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Dairy and Food Sanitation

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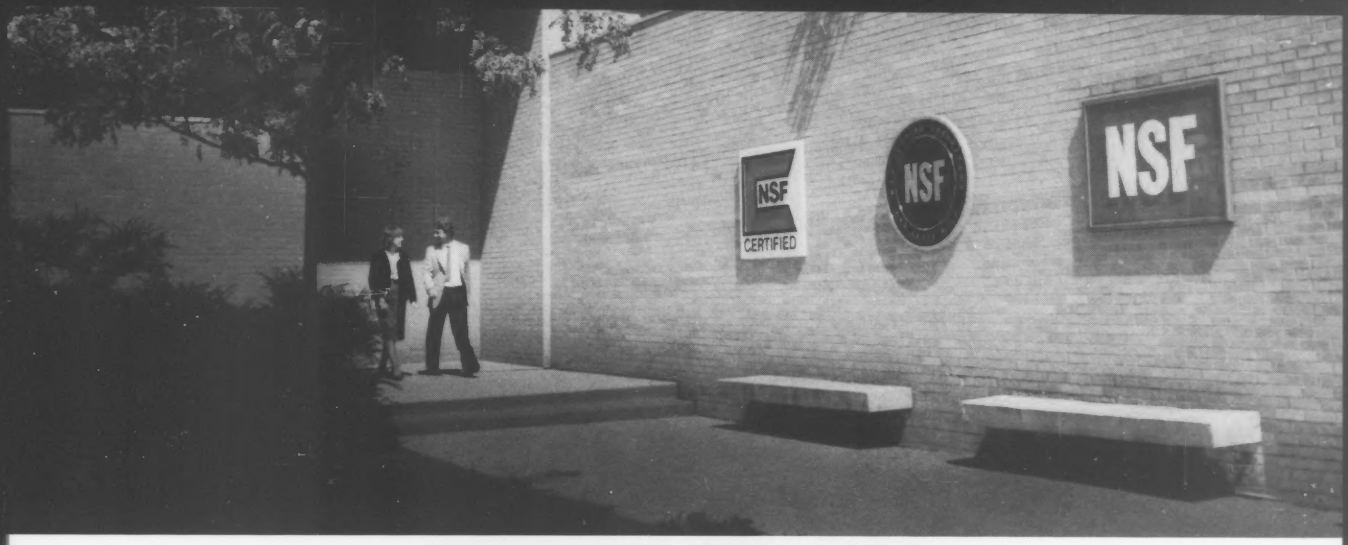

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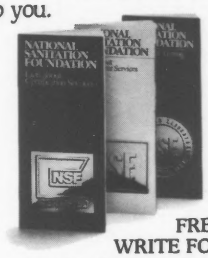

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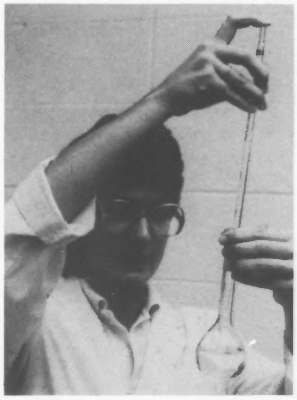

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CONTENTS Vol. 8 No. 2 FEBRUARY, 1988

Dairy and Food Sanitation, Vol. 8, No. 2, Pages 52-56, (February 1988)

Recommended Guidelines for Controlling Environmental Contamination In Dairy Plants

Revised October 1987. Issued Jointly by the: U.S. Food and Drug Administration and Milk Industry Foundation International Ice Cream Association.

Introduction

As a result of an intensive review of the dairy industry over the past several years, "Recommended Guidelines" were developed to assist state milk agencies and the dairy industry in controlling environmental contamination in dairy plants. These recommended guidelines were first issued in September, 1986 and widely disseminated throughout the United States. In an effort to keep states and the dairy industry informed about new information being derived from the Dairy Safety Initiatives and industry programs, these guidelines have been updated.

The Food and Drug Administration (FDA) and the Milk Industry Foundation and International Ice Cream Association are continuing to work cooperatively, exchanging findings and experiences derived from a review of check ratings, FDA inspections and industry programs. Updated guidelines to strengthen control of environmental contamination in dairy plants continue to be developed. These guidelines do not stand alone but must be combined with strict adherence to basic sanitation principles found in the *Pasteurized Milk Ordinance* (PMO) and all applicable sections of the *Code of Federal Regulations,* Title 21, e.g. 21 CFR 110, the Current Good Manufacturing Practice (GMP) regulations. All should serve to enhance existing programs and should not be considered or used as the sole element in providing safe plant conditions. These guidelines are primarily directed at controlling environmental, post-pasteurization contamination of product by such organisms as *Listeria* and *Yersinia,* but are applicable for all other contaminants.

1. *Pasteurization*

Every plant should have reassessed the adequacy of their pasteurization equipment to determine if it can consistently satisfy the basic principles of pasteurization. Pasteurization is assurance that every particle of milk or milk product is heated to at least a minimum temperature and held a that temperature for at least he specified time in properly designed, installed, and operated equipment. Dairy products which contain higher fat and/or added sugars require an additional 5°F above minimum pasteurization temperatures. More viscous products such as frozen dessert mixes, eggnog, etc., require even higher pasteurization temperatures and/or longer time (see Table 1).

It is recommended that the minimum pasteurization time/temperature combinations found in Table 1 be exceeded where possible.

Table 1. Minimum Pasteurization Temperatures and Times.

Product	Temperature	Time
Milk	145°F	30 minutes
	161°F	15 seconds
	191°F	1 second
	194°F	0.5 second
	201°F	0.1 second
	204°F	0.05 second
	212°F	0.01 second
Milk Products	150°F	30 minutes
of 10% fat or more	166°F	15 seconds
or added sugar	191°F	1 second
(1/2 & 1/2, cream,	194°F	0.5 second
chocolate milk, etc.)	201°F	0.1 second
	204°F	0.05 second
	212°F	0.01 second
Eggnog and Frozen	155°F	30 minutes
dessert mixes	175°F	25 seconds
	180°F	15 seconds

All pasteurization equipment must be properly designed, installed and operated. A properly designed, installed and operated flow diversion device, and properly operating pressure controls for regenerator systems must be an integral part of all HTST pasteurizing systems.

FDA's dairy initiatives have shown that problems may occur when ice cream mix, or other dairy ingredients are pasteurized at one location and transported to another plant for further processing without being repasteurized at the plant of final packaging. This product is more susceptible since the product is handled and exposed to potential contamination conditions and is not repasteurized.

It should be emphasized that all Grade "A" milk and milk products must be pasteurized in the plant of final processing and packaging. It is recommended that this

practice also be followed for other products such as frozen dessert mixes.

Heat exchangers (presses) of all HTST pasteurizer units need to be routinely opened and closely evaluated for stress cracks, pin holes, gasketing problems, inadequate cleaning, etc. Inspections have revealed numerous problems in these areas.

Vat Pasteurization

Many problems have recently been observed with vat pasteurization systems. These include: improper equipment design, lack of proper outlet valves, lack of proper airspace thermometers, improperly operated airspace heaters and other serious defects.

All vat pasteurizing equipment must meet the basic requirements for pasteurization. Pasteurization must be performed in equipment which is properly designed, installed, and operated, and which insures that every particle of milk or milk product has been held continuously at/or above the proper temperature for at least the specified period of time. Valves and connections must be properly designed to prevent pockets of cold milk within the system. Foam which is an excellent insulator must be minimized in the vat during filling, heating and holding. Covers must remain in place at all times while the product is in the vat.

The following items are critical if proper vat pasteurization is to be assured. Reliable and accurate recording, indicating and airspace thermometers must be present and functioning properly. The airspace between the product and the top of vat must be maintained at 5°F above minimum pasteurization temperatures. This is necessary to assure that any product, including foam, reaches proper pasteurization temperatures. It may be necessary to utilize airspace heaters in order to achieve this 5°F differential. Outlet valves should be inspected regularly to detect leaking, and must be of a leak detection type.

2. *Post-pasteurization Contamination*

By now all dairy plants should have completed a review of the adequacy of cleaning and sanitizing procedures for all processing and filling equipment, pipelines and storage tanks. Potential areas of post-pasteurization contamination should be determined and corrective action taken when necessary.

A thorough check should have been made of sweetwater and glycol cooling systems. A scheduled review program should be initiated to assure that they are properly protected and do not contain any pathogenic organisms. Any equipment such as storage tanks, jacketed vessels, cooling plates, etc., that utilize sweetwater or glycol solutions should continually be monitored for leaks and cracks. Contamination of product has been caused by *Listeria* contaminated sweetwater as a result of leaking plates.

Cracks and crevices in storage tanks, leaking valves, agitator shafts, shielding and venting are all areas where pathogenic organisms have been found.

Improper welds and similar irregular surfaces, which may cause ineffective cleaning and sanitizing, should have been eliminated. These areas should be monitored on a scheduled basis.

Cleaning and sanitizing regimens should have been reviewed for proper times, temperatures, pressures and flow rates. It is important to determine that proper sanitizers are being used at the appropriate strength and con/tact time. This review should be accomplished by routinely verifying recording charts and records to insure that the established cleaning and sanitizing regimen is being followed. It has been demonstrated that commonly used dairy and food plant sanitizers are effective against organisms such as *Listeria* when applied to clean surfaces for recommended times. Consultation with suppliers of sanitizing compounds is highly recommended to assure that the compound applied is effective against the organisms of concern. Chlorine based sanitizers at 100 ppm, acid anionics at 200 ppm, quaternary ammonium compounds at 100 ppm and iodophors at 25 ppm are recommended. It must be stressed that sanitizers are not effective unless all product surfaces are clean.

It is important that all pipeline circuits are designed to eliminate trapping of washing or sanitizing solutions or allowing product to collect during the operating day. The lines must be free draining or have provisions to be kept free of solution or product except during use. All piping circuits should have been reviewed by now. It is equally important to continue to monitor for any possible cross-connections.

Processors should attempt to minimize the amount of product handling, product exposure to the plant environment, and time or temperature abuse of the product after pasteurization. This can be accomplished by minimizing post-pasteurization handling and storage time prior to final packaging.

The use of absorbent items, such as rags and sponges, should be eliminated to reduce potential harborage and spreading of microorganisms in the plant environment. Separate brushes should be used for product and non-product surfaces. Brushes should be maintained in good repair, cleaned, sanitized and stored between uses. Use of impervious materials, (i.e., plastic or metal) is recommended. Porous equipment such as wooden handled brushes, tools, paddles, sponges, cloth, etc., should not be used in production areas.

Frozen dessert novelty lines tend to expose product to both potential airborne and condensate contamination more than many other product lines. Exposure to these hazards may be minimized by providing additional shielding.

Filling/packaging operations are areas where product contamination has occurred. Mandrels, drip shields, bottom and top breakers, prefilling coding equipment, deflector bars, cutting blades and extruder heads are critical areas where environmental contamination may occur. Overhead shielding, conveyors, conveyor belts, chain rollers, supports, and lubricants should be constantly

monitored. It is important to incorporate a routine cleaning and sanitizing regimen for all conveyors. Blow molding operations and handling of packaging materials should be examined on a routine basis, particularly where open containers/jugs are conveyed through nonprocessing areas.

Any product recovered from defoamer systems should be protected form contamination, maintained at or below 45°F at all times, and should be repasteurized. A thorough review of the procedures for handling of imperfectly capped or filled containers/packages is suggested. Particular emphasis should be directed at eliminating manual handling, filling and capping of containers.

3. *Cross-connections*

Cross-connections have been found in a number of the dairy plants. Inspections have revealed direct piping connections between pasteurized milk and raw milk lines, product lines to CIP circuit lines or pasteurized product lines to other potentially hazardous circuits. Blueprints should be reviewed on a periodic basis and updated to reflect existing piping arrangements. This can be accomplished only by "walking" the blueprints through the plant and physically insuring the blueprints are accurate. Internal plant controls are needed to prevent any piping changes without prior review by qualified authorities.

4. *Use of Returned Product and Reclaiming Operations*

All returned packaged milk and milk products which have physically left the premises of the processing plant should not be repasteurized for Grade A use. You should check with your state regulatory agency concerning specific isolated problems relating to this area.

Salvage operations, by their very nature, are high risk enterprises which can put the whole company in jeopardy if not carried out in a sanitary manner.

Recent experience has revealed salvage product being inadvertently pumped through the same lines as pasteurized product without cleaning and sanitizing the lines between uses.

Other aspects of salvage operations which pose potential contamination problems are:

- Failure to pasteurize salvages or reworked product before reuse.
- Reuse of product which has been in distribution channels and may have been temperature-abused, tampered with, or exposed to chemical or biological contamination.
- Use of product in damaged containers where container integrity may have been compromised, or when the outside of the container may be contaminated.
- Reworked product which is handled differently from normal production such as start up and change over product, underweights, package/wrapper problems, product involved in line jam-ups and that which is held in barrels or buckets then reworked back into the product.

Any product that has been mishandled, not adequately protected from contamination or which has not been maintained at a temperature of 45°F or less should be discarded. External carton contamination with *Listeria* and *Yersinia* has occurred and may lead to product contamination. Breaking or splashing containers over a vat or horn for reprocessing may introduce contamination into product. The reclaiming operation should be reviewed to eliminate potential hazards. It is essential that if product is to be reclaimed that proper holding temperatures and sanitary practices, including careful container handling, be exercised. Repasteurization of all reclaimed product is necessary and higher temperatures and/or longer holding times should be used. Products returned from stores and outdated products which are being returned to the dairy plant for disposal should be isolated from all other plant operations. Precautions should be taken to prevent these areas from serving as a source of contamination. All equipment including tanks, pumps, pipelines, used in the reclaiming operation should be constructed so they can be cleaned and sanitized daily.

All salvaged and/or reworked product, such as ice cream, which is retained in buckets during start-up while overrun is stabilized, should be kept to a minimum. Ideally, this material should be discarded. If this product is to be recycled back into product, it should be repasteurized.

The practice of reclaiming product should be seriously evaluated, in view of the potential for environmental and product contamination.

5. *Airborne Contamination*

Airborne contamination is strongly suspected as a vehicle for allowing pathogenic organisms to enter product. A comprehensive assessment of both processing and ventilating air utilized within the plant should have been conducted. Heating, ventilating and air conditioning (HVAC) systems should be designed for easy cleaning and should be periodically cleaned. Condensate drip pans and drain lines should be periodically checked and cleaned to assure they are not providing favorable environments for the growth of pathogenic organisms. It is highly recommended that frozen dessert novelty plants and other facilities immediately evaluate the adequacy of all protective shielding. This review should include all product contact surfaces as well as exposed product areas to assure they are not subject to possible contamination by condensate, aerosols, dust or other airborne contaminates. Air systems in refrigerated areas should also be designed for ease of cleaning and should be routinely cleaned.

HVAC systems should be properly designed and adjusted to maintain positive pressure in areas where product is exposed such as batching, freezing, filling and packaging operations. Air transfer from potentially contaminated areas, such as raw product receiving, ingredient and supply storage to processing or packaging areas should be minimized.

Outside air should be filtered and free of condensate. Air flow should be determined and controlled to eliminate

direct air movement blowing onto product, product contact surfaces or filling and packaging areas. Air filters should be of the type effective in removing particulate matter and condensate thus reducing the potential for dispersion of microorganisms. Filters should be kept clean and replaced according to an established maintenance schedule.

Processing systems which incorporate air directly into the product, such as freezers, airblows, and air agitation systems must be designed to reduce potential contamination and should be easily cleanable. Process air systems should contain appropriate filters to remove undesirable particulate matter. Sanitary check valves should be provided as necessary to prevent product backup into air lines. Air blow and agitation equipment should be routinely checked for proper assembly and cleanliness. Most air blow and agitation equipment is not satisfactorily cleaned by usual CIP methods and should, therefore, be dismantled and manually cleaned and sanitized routinely.

6. *Plant Environment (General)*

The general plant environment should be recognized as having a significant impact on the safety of finished product. Particular emphasis is required for general plant conditions. Special consideration of refrigerated areas is necessary, in light of the growth potential of certain organisms (i.e. *Listeria, Yersinia*) at refrigerated temperatures. Keeping floors, walls and ceilings clean, relatively dry and free from condensate buildup is imperative in order to minimize product contamination.

Special attention should be given to the cleaning and sanitization of all conveyor track and belt systems throughout the plant. These areas are difficult to keep clean, and equipment should not take place during production runs when product and/or product contact surfaces are exposed to the cleanup.

For chemical sanitizers to be effective, the surfaces to be sanitized must be clean. The proper concentration of the sanitizers must be in contact with all surfaces to be sanitized for at least the minimum recommended contact time. Some CIP systems may contain air agitators, or valves that do not pulsate (open and close) during the CIP cycle. These should be redesigned to eliminate this conditions. Caution is advised when significantly exceeding the recommended strengths of sanitizers to avoid creating a chemical hazard to either the product or plant employees.

The pooling of milk, water or other processing wastes, such as in ducts, floor plating, grouting, cracks, holes and other areas should be minimized. Pits for conveyor drive motors need to be routinely cleaned. Protection of product and containers from splash during cleaning while in storage rooms and coolers should be examined and any necessary corrective action taken. Returned goods should be isolated in a properly identified holding area.

Practices which may lead to aerosolization (formation of microscopic water droplets) such a condensate formation, the use of high pressure hoses, unshielded pumps etc., should be minimized. These aersols may act as vehicles in which pathogenic organisms such as *Listeria* and *Yersinia* may contaminate exposed product and product contact surfaces.

Listeria has been frequently isolated from floor drains in processing and other areas. Because of this potential, floor drains should not be located under or in close proximity to filling and packaging equipment. Floors and drains should be constructed and maintained to insure proper drainage. Brushes used for cleaning floor drains should not be used for any other purpose and should be cleaned and stored in proper strength sanitizing solution between uses Floor drains should be frequently cleaned and periodically flushed with a sanitizing solution. Floor drain covers and baskets should be cleaned and sanitized after each production run. Under *no* circumstances should high pressure hoses be used to clean drains.

A routine cleaning, sanitizing and inspection program should be established for casers, cappers, stackers, underside of equipment, undersides and brackets for packaging guiderails, and utility equipment such as parts tables, can dolly, etc. Use of hot water in processing areas during production should be minimized to prevent the formation of condensate while product is exposed. Condensate forms on cold surfaces in the presence of high humidity, which is created by wide temperature variations found in many dairy processing areas.

