes for a number of years. Enka's Cuprophan dialysis membrane is the predominate material used in kidney dialysis.

To add to our product line, Enka is now offering for sale, the hollow fiber membranes which are used in our Enka Microdyn crossflow microfiltration modules.

Data sheets and pricing on available material can be obtained by contacting: Enka America, Inc., One North Pack Square, PO Box 2659, Asheville, NC 28802.

Please circle No. 259 on your Reader Service Card

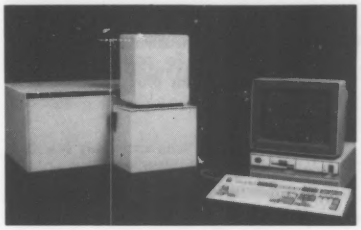


Pneumatic Metering Pumps Explosion Proof by Design

• Williams Instrument Co., Inc., offers a complete line of pneumatic plunger and diaphragm metering pumps to actually inject precise amounts of chemicals and additives in all types of fluid metering applications. Depending on the model selected, the pumps are available from volumes of one (1) pint per day to ninety (90) gallons per hour and pressures to 10,000 PSI, maximum. "W" series pneumatic plunger pumps have standard 316 stainless steel or PVC wetted parts. Williams can also design and fabricate any type of fluid metering or high pressure chemical injection system.

For more information, contact: Williams Instrument Co., Inc., 25217 Rye Canyon Rd., Valencia, CA 91355.

Please circle No. 260 on your Reader Service Card



Model 6250 NIRS Spectrophotometer Combines Latest Computer Hardware with Unique Technology

• The 6250 Research Spectrophotometer -- featuring a grating monochromator with low noise specifications and interfacing into an IBM-PC XT/AT -- offers the latest in state-of-the-art NIR research technology research spectrophotometer systems. This instrument is primarily used in methods development, but can be used for routine analysis in quality assurance laboratories.

The Model 6250 System uses various types of stationary or moving sample holders. Pathlengths available vary between 0.5 mm to 30.0 mm depending upon type of sample cell and sample being studied.

Four types of regression software include: Pacific Scientific Step Regression; Norris Regression; Best-Pairs/Best Combinations; and Partial Least Squares. All of these include: statistical summaries; intercorrelation tables; correlation plots, residual plots; spectra reconstruction; and control charts. Optional software available include: Spectral Library Program; Spectral Match Program; FT-IR Transform; Oracle 1; and Intrasoft International.

For more information on the 6250 NIRS Spectrophotometric System, contact the NIR specialists at Pacific Scientific, Instrument Division, 2431 Linden Lane, Silver Spring, MD 20910. Telephone: 800-638-2790, or 301-495-7000.

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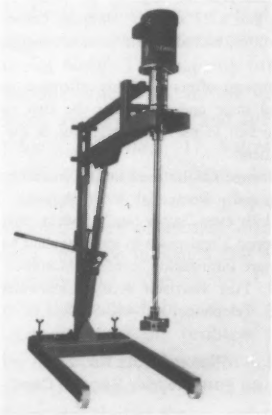

Mixer/Emulsifier

Precisse, Accurate Trace Gas Analysis

• Antek Instruments announces the availability of the Model 3200 Helium Ionization Gas Chromatograph. This instrument is designed to determine low level impurities in permanent gases or light hydrocarbons. It accepts either packed or capillary columns, and can be configured for single or dual column/detector operation.

Featuring a unique helium purged housing, the unit has a wide range/low ppb sensitivity for H_2, Ar, O_2, N_2, CO, CO_2, Ne, light hydrocarbons, and others. This helium purged housing completely encloses all valves, column connections, and other fittings in the flow system to minimize potential leaks and provide for extremely high sensitivity.

Solid state circuitry, trace gas valves for sampling and "heartcutting", automated or manual operation, and methods manipulation via easily accessible touch pads combine to make the Model 3200 an economic, versatile answer to trace gas analysis needs.

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

Please circle No. 262
on your Reader Service Card

New Mixer/Emulsifier Increases Additive Absorption in Meat and Poultry Products by 15-20%

• The Eastern Rotostat Mixer Emulsifier produces uniform enzyme, protein, nitrate and brine solutions in half the time of conventional mixers. The unique rotor stator creates a high degree of shear and flow producing a stabilized solution - no settling out or waste of expensive additives.

Unlike propeller mixers or dispersers, the stator revolves at 1/10 the speed of the rotor, producing a pumping action. The induced flow in the tank means the additives pass through the mixing head many more times for a completely uniform mix. This prevents additives from coming out of solution or "lumping" and clogging injector nozzles.

Models are available from 5 to 25 HP with a variety of mounting arrangements. All are USDA approved with polished 316 SS wetted ends and CIP motors. Mixing head is detachable to simplify disassembly and cleaning.

For more information, contact: EMI, Inc. Telephone: 203-669-1199.

Please circle No. 263
on your Reader Service Card

Sentinel Introduces Newpack Food Processing System

• Hyannis, MA ... Sentinel Machinery, a division of Packaging Industries Group, Inc., announces the *Sentinel Newpack*. The *Sentinel Newpack* is a high performance, continuous motion food packaging system designed to form-fill-seal all standard thermoformable and heat sealable materials for a broad range of viscous and non-viscous products.

"Through the use of unusually wide web widths and continuous motion, the *Sentinel Newpack* provides extremely high cycle rates and reduces head space requirements," says Peter Norris, National Sales/Marketing Manager, Sentinel Food Packaging Systems. "And since it forms from roll stock, fills, and seals in one operation, the *Sentinel Newpack* is very cost effective. When compared to preformed packaging, Lidding, warehouse space, and freight costs are substantially reduced. And the user has more options in choosing material suppliers. We've custom tooled a *Sentinel Newpack* installation for a major food processing company in the Boston area and we're very excited with its performance."

Engineered to meet or exceed FDA requirements, the *Sentinel Newpack* is capable of manufacturing both mono-layer and multi-layered containers in virtually any style or color. This allows great flexibility in implementing innovative packaging concepts and designs.

Other features of the *Sentinel Newpack* include a laminar flow of filtered sterile air to protect the product from contamination and a unique, "clean-in-place" pump capability.

Simply designed for maximum efficiency, the Sentinel *Sentinel Newpack* is sturdy, dependable, and requires minimal maintenance. Sentinel provides complete technical service and support through its nationwide network of representatives, technical personnel, and facilities.

For more information, call or write: Sentinel Machinery Division of Packaging Industries Group, Inc., 130 North St., Hyannis, MA 02601. Telephone: 800-323-5005 (MA 800-323-5001).

Please circle No. 264
on your Reader Service Card

New Packaging, Processing for Milk Give Consumers Fresh Options

• Caution: What you are about to read may shock you.

The dairy products you use each day can be stored without refrigeration for up to eight months. What's more, they'll taste deliciously fresh when opened.

No, we're not talking about milk and cream that have been canned, dried, frozen, irradiated or laden with preservatives. We're talking about UHT-treated (ultra high temperature) dairy products -- milk and cream that have been packaged according to the Tetra Pak aseptic packaging method.

The Tetra Pak technology -- flash heating to an ultra high temperature for a very short time, then packaging in bacteria-free Tetra Brik Aseptic® cartons in a bacteria-free atmosphere -- results in the safest milk product that consumers can buy.

Long-life treatment by the UHT method takes advantage of the fact that a higher temperature permits a much shorter processing time for the product, while maintaining its fresh flavor and quality.

To preserve the high quality of UHT milk, it must be stored in aseptic containers. Tetra Brik Aseptic cartons are the packages made of paper, aluminum foil and polyethylene.

Tetra Brik Aseptic cartons protect their contents from contaminants such as light, air and bacteria. The cartons protect the milk so well that no preservatives are needed.

Among other uses, UHT milk is easy to keep on hand for cooking, or simply to make sure that milk is always available for that morning bowl of cereal.

From a nutritional point of view, UHT milk represents a protein source as good as pasteurized milk. Studies on human infants indicate improved protein digestibility and utilization.

The bigger question for consumers, says Hatton, is how it tastes. Oddly enough, says Hatton, some consumers think that because it can be purchased and stored unrefrigerated, milk in Tetra Brik Aseptic cartons is intended to be consumed warm. "On the contrary," she says. "Just like pasteurized milk, UHT milk should be nice and cold before drinking to be fully enjoyed."

She adds that because of its long shelf life, UHT milk is suited to modern lifestyles. For consumers who shop less frequently and are members of a growing legion of small families and single person households, UHT milk allows them to store milk for longer periods of time, to use when needed. This avoids product waste.

For more information, contact: Tetra Pak Inc., 889 Bridgeport Ave., Shelton, CT 06484. Telephone: 203-929-3200.

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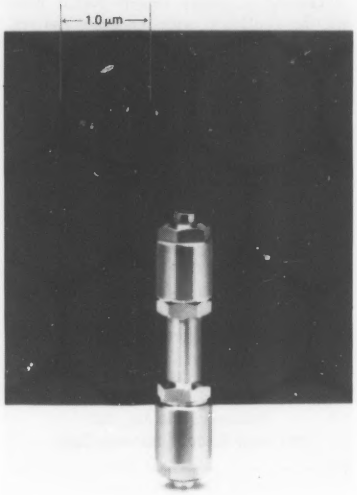
on your Reader Service Card



New 1.5-Micron Monospher™ Columns From EM Science Deliver Fast, Sensitive HPLC Separation of Proteins, Peptides

• New HPLC Columns with 1.5-micron, non-porous Monospher™ sorbent particles from EM Science enable chemists and researchers to perform HPLC biopolymer separations faster and with greater sensitivity.

The ultra-small silica spheres represent the latest breakthrough in HPLC technology, facilitating both reversed-phase and normal-phase separations of large sample capacities without a loss of resolution.

The Monospher particles, employed in short, wide columns, provide excellent HPLC performance and analysis up to three times faster than traditional methods. Researchers can achieve rapid separation of proteins with gradient times of 3 minutes and flow rates of 1.5 ml/min.

The non-porous surface of the Monospher beads is easily accessible and can be fully utilized in solute ligand interactions of peptides and proteins. Thus, scientists can rely on increased detection sensitivity and exceptional reproducibility of results from Monospher particles.

Compared with porous reversed-phase silicas, the non-porous columns generate a much higher peak capacity for proteins. Moreover, the Monospher columns provide sufficient retention capacity to resolve peptide mixtures efficiently.

Scientists working with extremely low concentrations of proteins will find the columns deliver excellent detection and resolution in amounts as low as 10 µg. The fast flow rates and high loading capacity make the Monospher sorbent ideal for the preparation of mg-size samples. The typical sample capacity of a short, wide column packed with Monospher sorbent is 1 mg of protein per column volume.

EM Science is a division of EM Industries, Inc. and an Associate of E. Merck, Darmstadt Germany, which developed the patented 1.5-micron Monospher particles. E. Merck has pioneered high-quality analytic instrumentation and high-purity reagents since 1968. For additional information, contact: Marketing Dept., EM Science, 111 Woodcrest Rd., Cherry Hill, NJ 08034-0395. Telephone: 800-222-0342, in NJ call 609-354-9200.

Please circle No. 266
on your Reader Service Card

Rampage Floor Display Now Available

• A colorful new floor display unit for Rampage Rat and Mouse Bait is now available from Motomco Ltd.

The easy to assemble cardboard display holds 36 boxes of 8 x 30 gram Rampage Rat and Mouse Bait. Each box contains eight ready-to-use place packs.

Motomco's new self-serve Rodent Control Center is reuseable and takes up no shelf space. The floor unit and Rampage product are neatly packaged together in one shipping carton for easy mobility and storage.

When fully assembled, the three color display measures 65" high by 20" wide. It folds down into a 27"x6"x20" shipping carton. The entire unit, including the product, weighs just 25 lbs.

Rampage offers a highly effective way to control mice and rats. It is the first rat and mouse bait to use cholecalciferol as the toxic ingredient.

Rampage can be used in and around homes, farms and commercial establishments. Rampage kills even "super rats" - rodents that have developed a resistance to anticoagulant baits.
For more information, contact: Motomco Ltd., 29 N. Fort Harrison Ave., Clearwater, FL 33515. Telephone: 813-447-3417.

Please circle No. 267
on your Reader Service Card

Increasing Rate of *Salmonella Enteritidis* Infections in the Northern United States

In the last 10 years, New England and the Middle Atlantic region have experienced a fivefold increase in the reported isolation rate of Salmonella enteritidis. The increase exceeds the regional 1.7-fold increase in the collective isolation rate reported for all other Salmonella serotypes. In 1985, *S.enteritidis* replaced *S.typhimurium* as the single most commonly reported serotype in New Jersey, New York, and New Hampshire. The reasons for this increase are not understood. The median age of persons infected with *S.enteritidis* increased from 10 years to 24 years between 1975 and 1985, but the seasonality of the infections has not changed. In 1986, investigations of outbreaks of *S.Enteritidis* infections in the northeastern United States implicated a variety of food vehicles, including scrambled eggs in Connecticut, a liquid protein supplement in Pennsylvania, home-made ziti in New Jersey, Italian-style rice balls in New York City, Hollandaise sauce in New York State, roast beef in Massachusetts, and one branch of commercial frozen pasta products in multiple states in the region. No single reservoir that would connect all of these outbreaks and the many sporadically occurring cases has been detected.

On November 1, 1986, epidemiologists from state health departments in the Northeast and the CDC met to review the findings of recent *S.enteritidis* outbreak investigations and to discuss possible approaches to the improved understanding and control of *S.enteritidis* infections in the region. As *S.enteritidis* Working Group was established to facilitate communication and cooperation among public officials in several states and the CDC in the investigation of *S.enteritidis* outbreaks. Since the serogroup of Salmonella isolate is often known before its serotype and because more than 90% of Group D isolates in the Northeast are *S.enteritidis*, a strategy was developed to intensify the rapid investigation of outbreaks of Group D Salmonella in the region. The U.S. Department of Agriculture and the Food and Drug Administration are assisting the *S.enteritidis* Working Group in investigations that suggest a food production or food processing source for the contamination.

Editorial Note: The majority of outbreaks of non-typhoid Salmonella infections in the United States come from foods of animal origin, and this is also likely to be the case for *S.enteritidis* (1). Salmonella may be introduced into such foods on the farm, during slaughter or processing, or during final food preparation. A broad increase in regional rates of human infections by a specific Salmonella serotype indicates that a regional increase in contamination may have occurred at one or more of these steps in the food chain.

Recognition of the problem of *S.enteritidis* infections in the northeastern United States and the intensive investigation proposed by the *S.enteritidis* infections in the northeastern United States and the intensive investigation proposed by the *S.enteritidis* Working Group are both made possible by routine serotyping of Salmonella isolates in public health laboratories. It is hoped that the regional effort proposed by the *S.enteritidis* Working Group to understand the epidemiology of *S.enteritidis* infections in the Northeast will lead to specific control measures for *S.enteritidis*. Understanding the epidemiology of a specific serotype in a region of high incidence may also lead to a better understanding of the continuing long-term increase in salmonellosis in the United States.

MMWR 1-16-87

Imported Polio - Implications for Travellers to Third World Countries

Polio type 1 was diagnosed this year in a 29-year-old woman from Auburn, California who had been in Nepal and Burma before her onset of illness on 10 May. Specifically, she worked in Nepal from January through 2 May 1986; on 14-24 April she was on a raft trip in the same country; from 3-9 May she was in Burma. On 10 May she travelled to Bangkok, Thailand where she had onset of fever (38.9° C), malaise, restlessness, and a general feeling of weakness lasting 1 day. She was well until 16 May when she again had fever (39.1° C), headache, and low back pain. The next day she had onset of weakness in her legs, more severe on the right, decreased urinary urgency, and constipation.

By 19 May she could not walk and was hospitalized in Thailand. No sensory, cranial nerve, or central nervous system abnormalities were noted. On 6 June she was flown back to the U.S. and to her parents' home in Auburn, still confined to a wheelchair, though the constipation and decreased urinary urgency had disappeared. On 11 June, her right lower extremity was entirely flaccid except for some minimal strength in the glutei. There was moderate weakness and loss of tone in the left lower extremity in the glutei, quadriceps, and peroneal and calf muscles. By late July, over 60 days after weakness onset, the left leg appeared to have recovered completely and strength of muscles above the knee in the right leg was greatly improved. However, paralysis of muscles persisted below the right knee.

Laboratory results included the following: CSF obtained during the acute illness in Thailand - 90 WBCs with 93% monos and 7% polys (it is not known whether CSF protein was evaluated). Type 1 poliovirus was isolated and later characterized as wild virus by the Centers for Disease Control from a stool specimen collected on 22 June. Serum obtained 27 June and tested for polio CF antibodies revealed type 1-1:16, and types 2 and 3-< 1:8. Electromyogram and nerve conduction velocity studies on 26 June (when she was recovering clinically) showed widespread denervation changes in the muscles below the right knee. Immuno-competence testing, including IgM and IgM quantitation as well as quantitative

immunoelectrophoresis, was normal in a blood specimen obtained on 27 June.