It has recently been demonstrated that porous materials such as wood, when used for construction of floors, walls, ceilings, etc., can harbor *Listeria*. Impervious materials such as tile, metal, cement, etc., should be used whenever possible to minimize harborages for such microorganisms. Stationary and moveable platforms and steps especially with hard to reach, open grid-patterned materials, need regular cleaning.

7. *Plant Traffic*

Employees should be trained to recognize the importance of cross contamination problems within the plant. Special emphasis in training employees in avoiding the spread of pathogens within the plant environment from outside the plant (home/farm, etc.) or from areas such as the machine shop, raw milk receiving area (manure from farms carried in on trucks, raw milk) is needed. Employees should understand that organisms can be carried on their clothing, boots, tools, etc.

A traffic pattern of restricting access to processing areas should be in place. Milk haulers and all other non-processing operations people should be restricted from entering the processing areas. The use of footbaths should be encouraged and monitored routinely for proper disinfectant strength and cleanliness. A continuing review and restriction of the movement of pallets, forklifts and other similar equipment from raw milk, case wash, dock or other such areas into processing/packaging areas is needed. Wooden pallets have been shown to be contami-

nated with pathogenic organisms such as *Listeria* and *Yersinia*.

8. *Personnel Cleanliness*

Employees with obvious illnesses, infected cuts, or abrasions, etc., should be excluded from working in processing areas or performing other functions which can contaminate product, product-contact surfaces or packaging material. The use of tobacco products, chewing gum, or other food for employee consumption should be permitted in any production area. Employees should not be allowed to wear hairpins, rings, watches, etc., in production areas. Special attention is needed to assure that street clothes are not allowed in the processing area and that plant clothing (including rubber boots) do not leave the plant. It is recommended that the laundering of all work clothing should be the plant's responsibility, and proper procedures for storing and issuing clean clothing need to be developed. Of equal concern is a potential problem associated with plant maintenance personnel working in raw milk areas and then working on pasteurized milk equipment without adequate cleanup of hands, tools, clothing, etc.

It is recommended that uniforms be color coded by department to control movement of employees into restricted areas. When the use of disposable single service gloves are necessary to handle exposed product contact surfaces during a production run, they must be maintained in an intact, clean and sanitary condition. Single service gloves should be thrown away whenever they become torn, contaminated or if removed for any reason.

Handwashing facilities must be properly designed and conveniently located near work station. Employees should be encouraged to use them frequently.

9. *Sampling and Testing*

It is recommended that particular emphasis be given to environmental sampling to detect any problems. Testing conducted by industry laboratories can plan an important role in successful management of sanitary practices. This testing should be a part of routine plant quality control operations. Testing is an additional tool that can be used to detect various conditions of plant sanitation as well as to monitor for unusual increases of bacterial counts during refrigerated storage.

Coliform testing can be used as an index for post-pasteurization contamination. Any coliform level detected should generate a review of plant practices. However, the presence or absence of coliform organisms may not always correlate with the presence of some pathogenic organisms, such as *Listeria*.

Actual analysis for pathogenic organisms should be done in a separate, isolated laboratory away from the dairy plant.

Dairy and Food Sanitation, Vol. 8, No. 2, Page 57, (February 1988)

Comparison of Two Stains For Use in Making Direct Microscopic Somatic Cell Counts

by Charlotte W. Hinz

Director of Laboratory Services
Upstate Milk Cooperatives, Inc.
7115 West Main Street
LeRoy, New York 14482

Introduction

Recently a modification of the Levowitz-Weber stain, called the Canadian Formula, became available.

A study was performed by five laboratories to compare the Levowitz-Weber modification of the Newman-Lampert stain with the Canadian Formula stain for Direct Microscopic Somatic Cell Counts.

Methods:

Thirty samples of farm bulk tank milk, ranging from 210,000 to 1,600,000 DMSCC/ml were compared. Duplicate smears were counted for each sample. The null hypothesis that the means for the two stains do not differ significantly at the $\alpha = 0.05$ level was tested.

An analysis of variance was computed using the $\log_{10}$ count to assure normality of the somatic cell counts. The results are shown in Table I. Since the stains are fixed variables and the samples are random variables, only B and AB effects are significant (1) at the $\alpha = 0.05$ level.

Thus, the stain means of 740,000 and 760,000 count/ml cannot be shown to differ at the $\alpha = 0.05$ level.

Conclusion:

The variance of 0.00080 and 0.00034 are well below the 0.00200 sometimes observed for the DMSCC.

Therefore, the Canadian Formula stain can be a satisfactory substitute for the current Levowitz-Weber stain.

Acknowledgements:

Dairylea Cooperative, Inc. Lab. - Syracuse, NY
Eastern Milk Producers, Inc. Lab. - Waverly, NY
Friends Laboratory - Waverly, NY
McAndrews Laboratory - Hamburg, NY
Upstate Milk Cooperatives, Inc. Lab. - LeRoy, NY
Food and Drug Administration - Cincinnati, OH

References

1. Ostle, B. and R.W. Mensing. 1975 Statistics in Research 3rd Edition. Iowa State University Press. Ames.

Table 1 — Summary of the Analysis of Variance.

Souce	Sum of Squares	Degrees of Freedom D F	Mean Square	F-Ratio
Fixed				
A-Stain	0.00253	1	0.00253	2.39
Random				
B-Sample	8.59548	29	0.029640	279.62*
AB	0.03074	29	0.00106	1.86*
Error	0.03423	60	0.00057	--
Total	8.66298	119	--	--

*Significant at the $\alpha = 0.05$ level

	Count/ml Geometric Mean	% Difference	Variance
L-W Stain	740,000	2.7%	0.00080(30)a
Canadian Stain	760,000		0.00034(30)a

a = Degrees of Freedom

Dairy and Food Sanitation, Vol. 8, No. 2, Pages 58-60,. (February 1988)

A Survey of Laboratory Control of Infra-Red Instruments Used in Analysis of Raw Milk Components

by Vernal Packard(1) and Roy Ginn(2)

(1)Department of Food Science and Nutrition, University of Minnesota, 1334 Eckles Ave., St. Paul, MN 55108. (2)Dairy Quality Control Institute, Inc., 2353 Rice St., St. Paul, MN 55113.

INTRODUCTION

Infra-red instruments provide an efficient method of measuring the level of raw milk components used in various pricing programs. Their extensive use in this regard has come about only recently in the United States. For this reason, little is known about their general level of precision (repeatability) and accuracy (agreement with reference test results) on a practical basis. Rather, it is understood that such instruments must be calibrated and monitored for calibration status by regular comparison of test results against control samples tested by reference methods. In addition, standards of precision and accuracy have been established by the Association of Official Analytical Chemists (1). These latter require a mean difference and standard deviation of the difference of duplicate analyses and analyses against reference samples to fall within prescribed limits. Such limits have been set for four components: fat, protein, lactose and total solids. Although no standards have been established for solids-not-fat (SNF), some payment plans make use of this group of components, and some examination of SNF variability seems appropriate.

The present survey purports to do not more than to provide a kind of overview of the progress made in infra-red control of milk analyses in several laboratories over the initial three years of control effort. The survey considers only the accuracy of the instruments, and does not distinguish between adjusted or unadjusted test results.

Methods

Nine laboratories using a total of ten infra-red milk analysis instruments were selected for this survey. These laboratories were purposely selected from among a larger number of laboratories participating in the DQCI control program for two reasons: (1) all were testing milk for five components (fat, protein, lactose, solids-not-fat and total solids) and (2) all had more or less regularly reported back the results of infra-red analyses done on control samples of milk. Although these reports were not solicited and represent both adjusted and unadjusted infra-red analytical results, the data nonetheless reflect general trends in analytical accuracy over the first three years (Jan. 1984 - Dec. 1986) of a fairly extensive control effort.

For the first one and one-half years of the time period, ten reference control samples were made available. During the last one and one-half years, twelve-sample control batches were provided.

It should be understood that "unadjusted" values of infra-red analyses reflect the status of the instrument *before* adjustments are made to improve overall calibration status. In a sense, these values indicate the extent of drift away from appropriate calibration between any two sets of control analyses. Some reports from the laboratories selected for this survey distinguished between adjusted and unadjusted results; others did not. Where such was known, *unadjusted* data were used. Although samples were made available on a weekly basis, not all laboratories assessed the status of infra-red units that frequently. Or some may have monitored the status more frequently than results were reported. In any event, the survey was undertaken as a way of obtaining a general overview of trends in infra-red analysis of raw milk, and are presented solely in that light.

Results and Discussion

Association of Official Analytical Chemists (AOAC) standards of accuracy (i.e., instrument vs. reference test results) are shown in Table 1. These data provide a basis for interpreting the information presented in this survey. Please note that standards exist for four components only (fat, protein, lactose, and total solids), and that values reflect a statistical comparison between infra-red and reference method analyses of a minimum of an 8-sample

set of comparative results. In other words, a minimum of eight samples ranging widely in component level(s) are tested by both reference and infra-red methods. The difference in results is recorded and averaged. A standard deviation of this difference is also determined. Results of such testing should be equal to or less than the value shown in the table.

Table 2 summarizes by year the grand average mean difference and grand average standard deviation of the difference of the ten instruments (nine laboratories) surveyed.

As an overall observation, it appears that instrument control generally improved over time. The values for 1986 for the most part are lower (the instruments more accurate) than those found in earlier years. This is true of both grand average mean difference and standard deviation of the difference of the ten instruments (nine laboratories) surveyed.

As an overall observation, it appears that instrument control generally improved over time. The values for 1986 for the most part are lower (the instruments more accurate) than those found in earlier years. This is true of both grand average mean difference and standard deviation of the difference. However, the grand average values do not always meet the AOAC standards shown in Table 1 (which, it must be made clear, are imposed upon *adjusted* infra-red test results). In fact, it is quite apparent that mean difference standards are much easier to meet than standard deviation standards. Or perhaps it is better stated to suggest that on either adjusted or unadjusted basis, infra-red units appear to maintain greater stability in terms of mean difference than standard deviation of the difference. In fact, only two of the grand average mean differences fail to meet AOAC standards. One of these fails the lactose standard (lab 8, 1984), the other, the total solids standard (lab 2, 1985). Most of the mean difference yearly averages fall well below the suggested standards, and for all four components. As a general rule, therefore, laboratory technicians/managers should expect little difficulty in this respect and should perhaps expect values to fall well below AOAC standards.

Standard deviation standards are obviously another matter. Here, most laboratories fail the test at least in terms of overall yearly averages. Improvements are apparent, but nonetheless often in excess of standard values. And it is interesting to note that the failure rate is about the same for fat, protein and total solids, but more frequent for lactose. Again, it is important to emphasize that the results reflect both adjusted and unadjusted values and might well -- and likely would -- be lower and even possibly within limits if adjusted values only had been considered. The lesson to be learned, it appears, is that instruments do drift -- they do vary from realistic operating standards -- and do require very regular monitoring in order to achieve their potential for accuracy. The grand averages for 1986 indicate that most of the laboratory workers represented in this survey came to understand that fact. Far more frequently do later values meet or come close to meeting the standards than those obtained during earlier years.

To focus more closely on present capabilities, the last report submitted by each laboratory over the three-year period was identified and the results collated. Table 3 shows these data.

Table 1. AOAC standards of accuracy of infra-red instruments used in analysis of components of raw milk.

Component	Mean Difference (%)(1) (≤)(3)	Std. Dev. of Difference (%)(2) (≤)
Fat	0.05	0.06
Protein	0.05	0.06
Lactose	0.05	0.06
Total Solids	0.09	0.12

(1) Average difference between the two methods in an 8-sample comparison of infra-red and reference test results.

(2) Standard deviation of the difference in an 8-sample comparison of infra-red and reference test results.

(3) Equal to or less than.

Table 2. Relative accuracy of infra-red instruments used in nine laboratories over the years 1984-1986.

			COMPONENTS TESTED									
			Fat		Protein		Lactose		SNF		Total Solids	
Lab No.	Year	No. of Reports	mean(%)	S.D.(%)	mean(%)	S.D.(%)	mean(%)	S.D.(%)	mean(%)	S.D.(%)	mean(%)	S.D.(%)
1	1984	50	.007	.118	-.014	.068	.017	.133	-.040	.134	-.034	.194
	1985	39	.021	.083	.004	.101	.004	.079	-.003	.131	.018	.172
	1986	45	.014	.051	-.003	.035	.019	.068	.002	.050	.015	.086
1	1984	48	.005	.127	.0009	.076	.038	.144	-.00006	.129	.003	.203
	1985	39	-.004	.109	.003	.085	.003	.073	.011	.108	.007	.154
	1986	44	.012	.033	-.004	.033	.013	.063	.004	.060	.016	.081
2	1984	31	.001	.149	.009	.039	-.014	.086	.056	.166	.060	.269
	1985	39	.001	.045	.0009	.035	.011	.060	.150	.210	.153	.237
	1986	7	-.006	.122	.009	.032	-.012	.082	.026	.179	.018	.236
3	1984	26	-.010	.090	.006	.154	.041	.137	-.006	.158	-.020	.179
	1985	23	.001	.052	.014	.040	.016	.057	.006	.074	-.009	.279
	1986	18	.005	.093	.003	.040	-.004	.105	-.017	.078	-.013	.139
4	1984	27	-.004	.087	-.015	.162	.025	.125	-.015	.145	-.018	.152
	1985	23	.008	.051	-.021	.090	-.015	.089	-.003	.111	.003	.122
	1986	21	.004	.127	.002	.092	-.017	.071	-.064	.510	-.063	.531
5	1984	27	.008	.096	-.010	.071	.046	.138	-.011	.136	-.007	.162
	1985	25	.006	.052	-.010	.034	-.009	.086	-.013	.057	-.009	.083
	1986	46	.021	.067	-.007	.048	-.007	.075	-.019	.092	.0007	.109
6	1984	28	-.026	.100	.0002	.074	.014	.295	-.006	.126	-.031	.153
	1985	21	.004	.085	-.004	.050	.004	.085	.009	.070	.011	.112
	1986	24	.004	.071	-.008	.042	.013	.086	.005	.061	.004	.100
7	1984	33	.012	.176	-.012	.108	.050	.125	-.042	.369	-.030	.413
	1985	39	.012	.116	-.013	.071	.027	.084	.018	.168	.029	.198
	1986		—	—	—	—	—	—	—	—	—	—
8	1984	24	.005	.170	-.0009	.065	.063	.190	-.0005	.170	.009	.250
	1985	41	-.010	.140	.017	.085	.007	.090	-.016	.166	-.027	.202
	1986	12	.0007	.056	.006	.086	.003	.062	-.005	.067	-.005	.072
9	1984	27	.017	.220	-.016	.071	-.012	.086	.006	.104	.006	.265
	1985	39	-.008	.056	-.009	.071	-.0002	.079	.006	.090	-.006	.110
	1986	26	.002	.038	.004	.093	-.0006	.258	-.014	.230	.0002	.071

Table 3. Relative accuracy of infra-red instruments on the final reporting date(1)

		Fat		Protein		Lactose		SNF		Total Solids	
Lab No.	Year	mean(%)	S.D.(%)	mean(%)	S.D.(%)	mean(%)	S.D.(%)	mean(%)	S.D.(%)	mean(%)	S.D.(%)
1	Dec. 86	.018	.022	-.016	.031	-.009	.045	-.006	.044	.012	.047
1	Dec. 86	.005	.021	-.043	.021	-.002	.032	-.026	.026	.010	.026
2	July 86	.004	.020	-.022	.033	.008	.087	.029	.091	.034	.093
3	Dec. 86	.001	.032	.025	.020	.012	.065	.045	.040	.045	.056
4	Dec. 86	.008	.029	.036	.019	.029	.025	-.029	.144	-.053	.149
5	Dec. 86	.029	.041	-.036	.038	.018	.032	-.040	.049	-.012	.041
6	Dec. 86	-.016	.023	-.031	.025	-.033	.051	-.029	.039	-.046	.041
7	Dec. 85	-.057	.033	-.045	.045	.161	.059	.126	.190	.070	.198
8	June 86	-.073	.060	.008	.034	.094	.038	.055	.068	-.020	.060
9	Nov. 86	-.013	.015	-.026	.025	-.032	.054	-.019	.049	-.034	.044

(1) Status is expressed in terms of the mean difference (mean) and standard deviation of the difference (S.D.) of infra-red results compared to control sample results.

It is readily apparent that most labs were within AOAC standards for most components. Only two labs each fall outside the mean difference requirements for fat and lactose. Two labs each also fail the standard deviation standards for lactose and total solids. Stating the situation

positively, eight of ten laboratories were meeting the AOAC standards for essentially all components.

It is also apparent that laboratories generally do better -- maintain somewhat tighter control -- in protein than fat analysis. Data in both Tables 2 and 3 generally indicate that fact. Quite possibly this is due to the somewhat more stable composition of protein than fat, thereby minimizing seasonal differences. As a matter of interest, however, a review of the data of this 3-year survey on a quarter-year basis indicated few, if any, differences in calibration status over the four quarters of any one given year. Seasonal influences may occur and may have some effect, but the differences appear to be small in comparison to other potential causes of variation in test result.

One last observation seems in order, and that relates to mean and standard deviation of the difference values for SNF. Although standards do not exist, data in Tables 2 and 3 suggest that values at least as low or lower than those for total solids should be reasonable expectations. Certainly a mean difference less than 0.09% and a standard deviation of the differences of less than 0.12% seem readily attainable, and laboratories might do well to use these or lower standards where milk payment is based on SNF as such.

Data from this survey seems to suggest that desirability of monitoring infra-red instruments in representative laboratories using identical sets of control samples. This can and should be done on a sample by sample basis, not only to validate reference test results on individual control samples, but to uncover any idiosyncratic behavior of instruments due either to some failure in maintenance or to specific compositional factors associated with a given producer's supply of control milk. Routine monitoring of this sort should also lend credibility to a control program by providing assurance that instruments are indeed in reasonable adjustment as compared to others or that deviations from the norm are a legitimate cause for undertaking corrective action. Such a program has now been undertaken by Dairy Quality Control Institute, Inc., and initial results appear most promising. A report of the effort will be forthcoming at a future date.

References

1. Association of Official Analytical Chemists 1984. Official methods of analysis. Sidney Williams, ed., Washington, D.C.

IAMFES Secretary Candidates

Austin D. Olinger

Austin is employed by Milligan Sales, Inc., City of Industry, California. Prior to joining Mulligan Sales, Inc. in 1984, Austin was associated with Jerseymaid Milk Products Company in Los Angeles for approximately 20 years in various capacities as Field Representative, Production Superintendant, and Manager of Milk Procurement and Quality Control. He was previously employed for four years by Safeway Stores, Milk Department, Portland, Oregon, as Quality Control Supervisor.