The patient's mother recalls that her daughter had received 3 Salk vaccine shots in the late 1950s and 1 "sugar cube" (Sabin vaccine) at a mass public clinic in Long Beach, California in the early 1960s but has no records. The patient took no polio vaccine doses before travel to Nepal and recalls no outbreak of paralytic illness or exposure to recently immunized persons during her travel in Nepal and Burma.

Comment: Travellers to developing countries should be considered at risk of exposure to wild polio virus. Even persons who have previously received a primary series may need a "booster" of polio vaccine before travelling to such areas. For adults who previously *completed* a serious of OPV, *another* dose of OPV should be given. (The need for further supplementary doses of OPV has not been established). For adults who previously completed a primary series of IPV, a dose of either IPV *or* OPV may be given. If IPV is used, additional doses may be given every 5 years if the person remains at increased risk (but the need for these additional doses has not been established).

Source: California Morbidity Weekly Report, No. 32, 1986.

Can Dis Weekly Report 11-29-86

Salmonellosis at a Resort Hotel-Puerto Rico

Several state health departments and CDC have received reports of salmonellosis in travelers returning from the Hotel Cerromar, Vega Alta, Puerto Rico. Earlier, in July 1986, CDC received reports about travelers returning from this hotel with Salmonella enteritidis infections. The Puerto Rico Department of Health investigated, and no additional cases were reported until November. At present, several state health departments have obtained preliminary epidemiologic information about additional cases from recently returning groups.

A New Jersey trade association held a convention at the hotel during the period November 1-8. At least 23 of 141 travelers (16%) complained of acute diarrhea. Two were hospitalized for a week in Puerto Rico, and three were hospitalized upon returning. *S. enteritidis* was isolated from two of these cases. A week later, during the period November 9-19, a New Jersey professional association hosted a convention of 1,400 members and their families at the hotel. The New Jersey State Department of Health contacted a representative sample of the group after receiving a report of four cases in one returning family. The attack rate is estimated to be 10% to 15%; onset dates ranged from November 12 to 22. Eight stool cultures have yielded *Salmonella* Group D, and six of these have been serotyped as *S. enteritidis*. A questionnaire followup is underway to determine whether or not further cases have occurred.

A convention of 800 food distributors, primarily from Connecticut and Massachusetts, was held at the same hotel, in two successive groups, during the period November 2-12. Among the 220 Connecticut residents, 16 (7%) reported diarrheal illness within several days after their visit. The Connecticut State Department of Health Services confirmed nine cases of *S. enteritidis* infection in this group. Followup is underway to more fully evaluate the extent of illness. The Massachusetts Department of Public Health has identified 42 cases (10%) of diarrheal illness among 442 state residents who had attended the same convention. *S. enteritidis* has been isolated from nine of these. Other possible cases are being investigated.

Most recently, CDC has received a report of eight cases of diarrheal illness among attendees of a Puerto Rican trade convention at the hotel during the period November 28-30. Thus far, two of five cultures obtained have yielded *Salmonella* Group D.

Editorial Note: Laboratory studies are in progress to determine whether or not the same strain of *S. enteritidis* caused all of the outbreaks. Reports in both July and November of *S. enteritidis* gastroenteritis among persons visiting the same hotel suggest a recurrent source. Measures to control the outbreak are being implemented by the hotel management and the Puerto Rico Department of Health. Cases of salmonellosis developing in persons within 1 week after staying at this hotel should be reported to local and state health departments. State health departments are requested to report such cases to the Enteric Diseases Branch, Division of Bacterial Diseases, CDC. Information about the current status of the outbreak can be obtained by calling the Commonwealth of Puerto Rico, Department of Health, (809)766-2240.

MMWR 12-12-86.

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Check Your Vacuum Regulator Performance

The vacuum regulator on your milking system is one of the system's most important components.

It has two major functions: control the vacuum level and compensate for many forms of vacuum usage in order to maintain the present level. For example, it must compensate for the intermittant air admission of the pulsators, unit air bleeds and other unpredictable operator events such as put-ons and take-offs.

Pressure (negative pressure or vacuum) changes within the milking system occur at very high speeds approximately the speed of sound (1,080 feet per second). The control must react to these pressure changes rapidly and correct for sudden air admissions.

The types of regulators that respond rapidly to vacuum changes are the servo-diaphram types. They also are superior in load sensitivity characteristics. This means that the vacuum level is more constant under a wider range of air flow through the regulator.

Spring loaded sleeve type regulators are acceptable in performance. Dead weight controls usually are adequate for small milking systems. The lever weight controls are the least responsive and should be replaced for better system performance.

Service the vacuum control on a regular basis. The operating vacuum level should be checked each day. Change filters on a regular basis. Keep the internal operating valve clean. A 30-day interval for servicing the operating valve usually is sufficient.

Regulator performance can be tested with the use of an airflow meter. Increments of 5 to 10 cubic feet per minute (CFM) are admitted to the system. After each increment, the vacuum level is noted and recorded. An excellent regulator will sustain the vacuum level within 1/2 inch of mercury when 90 percent of the available vacuum reserve is admitted to the system. If the vacuum level drops up to 1 inch of mercury, the regulator is marginal. If vacuum drops over 1 inch, the regulator should be replaced if a thorough cleaning and adjustment does not improve performance.

A simple test can be made by the operator which will give some indication of regulator performance, provided that vacuum supply is adequate. Duplication of a fall-off is a good indicator of system performance. The test is done simply by turning one or more units upside down and observing the vacuum level. One unit for every 6 to 8 units in the system is suggested. The remaining milking units should be pulsated, but do not make this test while milking cows. Follow the same guidelines as above with respect to system performance. For example, if two units are turned upside down with the shut-off valves fully opened in a parlor with 16 units, and if the vacuum drops only 0.4 inch of mercury, excellent performance is indicated.

In summary, remember that the vacuum regulator is one of the most important components of the milking system. The filter and operating value must be kept properly serviced and clean. A regular check of regulator performance can be made by duplicating a unit fall-off and observing the ability of the regulator to sustain vacuum level.

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University of Alberta Announces a Gold Medal in Food Science

Its first Gold Medal in Food Science will be available to the Alberta Class of '88. The solid gold Medal which will have a value of close to $1,000.00 was made possible as a result of a fund raising campaign which generated an endowment to support the Medal on an ongoing basis. The Alberta Association of Milk, Food and Environmental Sanitarians and the Canadian Institute of Food Science and Technology (Alberta Section) were major sponsors of the endowment. Other contributions were provided by members of the food processing industry, staff and other friends of food science.

The Medal will be awarded to the graduating student who has shown the highest distinction in scholarship over the final two years in the B.Sc. Food Science Program. Consideration may also be given to the qualities of leadership, personality and character.

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 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.

MISSOURI MILK, FOOD AND ENVIRONMENTAL HEALTH CONFERENCE will be held at the Holiday Inn Executive Center, Columbia, Missouri. For more information, contact: John Norris, MMFEHA, Bureau of Community Sanitation, PO Box 570, Jefferson City, MO 65102.

THE PA DARY 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.

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

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

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All manuscripts and letters should be submitted to the Editor, Kathy R. Hathaway, IAMFES, P.O. Box 701, Ames, Iowa 50010.

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

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

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

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Dairy and Food Sanitation regularly publishes nontechnical articles as a service to those readers who are not involved in the technical aspects of milk, food and environmental protection. These articles deal with such topics as the organization and application of a milk or food control program or quality control program, ways of solving a particular problem in the field, organization and application of an educational program, management skills, use of visual aids, and similar subjects. Often talks and presentations given at meetings of affiliate groups and other gatherings can be modified sufficiently to make them appropriate for publication. Authors planning to prepare general interest nontechnical articles are invited to correspond with the editor if they have questions about the suitability of their material.

Book Reviews

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

Preparation of Articles

All manuscripts should be typed, double-spaced, on 8½ by 11 inch paper. Side margins should be one inch wide.