Austin is a graduate of California State Polytechnic University at San Luis Obispo, California, with a B.S. in Dairy Manufacturing.

Some of Austin's other accomplishments include: Local Arrangements Chairman - 74th Annual IAMFES Meeting at Disneyland Hotel; Past President - California Association of Milk and Dairy Sanitarians; Past Section Director - California Dairy Industry Association; and, 32° Masonn and is a Shriner.

Austin is married to Maureen and they reside in Upland, California. The have two children. A son, Captain Mark A. Olinger, U.S. Army, Fort Bragg, North Carolina and a daughter, Kristine M. Olinger, Fayetteville, North Carolina.

Damien A. Gabis

Damien Gabis is presently the President of Silliker Laboratories, Inc. in Chicago Heights, Illinois. In adjunction with Silliker Labs. Damien is an associate professor working in the Biology Department with the Illinois Institute of Technology in Chicago, Illinois. Prior to his work in Chicago, he was a bacteriologist on the Board of Health in Steubenville, Ohio.

Damien received his Bachelor's degree from the College of Steubenville, Ohio in Biology and his Master's degree from the University of Kentucky in Dairy Science-Bacteriology. He continued on to receive his Doctorate from North Carolina State University in Food Science-Microbiology.

Damien has a long list of publications and presentations. He is a member of several committees and others professional public service groups such as: the American Assoc. of Cereal Chemists Committee on Microbiological Methods, American Council of Independent Lab. Food and Drug and Agriculture Committee, a member of IFT, and a Graduate Student Adviser with the Biology Dept. at Illinois Inst. of Technology. Among other memberships he has been a member of IAMFES since 1974.

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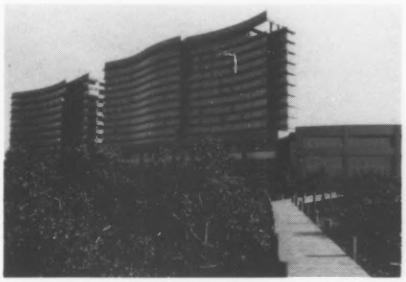

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News and Events

American Institute for Cancer Research Offers Free Breast Self Examination Kit

More than 75 percent of breast cancers are first discovered by women themselves. "That fact is one reason why learning proper breast self-examination and performing it on a regular basis is so important," stressed Marilyn Gentry, Executive Director of the American Institute for Cancer Research.

The Institute is now making available to women a free breast self-examination kit which includes instructions on the correct methods for self-exams, and reminder stickers to help a woman make such an examination a regular activity.

"A frightening fact is that so few women practice regular breast self-examination," noted Ms. Gentry, "yet all the research shows that early detection of breast cancer can be an important factor in saving lives."

Ms. Gentry also stressed the need for lowering cancer risk. "High incidence rates for breast cancer have been associated in many studies with high fat diets," she pointed out. This is why the Institute's Dietary Guidelines for Lower Cancer Risk emphasize lowering dietary fat intake from the current national average of 40 percent of calories to 30 percent or less.

"I urge women to practice regular breast self-examination and to change their diets for lower cancer risk. It can really make a difference," said Ms. Gentry.

For a free copy of the Institute's breast self-examination kit, please send a stamped, self-addressed envelope to American Institute for Cancer Research, Dept. BSE11, Washington, D.C. 20069. Telephone: 202-328-7744.

If It's Frozen, It's Hot, Anderson Tells Wisconsin Group

If it's frozen, it's hot, Steven C. Anderson, executive vice president and chief operating officer of the American Frozen Food Institute (AFFI) told members of the Wisconsin Food Processors Association in a Nov. 17 presentation.

Anderson, speaking at the group's annual convention, described the reasons behind the frozen food industry's recent success story and provided an overview of AFFI's public and trade relations program. He also described a number of legislative and regulatory issues facing the industry.

The retail public and trade relations program has been very active in interfacing with consumers of frozen food and informing the retail trade of the benefits, from a sales and profitability standpoint, of frozen foods, he said.

"This year, AFFI conducted a workshop entitled, "The New 'Wave of Frozen Food Sales" at the Food Marketing Institute Convention in Chicago. Not only did we stress the demographics that are leading to an increase in frozen food sales, Donovan Jon Fandre, host of the popular Public Broadcasting Service television show "Microwaves are for Cooking," stressed the natural, very positive tie-in between microwave ovens and frozen foods," he said.

Anderson outlined AFFI's highly successful America's New Traditional Homemaker Program for the group. "At first, this (the phrase New Traditional Homemaker) may seem to be a contradiction in terms, but let me explain. The New Traditional Homemaker is a consumer who lives a lifestyle that will make your head spin -- busy with career, family and outside interests. Yet in the middle of this whirlwind of activity, this consumer absolutely insists on providing good, nutritious meals for her or his family."

"The New Traditional Homemaker program has been very successful, and its growth from year to year indicates that success. This year, we selected 51 winners in new Traditional Homemaker contests in all 50 states and the District of Columbia. These winners were successful in conveying to the contest's judges the role frozen foods play in their busy lifestyles. Out of the 51 state winners, five regional winners were selected. And from the five regional winners, one national winner was selected. The national winner for 1987 is Barbara Brier of Bethel Park, Pennsylvania.

"The 1988 search for the New Traditional homemakers will be bigger and better than ever. There will be an expanded number of winners, more prizes, tie-ins with retailers in conducting the search, and greater publicity. We are truly excited about this program and the role it plays in taking the positive message of frozen foods to the consumer," Anderson said.

"AFFI also had an exciting year with our foodservice public and trade relations program. The biggest battle our members are fighting in the foodservice market is the frozen versus the so-called fresh. We've all been reading and hearing about patrons' demand for "fresh" foods, but we also know that frozen foods are vital to maintain a healthy foodservice industry."

"This year, AFFI completed a first step to encourage operators and distributors to reach into their freezers for the good food their patrons demand -- a comprehensive marketing brochure detailing the benefits of frozen foods," Anderson told the group.

"In this brochure, we have addressed the concerns of foodservice marketing decision-makers: menu

trends, pricing and, above all, satisfying the patron. Last month, the brochure was featured in a mailing targeted at 15,000 multi-unit and high-volume individual foodservice operations. Our members are also distributing the brochure to their distributors and operators."

"The 1988 foodservice program has already been developed and it will continue to confront the pressure from so-called fresh produce and meats. The foodservice brochure will be distributed to foodservice menu decision-makers in 1988. The brochure will be offered through direct mail to targeted foodservice operators, publicity placements and advertisements in trade magazines," he said.

Placements on frozen food within the foodservice trade media will support the use of frozen foods in contemporary menus and spotlight their value. A celebrity chef spokesperson will reach key operators and distributors through workshops at regional industry trade shows. A follow-up direct mail piece will continue to generate interest among key decision-makers.

"A videotape will be produced focusing on the marketing of frozen foods in the front-of-the house. The video will be a companion piece to the foodservice brochure. Also in 1988, we will conduct research to substantiate claims that frozen food's quality is comparable to that of so-called fresh food. The study will be designed to determine whether consumers can tell the difference between fresh and frozen vegetables," he noted.

Effective Government Relations

Another one of AFFI's strengths is in the area of government relations, Anderson told the group.

"The 100th Congress, which began its first session in January of this year, has been one of the most active in recent years on numerous issues affecting the frozen food industry. With the Democrats in control of the Senate and the House of Representatives for the first time since the election of Ronald Reagan as President, the focus on many issues in Congress has changed considerably."

"The Democrats have targeted as top priorities trade measures, plant closing proposals, new taxes on chlorofluorocarbons, restrictions on the use of pesticides, mandated employee benefits, food labeling initiatives, clean water legislation, country-of-origin markings on food products, user fees for meat and poultry inspection and other issues."

AFFI has been actively involved in all of these issues, and many more, he said, outlining the Institute's work on major issues.

He praised the Wisconsin Food Processors Association and other association for excellent work in monitoring state legislative and regulatory activity.

"Those of us in Washington are glad there is an organization in Wisconsin such as the Wisconsin Food Processors Association to keep a keen eye out on behalf of not only Wisconsin processors, but for all of our other members who distribute and sell product here."

"The Wisconsin Food Processors Association is a leader in the very valuable work of state and regional associations working in behalf of food processors. The American Frozen Food Institute has benefitted from a long standing working relationship with your group, especially in matters of legislation, regulation, and food technology," Anderson said.

For more information, contact: Scott Ramminger, American Frozen Food Institute, 1764 Old Meadow Lane, Suite 350, McLean, VA 22102-4399. Telephone: 703-821-0770.

Rapid Methods and Automation in Microbiology

The Eighth International Workshop on Rapid Methods and Automation in Microbiology will be held from July 8 to 15, 1988 at Kansas State University. The workshop is certified by the American Society for Microbiology for Continuing Education Credits.

Some lectures on the agenda include: Introduction to conventional and miniaturized methods Multi-media Diagnostic Kits; Comparative Analysis of Diagnostic Kits; Salmonella Detection-Conventional vs Rapid Methods; Emerging Pathogens-*Campylobacter, Listeria, Yersinia,* Hemorrhagic *E. coli.;* Rapid Detection of Microbial Toxins, and a look into the future.

For more information, contact: Dr. Daniel Y.C. Fung, Director, Food Science Graduate Program, Call Hall, Kansas State University, Manhattan, KS 66506. Telephone: 913-532-5654.

Ashland Chemical Company now has available a new bulletin describing its line of high-purity additives and specialities for the production of food and beverages.

Ashland Chemical's Food and Beverage Products Group represents many leading producers and carries a full line of food grade ingredients and additives to meet the needs of the food processing industry. The bulletin contains a representative listing of commonly sold products. Ashland also stocks a wide variety of additional items locally to meet specific market needs.

The bulletin lists the more than 70 warehouses and distribution locations Ashland uses to provide customers with just-in-time delivery service, and describes additional customer support services.

Ashland Chemical Company, a division of Ashland Oil, Inc., is a leading producers and distributor of chemicals and specialty chemicals for industry.

To secure a copy of the new bulletin, write Ashland Chemical Company, PO Box 219, Columbus, OH 43216. Request bulletin #1677. Telephone: 614-889-333.

Record 26,241 Attend Dairy & Food EXPO '87

Food & Dairy EXPO '87 attracted 26,241 attendees to Chicago's McCormick Place North September 26-30, making it the largest show ever produced by Dairy & Food Industries Supply Association (DFISA).

The total controlled attendance record, combined with the record 531 exhibitors on a record 297,185 net sq. ft., helped Food and Dairy EXPO edge Germany's DLG-FoodTec and France's SIEL to become the world's largest exhibition for dairy and pumpable foods.

Food & Dairy EXPO '87, the 45th exposition sponsored by DFISA, has a long and successful history of bringing together Food & Dairy processors and suppliers and "this EXPO was no exception," said DFISA President Robert C. Anderson, Jr. of Anderson Instrument Co. "The show was excellent from every standpoint."

"The exhibitors were extremely happy, and the processors were pleasantly overwhelmed wit the scope and array of new ingredients, packaging technology, processing and transportation equipment and services offered to them on the show floor," Anderson said.

Total Processor attendance for the 5-day show was 10,852, compared to 12,065 exhibitors. Included in the total are more than 2,000 international food and dairy processors from 92 countries.

Anderson stated that anyone walking the crowded aisles at the show would have been impressed with the number and variety of exhibits. "Virtually every aspect of the dairy and pumpable food industries was on display at the show," Anderson said.

An on-site survey of processors at EXPO by Robert E. Pitts Ph.D. of DePaul University disclosed that 62% of the processors interviewed reported that Food & Dairy EXPO was the most valuable show available for their needs. Seventy five percent of th dairy processors consider EXPO to be the most valuable they attend.

DFISA's Food & Dairy EXPO '89 will be held September 30 through October 4, 1989 at the Anaheim Convention Center, Anaheim, California, U.S.A. For more information, contact: DFISA, 6256 Executive Blvd, Rockville, MD 20852. Telephone: 301-984-1444; Telex: 908706 DFISA ROVE.

MIF/IICA Call FDA Policy "Unwarranted," Urge Adoption of USDA Listeria Testing Program

Calling the U.S. Food and Drug Administration's (FDA) insistence on Class I recalls whenever *Listeria monocytogenes* is found in dairy products "unwarranted," the Milk Industry Foundation (MIF) and the International Ice Cream Association (IICA) have urged the agency to adopt a testing and enforcement program more similar to that used by the U.S. Department of Agriculture (USDA).

"FDA's listeria policy is clearly unwarranted," says MIF/IICA Executive Vice President E. Linwood Tipton. "It's creating an undue hardship on the dairy industry, a hardship not being faced by other food industries."

"We think the USDA approach is much more reasonable and encourages companies to implement long-term solutions to prevent future listeria problems," says Tipton. "FDA should undertake a review of its current program and adopt the USDA testing and enforcement approach for its monitoring of the dairy industry."

The two government agencies have implemented vastly different testing and enforcement programs for listeria, according to MIF/IICA. FDA monitors the dairy industry; USDA has jurisdiction over the meat industry.

Significant among the differences, says MIF/IICA, is at least a 50-fold size difference in sample quantities tested by the two agencies for the same microorganism. USDA uses a one gram sample of product when testing for listeria, while FDA tests at least 50 grams of product. The larger the quantity of product tested, the greater the probability of testing positive for the microorganism.

MIF/IICA have also taken issue with what it calls FDA's "one bug mentality." FDA has insisted on a Class I recall whenever a positive sample is found, regardless of the extent or level of listeria present in the product.

USDA's listeria testing and enforcement program, on the other hand, calls for the testing of a single monitoring sample. If this sample is positive, USDA does not initiate a recall but, rather, notifies the company and allows it time to correct the problem before six follow-up samples are tested. If the follow-up samples test positive, USDA then initiates regulatory action.

Dairy processing companies have undergone more than 20 Class I recalls, costing over $70 million, since the stringent FDA testing and enforcement program was begun in April 1986. Yet there have been no documented cases of listeriosis traceable to beverage milk or ice cream products.

MIF/IICA requests a review of FDA's program and urged the adoption of th USDA approach in a recent letter to Health and Human Services Secretary Otis R. Bowen and Agriculture Secretary Richard E. Lyng.

For more information, contact: Glenn Witte, MIF/IIAC, 888 Sixteenth St., NW, Washington, DC 20006. Telephone: 202-296-4250.

Genetic Engineering Enables Mice to Secrete Human Protein in Milk

By applying the latest techniques of genetic engineering, investigators have induced laboratory mice to secrete in their milk a human protein called tissue plasminogen activator (TPA). The protein, found naturally in human blood, is an experimental anti-clotting agent that shows promise as a treatment for heart attacks and various clotting disorders. The study shows the feasibility of using animal milk as a source for large quantities of certain therapeutic proteins, which are now difficult and expensive to produce. Scientists from the National Institutes of Health, the biomedical research arm of the Federal government, and from Integrated Genetics Inc., a biotechnology company, described the advance in the November 1987 issue of the journal *Bio/Technology*.

This is the first published report in which a research team has, by introducing into mice a combination of human and mouse genetic material, induced the animals to produce a biologically active human therapeutic protein in the milk. By using genetic material that regulates protein production in the mammary glands of mice, the researchers were able to confine the tissue plasminogen activator almost entirely to the milk, causing no harm to the animals or their offspring.

The success with transgenic mice brings scientists one step closer to applying the same technology in animals that produce larger quantities of milk, such as sheep, cows and goats. It is expected that genetic engineering techniques may enable these animals to secrete in their milk large quantities of medically important proteins, such as cardiovascular proteins used in the treatment of heart disease and blood clotting factors used in the treatment of hemophilia. These proteins are now produced by bioengineering methods that are generally more expensive and less efficient, relying on cell cultures or on isolation and purification from animal and human sources.

Integrated Genetics (NASDAQ: INGN) utilizes proprietary techniques based on recombinanat DNA technology in the research, development, manufacture and marketing of products for the health are industry.

The National Institute of Diabetes & Digestive & Kidney Diseases and the National Institute of Child Health and Human Development are part of the National Institutes of Health, a agency of the Public Health Service under the U.S. Department of Health and Human Services. The mission of the National Institutes of Health is to improve human health care through biomedical research. For more information, contact: Nan DuCharme, Integrated Genetics, Inc., telephone: 617-872-8400.

International Conference on Mastitis to be held in St. Georgen/Langsee, Carinthia, Austria from May 29 - June 2, 1989.

The scientific program of the International Conference on Mastitis will cover the following areas:

1. General aspects of mastitis
2. Current knowledge of cytological aspects of mastitis
3. General view of machine milking
4. Chemotherapy of mastitis
5. Immunology regarding mammary gland
6. Pathogenesis of mastitis
7. Diagnostic methods of mastitis
8. Residues associated with mastitis treatment

Scientists are invited to contribute to the scientific program by presenting a paper or poster respectively on one of the subject mentioned above. Short communication will be preferred.

Participation, paper or poster presentations should be addressed to: Congress Secretariat, Prof. Dr. E. Glawischnig, International Conference on Mastitis, II. Medizinische Universitatsklinik for Klauentiere, der Veterinarmedizinischen Universitat in Wien, Linke Bahngasse 11, A-1030 Vienna, Austria. Telephone: 0222/73 55 81 ext. 500, 501.

New Bulletin Describes Food and Beverage Products Available from Ashland Chemical Company

Ashland Chemical Company now has available a new bulletin describing its line of high-purity additives and specialities for the production of food and beverages.

Ashland Chemical's Food and Beverage Products Group represents many leading producers and carries a full line of food grade ingredients and additives to meet the needs of the food processing industry. The bulletin contains a representative listing of commonly sold products. Ashland also stocks a wide variety of additional items locally to meet specific market needs.

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To secure a copy of the new bulletin, write Ashland Chemical Company, PO Box 219, Columbus, OH 43216. Request bulletin #1677. Telephone: 614-889-333.

American Dairy Products Institute Announces 1988 Annual Meeting and Technical Conference Plans

The American Dairy Products Institute will hold its 2nd Annual Meeting in conjunction with a Dairy Products Technical Conference during the period April 18-21, 1988, at the Chicago O'Hare Marriott Hotel, Chicago, Illinois. The Annual Meeting portion of this program will be held on Monday and Tuesday, April 18 and 19, 1988, and the Technical Conference will take place Wednesday and Thursday, April 20 and 21, 1988. A wide range of subjects will be addressed by knowledgeable industry, state and national government and university speakers.