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

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

Illustrations, Photographs, Figures

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

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

Examples of Proper Bibliographic Citations

Paper in a journal

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

Paper in a book

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

Book

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

Patent

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

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Antimicrobial Effect of Chlorine on *Listeria monocytogenes*, R. E. Brackett, Department of Food Science and Technology, University of Georgia, Agricultural Experiment Station, Experiment, Georgia 30212

J. Food Prot. 50:999-1003

The antimicrobial effect of reagent-grade sodium hypochlorite (SH) and household bleach (HB) on 2 strains of *Listeria monocytogenes* (Scott A and LCDC 81-861, both serotype 4a) was determined. After 24 h of growth in tryptic soy broth, cells were centrifuged, and pellets resuspended in potassium phosphate buffer (pH 7.0). Three-milliliter portions of the cell suspensions were then added to 27 ml of phosphate buffer containing about 0, 5, 10, 50, 100, or 200 ppm free residual chlorine. Cells were exposed to the chlorine for 20, 60, 120 and 300 s, at which time the chlorine was neutralized with 0.01 *M* sodium thiosulfate. Populations of surviving cells were determined by plating samples of the neutralized solution on tryptic soy agar and incubating the plates for 48 h at 30°C before counting. Chlorine concentrations less than about 50 ppm showed no antimicrobial effect but exposure to 50 ppm or greater chlorine resulted in no viable cells being recovered. Results for both SH and HB were similar. Dipping Brussels sprouts containing about 6 $\log_{10}$ colony forming units (CFU) *L. monocytogenes*/g into a 200-ppm chlorine solution for 10 s reduced viable cells recovered on McBrides agar by about 2 $\log_{10}$ CFU/g. Dipping Brussels sprouts in water alone reduced populations by about 1 $\log_{10}$ CFU/g.

Compositional Changes in Cold Raw Milk Supporting Growth of *Pseudomonas fluorescens* NCDO 2085 before Production of Extracellular Proteinase, Carmen Sanjose, Leonides Fernandez and Petra Palacios, Departamento de Higiene y Technología de Alimentos, Facultad de Veterinaria, Universidad Complutense, 28040 Madrid, Spain

J. Food Prot. 50:1004-1008

Changes in milk native content of several carbon and nitrogen sources were studied, along with growth at 7°C of a *Pseudomonas fluorescens* strain. The aim was to characterize the particular compositional environment in milk in which psychrotrophic bacteria produce their extracellular proteinases. Glucose and lactate were depleted from milk, pyruvate and gluconate were significantly diminished, but citrate was mostly unused when proteinase was first detected by the Hide Powder Azure assay, the psychrotrophic count being around 10^{10} CFU/ml. At that stage, levels of ammonia, amino acids and short peptides had just started to rise and only about 20% of the original urea had been consumed. A procedure to anticipate, in cold stored raw milk batches, the time for production of extracellular proteinase, on the basis of sensitive lactate and ammonia determination, is suggested.

Involvement of Heterofermentaive Lactobacilli in Development of Open Texture in Cheeses, L. C. Laleye, R. E. Simard, B.-H. Lee, R. A. Holley and R. N. Giroux, Département de sciences et technologie des aliments et Centre de recherche en nutrition, Université Laval, Ste-Foy, Québec G1K7P4; Canada, Centre de recherche alimentaire de St-Hyacinthe, Agriculture Canada, St-Hyacinthe, Québeck; Food Research Center, Agriculture Canada, Ottawa, Ontario; and Centre de controle et recherche, Agropur, Coopérative Agro-alimentaire, Granby, Québec

J. Food Prot. 50:1009-1012

Samples of Canadian Cheddar and Oka cheeses which exhibited gas formation and fissure defects were examined microbiologically. Analyses revealed that lactobacilli, especially heterofermentative types, as well as organisms capable of using citrate were more numerous in defective cheeses than in high quality products. Higher numbers of viable lactobacilli were obtained in assays where APT or MRS media were used than when MRS adjusted to pH 5.5 or Rogosa agar were used, especially when younger cheeses were sampled. The number of lactic streptococci did not differ between good quality Cheddar or rejected aged cheese. Coliforms, staphylococci, yeasts, molds and clostridia appeared to have no relationship with the formation of gas in cheeses late in the maturation process.

Oral Infectivity of *Vibrio vulnificus* in Suckling Mice, Antolin L. Reyes, Clifford H. Johnson, Procter L. Spaulding and Gerard N. Stelma, Jr., Division of Microbiology, Food and Drug Administration, 1090 Tusculum Avenue, Cincinnati, Ohio 45226

J. Food Prot. 50:1013-1016

Lethal doses of 11 clinical and environmental isolates of *Vibrio vulnificus* were determined in suckling mice after oral challenge. With one exception, isolates that were virulent to iron-overloaded adult mice after intraperitoneal inoculation were highly lethal to the infant mice (>50% lethality at 10^5 CFU/mouse). The virulent isolate that failed to kill infant mice at 10^5 CFU had lost its invasiveness. Conditionally virulent isolates that were virulent only to simultaneously iron-overloaded and immunosuppressed adult mice required $>10^9$ CFU to kill the infant mice. Avirulent isolates failed to kill at $>10^9$ CFU/mouse. There were no significant differences in the lethalities of clinical and environmental isolates. These findings demonstrated a close correlation between virulence in the iron-overloaded adult mouse and infectivity by the oral route.

Efficacy of Petrifilm™ VRB for Enumerating Coliforms and *Escherichia coli* from Frozen Raw Beef, Lawrence Restaino and Richard H. Lyon, Pabst Meat Supply, Inc., 11585 Courthouse Blvd., Inver Grove Heights, Minnesota 55075

J. Food Prot. 50:1016-1022

Petrifilm™ violet red bile (PVRB) compared favorably to the most probable number method (MPN) and violet red bile agar (VRBA) methods for enumerating coliforms from frozen raw ground beef. When comparing PVRB and VRBA incubated at 35°C, coliform enumeration displayed a linear relationship (correlation coefficient of 0.932). However, by analyzing 64 ground beef samples, PVRB enumerated 41% more coliforms/g than did VRBA. Two distinct colony types were observed on PVRB: *(a)* type I (butterfly in appearence) with a colony diameter equal to or greater than 1 mm and gas bubbles 2-4 mm in diameter touching the associated colony; and *(b)* type II with a colony diameter less than 1 mm in diameter and gas bubbles of the associated colony not necessarily touching the colony but within a colony diameter. The disparity between PVRB and VRBA for enumerating coliforms was attributed to non-coliforms representing approximately 50% of the type II coliform colonies. At 35°C, 83.7% of the type I colonies were *Escherichia coli,* whereas only 10.9%, of the type II colonies were *E. coli*. By elevating the incubation temperature from 35°C to 44.5°C, over 90% of the colonies in the counting dilution were type I of which 99.2% were *E. coli*. At 44.5°C, 39.4% of the type II colonies were *E. coli*; however, this colony type represented only 9.5% of the total colonies on PVRB. Therefore, a reliable method for enumerating *E. coli* from raw meat was developed by counting only the type I colonies on PVRB incubated at 44.5°C.

Effects of Yeast on Survival of *Staphylococcus aureus* in Pickled Cheese Brine, Amos Nussinovitch, Baruch Rosen and Ruth Firstenberg-Eden, Department of Food Engineering and Biotechnology, Technion, Haifa, Israel and Department of Life Sciences, Bar-Ilan University, Ramat-Gan, Israel

J. Food Prot. 50:1023-1024

The interactions between staphylococci and yeasts in pickled cheese brine were investigated. Above pH 5, *Staphylococcus aureus* grew in pickled cheese brine. Acid-consuming yeasts increased the pH of the brine to a level which enabled development of staphylococci. This indicates the need to monitor yeast contamination in cheeses preserved by the combination of acid and high salt.

Effects of Hot Boning and Various Levels of Salt and Phosphate on Protein Solubility, Functionality, and Storage Characteristics of Preblended Pork Used in Frankfurters, Y. I. Choi, C. L. Kastner and D. H. Kropf, Department of Animal Sciences and Industry, Knasas State University, Manhattan, Kansas 66506

J. Food Prot. 50:1025-1036

Five pork carcasses were used to determine the effects of hot boning and various combinations of salt (0, 1.5 or 3.0%) and a phosphate mixture (0 or 0.5%) on functional, processing, and storage characteristics of preblended pork (preblends). Although hot-boned (HB) preblends had superior functionalities compared to conventionally boned (CB) preblends, HB and CB frankfurters showed similar processing characteristics. More myosin heavy chain (MHC) from the myofibrillar protein fraction and more actin ($P<0.05$) from the sarcoplasmic protein fraction were extracted from HB than CB preblends. Addition of salt (1.5 or 3.0%) or phosphate (0.5%) generally increased the extraction of MHC and actin from the myofibrillar protein fraction in both HB and CB preblends. Salt level could be reduced from 3.0 to 1.5% in frankfurters without any processing or storage difficulties, if phosphate (0.5%) was added. Some model system measurements may be used to predict relative processing yield of raw materials.

Effects of Hot Boning and Various Levels of Salt and Phosphate on Microbial, TBA, and pH Values of Preblended Pork during Cooler Storage, Y. I. Choi, C. L. Kastner and

D. H. Kropf, Department of Animal Sciences and Industry, Kansas State University, Manhattan, Kansas 66506

J. Food Prot. 50:1037-1043

Five pork carcasses were used to determine the effects of hot boning and various combinations of salt (0, 1.5 or 3.0%) and a phosphate mixture (0 or 0.5%) on microbial, TBA and pH values of preblended pork (preblends). In both HB (hot boned within 2 h postmortem) and CB (conventionally boned at 24 h postmortem) preblends, salt increased ($P<0.05$) TBA values and decreased ($P<0.05$) psychrotrophic counts, whereas phosphate increased ($P<0.05$) pH and decreased TBA values. Salt level could be reduced from 3.0 to 1.5% in preblends without any storage problems if phosphate (0.5%) was included. Phosphate (mixture pH 7.2) seemed to have little influence on microbial growth of preblends during cooler storage.

Growth and Aflatoxin Production by *Aspergillus parasiticus* in a Medium Containing Plant Hormones, Herbicides or Insecticides, R. S. Farag, M. A. El-Leithy, A. E. Basyony and Z. Y. Daw, Departments of Biochemistry and Microbiology, Faculty of Agriculture, Cairo University, Giza, Egypt and Crop Technology Department, Crop Institute, Agricultural Research Center, Giza, Egypt

J. Food Prot. 50:1044-1047

The effect of some widely used plant hormones (indol-3-acetic acid and gibberellic acid), herbicides (gramoxone, stomp and treflan) and insecticides (malathion, actellic and guthion) on *Aspergillus parasiticus* growth and aflatoxin production in a synthetic medium was studied. Addition of indol acetic acid to the medium increased aflatoxin production more than gibberellic acid. Treflan at 5, 10 and 20 ppm levels caused a highly significant stimulatory effect on *A. parasiticus* growth and aflatoxin production. In contrast, stomp at 10 and 20 ppm produced the reverse effect. Guthion, an insecticide, caused a marked decrease in fungal growth and aflatoxin production. The inhibitory effect of insecticides under study on both fungal growth and aflatoxin production in effectiveness followed the sequence: guthion>actellic>malathion. At the recommended application rate (10 ppm), with the exception of indol acetic acid and treflan, all compounds suppressed mold growth and aflatoxin production.

Legal Liability and its Economic Impact on the Food Industry, Ewen C. D. Todd, Bureau of Microbial Hazards, Health Protection Branch, Sir Frederick G. Banting Research Centre, Tunney's Pasture, Ottawa, Ontario K1A 0L2, Canada

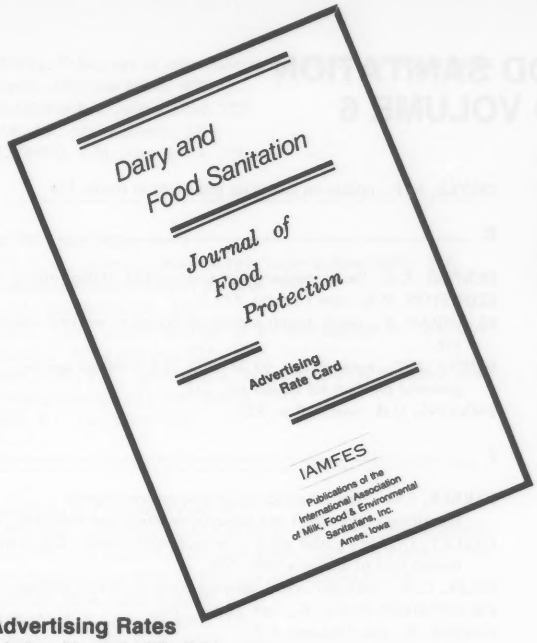
J. Food Prot. 50:1048-1057

Problems in food processing or foodservice that lead to spoilage, illness or contamination by pathogens or extraneous matter can be costly in terms of legal settlements to the companies involved. Although industry and public health officials have been aware of these risks, the extent and types of costs involved are not usually publicized. This paper gives examples of seizures, fines and settlements. The type of amounts given may depend on severity and length of illness and also whether or not the settlement is determined by Workers' Compensation Board, court or out-of-court action. In court cases, these settlements represent an average of about two-thirds of the total costs, the other amounts being for legal and court expenses. Because some of these awards are becoming prohibitively high for industries, insurance companies and the taxpayer, there are government moves to limit these to $100,000 and prevent excessive legal fees. The opposition to this will probably be strong enough to prevent any rapid change to the settlement system, and legal action will remain an important component in the economy of the food industry.

Chemical Contaminants: Their Metabolism and their Residues, Michael L. Biehl and William B. Buck, National Animal Poison Control Center, College of Veterinary Medicine, University of Illinois, Urbana, Illinois 61801

J. Food Prot. 50:1058-1073

Chemical contaminants which food animals may be exposed to include agricultural chemicals (e.g. insecticides, herbicides, fungicides, fumigants), industrial chemicals, metals and natural toxins (e.g. mycotoxins, phytotoxins, bacterial toxins). In the past, most intoxications of food animals resulted from natural toxicants. However, rapid development and usage of synthetic chemicals, while greatly benefitting society, have also provided new sources of potential chemical contamination. Various sources of contamination exist, but generally at least 80% of all residues in food animals are estimated to occur through the feed. Residues from water contamination or other sources occur less frequently. This paper reviews the sources, metabolism and residue problems created by various contaminants and outlines factors and therapeutic approaches utilized in alleviating some of the common chemical residues in food animals.



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SUBJECT INDEX

3-A Sanitary Standards For Multiple-Use Plastic Materials Used As Product Contact Surfaces For Dairy Equipment

Number 20-14

Formulated by
International Association of Milk, Food and Environmental Sanitarians
U.S. Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Multiple-Use Plastic Materials Used As Product Contact Surfaces For Dairy Equipment heretofore or hereafter developed which so differ in specifications or otherwise as not to conform with the following standards, but which, in the fabricator's opinion are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS and DIC at any time.

A. *SCOPE*

These sanitary standards cover the requirements of plastic materials for multiple-use as product contact surfaces in equipment for production, processing and handling of milk and milk products. Test criteria are provided for plastic materials as a means of determining their acceptance as to their ability to be cleaned and to receive effective bactericidal treatment and to maintain their essential properties under repeated use conditions. These standards do not apply to plastics for single service application nor plastics which are of rubber or rubber-like origin resulting from chemical or thermal vulcanization or curing. In order to conform with these 3-A Sanitary Standards, multiple-use plastic materials shall comply with the following material, fabrication, and standards for acceptability criteria.

B. *DEFINITIONS*

(1) *PRODUCTS*: Shall mean the milk product which is processed in contact with plastic surfaces.

(2) *PRODUCT CONTACT SURFACES*: Shall mean all surfaces which are exposed to the product, surfaces from which liquids may drain, drop, or be drawn into the product or into the container and surfaces that touch product contact surfaces of the container.

(3) *PLASTIC*: Shall mean materials as defined in ASTM D 883-59T under "plastic," "thermoplastic," "thermosetting," "elastomer," except those materials included under the "3-A Sanitary Standards for Multiple-Use Rubber and Rubber-like Materials Used as Product Contact Surfaces in Dairy Equipment, Number #1800." From ASTM D 883-59T:

Plastic, n.—A material that contains as an essential ingredient an organic substance of large molecular weight, is solid in its finished state, and, at some stage in its manufacture or in its processing into finished articles, can be shaped by flow.

Plastic, adj.—The adjective "plastic" indicates that the noun modified is made of, consists of, or pertains to plastic.

Thermoplastic, n.—A plastic which is thermoplastic in behavior.

Thermoplastic, adj.—Capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature.

Note: Thermoplastic applies to those materials whose change upon heating is substantially physical.

Thermoset, n.—A plastic which, when cured by application of heat or chemical means, changes into a substantially infusible and insoluble product.