All evaporated and dry milk and whey products manufacturers, allied industry representatives interested in the processing, marketing, and utilization of these products, government and university representatives and end-products users are invited to attend the meeting.

Additional information about the meeting can be obtained by contacting: Dr. Warren S. Clark, Jr., Executive Director of the American Dairy Products Institute, 130 North Franklin St., Chicago, IL 60606. Telephone: 312-782-4888.

Sonoco Signs Licensing Agreement to Market and Manufacture Versatile Tritello^{R} Food Package

Sonoco Products Company has signed a licensing agreement with Akerlund & Rausing of Lund, Sweden, to manufacture and market the Tritello^{R} food container in Canada, Mexico and the U.S. Production is expected to being Spring 1988.

Tritello, a popular European food package, is a versatile, value-added paper/plastic container with a wide variety of single and multiple serving applications. Appropriate end uses include frozen and chilled foods, dairy products and deli foods. It is available in a wide range of shapes and sizes, is tamper-resistant and brings attractive, table-ready convenience to the consumer.

The package consists of a thermoformed plastic liner heat sealed to a preprinted paperboard exterior. The printable paperboard exterior adds rigidity to the container and provides excellent graphic possibilities on a six surfaces, a key marketing advantage in today's competitive product environment.

The Tritello container can be hot or cold filled and will be developed to withstand cooking in both microwave and conventional ovens.

For more information, contact: Charles Coker, Jr., TablePac Group^{TM}, Sonoco Products Company, North Second Street, Hartsville, SC 29550. Telephone: 803-383-7000.

Dr. Greswaldo A. Verrone and Kathy Hathaway.

A Visit to Ames by Chief Sanitarian of the Sanitarian Professional Advisory Committee

Dr. Greswaldo A. Verrone visited the Ames office in November and met with Kathy Hathaway, Executive Manager of IAMFES. He would like to convey to other sanitarians the importance of belonging to an association such as IAMFES and feels the benefits are endless.

Food Labels and Food Safety

Most products in food stores have dates and handling directions on them, even though manufacturers are not required to put this information on packaging.

"The date stamped on product packages can indicate product freshness and serve as a guide to safe storage time, if you know how to use it," says Marilyn Haggard, a Texas A&M University Agricultural Extension Service nutrition specialist.

She explains that the "sell-by" date is the last day the product should be sold, the "use-by" date indicates how long the product will retain top eating quality after purchase, and the "expiration date" tells the last day the food should be eaten or used.

"Reading handling directions can also help you make sure food remains safe to eat," says the specialist.

All perishable products must give handling instructions, such as "keep frozen" or "keep refrigerated," notes Haggard. Some meat and poultry products may be labeled "ready-to-eat" or "fully cooked," which means no further cooking is necessary.

The specialist advises checking the labels of aseptically packaged products, since many will require refrigeration after opening.

"Although some product labels carry directions on how long and at what temperature to cook a product, the directions are not required or verified by the U.S. Department of Agriculture," she remarks.

"When cooking instructions are not included on the label or you have some doubts about them, the safest course is to cook the product thoroughly," Haggard adds.

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

New Product News

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

Pre-Washed VOA Vials Available

• Scientific Specialities, Inc. is offering it's line of pre-washed VOA Vials for use in water determination and similar work, and other glass vials, bottles, jars, and culture tubes in it's new catalog/price list #887.

The new catalog/price list which will be sent on request to interested readers, covers the complete line of Sci/Spec Teflon® Caplin-ers which range in size from 5/16" thru 5" in standard (non-adhesive, pressure-fit) Teflon®, A-B (adhesive-backed) Teflon®, and Septrseal (Silicone/Teflon®) Septa; as well as glass vials, bottles, jars, and culture tubes with various closures (Teflon® lined caps, Teflon®/ Silicone Septa with closed-top or open-top caps, regular pulp and saran lined caps, etc.).

The new catalog also includes Teflon® Sealing tapes in roll widths from 3/8" up to 7" and Teflon® Pressure Sensitive Tapes in roll widths from 1/4" up to 12" for laboratory and industrial uses.

Scientific Specialities Service, Inc. is a manufacturer and distributor of plastic and glass containment products to the health research and environmental control areas.

For additional information, contact: S. Leonard Grebow, Product Manager, Scientific Specialties Service, Inc., PO Box 352, Randallstown, MD 21133. Telephone: 301-964-9666.

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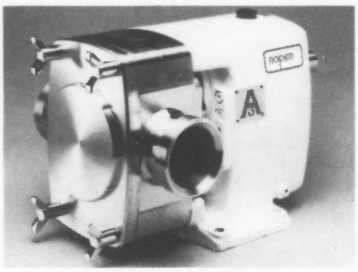

Roper Sanitary Rotary Lobe Pump

Roper Pump Company

• Responding to the needs of today's growing food and pharmaceutical industries, Roper Pump Company is introducing a sanitary rotary lobe pump designed to meet their exacting demands.

This Roper sanitary positive displacement pump incorporates the elements critical to food and drug applications and is the first rotary lobe pump available with the choice of manually cleaned, CIP (cleaned-in-place) or asceptic liquid ends.

Available in 17 models, the Roper sanitary rotary lobe pump is 3A-approved and meets all FDA specifications.

All the wearing parts of the pump are in a single-assembly cartridge, allowing easy on-site repairs.

The first stainless steel rotary lobe pump was introduced in England by The Howard Pump Company in 1932 and models over the years have been successful in European and Japanese sanitary pump markets.

Roper Pump Company has identified the Howard Pump Company as the manufacturer of the highest quality line of fully sanitary rotary lobe pumps to offer the United States market.

FEATURES
- Seventeen 3A-approved models
- Meets all FDA specifications
- Handles viscosities from 1 to 1,000,000 cps
- Handles temperatures from -40°F to 400°F
- Handles pressures up to 300 psi for maximum capacities of 1,000 GPM
- Hygienic fully swept AIS 1316 stainless steel pumping chamber
- Vacuum extraction down to 720 mm Hq
- Delivers capacity to 3,700 litres/minute

The Roper Pump Company, located in Commerce, GA, has provided a wide range of pumps for more than 135 years. Jeff Markham, Roper's vice president of sales and marketing said, "The addition of the sanitary rotary lobe pump allows Roper to provide a time-tested product of unmatched quality to industries who rightfully demand reliability, durability, and quality." He added, "This is a new product on the U.S. market but it is backed, as all Roper pumps are, by our nationwide network of distributors and the Roper team of application engineers."

For further information, contact: Pat Kerley, Sawyer Riley Compton, Inc., PO Box "0", Gainesville, GA 30503. Telephone: 404-532-6285.

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Tectron Engineering

Falkenberg, Inc.

• Fed up with the bulkiness of those so-called "portable" sprayers? Then you'll love the Spotlyte Sprayer from Falkenberg. Cradled in a sturdy steel frame, it's available with large pneumatic tires (optional), for moving by hand or towing, or without wheels for mounting on a truck, tractor or ATV. The Spotlyte has a 20 gallon high-density polyolefin tank with eight-inch vented lid and 20 year U.V. protection.

A whisper quiet 60 psi, 1.8 gpm triplex diaphragm pump delivers the goods to the 30 feet of 3/8" nylon reinforced hose and lightweight gun with adjustable conejet nozzle. Options available include the wheel kit, additional hose lengths, 12 volt or 110 volt connections, and 18 foot broadcast spraying kit.

For more information about the most convenient sprayer on the market today, call toll free at 1-800-424-7867. Or contact: Falkenberg, 9420 S.E. Lawnfield, Clackamas, OR 97015.

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on your Reader Service Card

Tectron Engineering

• Tectron Engineering, recognized for years as a leader in metal detection for the mining and aggregate industries, is pleased to introduce its small particle detector, the Model 5500.

The Model 5500 is a high sensitivity metal detector specifically designed for use in any process flow where the detection of small pieces of metal is required. Tectron Engineering has successfully applied its pulsed eddy current technology, previously used only in heavy industry, to small particle detection. With this unique capability, the Model 5500 detects magnetic, non-magnetic, ferrous and non-ferrous metals without the need to continually adjust for conductive product content such as salt or moisture. Special features also include the detection of metal contaminant in metalized mylar film packages.

No belt cutting is required for installation, therefore Tectron detectors conveniently mount on existing conveyor systems. The Model 5500 also features field replaceable electronics for reliability and ease of maintenance. Each detector is fabricated and calibrated to suit the user's particular application. U.S.D.A. approved detector and conveyor combinations are available.

For more information, contact: Tectron Engineering, PO Box 19629, Irvine, CA 92713. Telephone: 714-855-9867.

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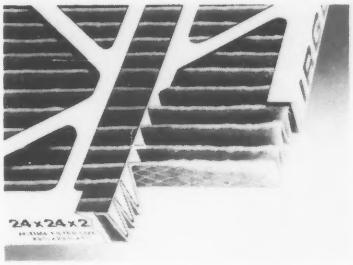

New Concept in Air Filters

• A new type extended surface air filter being introduced by Airguard Industries, Inc. is designed to increase dust retention by 15% and provide a commensurate longer life cycle. Type DP is the name of the new 2" disposable air filter which features individual die cut fingers, separating and reinforcing each pleat. The fingers, which are an integral part of the frame, enhance overall filter rigidity and maintain pleat alignment under extreme velocity, turbulence or other demanding application conditions.

Airguard Industries' new DP pleat reinforcing finger design allows reduction of the filter edge flange, thereby offering maximum utilization of the entire filter's cellular surface area. Type DP extended surface filters have been tested under ASHRAE STANDARD 52-76 to deliver up to 2500 CFM. The new product is offered for use in areas requiring a higher degree of air cleanliness, but, where cost or space limitations prevent system modifications. Type DP filters are available in two efficiency ranges and a wide range of standard sizes from Airguard distributors.

Airguard Industries, Inc., with corporate headquarters located in Louisville, Kentucky, is a major producer of after market air filtration supplies. Continuing product development at Airguard Research Center has evolved an air filter replacement supply line to meet customer needs regardless of the original equipment installed. Product distribution is worldwide.

For further information, contact: Jim French, Manager, Marketing Systems, Airguard Industries, Inc., PO Box 32578, 3807 Bishop Lane, Louisville, KY 40232. Telephone: 502-969-2304.

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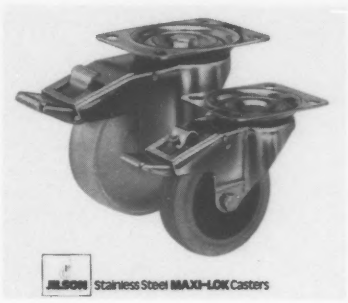

Jilson Heavy Duty Stainless Steel Casters

• Jilson, Casters, Inc. has just introduced a new line of heavy duty stainless steel casters. Every single metal part - housing, top plate, swivel balls, raceways, axle, bushing, stem, kingpin - is made of corrosion resistant stainless steel.

Wheels have corrosion proof plastic hubs. Standard tire materials include black cushion rubber, solid white nylon or durable resilient polyurethane. Other tire materials are available and include grey cushion rubber, SuperSoft shock absorbing rubber and phenolic.

Jilson heavy duty stainless steel casters are available in free swiveling or stationary designs. The swivel caster can also be supplied with our patented Maxi-Lok brake mechanism. The Maxi-Lok simultaneously brakes the wheel and locks the swivel head in any position, thus holding the equipment firmly in place.

Jilson stainless steel casters are available in wheel diameters of from 3" to 8" and in capacities up to 550 lbs. Jilson also offers a complete line of carbon steel casters with capacities up to 20,000 lb. For more information, please contact: Lloyd Astmann, Jilson Casters, Inc., 20 Industrial Road, Lodi, NJ 07644-2608. Telephone: 201-471-2400.

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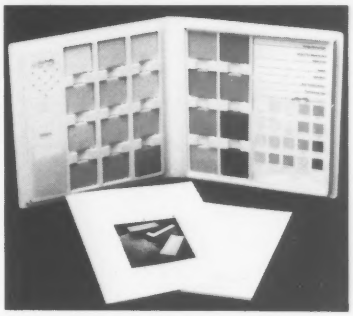

FUNCTIONAL COLORS: The Rhapsody Color Collection Provides New Options for Interiors

• When Stark Ceramics decided to introduce a new line of structural glazed facing tile (SGFT), we wanted the product to meet functional, aesthetic, FDA, and human response considerations.

Called the Rhapsody Color Collection, Stark's new SGFT line was introduced in June at the American Institute of Architects annual convention in Orlando, Florida. The new line is designed for food processing plants, including canneries, meat packers, dairies, commissaries, and similar facilities where durability sanitation and very low maintenance are requirements.

Integrity of design is assured because the Rhapsody colors remain true for the life of the structure. The ceramic glazes won't peel, fade or discolor. In addition, the extremely hard, impervious glazed finish stands up to lactic acid and repeated steam cleaning. Hard-to-remove stains wipe clean with soap and water.

The finish hardness prevents keys, common knives and other ordinary wear from scratching the SGFT surface. Also, cigarettes, matches and lighter flame cannot mar the finishes, which are fired at temperatures in excess of 2,000 degrees F.

Stark's SGFT product is UL-listed at zero flame spread and zero smoke development. The finishes and their clay bodies are completely fire safe and won't produce toxic smoke.

Located in Canton, Ohio, Stark Ceramics is the country's largest manufacturer of structural glazed facing tile. The company's three automated kilns also produce the Millennium Collection exterior masonry units and large-scale brick.

For more information, contact: Stark Ceramics, Inc., PO Box 8880, Canton, OH 44711. Telephone: 216-488-1211.

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Food and Environmental Hazards to Health

Another Hazard in Undercooked Pork

For decades, the concern with undercooked pork has been the potential development of trichinosis. As a result of such caution, this disease is relatively rare in the United States today. Moreover, U.S. pork producers - through more stringent inspection and improved animal breeding - are working toward meat certified as trichina-free, notes Veterinarian Jitender P. Dubey of the Agriculture Department's Animal Parasitology Institute in Beltsville, MD.

These trends worry him because they may lead to complacency, and this is especially dangerous, he suggests, because a study he and his colleagues recently completed indicates that undercooked pork can harbor a far more serious potential health hazard than trichinosis.

The researchers recently reported the first finding of the protozoa *Toxoplasma gondii* in commercial cuts of pork. Like the parasitic trichinia worm, *T. gondii* can be killed by cooking meat or edible organs (like brain and heart) to an internal temperature of 158 degrees F. However, with trichinosis scares on the move, Dubey worries that consumers may be tempted to serve rarer pork - a practice that has been advocated in some areas of the world, including France.

Humans ingesting the live *T. gondii* parasite may contact toxomplasmosis. In a developing fetus or an immunocompromised individual, including those with AIDS or undergoing cancer therapy, this disease can eventually lead to blindness, mental retardation, even death. Of the estimated 3,300 U.S. infants born each year with this infection (contracted through the mother), about 6 percent soon die, according to National Institute of Health sponsored research. How many of the rest develop related problems later in life is not known.

Implications of the new pork findings are described in a related report by Dubey in the July 15 *Journal of the American Veterinary Medical Association* (in the May 1 issue of the journal, Dubey's group reported the initial discovery of *T. gondii* in pork). According to Dubey, an estimated one in three pigs may be infected with the parasite. Though cat feces have long been considered the leading source of human infection, Dubey notes in the new report that French pork may be the main meat source of *T. gondii* infection in the United States. However, he says, because an estimated 6 percent of all hamburger may also be contaminated with pork during grinding, many people who eat rare or raw ground beef may also risk picking up the *T. gondii* infection.

NYSMFS Newsletter 3/87.

Microbiological Standards of Imported Foods

John P. Schrade
Supervisory Microbiologist - FDA
NY Regional Laboratory
840 Third Avenue
Brooklyn, NY

The New York District of the Food & Drug Administration has concentrated efforts to more closely focus on imported commodities coming into this country. More than 30% of the nation's imported commodities are entered through the ports of New York and Newark including JFK & Newark International Airports. These areas handle more than 45 billion dollars worth of goods yearly, of which approximately 5 billion dollars are of food products. The greatest volume of food products include cheeses, tea, seafood, spices, nutmeats and fresh fruits and vegetables.

Since FDA receives more than 1500 entries per day, several factors are taken into consideration for sample collection and examination. These include the history of the commodity, the shipper and the importer; import alerts which are headquarters' generated notices identifying current or emerging problems; blocklists which are lists of products identified for automatic detention based upon a violative history; detention lists which show products that were detained by other FDA Districts. Samples of imported commodities are examined for pesticides, filth, aflatoxins, heavy metals, phosphatase, decomposition and a diversity of microbiological tests.

Recent problems with imported cheese necessitated FDA to undertake an extensive survey of all soft and semi-soft cheeses. During the past 8 months, more than 1000 samples were examined for *Listeria monocytogenes*. *E. coli*, and Enteropathogenic *E. coli* of which 23 were found to be in violation. The testing of seafood products for *Salmonella sp.* is also a high priority. Violative analytical findings have resulted in a blocklisting of certain shrimp packers in India, Pakistan, Japan, Taiwan, Thailand, Bangladesh and Indonesia. Black pepper from Brazil has also been blocklisted because of *Salmonella sp.* contamination. Imported canned foods are routinely examined for *Clostridium botulinum* and its toxin. Analysis includes gas chromatograph testing of any headspace gases and a thorough examination of the can seams. The Microbiology for *Pseudomonas sp.* and drugs and devices for sterility.

NY State Association of Milk and Food Sanitarians 1986 Annual Report Jan. 1987.

Outbreak of Occupational Hepatitis-Connecticut

On September 28, 1986, a previously healthly, 40-year-old male factory worker who had experienced several days of abdominal pain and nausea was seen at the emergency room at Yale-New Haven Hospital, New Haven, Connecticut. Liver function tests revealed an elevated aspartate aminotransferase (AST) level of 949 U/L (normal = <35 U/L). Alkaline phosphatase and bilirubin assays were all normal. Hepatitis A IgM antibody and hepatitis B surface antigen and antibody were negative, as was an abdominal ultrasound.

Further history revealed that the patient had become ill after working for <2 weeks at a plant where fabrics are coated with a polyurethane polymer. He had no history of significant alcohol use or blood transfusions. When the patient was removed from the workplace, his symptoms resolved. Subsequent liver function tests have revealed partial resolution of his hepatitis. However, 2 months later, his alanine aminotransferase (ALT) level was still elevated at 207 U/L (normal = <32 U/L), and his AST level was 49 U/L. Within 1 month, three other co-workers were seen with similar symptoms and liver enzyme abnormalities.