Thermoset, adj.—Capable of being changed into substantially infusible and insoluble product when cured under application of heat or chemical means.

Elastomer,n.—A material which at room temperature can be stretched repeatedly to at least twice its original length and upon immediate release of the stress, will return with force to its approximate original length.

(4) *FABRICATION*: Shall mean the standard techniques of the plastic industry for forming and shaping parts.

(5) *REFERENCES*: See Appendix D.

C. *MATERIALS*

Plastic materials used as product contact surfaces shall be non-toxic, shall comply with Section I.

Standards for Acceptability, shall be relatively resistant to abrasion, and shall maintain their original characteristics such as form, shape, flexibility and dimensions when subjected to normal cleaning and bactericidal treatment.[1] Plastic materials complying with Section I. shall be considered to be relatively insoluble when subjected to normal cleaning and bactericidal treatment.[1]

Functional properties of plastic materials such as color, transparency, or translucency shall be relatively retained in the environment of its intended use, and in cleaning and bactericidal treatment.[1] Only virgin, unadulterated, first run plastic materials shall be used in fabrication of plastic equipment and/or parts.

D. *FABRICATION*

The surface finish of plastic materials shall comply with subsection (3) of Section I. Standards for Acceptability.

E. *PREPARATION FOR CLEANABILITY RESPONSE, PRODUCT TREATMENT AND CLEANABILITY COMPARISONS PROCEDURES*

(1) *APPARATUS*

Appropriate glassware, oven, hot plate, analytical balance, wide field microscope or magnifying lens, sample of 18-8 stainless steel sheet, having a 120 grit finish properly applied.

(2) *TEST SOLUTIONS (SIMULATED REAGENTS)*

(a) Test Solution A (Acid Cleaner)
Acid Solution: 2% Orthophosphoric Acid

(b) Test Solution B (Alkaline Cleaner)
Sodium tripolyphosphate, 15%
Sodium hydroxide, 80%
Trisodium phosphate, 3%
Synthetic detergent, anionic type, 2%
Above to be equivalent to 63% Na_2O. Dissolve in water to produce a 2.5% solution by weight.

(c) Test Solution C (Alkaline Chlorine Sanitizer)
Hypochlorite solution: sodium hypochlorite, 400 ppm in water, adjusted to pH 8.0 ± 0.5 with sodium bicarbonate

(d) Test Solution D (Acid Chlorine Sanitizer)

Dichloroisocyanurate, potassium salt (ACL 59 Monsanto)	15.0%
Monosodium phosphate, anhydrous	60.0%
Sodium sulfate, anhydrous	25.0%

Dilute above with distilled water to give a test solution containing 400 ppm of available chlorine.

(e) Test Solution E (Quaternary Ammonium Sanitizer)
Alkyl di methyl benzyl ammonium chloride, 400 ppm in water.

(f) Test Solution F (Iodophor Sanitizer)

Nonylphenol ethylene oxide condensate, 9-½ to 10 moles ethylene oxide	15.0%
Iodine to provide 1.75% avaliable iodine	2.45%
Orthophosphoric acid-100% basis	15.0%
Water	67.55%

Dilute above with distilled water to give a test solution containing 50 ppm of available iodine.

(g) Test Solution G (Acid Anionic Sanitizer)

Orthophosphoric acid—100% basis	21.0%
Dodecyl benzene sulfonic acid, sodium salt	2.75%
Nonionic wetting agent	1.00%
Water	75.25%

Dilute above with distilled water to give a test solution of 400 ppm of active anionic.

(h) Test Solution H (Simulated Dairy-Soil Solution)

Cream (27% butter fat)	55.6%
Nonfat dry milk	8.7%
Sucrose	15.0%
Water	20.7%

To give a composition of:
15.0% Fat
12.0% Milk-solids-not-fat
15.0% Sugar
58.0% Water

(i) Test Solution I (Dairy Product, High Fat Medium)
Pasteurized cream, minimum 36% butterfat

(j) Test Solution J (Dairy Product, Acid Medium)
Lactic acid, 3.0% in aqueous solution

(3) *TEST SPECIMENS*

(a) Test Specimens, when prepared for testing shall have a surface at least as smooth as stainless steel having a 120 grit finish properly applied and shall have a total exposed surface areas of 7.0 ± 0.1 square inches.

(aa) Molded test specimen shall be in the form of a disk 2 inches in diameter and 1/8 inch in thickness. Permissible variations in thickness are plus or minus 0.007 inch for hot molded and plus or minus 0.012 inch for cold molded or cast materials. The disk mold prescribed in Section 3 of ASTM D 647 is suitable for molding disk specimens of thermosetting materials, and Section 5 of ASTM D 647 is suitable for injection molding of thermoplastic materials.

(bb) Sheet test specimen shall be in the form of a bar 3 inches in length and 1 inch in width, which for comparison, shall 1/8 ± 0.008 inch thick (Surface area, 7.0 ± 0.1 sq. in.)

(cc) Rod test specimen shall be of normal

[1] *Procedures in Sections F and G are not normal cleaning and bactericidal treatment tests but are accelerated use-simulating tests.*

diameter as received, and cut to proper length to produce the required surface area of 7.0 ± 0.1 square inches. The diameter of the specimen shall be the diameter of the rod.

(dd) Tube test specimen of less than 3 inches in diameter shall be the full section of the tube cut to proper length to produce the required surface area of 7.0 ± 0.1 square inches including as the exposed surface area the outside, inside, and ends of the tube. For a tube having an inside diameter of 3 inches or more, a rectangular specimen shall be cut 3 inches in length laterally to the tube or cut to proper length and width to produce the required surface area of 7.0 ± 0.1 square inches including as the exposed area the outside, inside, and ends of the cut section.

(b) Test specimens from sheets, rods, and tubes shall be machined, punched, sawed or sheared from the sample and so treated on such surfaces as to have edges free from cracks, rough surfaces and loose material.

(4) *CONDITIONING OF TEST SPECIMEN*

All test specimens pre-conditioned to equilibrium in a Standard Laboratory Atmosphere (see E. (5) below) for water content at Room Temperature shall be cleaned using Test Solution B (Alkali Solution) at 165-170°F., with 6 repeated one minute immersions, followed by thorough cold water rinsing and drying at room temperature for 24 hours.

(5) *DEFINITIONS OF TERMS RELATING TO TESTING*

Room Temperature—defined in ASTM E-41-57T.
Standard Laboratory Atmosphere—a relative humidity of 50 ± 2% at a temperature of 23 ± 1°C. or 73.4 ± 1.8°F.
Hot Water—from 95 to 115°F.
Cold Water—from 45 to 65°F.

(6) *NUMBER OF TEST SPECIMENS*

Two sets (Set M and Set M^1) of eight specimens each and two sets (Set L and Set L^1) of eight specimens each shall be identified and treated as:

Set M and M^1	Set L and L^1	For Tests in:
M-0: M^1-0	L-0: L^1-0	Controlled, Distilled water
M-1: M^1-1	L-1: $L^1$1	Solutions A-B
M-2: M^1-2	L-2: $L^1$2	Solutions A-B-H-A-B
M-3: M^1-3	L-3: L^1-3	Solutions A-B-C-H-A-B-C
M-4: M^1-4	L-4: L^1-4	Solutions A-B-D-H-A-B-D
M-5: M^1-5	L-5: L^1-5	Solutions A-B-E-H-A-B-E
M-6: M^1-6	L-6: L^1-6	Solutions A-B-F-H-A-B-F
M-7: M^1-7	L-7: L^1-7	Solutions A-B-G-H-A-B-G

An extra molded test specimen or a piece of the sheet, rod or tube shall be available for the comparisons required in F. (10) (b) (1) and G. (3) (b) (1).

F. *PROCEDURE—CLEANABILITY RESPONSE*[1]

(1) After conditioning the test specimens according to section E. (4) above, all samples to be weighed (W_1). After W_1) has been determined:

(2) Specimen M-0, M^1-0 and L-0, L^1-0 are:
- (a) Immersed in distilled water, 165-170°F., 60 minutes.
- (b) Rinsed, hot water.
- (c) Dried, room temperature, 20 hours.
- (d) Re-weighed (W_2).

(3) Specimen M-1, M^1-1 and L-1, L^1-1 are:
- (a) Immersed in Solution A, 165-170°F., 30 minutes.
- (b) Rinsed, hot water.
- (c) Immersed in Solution B, 165-170°F., 30 minutes.
- (d) Rinsed, hot water.
- (e) Dried, room temperature, 20 hours.
- (f) Re-weighed (W_2).

(4) Specimen M-2, M^1-2 and L-2, L^1-2 are:
- (a) Immersed in solution A, 165-170° F., 15 minutes.
- (b) Rinsed, hot water.
- (c) Immersed in Solution B, 165-170°F., 15 minutes.
- (d) Rinsed, hot water.
- (e) Immersed in Solution H, room temperature, 20 hours.
- (f) Rinsed, hot water.
- (g) Immersed in Solution A, 165-170°F., 15 minutes.
- (h) Rinsed, hot water.
- (i) Immersed in Solution B, 165-170°F., 15 minutes.
- (j) Rinsed, hot water.
- (k) Dried, room temperature, 20 hours.
- (l) Re-weighed (W_2).

(5) Specimen M-3, M^1-3 and L-3, L^1-3 are:
- (a) Immersed in Solution A, 165-170°R., 15 minutes.
- (b) Rinsed, hot water.
- (c) Immersed in Solution B, 165-170°F., 15 minutes.
- (d) Rinsed, cold water.
- (e) Immersed in Solution C, room temperature, 60 minutes.
- (f) Rinsed, hot water.
- (g) Immersed in Solution H, room temperature, 20 hours.
- (h) Rinsed, cold water.
- (i) Immersed in Solution A, 165-170°F., 15 minutes.
- (j) Rinsed, hot water.
- (k) Immersed in Solution B, 165-170°F., 15 minutes.
- (l) Rinsed, cold water.

(m) Immersed in Solution C, room temperature, 60 minutes.
(n) Rinsed, hot water.
(o) Dried room temperature, 20 hours.
(p) Re-weighed (W_2).

(6) Specimen M-4, M^1-4 and L-4, L^1-4 are: Identical to regimen stated in paragraph (5) for M-3, M^1-3 and L-3, L^1-3 except: Use Solution D in place of Solution C.

(7) Specimen M-5, M^1-5 and L-5, L^1-5 are: Identical to regimen stated in paragraph (5) for M-3, M^1-3 and L-3, L^1-3 except: Use Solution E in place of Solution C.

(8) Specimen M-6, M^1-6 and L-6, L^1-6 are: Identical to regimen stated in paragraph (5) for M-3, M^1-3 and L-3, L^1-3 except: Use Solution F in place of Solution C.

(9) Specimen M-7, M^1-7 and L-7, L^1-7 are: Identical to regimen stated in paragraph (5) for M-3, M^1-3 and L-3, L^1-3 except: Use Solution G in place of Solution C.

(10) Report the following: (For Report Form, see Appendix A)
(a) Calculated per cent weight loss or gain—

$$\%\,\text{Loss} = \frac{W_1 - W_2}{W_1} \times 100$$

$$\%\,\text{Gain} = \frac{W_2 - W_1}{W_1} \times 100$$

(b) Comparison made visually with the aid of magnification
(1) The test specimen is compared with the original as to change in surface smoothness as: NO CHANGE, SLIGHT CHANGE, or MARKED CHANGE.
(2) The rating as to the smoothness of the test specimen compared to the sample of 18-8 stainless steel sheet having a 120 grit finish properly applied: SMOOTHER, EQUAL, or ROUGHER.
(3) Report under "Remarks" other apparent changes, such as: surface tack, exudation, cracks, and other surface discontinuities, color changes, changes in transparency, permanent or temporary visual changes, distortions in shape, dimension, delaminations, and changes in surface tension.

G. *PROCEDURE—PRODUCT TREATMENT*

The test specimens which were treated in section F—"Cleanability Response", are to be *further* tested as follows:

(1) Immerse Set M and M^1 (Specimens M-0 to M-7 and M^1-0 to M^1-7 inclusive), weighed (W_2) in: Test Solution I, at room temperature for a total time of 168 hours, renewing the test Solution I every 24 hours. Test specimens shall be rinsed with cold water to remove old solution prior to re-immersing in renewed solution. At the conclusion of the 168 hours immersion, the specimens shall be removed and cleaned, using Test Solution B at 165-170°F., with 6 repeated one minute immersions, followed by a thorough hot water rinse, dried at room temperature for 20 hours. Re-weighed (W_3).

(2) Immerse Set L (Specimens L-0 to L-7 and L^1-0 to L^1-7 inclusive) weighed (W^2) in: Test Solution J, at 155-160°F., for a total time of 168 hours, renewing the test Solution J every 24 hours. Test specimens shall be rinsed with cold water to remove old solution prior to reimmersing in renewed solution. At the conclusion of the 168 hours immersion, the specimens shall be removed and cleaned, using Test Solution B at 165-170° F., with 6 repeated one minute immersions, followed by a thorough hot water rinse, dried at room temperature for 20 hours. Re-weighed (W^3).

(3) Report the following: (For Report Form see Appendix B)
(a) Calculated per cent weight loss or gain—

$$\%\,\text{Loss} = \frac{W_2 - W_3}{W_2} \times 100$$

$$\%\,\text{Gain} = \frac{W_3 - W_2}{W_2} \times 100$$

(b) Comparison made visually with the aid of magnification
(1) The test specimen is compared with the original as to change in surface smoothness as: NO CHANGE, SLIGHT CHANGE, or MARKED CHANGE.
(2) The rating as to the smoothness of the test specimen compared to the sample of 18-8 stainless steel sheet having a 120 grit finish properly applied: SMOOTHER, EQUAL, or ROUGHER.
(3) Report under "Remarks" other apparent changes, such as: surface tack, exudation, cracks and other surface discontinuities, color changes, changes in transparency, permanent or temporary visual changes, distortions in shape, dimensions, delaminations, and changes in surface tension.

H. *FROCEDURE—CLEANABILITY COMPARISON*

(1) All of the test specimens after exposure to the regimen set forth in sections F and G are to be immersed in Test Solution H, at room temperature for 20 hours, cleaned using Test Solution B at 165-170°F., with 6 repeated one minute immersions, followed by a thorough hot water rinsing and drying at room temperature for 20 hours.

(2) The sample of 18-8 stainless steel sheet having a 120 grit finish properly applied or a piece of it (ap-

proximately 3 inches in length and 1 inch in width) is to be cleaned as set forth in E. (4). This sheet or piece of stainless steel is then to be exposed to the regimen set forth in H. (1).

(3) With the aid of magnification, visually judge the cleanability of the test specimens by comparing them with the sample of 18-8 stainless steel sheet after exposure to the regimen set forth in H. (2). Rate the cleanability of the test specimens as: BETTER, EQUAL, or POORER. (For Report Form see Appendix C.)

I. *STANDARDS FOR ACCEPTABILITY*

Acceptable plastic materials shall comply with the following:

(1) None of the test specimens, after exposure to the regimen set forth in Sections F and G, shall have a loss in weight greater than 0.05 percent.

(2) None of the test specimens, after exposure to the regimen set forth in sections F and G, shall have a gain in weight greater than that given for the generic class shown in Table 1.

(3) All of the test specimens, after exposure to the regimen set forth in sections F and G, shall be at least as smooth and cleanable as 18-8 stainless steel sheet having a 120 grit finish properly applied. To conform with this, all of the test specimens shall be judged to be SMOOTHER or EQUAL in the comparisons made in accordance to F.(10) (b) (2) and G.(3) (b) (2), and BETTER or EQUAL, in the comparisons made in accordance to H. (3).

These standards shall become effective Sept. 9, 1984, at which time the "3-A Sanitary Standards for Multiple-Use Plastic Materials used as Product Contact Surfaces for Dairy Equipment," Serial #20-00, amendments 20-01 through 20-07, inclusive, and Numbers 20-08, 20-11, and 20-12, are rescinded and become null and void.