Inspection of the patients' workplace showed that large quantities of dimethylformamide (DMF), a solvent which is widely used in manufacturing acrylic fibers and polyurethanes, were being used in poorly ventilated areas. DMF and smaller quantities of other solvents including toluene; methyl ethyl ketone; and 1,1,1 trichloroethane were mixed with polyurethane polymer, coated onto the fabric, and then evaporated from the polyurethane-coated fabric as it dried. The company has 66 employees, most of whom work directly in the production of polyurethane-coated materials. The employees are generally young (mean age = 35 years) and healthy.

Forty-five of the employees agreed to have liver screening tests, including AST, ALT, bilirubin, Y-glutamyl transpeptidase (GGT), alkaline phosphatase, and lactate dehydrogenase. Thirty of the 45 employees screened had elevated levels of AST, ALT, or GGT. Eleven had elevations that were more than twice the normal level for one or more of these liver enzymes. In all but one employee, the ALT level was greater than the AST level. In addition, workers directly involved with producing the polyurethane-coated material had higher liver enzyme elevations than did nonproduction workers.

Based on these findings, the professional staff at the Yale Occupational Medicine Program urged immediate termination of the production process until protective engineering controls had been adequately installed. These instructions have been followed. This cohort of workers will be followed to help ascertain whether DMF causes chronic liver damage.

Editorial Note: Although the hepatotoxic effects of industrial chemicals such as carbon tetrachloride (CCl_4), chlordecone (kepone), and monovinyl chloride are widely known, occupationally induced liver disease is regarded by some as a historic problem. However, there is continuing evidence that chemically induced hepatic disease is an important occupational health problem for selected U.S. workers. This outbreak of subacute hepatic disease, occurring during routine workplace exposure to DMF, without evidence of a chemical spill or accidental release, further, emphasizes the importance of this problem.

Because of its excellent solvent properties and lack of volatility, DMF, is widely used in manufacturing polymerized films, fibers, and coatings, particularly in acrylic and spandex fabrics. It is readily absorbed through the skin and lungs, metabolized by the liver, and excreted in urine. In several earlier toxicologic assays, chronic exposure to DMF produced liver abnormalities in cats, rats, mice, and dogs. When these occurred, air concentrations were above the current federally permissible exposure limit (PEL) of 10 parts per million. There have been several reported cases of human liver injury accompanied by abdominal pain and elevated hepatic transaminases, but these have been attributed to accidental overexposures. An antabuse-like reaction of flushing and dizziness, caused by coincident ethanol ingestion, has also been described among DMF workers, but without measurable liver injury.

Since two-thirds of the tested employees had elevated liver enzymes even though there was no documentation of recent or chronic liver infection for any of them, this outbreak raises concerns about whether DMF poses a significant and overlooked human health hazard or whether other agents or factors could be responsible. When introduced independently, the other solvents used (methyl ethyl ketone; toluene; and 1,1,1, trichloroethane) have been only minimally associated with human or animal liver toxicity. A potentiating effect is indeed possible, however. Liver damage, induced by the well-known hepatotoxin carbon tetrachloride, can be aggravated by simultaneous exposure to a variety of organic chemicals of lesser or immeasurable hepatotoxicity.

There are precedents that reinforce the possibility that serious human hepatotoxins may not have yet been recognized. For some of the most severe occupational hepatotoxins, such as trinitrotoluene, dimethylnitrosamine, polychlorinatd biphenyls, and tetrachloroethane, the epidemiologic identification of human liver disease preceded an adequate exploration of animal hepatotoxicity. On the other hand, human liver disease from the organochloride insecticide, kepone, reached national attention through reports in the lay press in the mid-1970s, although parallel animal toxicities had been demonstrated a decade earlier.

Adverse human effects from DMF and other dimethylamides merit a much closer look. Perhaps this review should also include the classes of halogenated hydrocarbons and nitroaromatics from which the most damaging identified hepatotoxins have emerged.

MMWR 2-27-87.

Update: *Salmonella enteritidis* infections in the Northeastern United States

New England and the Middle Atlantic region experienced a fivefold increase in the reported isolation rate of *Salmonella enteritidis* between 1976 and 1985. Consequently, a regional *S. enteritis* Working Group was established in 1986 to coordinate investigations of recent outbreaks and related studies suggest that many *S. enteritidis* infections in the Northeast are associated with eggs.

Fourteen *S. enteritidis* outbreaks have been reported to CDC from the Northeast since October 1, 1986. The vehicles of transmission have been identified for 10 of the outbreaks. At least six of these vehicles were either eggs or foods which contained raw or undercooked eggs (homemade eggnog prepared with store-bought eggs, Monte Cristo sandwiches made of sliced cooked meat and cheese on bread dipped in raw egg and grilled, and Caesar salad dressing made with raw eggs). The outbreak-associated eggs were all USDA grade A shell eggs, and, in each instance, the food preparation history suggested the eggs were eaten raw or undercooked. The outbreak-associated eggs were not available for culture. However, in an outbreak associated with riceballs (made with eggs) in September 1986, *S. enteritidis* was cultured from an egg-breaking machine in the restaurant involved.

Editorial Note: Salmonellosis associated with eggs is not a new problem. Large outbreaks of salmonellosis associated with bulk egg products and cracked shell eggs led to the passage of the Egg Products Inspection Act in 1970. This law required pasteurization of all bulk egg products and federally-supervised inspection of shell eggs for "checks" or cracks. Since enactment of this legislation, there have been fewer egg-associated outbreaks of salmonellosis and CDC has not received any reports of outbreaks associated with bulk egg products.

These recent outbreaks suggest that egg-associated *S. enteritidis* is an emerging public health problem and show the importance of routine serotype-specific surveillance. Eggs can become contaminated with Salmonella in several ways. Fecal soiling may contaminate egg shells, and the internal contents of the egg may occasionally be contaminated by organisms entering through hairline cracks in the shell. In addition, if there is an ovarian infection in the hen, an egg yolk may become infected by certain serotypes of Salmonella before the shell is formed. It is not known whether *S. enteritidis* is one such serotype.

As is true for meat, poultry, raw milk, and other raw foods of animal origin, proper handling and cooking of eggs can minimize the risk of salmonellosis. Thorough cooking kills Salmonella. Consumers concerned about the proper handling of egg-containing foods should contact their county extension home economist or call the USDA Meat and Poultry Hotline (800-535-4555). Further research is needed to understand the ecology of Salmonella colonization in poultry and other food-animal species and to determine ways to further reduce the contamination of eggs and other foods derived from animals.

Clinicians are encouraged to report cases of salmonellosis to their state health department. Isolates of Salmonella can be submitted to state laboratories for serotyping to support epidemiologic investigations.

MMWR 4-10-87.

International Association of Milk, Food & Environmental Sanitarians, Inc. Exhibit Information

75th Annual Meeting
Hyatt Regency Westshore, Tampa, FL
July 31-Aug. 4, 1988

Tabletop Display Hours

Set-up	Sunday, July 31	Noon-5 p.m.
Open	Sunday, July 31	8-10 p.m.
	Monday, Aug. 1	8-9 a.m.; 11:30 a.m.-1:30 p.m. and during a.m. & p.m. refreshment breaks
	Tuesday, Aug. 2	11:30 a.m.-1:30 p.m. and during a.m. & p.m. refreshment breaks
	Wednesday, Aug. 3	11:30 a.m.-1:30 p.m. and during a.m. refreshment break
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June 1 Deadline for listing in Program.

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

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

GAFES Sponsors Salmonella Meeting

Recently, the Georgia Association of Food and Environmental Sanitarians co-sponsored a symposium with Georgia State University entitled: "Salmonella Control in the Food Industry -- Poultry Industry Experience". The meeting was held on September 18, 1987 at Georgia State University in Atlanta. Ninety-four persons attended the meeting which featured a number of renowned speakers presenting various aspects of the Salmonella problem in the poultry industry. Topics included: the role of USDA in inspecting processing plants, research projects for controlling Salmonella, processing in developing countries, radiation methods for Salmonella control and other topics.

This was the second symposium sponsored by the GAFES organization during its charter year. During the meeting, 22 new members joined the ranks of this up and coming Georgia organization brining the total membership to over one-hundred individuals. During a brief business meeting, David Fry presented to Stan Skelske, GAFES President, the IAMFES affiliate charter thereby proclaiming GAFES as a sanctioned affiliate of the International Association of Milk, Food and Environmental Santarians.

During a November 10, 1987 executive meeting, the second GAFES annual meeting was planned for February 19, 1988 at the Russell Research Center in Athens. The theme of the meeting will be "Current Sanitation Problems in the Food Industry."

In the presence of the GAFES Executive Committee members, David Fry of the organization presents the IAMFES affiliate charter to GAFES President Stan Skelskie.

Dr. George Giddings (2nd from left) of Isomedix, Inc., fields a question during the panel/discussion segment of the GAFES Salmonella Control symposium. Also pictured are: L. C. Blankenship (far left), GAFES President Stan Skelskie (2nd from right) and Stan Bailey (far right).

Affiliate Calendar

1988

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

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

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

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

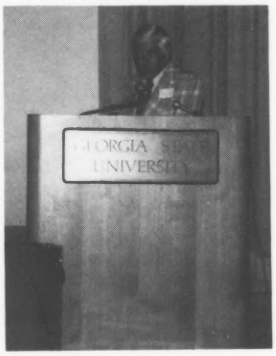
April 6-8, MISSOURI MILK, FOOD AND ENVIRONMENTAL HEALTH CONFERENCE will be held at the Holiday Inn Executive Center, Columbia, Missouri. For more information, contact: Grace Steinke, 9713 Fall Ridge Trail, Sunset Hills, MO 63127-1508.

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

May 16-18, THE PA DAIRY 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 16801. Telephone: 814-863-3915.

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

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



Dr. L. C. Blankenship of the USDA, Athens, Georgia discusses research towards Salmonella Control at the GAFES sponsored symposium.

Tennessee Association of Milk, Water and Food Protection Holds Annual Meeting

The Tennessee Association of Milk, Water and Food Protection met at the Garden Plaza Hotel, Johnson City, on November 4 and 5. Some of the topics presented at the conference included: Dairy Plant Quality Assurance Programs, Animal Products - Are They Healthy?, USDA Manufacturing Milk Program, and Mastitis Prevention Programs. The second day of the conference included a tour of Valleybrook Farm.

David Mayfield, Athens, TN

Otto Hampton, Pet Dairy

Hugh McCampbell, Veterinarian

Jeff Spomer, USDA, Washington, D.C.

Curtis Melton, University of Tennessee, Knoxville

Bob Jarzenski, Tennessee Eastman Research Center

From a member of the Florida Association of Milk, Food and Environmental Sanitarians, Inc.

ODE TO EMERGING PATHOGENS*

by R.H. Schmidt, Poet Lariat

Our dairy industry was niave in the year '83.
At least we thought we were fairly pathogen-free.
Then salmonella in midwest
Gave us a real test.
But, we were still unaware of the future to be.

Then sudden movement from the land primed for the quake.
Movement to cause our whole food industry to shake.
They were not dancing calipso
In this cheese, Jalisco
Using raw milk may have been their first mistake.

Now the feds have come swabbing so tedious;
Using the most exotic of medias.
Taking great pains
They are checking those drains.
And publishing recalls in news medias.

Next came concern for salmonella in chickens.
Should we be careful with our finger lickin.
What we saw on the telly
Turned everyone's belly.
And now USDA samples they're pickin.

So let's turn to foods from the sea.
What problems could there possibly be.
Raw oysters; So macho;
With tabasco and a nacho.
From now on they'll steam 'em for me.

Are they really just emerging?
All those bacteria we hope to be sparging?
Their actual number remain low.
At least we think so!!??
From that stanpoint, life is encouraging.

*Presented as part of talk on emerging pathogens at Florida Sect. IFT meeting.

New Members

Alabama

Robert T. Ferguson
Jefferson Co. Hlth Dept.
Birmingham

Lee Jeter
Univ. of Alabama
Tuscaloosa

Arizona

Gary M. Reed
Scientific Growth, Inc.
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California

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Vimifos de Sonora
CD. Obregon

Wilimina Plascencia Sanchez
Nacional de Dulces
El Salto

Book Review

Nitrate, Nitrite and N-Nitroso Compounds in Food, Food Surveillance Paper #20, Her Majesty's Stationery Office, London.

Based on literature search and limited diet and chemical analyses, the United Kingdom (U.K.) Research team has estimated intake average and extreme consumption of Nitrogenous products and formulated plans for further investigations.

In normal diets, estimated intake of nitrates is 61 grams, nitrite < 1 gram, and N-nitrosodimethylamine up to 0.6 micrograms per person per day. In extremes, these dietary intakes may double. The major source of nitrogenous food intake is vegetables, especially root crops (potatoes). Additional amounts come from cured and smoked meats and fish and some continental cheeses.

Additional sources include water, barley-based beers and whiskeys, all forms of tobacco usage, and industrial air pollution. The U.K. has mostly controlled water and barley beverage contamination. Aerosol particles are difficult to assess.

Major concerns are: excess N in waters for dilution of baby formulas, especially, and in making all beverages; tobacco; and certain volatile industrial discharges. Although normal foods, including root crops, cured meats, and smoked meats were within U.K. and U.S. tolerances, more samples will be analyzed.

Grady F. Williams
Extension Dairy Scientist
Washington State University
7612 Pioneer, W.W.R.E.C.
Puyallup, WA 98371-4998.

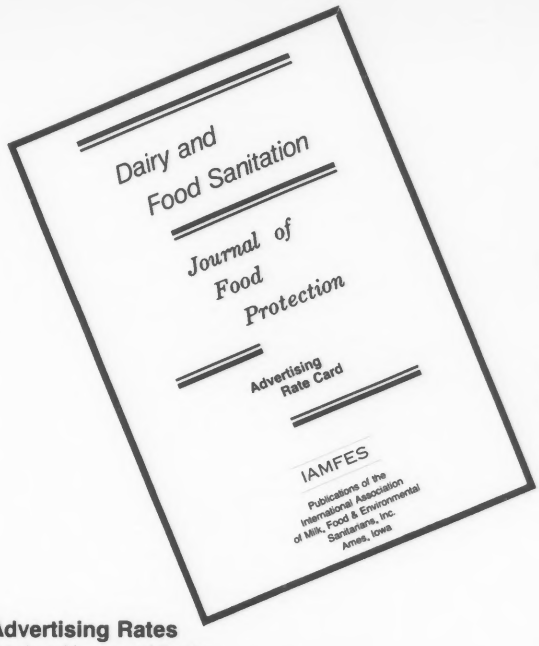
FOOD RESEARCH AND DATA ANALYSIS, Editors: H. Martens and H. Russwurm, Jr. Applied Science Publishers. London and New York 1983. 535 Pages

FOOD RESEARCH AND DATA ANALYSIS is a unique and valuable reference for the food scientist and researcher. The editors, Harald Martens and Hellumt Russwurm, Jr., have done an excellent job of arranging invited lectures and papers presented during the 1982 International Union of Food Science and Technology Symposium on food research and data analysis to an authoritative statistical reference.

More than twenty symposium presentations are included in this volume ranging from multivariate analysis to matrix algebra. The editors have standarized notations and terminology used by the different authors making it easier for the non-mathematician to grasp fundamental concepts. In addition, each of the authors has used actual food researh data in demonstrating the application of different analysis techniques discussed.

While FOOD RESEARCH AND DATA ANALYSIS is targeted for a specific audience it could be used by public health professionals. For the sanitarian in graduate school it would be a useful reference for data analysis and research design. It would also be a valuable tool in presenting field research data in the analysis of data collected during foodborne or waterborne disease outbreaks.

Homer C. Emery, R.S., Ph.D.
LTC, MS, US Army



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4840 W. Kearney
Springfield, Missouri 65803

319 Mono Group, Inc. (3/21/79)
(Mfg. by SSP Pumps, England)
847 Industrial Dr.
Bensenville, Illinois 60106

148R Moyno Industrial Products (4/22/64)
of Robbins & Meyers, Inc.
1895 Jefferson St.
Springfield, OH 45506

400 Netzsch Incorporated (8/15/83)
119 Pickering Way
Exton, PA 19341-1393

375 Niro Atomizer Food & Dairy Inc. (1/25/83)
(Mfg. by Pasilac, Denmark)
1600 County Road F
Hudson, Wisconsin 54016

404 PACKO INOX N.V. (8-24-83)
(Not available in USA)
Torhoutsesteenweg 154

B8210 Zedelgem (Belgium)

241 Puriti, S.A. de C V. (9/12/72)
(not available in USA)
Alfredo Nobel 39
Industrial Puente de Vigas
Tlalnepantla, Mexico

364 Roper Pump Company (7-28-82)
(Mfg. by Howard Pump Co., England)
P.O. Box 269
Commerce, GA 30529

507 Sine Pump (7-21-87)
Division of The Kontro Co., Inc.
500 West River Street
Orange, MA 01364

332 Superior Stainless, Inc. (12/10/80)
611 Sugar Creek Rd.
Delavan, Wisconsin 53115

72R L. C. Thomsen & Sons, Inc. (9/14/57)
1303-43rd St.
Kenosha, Wisconsin 53140

219 TCI-Superior Division, (2/15/72)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

26R Tri-Clover, Inc. (9/29/56)
9201 Wilmot Road
Kenosha, WI 53141

175R Universal Cooperatives, Dairy (10/25/56)
Dairy Division
U.S. Hwy 33 East/Box 115
Goshen, Indiana 46526

471 VNE CORPORATION (4/27/86)
1415 Johnson Street
Janesville, Wisconsin 53545

329 Valex Products Corp. (6/10/80)
6080 Leland Street
Ventura, California 93003

52R Viking Pump-Houdaille, Inc. (12/31/56)
406 State St.
Cedar Falls, IA 50613

5R Waukesha Foundry Division (5/6/56)
Abex Corporation
1300 Lincoln Avenue
Waukesha, Wisconsin 53186

408 Westfalia Systemat (10/18/83)
(Mfg. by Westfalia, West Germany)
1862 Brummel Drive
Elk Grove Village, IL 60007

517 Westmoor Ltd./Conde Dairy Equipment (9-23-87)
P.O. Box 99
West Hamilton Avenue
Sherrill, NY 13461

04-03 Homogenizers and High Pressure Pumps of the Plunger Type

37 APV Crepaco, INC. (10/19/56)
100 South CP Ave.
Lake Mills, Wisconsin 53551

75 APV Gaulin, Inc. (9/26/57)
44 Garden St.
Everett, MA 02149

390 American Lewa, Inc. (6/9/83)
(Mfg. by Lewa, Germany)
132 Hopping Brook Road
Holliston, Massachusetts 01760

247 Bran & Luebbe, Inc. (4/14/73)
1025 Busch Parkway
Buffalo Grove, Illinois 60015

87 Cherry-Burrell Corp. (12/20/57)
(A Unit of AMCA Int'l., Inc.)
2400-6th St., SW, P.O. Box 3000
Cedar Rapids, Iowa 52406

486 Kol-Flo Corporation (11/18/86)
320 N. Jensen Road
Vestal, New York 13850

309 Niro Atomizer Food & Dairy Inc. (7/19/78)
(Mfg. by Masinfabriken, Denmark)
1600 County Road F
Hudson, Wisconsin 54016

425 TCI-Superior Division (8/31/84)
(Not available in USA)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

05-13 Stainless Steel Automotive Milk Transportation Tanks for Bulk Delivery and/or Farm Pick-up Service

379 Bar-Bel Fabricating Co., Inc. (3/15/83)
RR 2
Mauston, Wisconsin 53948

70R Brenner Tank, Inc. (8/5/57)
450 Arlington Ave., P.O. Box 670
Fond du Lac, Wisconsin 54935

45 The Heil Company (10/26/56)
1125 Congress Pkwy.
P.O. Box 160
Athens, Tennessee 37303-0160

40 Hills Stainless Steel & (10-20-56)
Equipment Co., Inc.
505 W. Koehn Street
Luverne, MN 56156

66 Kari-Kool Transports, Inc. (5/29/57)
P.O. Box 538
Beaver Dam, WI 53916

201 Paul Krohnert Mfg. Ltd. (4/1/68)
(not available in USA)
811 Steeles Ave., P.O. Box 126
Milton, Ontario Canada L9T 2Y3

305 Light Industrial Design Co., Inc. (3/23/78)
8631-A Depot Rd.
Lynden, Washington 98264

513 Nova Fabricating Inc. (8-24-87)
Jctn. I-94 & Co Road 9
P.O. Box 231
Avon, MN 56310

85 Polar Tank Trailer, Inc. (12/20/57)
Holdingford, MN 56340

521 R & D Stainless (12-17-87)
409 S. Hampton
Republic, MO 65738

189 A & L Tougas, Ltee (10/3/66)
(not available in USA)
1 Tougas St.

Iberville, Quebec, Canada

25 Walker Stainless Equipment Co. (9/28/56)
New Lisbon, Wisconsin 53950

437 West-Mark (11/30/84)
2704 Railroad Ave., P.O. Box 418
Ceres, CA 95307

08-17 Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products

349 APN, Inc. (12/15/81)
400 W. Lincoln
Caledonia, Minnesota 55921

260 APV CREPACO, INC. (08-17 A&B) (5/21/75)
100 South CP Avenue
Lake Mills, Wisconsin 53551

450 APV International Limited (8/22/85)
(Not available in USA)
P.O. Box 4, Manor Royal
Crawley
West Sussex RH10 2QB
England

484 APV ROSISTA, INC. (10/22/86)
(08-17REV)
(08-17B)
1325 Samuelson Road
Rockford, Illinois 61109

291 Accurate Metering Systems, Inc. (6/22/77)
(Mfg. by Diessel, Germany)
1651 Wilkening Court
Schaumburg, IL 60173

470 Advance Stainless Mfg. Corp. (3/30/86)
218 West Centralia Street
Elkhorn, Wisconsin 53121

380 Allegheny Bradford Corp. (3/21/83)
P.O. Box 200 Route 219 South
Bradford, PA 16701

79R Alloy Products Corp. (11/23/57)
1045 Perkins Ave., P.O. Box 529
Waukesha, Wisconsin 53187

422 BS&B Safety Systems, Inc. (6/12/84)
7455 E. 46th St.
Tulsa, OK 74133

245 Babson Brothers Company (2/12/73)
Dairy Systems Division
1400 West Gale
Galesville, WI 54630

443 Badger Meter, Inc. (5/1/85)
6116 East 15th Street
Tulsa, OK 74158

514 H. D. Bauman Assoc., Ltd. (08-17B) (8-24-87)
35 Mirona Road
Portsmouth, NH 03801

284 Bristol Engineering Co. (08-17D) (11/18/76)
210 Beaver St., P.O. Box 696
Yorkville, Illinois 60560

411 Capital Equipment Corp. (11/15/83)
2421 Darwin Road
Madison, WI 53704

82R Cherry-Burrell Corp. (12/11/57)
(A Unit of AMCA Int'l. Corp.)
2400-6th St. SW, P.O. Box 3000
Cedar Rapids, Iowa 52406

478 CIPRIANAI, INC. (7-31-86)
(Mfg. by Fratelli Tassalini, Italy)
25201 East La Paz Road
Laguna Hills, CA 92653

407 Continental Disc Corp. (10/14/83)
(08-17G)
4103 Riverside NW
Kansas City, MO 64150

376 Defontaine Inc. (1/25/83)
(Mfg. by Defontaine, France)
563 A. J. Allen Circle
Wales, WI 53183

509 Fitting Specialty (8-7-87)
1303 35th Street
Kenosha, WI 53140

455 Flowtech Inc. (9/17/85)
120 Interstate N. Pkwy. E. #208
Atlanta, Georgia 30339-2103

271 The Foxboro Co. (3/8/76)
38 Neponset Ave.
Foxboro, Massachusetts 02035

480 GEA Food and Process Systems Corp. (8/8/86)
8940 Route 108 (08-17A)
Columbia, Maryland 21045

67R G & H Products Corp. (6/10/57)
7600-57th Avenue
P.O. Box 1199
Kenosha, WI 53141

287 Hackman-MKT%, Inc. (1/14/77)
(MFg. by Koltech, Finland)
100 Pinnacle Way, Suite 165
Norcross, GA 30071

369 IMEX, Inc. (11/3/82)
(Mfg. by Lube Corp., Japan)
4040 Del Rey Ave. Unit 9
Marina del Rey, CA 90292

203R ITT Grinnell Valve Co., Inc. (11/27/68)
Dia-Flo Division
33 Centerville Rd.
Lancaster, Pennsylvania 17603

454 Jensen Fittings Corp. (9/11/85)
107-111 Goundry St.
North Tonawanda, New York 14120-5998

510 Key Stainless Fittings (8-14-87)
1303 35th Street
P.O. Box 1676
Kenosha, WI 53140

389 Lee Industries, Inc. (5/31/83)
P.O. Box 688
Philipsburg, PA 16866

239 Lumaco, Inc. (6/30/72)
P.O. Box 688
Teaneck, New Jersey 07666

200R Paul Mueller Co. (3/5/68)
1600 W. Phelps St., Box 828
Springfield, Missouri 65801

374 Niro Atomizer Food & Dairy Inc. (1/25/83)
(Mfg. by Pasilac, Denmark)
1600 County Road F
Hudson, Wisconsin 54016

483 On-Line Instrumentation, Inc. (10/15/86)
Rt. 376, P.O. Box 541
Hopewell Junction, New York 12533

416 Process Engineers, Inc. (1/11/84)
(Mfg. by Rizzato, Italy)
3329 Baumberg Ave.
Hayward, CA 94545

242 Puriti, S.A. de C.V. (9/12/72)
(not available in USA)
Alfredo Nobel 39
Industrial Puente de Vigas
Tlalnepantla, Mexico

149R Q Controls Subsid. of Cesco Magnetics (5/18/64)
93 Utility Court
Rohnert Park, California 94928

424 Robert-James Sales, Inc. (8/31/84)
P.O. Box 1672, 269 Hinman Ave.
Buffalo, NY 14216-0672

494 Saunders Valve, Inc. (2/10/87)
15760 W. Hardy, #440
Houston, Texas 77060

334 Stainless Products, Inc. (12/18/80)
1649-72nd Ave., Box 169
Somers, Wisconsin 53171

391 Stork Food Machinery, Inc. (6/9/83)
(Mfg. by Stork Amsterdam, Netherlands)
P.O. Box 1258/Airport Parkway
Gainesville, Georgia 30503

300 Superior Stainless, Inc. (11/22/77)
611 Sugar Creek Rd.
Delavan, Wisconsin 53115

357 Tanaco Products (4/16/82)
3860 Loomis Trail Rd.
Blaine, Washington 98230

73R L. C. Thomsen & Sons, Inc. (8/31/57)
(08-17REV)
(08-17A)
1303-43rd St.
Kenosha, Wisconsin 53140

34R Tri-Clover, Inc. (10/15/56)
(08-17REV)
(08-17A)
9201 Wilmot Road
Kenosha, WI 53141

467 Tuchenhagen North America Inc. (1/13/86)
(Mfg. by Otto Tuchenhagen, West Germany)
4119 W. Green Tree Road (08-17A)
Milwaukee, Wisconsin 53209

449 Up-Well Enterprises Co., USA (8/1/85)
P.O. Box 5334
Grants Pass, Oregon 97527

304 VNE Corporation (3/16/78)
(Mfg. by Egmo, Israel)
1415 Johnson St., P.O. Box 187
Janesville, Wisconsin 53547

278 Valex Products Corp. (8/30/76)
6080 Leland Street
Ventura, California 93003

86R Waukesha Specialty Co., Inc. (12/20/57)
Hwy 14
Darien, Wisconsin 53144

09-07 Instrument Fittings and Connections Used on Milk and Milk Products Equipment

428 ARi Industries, Inc. (9/12/84)
381 ARi Court
Addison, IL 60101

321 Anderson Instrument Co., Inc. (6/14/79)
RD #1
Fultonville, New York 12072

315 Burns Engineering, Inc. (2/5/79)
10201 Bren Rd., East
Minnetonka, Minnesota 55343

206 The Foxboro Co. (8/11/69)
38 Neponset Ave.
Foxboro, Massachusetts 02035

418 Niro Atomizer Food & Dairy Inc. (4/2/84)
1600 County Road F
Hudson, Wisconsin 54016

487 Pyromation, Incorporated (12/16/86)
5211 Industrial Road
Fort Wayne, Indiana 46825

367 RdF Corporation (10/2/82)
23 Elm Ave.
Hudson, New Hampshire 03051

495 Rosemount Analytical Division (2/13/87)
2400 Barranca Pkwy.
Irvine, California 92714

420 Stork Food Machinery, Inc. (4/17/84)
P.O. Box 1258/Airport Parkway
Gainesville, Georgia 30503

32 Taylor Instrument (10/4/56)
Combustion Engineering, Inc.
400 West Avenue, P.O. Box 110
Rochester, New York 14692

444 Tuchenhagen North America, Inc. (6/17/85)
4119 Green Tree Road
Milwaukee, WI 53209

522 Weed Instrument Company, Inc. (12-28-87)
707 Jeffrey Way
Round Rock, TX 78664

10-03 Milk and Milk Products Filters Using Disposable Filter Media, as Amended

371 Alloy Products Corp. (12/10/82)
1045 Perkins Ave., P.O. Box 529
Waukesha, Wisconsin 53187

435 Sermia Equipment Limited (11/27/84)
(Not available in USA)
2511 Barbe Avenue
Chomedey, Laval, Quebec, Canada H7T 2A2

296 L. C. Thomsen, Inc. (8/25/77)
1303 43rd St.
Kenosha, Wisconsin 53140

35 Tri-Clover, Inc. (10/15/56)
9201 Wilmot Road
Kenosha, WI 53141

11-03 Plate-type Heat Exchangers for Milk and Milk Products

38 APV Crepaco, INC. (10/19/56)
100 South CP Ave.
Lake Mills, Wisconsin 53551

20 APV Crepaco, INC. (9/4/56)
395 Fillmore Ave.
Tonawonda, New York 14150

458 APV International Limited (10/15/85)
(Not available in USA)
P.O. Box 4, Manor Royal
Crawley

West Sussex RH10 2QB
England

17 Alfa-Laval, Inc. (8/30/56)
2115 Linwood Ave.
Ft. Lee, New Jersey 07024

120 Alfa-Laval, Ltd. (12/3/59)
(DeLaval Agric. Div.)
11100 No. Congress Ave.
Kansas City, Missouri 64153

326 American Vicarb Corporation (2/4/80)
(Mfg. by Vicarb, France)
89 Pearce Avenue
Tonawanda, New York 14150

30 Cherry-Burrell Corp. (10/2/56)
(A Unit of AMCA Int'l. Inc.)
2400-6th St. SW, P.O. Box 3000
Cedar Rapids, Iowa 52406

14 Chester-Jensen Co., Inc. (8/15/56)
5th & Tilghman Sts., P.O. Box 908
Chester, Pennsylvania 19016

468 GEA Food and Process Systems Corp. (2/2/86)
8940 Route 108
Columbia, Maryland 21045

15 Kusel Equipment Co. (8/15/56)
820 West St., P O. Box 87
Watertown, Wisconsin 53094

360 Laffranchi Wholesale Co. (7/12/82)
P.O. Box 698
Ferndale, California 95536

414 Paul Mueller Co. (12/13/83)
P.O. Box 828
Springfield, MO 65801

491 On-Line Instrumentation, Inc. (1/2/87)
P.O. Box 541
Hopewell Junction, New York 12533

365 Pasilac Therm (9-8-82)
(Mfg. by Pasilac, Denmark)
1000 FM 1960 West
Houston, TX 77090

279 The Schlueter Co. (8/30/76)
(Mfg. by Samuel Parker, New Zeland)
112 E. Centerway
Janesville, Wisconsin 53545

472 Schmidt-Bretten Inc. (5/7/86)
1612 Locust Avenue
Bohemia, New York 11716

426 TCI-Superior Division (8/31/84)
(Not available in USA)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

12-05 Tubular Heat Exchangers for Milk and Milk Products

438 APV Crepaco, INC. (12/10/84)
395 Fillmore Avenue
Tonawanda, New York 14150

248 Allegheny Bradford Corp. (4/16/73)
P.O. Box 200 Route 219 South
Bradford, PA 16701

243 Babson Brothers Company (10/31/72)
Dairy Systems Division
1400 West Gale
Galesville, WI 54630

103 Chester-Jensen Co., Inc. (6/6/58)
5th & Tilghman Sts., P.O. Box 908
Chester, Pennsylvania 19016

307 G & H Products Corp. (5/2/78)
7600-57th Avenue
P.O. Box 1199
Kenosha, WI 53141

217 Girton Manufacturing Co. (1/31/71)
Millville, Pennsylvania 17846

238 Paul Mueller Co. (6/28/72)
P.O. Box 828
Springfield, Missouri 65801

96 C. E. Rogers Co. (3/31/64)
So. Hwy #65, P.O. Box 118
Mora, Minnesota 55051

298 Sanitary Processing Equipment Corp. (1/28/85)
P.O. Box 178, Salino Station
Syracuse, NY 13201

392 Stork Food Machinery, Inc. (6/9/83)
(Mfg. by Stork, Netherlands)
P.O. Box 1258/Airport Parkway
Gainesville, Georgia 30503

13-08 Farm Milk Cooling and Holding Tanks

49R A-L Stainless Inc. (12/5/56)
(Not available in USA)
113 Park St., South
Peterborough, Ontario Canada K9J 3R8

240 Babson Brothers Company (9/6/72)
Dairy Systems Division
1400 West Gale
Galesville, WI 54630

4R Dairy Equipment Co. (6/15/56)
1919 So. Stoughton Rd.
Madison, Wisconsin 53716

179R Heavy Duty Products (Preston) Ltd. (3/8/66)
(not available in USA)
1261 Industrial Rd.
Cambridge (Preston)
Ontario Canada N3H 4W3

12R Paul Mueller Co. (7/31/56)
1600 W. Phelps, P.O. Box 828
Springfield, Missouri 65801

16R Zero Manufacturing Co. (8/27/56)
811 Duncan Ave.
Washington, Missouri 63090

16-05 Evaporators and Vacuum Pans for Milk and Milk Products

254 APV Anhydro, Inc. (1/7/74)
(Mfg. by Anhydro, Denmark)
165 John L. Dietsch Square
Attleboro Falls, Massachusetts 02763

132 APV Crepaco, INC. (10/26/60)
395 Fillmore Ave.
Tonawanda, New York 14150

277 Alfa-Laval, Inc. (8/19/76)
Contherm Division
P.O. Box 352, 111 Parker St.
Newburyport, Massachusetts 01950

500 Dedert Corporation (4/9/87)
20000 Governors Drive
Olympia Fields, IL 60461

311 GEA Food and Process Systems Corp. (8/28/79)
(Mfg. by Gebruder, West Germany)
8940 Route 108
Columbia, Maryland 21045

273 Niro Atomizer Food & Dairy, Inc. (5/20/76)
1600 County Rd F
Hudson, Wisconsin 54016

107R C. E. Rogers Co. (7/31/58)
So. Hwy #65, P.O. Box 118
Mora, Minnesota 55051

299 Stork Food Machinery, Inc. (11/17/77)
(Mfg. by Stork, Holland)
P.O. Box 1258/Airport Parkway
Gainesville, Georgia 30503

427 TCI-Superior Division (8/31/84)
(Not available in USA)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

387 Unitech Div. of the Graver Co. (5/13/83)
2720 Hwy. 22
Union, New Jersey 07083

186R Marriott Walker Corp. (9/6/66)
925 E. Maple Rd.
Birmingham, Michigan 48011

17-06 Fillers and Sealers of Single Service Containers for Milk and Milk Products

366 Autoprod, Inc. (9/15/82)
12 So. Denton Ave.
New Hyde Park, New York 11040

346 B-Bar-B, Inc. (10/21/81)
E. 10th & McBeth, P.O. Box 909
New Albany, New York 47150

192 Cherry-Burrell Corp. (1/3/67)
(A Unit of AMCA Int'l., Inc.)
2400-6th St. SW, P.O. Box 3000
Cedar Rapids, Iowa 52406

382 Combibloc, Inc. (4/15/83)
(Mfg. by Jagenberg, West Germany)
4800 Roberts Rd.
Columbus, OH 43228

324 Conoffast (11/29/79)
(Mfg. by ERCA, France)
800 Connecticut Avenue
P.O. Box 5410
Norwalk, Connecticut 06856

352 GMS Engineering (1/12/82)
1936 Sherwood St.
Clearwater, Florida 33515

488 Holmatic Inc. (12/22/86)
6691 Jimmy Carter Blvd.
Norcross, Georgia 30071

473 International Paper Company (6/12/86)
Extended Shelf Life Division
4020 Stirrup Creed Drive Bldg. 200
P.O. Box 13318
Research Triangle Park, NC 27709