TABLE 1

Generic Classes of Plastics	Maximum Percent Weight Gain: Cleanability Response (Section F. Regimen)	Product Treatment (Section G. Regimen): Solution I	Solution J
Polyethylene—			
ASTM Type I	0.20	0.50	0.20
ASTM Type II	0.20	0.20	0.20
ASTM Type III	0.20	0.20	0.20
Polypropylene— (unmodified and modified for impact resistance)	0.10	0.20	0.20
Polystyrene—			
Normal (unmodified), Type 3 of ASTM D 703-56T	0.10	0.10	0.10
Modified (impact), Type III, Grade 6 of ASTM D1892-61T	0.10	0.10	0.10
Styrene-acrylonitrile	0.20	0.50	0.50
Plasticized polyvinyl chloride—			
(a) For contact with high-water, low-fat products	0.25	0.55	0.90
(b) For contact with high-fat products	0.10	0.20	0.55
Acrylics	0.20	0.50	1.50
Polycarbonates	0.10	0.15	0.25
Nylon—			
Nylon Type 66	2.00	3.00	8.00
Nylon Type 610	1.00	2.00	4.00
Nylon Type 6	2.00	3.00	8.00
Chlorinated polyether	0.05	0.05	0.05
Acrylonitrile butadiene styrene	0.30	0.45	0.90
Fluorocarbons			
CTFE, TFE and FEP types	0.05	0.05	0.05
Vinylidene fluoride types	0.05	0.05	0.15
Reinforced Epoxy, molded, natural (no color added), and black	.20	.25	.35
Propoxylated bisphenol-A fumarate polyester-styrene copolymer	.20	.20	.20
Polysulfone Resin	.05	0.1	0.1
Cross-linked polyester resins (vinyl ester-styrene copolymer)	0.20	0.20	0.20
Polyphenylene sulfide	0.06	0.08	0.08
Polyoxymethylene copolymer	0.25	0.60	1.00
Ethylene-vinyl acetate copolymers	0.25	0.55	0.10
Polyetherimide* * * * *	0.20	0.25	0.25
Polyurethane*	1.22	1.59	1.29
Polymethylpentene* *	0.10	0.20	0.20
Polyphenylene oxide* * *	0.10	0.15	0.25
Epoxy Resin as coating* * * *			
Isopropylidendiphenol Hardener-TETA Triethylenetetramine	0.10	0.15	0.25

** covered by 21 CFR 177.1680 for contact with dry food*
** * as covered by 21 CFR 177.1520*
** * * as covered by 21 CFR 177.2460·*
** * * * as covered by 21 CFR 177.300*
** * * * * as covered by 21 CFR 177.1595*

Selected References

Technical data on Plastics, February, 1957. Manufacturing Chemists Association, 1825 Connecticut Ave., N.W., Washington, D.C.

S. P. I. Plastics Engineering Handbook, Society of Plastic Industry, Inc., Book Division, Reinhold Publishing Corp., New York, New York.

Terms Relating to Plastics, ASTM D-883-59T. American Society for Testing Materials, 1916 Race Street, Philadelphia, Pa. 19103.

Descriptive Terms Pertaining to Plastics, ASTM D-675-58T, American Society for Testing Materials, 1916 Race Street, Philadelphia, Pa. 19103.

J. F. Lakey, Association of Food & Drug Officials of the U.S. Appraisal Of The Safety Of Chemicals In Foods, Drugs, And Cosmetics, Texas State Department of Health, Austin, Texas.

Public Law 929, 85th Congress, September 6, 1958. (The Food Additive Amendment of 1958).

Federal Register, March 28, 1959, Page 2434—Food Additives, Definitions and Procedural and Interpretive Regulations.

Machine Design Plastics Book Issue, September 20, 1962. Penton Publishing Co., Penton Bldg., Cleveland, Ohio.

These practices become effective January 25, 1988 at which time 3-A Sanitary Standards For Mutliple-Use Plastic Materials Used As Product Contact Surfaces For Dairy Equipment, Number 20-13, are rescinded and become null and void.

Calendar

1988

January 11-20, 38th ANNUAL UNIVERSITY OF MARYLAND ICE CREAM SHORT COURSE, for more information, contact: Dr. James T. Marshall, Department of Animal Sciences, University of Maryland, College Park, MD 3742. 301-454-7843.

January 20-23, FOURTH INDUSTRY-WIDE U.S. DAIRY FORUM, sponsored by the Milk Industry Foundation and International Ice Cream Association. To be held at the Innisbrook in Tarpon Springs, 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 9, SYMPOSIUM ON FOOD-BORNE 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 21-24, SWEETENER USERS GROUP, INTERNATIONAL SWEETENER COLLOQUIUM, to be held at Innisbrook Resort, Tarpon Springs, 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 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 Hilon 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 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.

MISSOURI MILK, FOOD AND ENVIRONMENTAL HEALTH CONFERENCE, to be held at the Holiday Inn Executive Center, Columbia, Missouri. For more information, contact: John Norris, MMFEHA, Bureau of Community Sanitation, PO Box 570, Jefferson City, MO 65102.

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 13-15, 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.

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.

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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105	118	131	144	157	170	183	196	209	222	235	248	261	274	287	300	313	326	339	352
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111	124	137	150	163	176	189	202	215	228	241	254	267	280	293	306	319	332	345	358
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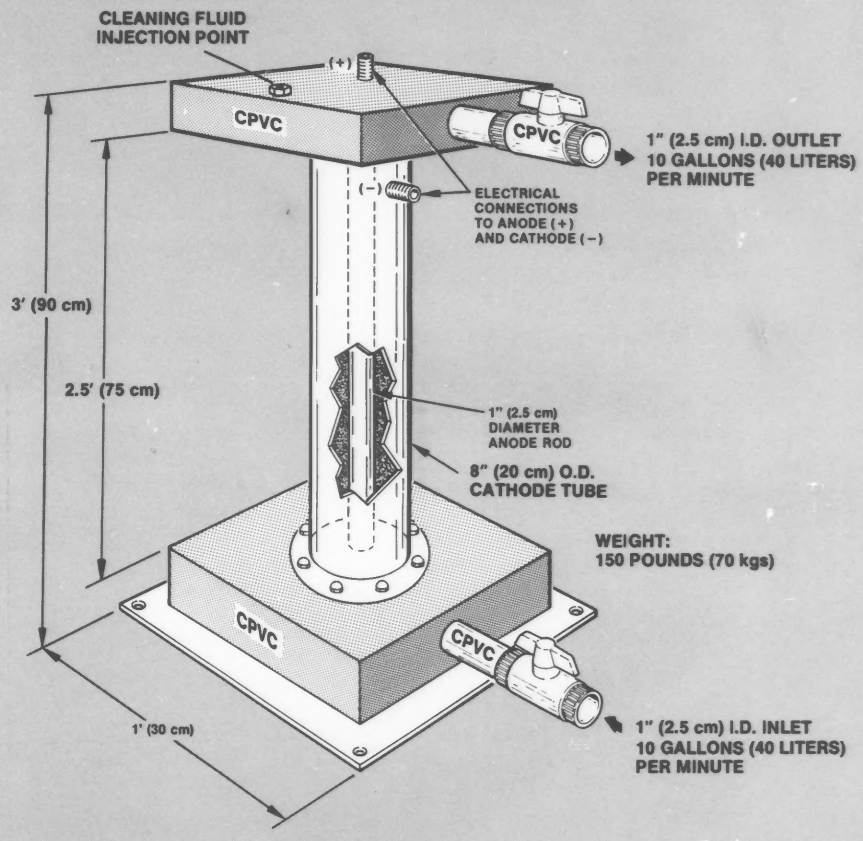

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If this cell operates at its MINIMUM capacity as stated above, it will generate the equivalent of 2,000 ppm-mg/l of a 10% liquid chlorine concentration or 20,000 ppm-mg/l at its 10 gpm (40 lpm) effluent. This concentration must be diluted 20 times since sewage requires as much as 20 ppm-mg/l of a 10% liquid chlorine residual for proper treatment. Therefore, this cell's effluent will treat; 1,000 gpm (4,000 lpm), 60,000 gph (240,000 lph) or 1,440,000 gallons (544 cubic meters) per 24-hour operation. At 5 oz. (150 ml) per minute of saline, this cell will consume about 1 kilowatt per hour! This cell's concentration and capacity increases as the saturated saline intake increases.

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If this cell operates at its MAXIMUM capacity which is 50 V DC at 100 amperes, it will consume 50 x 100 = 5,000 watts per hour. Therefore it requires a 5 KVA service. If each KWH cost 6 cents (US), the daily operating cost will be; 5 X 6 X 24 = $7.20 (US). The cost of the salt will be about $10 per day for a grand total of less than $20 per 24-hour operation.

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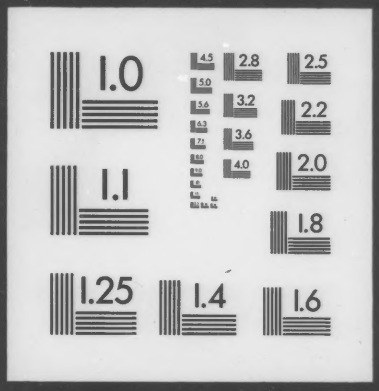
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