452 Jagenberg Inc. (9/3/85)
Freshwater Blvd.
P.O. Box 188
Enfield, Connecticut

516 Leifeld + Lemke USA (9-18-87)
(Mfg. by Leifeld + Lemke, West Germany)
25 Whitney Road
Mahwah, NJ 07430

220 Liquipak International, Inc. (4/24/71)
2285 University Ave.
St. Paul, Minnesota 55114

330 Milliken Packaging (8/26/80)
(Mfg. by Chubukkikai, Japan)
White Stone, South Carolina 29353

442 Milliken Packaging (2/21/85)
White Stone, SC 29386

137 Pure-Pak, Inc. (10-17-62)
850 Ladd Road
Walled Lake, MI 48088

281 Purity Packaging Corp. (11/8/76)
800 Kaderly Dr.
Columbus, Ohio 43228

511 E. P. REMY (8-14-87)
(Mfg. by E. P. Remy, France)
2096 Gaither Road
Rockville, MD 20850

482 Serac Inc. (8/25/86)
1209 Capitol Drive
Addison, Illinois

351 Tetra Pak Inc. (1/7/82)
(Mfg. by A. B. Tetra, Italy)
889 Bridgeport Ave.
P.O. Box 807
Shelton, Connecticut 06484-0807

211 Twinpak, Inc. (Canada) (2/4/70)
(Not available in USA)
2225 Hymus
Dorval, Quebec, Canada H9P 1J8

19-03 Batch and Continuous Freezers for Ice Cream, Ices, and Similarly Frozen Dairy Foods, as Amdended

141 APV Crepaco, INC. (4/15/63)
100 South CP Ave.
Lake Mills, Wisconsin 53551

146 Cherry-Burrell Corp. (12/10/63)
(A Unit of AMCA Int'l., Inc.)
2400-6th St. SW, P.O. Box 3000
Cedar Rapids, Iowa 52406

401 Coldelite Corp. of America (8/22/82)
Robinson Rd. & Rt. 17 So.
Lodi, NJ 07644-3897

286 O. G. Hoyer, Inc. (12/8/76)
(Mfg. by Alfa Hoyer, Denmark)
201 Broad St.
Lake Geneva, Wisconsin 53147

465 Leon's Frozen Custard (12/17/85)
3131 S. 27th Street
Milwaukee, Wisconsin 53151

412 Sani Mark, Inc. (11/28/83)
2020 Production Drive
Indianapolis, Indiana 46241

355 Emery Thompson Machine & Supply Co. (3/9/82)
1349 Inwood Ave.
Bronx, New York 10452

22-04 Silo-type Storage Tanks for Milk and Milk Products

262 A-L Stainless Inc. (11/11/74)
(Not available in USA)
113 Park St., South
Peterborough, Ontario Canada K9J 3R8

154 APV Crepaco, INC. (2/10/65)
100 South CP Ave.
Lake Mills, Wisconsin 53551

168 Cherry-Burrell Corp. (6/16/65)
(A Unit of AMCA Int'l, Inc.)
575 E. Mill St.
Little Falls, New York 13365

160 DCI, Inc. (4/5/65)
P.O. Box 1227, 600 No. 54th Ave.
St. Cloud, Minnesota 56301

181 Damrow Co. (5/18/66)
(Div. of DEC Int'l., Inc.)
196 Western Ave., P.O. Box 750
Fond du Lac, Wisconsin 54935-0750

439 JV Northwest Inc. (1/22/85)
28120 SW Boberg Rd.
Wilsonville, Oregon 97070

155 Paul Mueller Co. (2/10/65)
1600 W. Phelps, P.O. Box 828
Springfield, Missouri 65801

460 Niro Atomizer Food & Dairy Inc. (11/4/85)
1600 County Road F
Hudson, Wisconsin 54016

503 Ripley Stainless Ltd. (5/1/87)
(Not available in USA)
R.R. #3, Site 41
Summerland, B.C. V0H 1Z0

312 Sanitary Processing Equipment Corp. (9/15/78)
P.O. Box 178, Salino Station
Syracuse, New York 13201

479 Scherping Systems (8/3/86)
801 Kingsley Street
Winsted, Minnesota 55395

434 TCI-Superior Division (11/9/84)
(Not available in USA)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

165 Walker Stainless Equipment Co., Inc. (4/26/65)
Elroy, Wisconsin 53929

23-01 Equipment for Packaging Frozen Desserts, Cottage Cheese, and Similar Milk Products, as Amended

174 APV Anderson Bros. Mfg. Co. (9/28/65)
1303 Samuelson Rd.
Rockford, IL 61109

209 Doboy Packaging Machinery Incorp. (7/23/69)
869 S Knowles Ave.
New Richmond, Wisconsin 54017

499 Holmatic Inc. (3/19/87)
6691 Jimmy Carter Blvd.
Norcross, Georgia 30071

343 O. G. Hoyer, Inc. (7/6/81)
(Mfg. by Alfa Hoyer, Denmark)
201 Broad St.
Lake Geneva, Wisconsin 53147

447 Mateer-Burt Co., Inc. (7/22/85)
(Mfg. by Trustpak, England)
436 Devon Park Drive
Wayne, Pennsylvania 19087

222 Sweetheart Packaging Corporation (11/15/71)
Maryland Cup Corporation
10100 Registerstown Road
Owings Mills, Maryland 21117

24-01 Non-coil Type Batch Pasteurizers

158 APV Crepaco, INC. (3/24/65)
100 South CP Ave.
Lake Mills, Wisconsin 53551

161 Cherry-Burrell Corp. (4/5/65)
(A Unit of AMCA Int'l., Inc.)
575 E. Mill St.
Little Falls, New York 13365

402 Coldelite Corp. of America (8/22/83)
Robinson Rd. & Rt. 17 So.
Lodi, NJ 07644-3897

187 DCI, Inc. (9/26/66)
P.O. Box 1227, 600 No. 54th Ave.
St. Cloud, Minnesota 56301

166 Paul Mueller Co. (4/26/65)
P.O. Box 828
Springfield, Missouri 65801

519 Saintary Processing Equip. Corp. (10-22-87)
2611 Lodi Street
Syracuse, NY 13208

25-01 Non-coil Type Batch Processors for Milk and Milk Products

159 APV Crepaco, INC. (3/24/65)
100 South CP Ave.
Lake Mills, Wisconsin 53551

162 Cherry-Burrell Corp. (4/5/65)
(A Unit of AMCA Int'l., Inc.)
575 E. Mill St.
Little Falls, New York 13365

188 DCI, Inc. (9/26/66)
P.O. Box 1227, 600 No. 54th Ave.
St. Cloud, Minnesota 56301

167 Paul Mueller Co. (4/26/65)
P.O. Box 828
Springfield, Missouri 65801

448 Scherping Systems (8/1/85)
801 Kingsley Street
Winsted, Minnesota 55395

520 Stainless Fabrication, Inc. (12-8-87)
633 N. Prince Lane
Springfield, MO 65802

202 Walker Stainless Equipment Co. (9/24/68)
New Lisbon, Wisconsin 53950

26-02 Sifters for Dry Milk and Dry Milk Products

173 Blaw-Knox Food & Chemical Equip. Co. (9/20/65)
P.O. Box 1041
Buffalo, New York 14240

229 Russell Finex, Inc. (3/15/72)
(Mfg. by Russell Finex, England)
156 W. Sandford Blvd.
Mt. Vernon, New York 10550

363 Kason Corp. (7/28/82)
1301 East Linden Ave.
Linden, New Jersey 07036

430 Midwestern Industries, Inc. (10/11/84)
915 Oberlin Rd., P.O. Box 810
Massillon, OH 44648-0810

185 Rotex, Inc. (8/10/66)
1230 Knowlton St.
Cincinnati, Ohio 45223

172 SWECO, INC. (9-1-65)
8029 U.S. Hwy. 25
Florence ,Y 41042

176 Sprout-Waldron, Koppers Co., Inc. (1/4/66)
Muncy, Pennsylvania 17756

27-01 Equipment for Packaging Dry Milk and Dry Milk Products

353 All-Fill, Inc. (3/2/82)
40 Great Valley Pkwy.
Malvern, Pennsylvania 19355

409 Mateer-Burt Co. (10/31/83)
436 Devon Park Dr.
Wayne, PA 19087

476 Stone Container Corporation (7/17/86)
1881 West North Temple
Salt Lake City, Utah 84116-2097

497 Triangle Package Machinery Co. (2/26/87)
6655 West Diversey Ave.
Chicago, Illinois 60635

28-00 Flow Meters for Milk and Liquid Milk Products

272 Accurage Metering Systems, Inc. (4/2/76)
(Mfg. by Diessel GmbH, Germany)
1651 Wilkening Court
Schaumburg, IL 60173

253 Badger Meter, Inc. (1/2/74)
4545 W. Brown Deer Rd.
P.O. Box 23099
Milwaukee, Wisconsin 53223

518 Bailey Controls Company (10-16-87)
29801 Euclid Avenue
Wickliffe, OH 44092

265 Electronic Flo-Meters, Inc. (3/10/75)
P.O. Box 38269
Dallas, Texas 75238

359 Emerson Elec. Co. (6/11/82)
Brooks Instrument Div.
P.O. Box 450, North 301
Statesboro, Georgia 30458

469 Endress + Hauser, Inc. (3/3/86)
2350 Endress Place
Greenwood, Indiana 46142

226 Fischer & Porter Co. (12/9/71)
County Line Rd.
Warminster, Pennsylvania 18974

477 Flowdata Inc. (7/31/86)
15510 Wright Bros. Drive
Dallas, Texas 75244-2137

506 Flow Technology, Inc. (6/17/87)
4250 East Broadway Road
Phoenix, AZ 85040

224 The Foxboro Co. (11/16/71)
38 Neponset Ave.
Foxboro, Massachusetts 02035

475 Hackman-MKT, Inc. (7/15/86)
100 Pinnacle Way, Suite 165
Norcross, GA 30071

512 Hoffer Flow Controls, Inc. (8-17-87)
149 Highway 26
Port Monmouth, NJ 07758

474 Hydril Production (6/30/86)
Technology Division
3300 North Belt East
P.O. Box 60458
Houston, TX 77205-0458

399 E. Johnson Engineering & Sales (8/3/83)
11 N. Grant St.
Hinsdale, IL 60521

320 Max Machinery, Inc. (3/28/79)
1420 Healdburg Ave.
Healdburg, California 95448

378 Micro Motion, Inc. (2/16/83)
7070 Winchester Circle
Boulder, Colorado 80301

431 Niro Atomizer Food & Dairy Inc. (10/11/84)
1600 County Road F
Hudson, Wisconsin 54016

490 Rosemount Inc. (1/8/87)
12001 West 78th Street
Eden Prairie, Minnesota 55344

493 Sarasota Automation Inc. (2/2/87)
1500 N. Washington Blvd.
Sarasota, Florida 33577

270 Taylor Instrument (2/9/76)
Combustion Engineering, Inc.
400 West Avenue, P.O. Box 110
Rochester, New York 14692

386 Turbo Instruments, Inc. (5/11/83)
(Mfg. by Turowerk, West Germany)
4 Vashell Way
Orinda, California 94563

29-00 Air Eliminators for Milk and Fluid Milk Products

340 Accurate Metering Systems, Inc. (6/2/81)
(Mfg. by Diessel GmbH. Germany)
1651 Wilkening Court
Schaumburg, IL 60173

485 Hackman-MKT, Inc. (11/18/86)
100 Pinnacle Way, Suite 165
Norcross, GA 30071

436 Scherping Systems (11/27/84)
801 Kingsley Street
Winsted, MN 55395

30-01 Farm Milk Storage Tanks

421 Paul Mueller Co. (4/17/84)
P.O. Box 828
Springfield, MO 65801

31-01 Scraped Surface Heat Exchangers, as Amended

290 APV Crepaco, INC. (6/15/77)
100 South CP Ave.
Lake Mills, Wisconsin 53551

274 Alfa-Laval, Inc. (6/25/76)
Contherm Div.
P.O. Box 352, 111 Parker St.
Newburyport, Massachusetts 01950

361 BFM Machinery Corp. (7/12/82)
(Mfg. by M. V. Machinfabriek, Netherlands)
P.O. Box 117
Fall River, Wisconsin 53932

323 Cherry-Burrell Corp. (7/26/79)
(A Unit of AMCA Int'l., Inc.)
2400-6th St., SW, P.O. Box 3000
Cedar Rapids, Iowa 52406

496 FranRica Mfg. Corp. (2/23/87)
2807 South Highway 99
Stockton, California 95202

32-00 Uninsulated Tanks for Milk and Milk Products

397 APV Crepaco, INC. (6/21/83)
100 South CP Ave.
Lake Mills, Wisconsin 53551

264 Cherry-Burrell Corp. (1/27/75)
(A Unit of AMCA Int'l., Inc.)
575 E. Mill St.
Little Falls, New York 13365

268 DCI, Inc. (11/21/75)
600 No. 54th Ave., P.O. Box 1227
St. Cloud, Minnesota 56301

354 C. E. Rogers Co. (3/3/82)
So. Hwy #65, P.O. Box 118
Mora, Minnesota 55051

441 Scherping Systems (3/1/85)
801 Kingsley St.
Winsted, MN 55395

433 TCI-Superior Division (11/9/84)
(Not available in USA)
Mueller Canada Inc.
6500 Northwest Dr.
Mississauga, Ontario, Canada L4V 1K4

339 Walker Stainless Equipment Co., Inc. (6/2/81)
601 State St.
New Lisbon, Wisconsin 53950

33-00 Polished Metal Tubing for Dairy Products

310 Allegheny Bradford Corp. (7/19/78)
P.O. Box 200 Route 219 South
Bradford, PA 16701

413 Azco, Inc. (12/8/83)
P.O. Box 567
Appleton, W154912

308 Rath Manufacturing Co., Inc. (6/20/78)
2505 Foster Ave.
Janesville, Wisconsin 53545

368 Gordon J. Rodger & Sons Ltd. (10/7/82)
P.O. Box 186
Blenheim, Ontario Canada N0P 1A0

335 Stainless Products, Inc. (12/18/80)
1649-72nd Ave., Box 169
Somers, Wisconsin 53171

289 Tri-Clover, Inc. (1/21/77)
9201 Wilmot Road
Kenosha, Wisconsin 53141

331 United Industries, Inc. (10/23/80)
1546 Henry Ave.
Beloit, Wisconsin 53511

35-00 Continuous Blenders

417 Cherry-Burrell (2/7/84)
Anco/Votator Division
P.O. Box 35600
Louisville, KY 40232

464 Dairy Service Mfg., Inc. (12/12/85)
4630 W. Florissant Ave.
St. Louis, Missouri 63115

415 Luwa Corporation (1/5/84)
P.O. Box 16348
Charlotte, North Carolina 28297-6348

36-00 Colloid Mills

293 Waukesha Div., Abex Corp. (8/25/77)
1300 Lincoln Ave.
Waukesha, Wisconsin 53186

37-00 Presure and Level Sensing Devices

318 Anderson Instrument Co., Inc. (4/9/79)
R.D. #1
Fultonville, New York 12072

481 Control Systems Design, Inc. (8/14/86)
P.O. Box 1689
Manchester, Missouri 63011

405 Drexelbrook Engineering Co. (9/27/83)
205 Keith Valley Rd.
Horsham, PA 19044

423 Dynisco (6/15/84)
Ten Oceana Way
Norwood, MA 02062

459 Endress + Hauser, Inc. (10/17/85)
2350 Endress Place
Greenwood, Indiana 46142

463 The Foxboro Company (12/6/85)
38 Neponset Avenue
Foxboro, Massachusetts 02035

396 King Engineering Corp. (6/13/83)
P.O. Box 1228
Ann Arbor, Michigan 48106

501 Lumenite Electronic Company (4/27/87)
2331 N. 17th Avenue
Franlin Park, IL 60131

457 Moore Technologies Inc. (10/17/85)
P.O. Box 258
Klamath Falls, Oregon 97601

419 Niro Atomizer Food & Dairy Inc. (4/2/84)
1600 County Road F
Hudson, Wisconsin 54016

328 Rosemount, Inc. (5/22/80)
12001 W. 78th St.
Eden Prairie, Minnesota 55344

515 Setra Systems, Inc. (9-14-87)
45 Nagag Park
Acton, MA 01720

498 Statham Division of (3/5/87)
Solartron Transducers
2230 Statham Blvd.
Oxnard, California 93033

285 Tank Mate Div/Monitor Mfg. Co. (12/7/76)
P.O. Box AL
Elburn, IL 60119

317 Taylor Instrument (2/26/79)
Combustion Engineering, Inc.
400 West Avenue
Rochester, NY 14692

410 Viatran Corporation (11/1/83)
300 Industrial Drive
Grand Island, NY 14072

38-00 Cottage Cheese Vats (In Press)

385 Stoelting, Inc. (5/5/83)
P.O. Box 127
Kiel, Wisconsin 53042-0127

40-01 Bag Collectors for Dry Milk and Dry Milk Products

406 Chicago Conveyor Corporation (10/5/83)
330 LaLonde Avenue
Addison, IL 60101

504 General Resource Corporation (5/15/87)
201 3rd. Street South
Hopkins, MN 55343

381 Marriott Walker Corp. (4/12/83)
925 E. Maple Rd.
Birmingham, Michigan 48011

453 MikroPul Corporation (9/4/85)
10 Chatham Road
Summit, New Jersey 07901

456 C. E. Rogers Company (9/25/85)
P.O. Box 118
Mora, Minnesota 55051

JFP Abstracts

Abstracts of papers in the February Journal of Food Protection

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

Cook/Chill Foodservice System with a Microwave Oven: Coliforms and Aerobic Counts from Turkey Rolls and Slices, Patricia A. Ollinger-Snyder and M. Eileen Matthews, Department of Food Science, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 51:84-87

Turkey was sampled for total aerobic plate counts and coliform counts, before and after cooking, after chilled storage and after reheating in a microwave oven. Frozen turkey rolls were thawed for 48 h at 3°C. Rolls were then cooked (105, 135 and 165°C) to an internal temperature of 77°C. Cooked rolls were placed into a refrigerator operating at 1°C and chilled for 24 h. Rolls were removed from the refrigerator, sliced and refrigerated for ≤ 2 1/2 h to simulate holding conditions in a hospital cook/chill foodservice system. Slices were reheated for 30 or 40 s in a microwave oven. For the raw product, total aerobic plate counts and coliform counts ranged from 78,000 - 615,000/g and 1,600 - 38,000/g, respectively. No coliforms were found in turkey rolls following cooking and chilled storage and turkey slices reheated in a microwave oven. Cooking turkey rolls resulted in reduction of two to five orders of magnitude in total aerobic plate counts. For most trials of the experiment, counts were further reduced when turkey slices were reheated in a microwave oven. These low microbial counts may be attributed to cooking turkey rolls to an end point temperature of 77°C and storing chilled at 1°C before reheating the slices in a microwave oven.

Performance of Four Selective Media for Enumerating *Staphylococcus auerus* in Corned Beef and Cheese, K. Rayman, N. Malik and G. Jarvis, Food Directorate, Health Protection Branch, Health and Welfare Canada, Tunney's Pasture, Ottawa, Ontario, Canada K1A 0L2

J. Food Prot. 51:87-88

The performance of four selective media for enumerating *Staphylococcus aureus* in artificially contaminated samples of corned beef was strain-dependent. Baird-Parker (BP), Kranep (KR), Mannitol Salt (MS) and Staphylococcus medium 110 (S110) performed equally well in enumerating an enterotoxin A producing strain, but KR and BP were significantly better than S110 in enumerating an enterotoxin D producing strain of *S. aureus*. In naturally contaminated cheese samples which abound with competing microorganisms, BP performed significantly better than the other three media.

Evaluation of Three Different Cleaners Recommended for Ultrafiltration Systems by Direct Observations of Commercial-Scale Spiral-Wound Ultrafiltration Membranes, K. E. Smith and R. L. Bradley, Jr., Department of Food Science, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 51:89-104

Efficacy of cleaners designed for use with ultrafiltration systems was determined by microbiological evaluation and through visual inspection using scanning electron microscopy. The ultrafiltration system containing two commercial-scale, polysulfone membranes was soiled with sweet whey (40°C) then rinsed with water and membranes were removed. One half of each membrane was soaked for 2 h at 38°C in one of the following solutions: control (no soaking), acid cleaner (pH 2.5), enzyme-based cleaner (pH 11.5) and chlorinated alkaline cleaner (pH 11.5). The membranes were repositioned in the ultrafiltration unit, rinsed with water, then removed and unwound for analysis. Sections of membrane, retentate spacer and permeate mesh were aseptically removed for enumeration of microorganisms remaining and for examination by scanning electron microscopy. Membranes cleaned with chlorinated alkaline cleaner averaged 2×10^3 CFU/50 cm^2, enzyme-based cleaner 6×10^6/CFU, acid anionic cleaner 1×10^7 CFU and the control 5×10^7 CFU. Scanning electron microscopy found soil and microorganisms present on all membrane materials exposed to all three cleaners.

Effects of Antioxidants on the Retail Appearance and Display-Life of Frozen Bacon, L. E. Jeremiah, Red Meat and Beef Production Section, Agriculture Canada Research Station, Lacombe, Alberta, T0C 1S0, Canada

J. Food Prot. 51:105-109

The efficacy of three antioxidants and a reductant for preventing deterioration in factors contributing to the retail acceptability of bacon slices during frozen storage and simulated retail display was examined. The antioxidants [butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), and propyl gallate (PG) and the reductant [ascorbic acid (AA)] were incorporated into a dry sugar bacon cure alone or in combination. Composite results indicated that incorporation of the formulations evaluated into dry sugar bacon cures did not appear to be practical for either extending the frozen storability or retail display-life of frozen and thawed bacon from an appearance aspect. However, incorporation of BHA and BHT in combination extended the retail display life of fresh bacon slices by approximately 3.5 d, based upon regression analysis.

Enhanced Recovery of *Plesiomonas shigelloides* following an Enrichment Technique, Susan M. Freund, John A. Koburger and Cheng-I Wei, Food Science and Human Nutrition Department, University of Florida, Gainesville, Florida 32611

J. Food Prot. 51:110-112

Enrichment techniques using five broths (gram-negative broth, alkaline peptone water, tetrathionate broth without iodine and two *Plesiomonas* broths) were compared to direct plating methods using freshwater samples to determine their ability to increase the isolation rate of *Plesiomonas shigelloides*, a suspected food and waterborne pathogen. Tetrathionate broth consistently gave significantly ($p<0.05$) greater recovery of *P. shigelloides* than the other four broths tested as well as by direct plating. Incubation of the enrichment broths at 40°C also resulted in significantly higher recovery of *Plesiomonas* than at 35°C. It is therefore suggested that for routine monitoring of *P. shigelloides*, tetrathionate broth incubated at 40°C be used for enrichment before plating.

Effects of Electrical Stimulation and Kidney-Pelvic Fat Removal Before Chillng on Microbial Quality of Beef Tenderloins, E. Connie Grimes, William R. Jones, Dale L. Huffman and Dennis N. Marple, Department of Animal and Dairy Sciences, Alabama Agricultural Experiment Station, Auburn University, Auburn University, Alabama 36849

J. Food Prot. 51:113-116

Twenty-four steers (435-567 kg) were used to study the effects of electrical stimulation (50 V for 120 s) and of kidney-pelvic fat removal before chilling (3-4°C) on microbial populations of beef tenderloins on days 1, 4 and 7 post-mortem. Kidney-pelvic fat was stripped from one side of each carcass; the other side remained intact for later fat removal. On each respective chill-day, kidney-pelvic fat was aseptically removed from intact sides, tenderloins were swabbed at two anatomically referenced locations (3rd and 5th lumbar vertebra) and microbial load was determined. The statistical model for data analysis included the effects of electrical stimulation, chill-day, animal within chill-day X stimulation, fat removal, location, and all main effect interactions. Removal of kidney-pelvic fat before chilling resulted in a significantly higher bacterial load on the surface of exposed tenderloins after 24 h of chill. Electrical stimulation produced significantly lower bacterial counts for fat-intact surfaces on chill-day 7 and for fat-removed surfaces on chill-day 4. Kidney-pelvic fat removal allowed for significantly higher bacterial counts on the tail portion of tenderloins (3rd lumbar vertebra) for surfaces from non-stimulated carcasses than the butt portion (5th lumbar vertebra). Mean bacterial counts from electrically stimulated carcasses at the fifth and third lumbar vertebra locations did not differ ($P>.10$) between fat treatments.

Effects of Dietary *Trans* Fatty Acids on Mutagenesis of Known Carcinogens, Marianne Schaub and Nancy R. Green, Department of Nutrition and Food Science, Florida State University, Tallahassee, Florida 32306

J. Food Prot. 51:117-120

The metabolic activating potential of liver homogenates from animals fed a diet containing 46.6% *trans* fatty acids or a diet containing less than .1% *trans* fatty acids was compared in the Ames assay with 2-aminofluorene (AF), benzo(a)pyrene (BP), and dimethylbenz(a)anthracene (DMBA). The control fat had a similar fatty acid composition only consisting of *cis* fatty acid (*cis* fats). Since both the *cis* and *trans* fats contained moderate levels of saturated fatty acids, a comparison was made between these two fats and corn oil. All three fats were incorporated into high fat, 20%, and low fat, 5%, diets and fed to male Sprague-Dawley rats for three weeks. Although the mutagenic potentials of AF and BP increased with increasing mutagen concentration and with increasing level of dietary fat, there was no consistent difference in mutagenic potential between the *cis* and *trans* fats. DMBA was mutagenic only at the two highest concentrations with livers from corn oil-fed rats. The mutagenic activating potential of S-9 from animals fed *trans* fat diets generally was similar to that of animals fed *cis* fat diets, but did not follow the trend of animals fed corn oil diets. Thus the amount and/or type of polyunsaturated fatty acids (essential fatty acids) present in the diet may be key factors in evaluating the enhancement of mutagenic activity of DMBA by dietary fat.

Saprophytic and Pathogenic Bacteria Levels in Turkish Soundjouks Manufactured in Erzurum, Turkey, H. Y. Gokalp, H. Yetim, M. Kaya and H. W. Ockerman, Department of Animal Science, The Ohio State University, 2029 Fyffe Road, Columbus, Ohio 43210-1095

J. Food Prot. 51:121-125

In Turkey, spicy, typically dry, fermented sausage (soudjouk) is one of the most popular processed meat products. In this study, 42 soudjouk samples were collected from the eight manufacturers in Erzurum, Turkey. These samples were evaluated for aerobic plate count (APC) at 37 and 25°C, psychrotrophic, coliform, *Escherichia coli*, and coagulase-positive *Staphylococcus aureus* counts and presence of *Salmonella* and *Shigella* spp. Generally, all the samples had very high counts of most of the bacteria enumerated. In two samples of the 42, *Shigella* spp. was found and one of them was *Shigella boydii*. None of the samples yielded *Salmonella* spp.

Ineffectiveness of Three Added Mold Species to Enhance the Rapid Aging of Beef, A. W. Kotula, S. G. Campano and D. M. Kinsman, Meat Science Research Laboratory, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland 20705

J. Food Prot. 51:126-129

Paired beef short loin sections from four U.S. Good and four U.S. Choice carcasses were used to determine the effects of the mold *Thamnidium elegans* on cooking and palatability characteristics. The longissimus muscle from each section was treated with mold spores and aged for 2 or 4 d or left untreated and aged for 2 or 14 d at 4°C. Sensory panel ratings revealed that mold treatment had no significant effect ($P<0.05$) on tenderness, juiciness, detectable connective tissue amount, or beef flavor intensity of the loins aged for 2 d. Thawing loss, cooking loss, cooking time, Instron shear force and work force values were not affected ($P>0.05$) by treatment with *T. elegans*. Aging untreated meat for 14 d significantly improved ($P<0.05$) sensory panel ratings for tenderness. No significant difference ($P>0.05$) was noted between mold treatments (2 and 4 d) when compared to the 4-d untreated aging, for beef flavor intensity, detectable connective tissue amount, shear and work force values. Significant grade effects wee noted with U.S. Choice samples having higher ($P<0.05$) sensory panel ratings for juiciness and beef flavor intensity, and decreased ($P<0.05$) ratings for connective tissue amount when compared with U.S. Good samples. The data indicate that treatment of sub-primal cuts with *T. elegans* has little or no effect on palatability and cooking characteristics.

***Campylobacter* Species: Considerations For Controlling A Foodborne Pathogen,** Don A. Franco, U.S. Department of Agriculture, Food Safety and Inspection Service, Meat and Poultry Inspection Program, Regional Operations, Room 4864-5, Washington, D.C. 20250

J. Food Prot. 51:130-138

Studies in the past decade have demonstrated with convincing evidence that *Campylobacter jejuni* is an important enteric pathogen of man. The wide distribution of the organism in animal reservoirs, and in foods of animal origin makes control of this foodborne microbe a formidable undertaking. Although the vehicles that are incriminated as sources of infection are broad, most illnesses occur sporadically without a finite determination as to the mode of transmission. The problem is further amplified because an infectious zoonotic disease like *Campylobacter* enteritis not only occurs frequently, but is almost always unsuspected, and too often unrecognized. Factors that perpetuate the Campylobacter problem are spreading Campylobacter during animal slaughtering and processing, concentrating animals in feedlots and brooding houses, poor food handling and storage practices, environmental contamination from animal wastes and other sources. Campylobacteriosis is a universal problem and an immense challenge to all who work in the arena of food protection. The solutions for control and prevention are demanding. In addition to more needed research, close national and international cooperation is a mandate if progress will be realized in the long-term minimization, and eventual elimination of this pathogen.

Selective Enterotoxin Production by a *Staphylococcus aureus* Strain Implicated in a Foodborne Outbreak, Raymond G. Bryant, Josephine Jarvis and Gerry Guibert, California Department of Health Services, Microbial Diseases Laboratory, 2151 Berkely Way, Room 330, Berkeley, California 94704 and Sacramento County Public Health Laboratory, 4611 Broadway, Sacramento, California 95820

J. Food Prot. 51:139-140

More than 80 of 230 participants (>34.7%) at a literary conference became ill with acute gastroenteritis 3 to 14 h after a catered meal. Attack rate data implicated cheese tortellini as the suspect food ($p=0.0087$). Selective plating of partially prepared and finished tortellini produced *Staphylcoccus aureus* counts of 6.0×10^7 and 1.0×10^6 CFU per gram, respectively. Enterotoxin, phage typing, antibiotic sensitivity testing, and other biotyping studies were applied to *S. aureus* isolates from the suspect food and the single food-handler involved. All isolates reacted identically by all criteria, and each isolate produced both type A and C staphylococcal enterotoxins. Type A enterotoxin (0.90 ug/100 g) alone was detected in samples of the suspect food. The production of type C enterotoxin by the outbreak strain was delayed approximately 4 h relative to production of enterotoxin A when grown in Heart Infusion broth (pH 5.5). This study serves as an example of selective enterotoxin production by *S. aureus* in suspect foods which can be misleading to outbreak investigators.

Thermal Destruction of *Escherichia coli* and *Klebsiella pneumoniae* in Human Milk, Jeffrey N. Morgan, F. Jane Lin, Ronald R. Eitenmiller, Harold M. Barnhart and Romeo T. Toledeo, Food Science and Technology Department, University of Georgia, Athens, Georgia 30602

J. Food Prot. 51:141-145

A continuous flow high-temperature short-time pasteurization system was used to determine kinetic parameters (D- and z-values) for thermal destruction of the bacterial pathogens, *Escherichia coli* and *Klebsiella pneumoniae*, in mature human milk. D- and z-values of each bacterium were determined from data on survivors enumerated on both selective media, Violet Red Bile agar or MacConkey's, and on a non-selective medium, nutrient agar (NA). For *E. coli*, D-values were determined at 58, 60, 62 and 64°C. The predicted value of D at 60°C is 31.5 s. The z-value for *E. coli* is 3.2°C. D-values for *K. pneumoniae* were determined at 52, 56 and 58°C. Based on these data the predicted value of D at 60°C is 1.3 s. The z-value for *K. pneumoniae*, is 2.8°C. For both *E. coli* and *K. pneumoniae*, counts on NA tend to be higher than on selective media. This is undoubtedly due to the inhibitory nature of the selective media. This also suggests that some degree of thermal injury may occur for each organism.

Analysis of Sulfites in Shrimp Using Rapid Distillation Followed by Redox Titration, Marian V. Simpson, W. Steven Otwell, Maurice R. marshall and John A. Cornell, Food Science and Human Nutrition Department and Department of Statistics, University of Florida, IFAS, Gainesville, Florida 32611

J. Food Prot. 51:146-147

The use of rapid steam distillation followed by redox iodine titration provides a rapid and accurate determination of total sufite residual in shrimp. Values obtained for sulfite-treated shrimp using the rapid distillation method gave comparable results to those of the officially recognized Monier-Williams method. Values fcr the rapid distillation method ranged from 6 to 212 ppm while those of the Monier-Williams procedure ranged from 6 to 241 ppm for untreated and treated shrimps, respectively. Statistical analysis using two-sample Student's t-test indicated that there were no significant differences ($p>0.05$) for residual levels below 100 ppm but the values obtained by the rapid distillation method and the Monier-Williams procedure were significantly different ($p<0.05$) at concentrations near and above 100 ppm.

and Technology, University of Nebraska, Lincoln, Nebraska 68583-0919

J. Food Prot. 51:148-153

Potassium sorbate at 500, 1000 and 1500 μg/ml delayed initiation of growth and sporulation by *Aspergillus ochraceus* 0L24 in yeast extract-sucrose (YES) broth at 15°C, 25°C and 35°C. At 25°C, sporulation and growth were more rapid. Potassium sorbate at 500 μg/ml resulted in an increase in mycelial weight, but at 1000 and 1500 μg/ml the mycelial mass was decreased. Potassium sorbate also reduced or prevented production of penicillic acid, especially at 15 and 35°C. Natamycin at 1, 10 and 20 μg/ml delayed initiation of growth and sporulation in YES broth. At 20 μg of natamycin/ml, mycelial growth was inhibited by 80 to 100% and penicillic acid production was completely inhibited. Growth and penicillic acid production on olive paste by *A.ochraceus* in the presence of potassium sorbate and natamycin showed that sorbate at 1500, 3000, and 6000 μg/g delayed growth and sporulation. Also, the extent of growth was greatly reduced by 3000 and 6000 μg of potassium sorbate/g. Penicillic acid production was reduced over the control at all the potassium sorbate levels. At 6000 μg of sorbate/g, no penicillic acid was detected after 21 d of incubation. Natamycin at 85, 175, and 350 μg/g delayed growth and sporulation by *A. ochraceus* on olive paste. Increasing levels of

Calendar

1988

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

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

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

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

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

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

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

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

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

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

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

March 9-11, AMERICAN BUTTER INSTITUTE - NATIONAL CHEESE INSTITUTE ANNUAL MEETING, to be held at the Hyatt Regency Washington on Capitol Hill, Washington, DC. For more information, contact: the ABI-NCI, 699 Prince Street, Suite 102, Alexandria, VA 22314. 703-549-2230.

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

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

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

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

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

March 27-30, 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 DFISA offices at: 301-984-1444.

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

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

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

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

April 13, 38th ANNUAL UNIVERSITY OF MARYLAND ICE CREAM CONFERENCE, for more information, contact: Dr. James T. Marshall, Department of Animal Sciences, University of Maryland, College Park, MD 20742. 301-454-7843.

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

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

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

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

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

search, University of Wisconsin-Madison, 1605 Linden Drive, Madison, WI 53706. 608-262-5970.

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

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

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

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

May, RAPID METHODS AND AUTOMATION IN MICROBIOLOGY will be held at Kansas State University. The workshop is certified by American Society for Microbiology for Continuing Education Credits. Contact Dr. Daniel Y.C. Fung, Call Hall, Kansas State University, Manhattan, KS 66504. Telephone: 913-532-5654.

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

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

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

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

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

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

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

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

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ne Cow, One Cow, that father bought for two zuzim, One Cow, One Cow,

And the bug came
and infected the cow
that father bought
for two zuzim.
ONE COW, ONE COW.

And the tetracycline came
and killed the bug
that infected the cow
that my father bought
for two zuzim.

And the child came
and drank the milk
that contained the tet'
that killed the bug
that infected the cow
that my father bought
for two zuzim.

And the test was needed
to save the child
that drank the milk
that contained the tet'
that killed the bug
that infected the cow
that my father bought
for two zuzim.

And Stanley came
and invented the test
that saved the child
that drank the milk
that contained the tet'
that killed the bug
that infected the cow
that my father bought
for two zuzim.
ONE COW, ONE COW,